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Sustainable Supply Chain Management Strategy Influence on Supply Chain Management Functions in the Oil and Gas Distribution Industry

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Abstract: This paper analyses the influence of Sustainable Supply Chain Management strategies—Supplier Selection, Product Stewardship and Logistics Management—on Supply Chain Management functions—Planning, Execution, Coordination and Collaboration in the oil and gas distribution industry. Using multiple regression analyses, we performed the study on 79 companies from Romania and the Republic of Moldova operating in the oil and gas distribution industry. We concluded that Sustainable Supply Chain Management strategies have a positive and significant influence on Supply Chain Management functions, both overall and on each of the functions considered in the study. Overall, the findings of this study can be used by companies operating in oil and gas distribution to design Sustainable Supply Chain Management strategies to better address the requirements for more environmentally and socially responsible activities in their supply chains and to optimize their Supply Chain Management to better cope with Sustainable Supply Chain Management requirements and expectations.

Keywords: supply chain; sustainable supply chain management; oil and gas distribution

1. Introduction

The oil industry plays a central role in the modern economy and society [1,2]. However, intensive and extensive exploitation of oil sources often leads to environmental degradation, thus raising sustainability concerns. Despite the importance of the oil industry, the literature largely neglects the sustainability related challenges in the management of supply chains [3].

Sustainability involves an integrated approach of economic, social and environmental dimensions of a business [4,5]. Since business success depends to a larger extent on efficient Supply Chain Management (SCM) [6,7], it is therefore critical that sustainability considerations be integrated in the management of supply chain functions [8].

Even though Sustainable Supply Chain Management (SSCM) benefits from extensive research inputs [9–12], actual implementation has proven difficult [13], while extensive research is required in order to fully understand its impact on supply chains [14–17]. This provided the rationale of this study: to analyze the possible impact induced by sustainable approach of Supply Chain Management upon Supply Chain Management functions. Since the relationships between SCM functions and SSCM strategies in the oil industry are not analysed in the literature, this contributes to literature

development on the topic. Accordingly, this study aims to contribute to understanding the impact of Sustainable Supply Chain Management strategies—Supplier Selection, Product Stewardship and Logistics Management—on SCM functions—Planning, Execution, Coordination and Collaboration.

The paper is organized as follows: Section 2 presents existing literature related to SSCM strategies and the SCM functions; Section 3 presents the conceptual research model; Section 4 describes the research methodology; Section 5 details the results; and Section 6 is dedicated to conclusions by highlighting the main findings, shortcomings and future research directions.

2. Literature Review

Sustainable Supply Chain Management represents the systemic integration of critical business processes which enables companies and their supply chains to fulfill economic, environmental and social goals [10]. As such, companies implementing it are able to reach short term economic goals and become proactive in addressing supply chain activities long term environmental and social expectations.

The oil industry is important in terms of sustainability because its products are widely used in economic and social activities. SSCM implementation may reduce the negative impacts of operations. Although SCM as a field reached maturity, research on SSCM in the oil industry is still in its infancy. The few existing studies on the topic focused on supply chain performance improvement through innovation strategies and open innovation programs [18]: suppliers development through management systems able to identify and manage the environmental and social risks involved in their operations [17]; developing a Green SCM framework to assess environmental sustainability in oil refinery operations [19]; assessing the impacts on environment of decommissioning offshore oil platforms [20]; challenges in integrating corporate strategic topic in SCM in oil companies and their suppliers [21]; and close cooperation of oil companies with suppliers to improve the environmental performance of logistics operations [22].

2.1. Sustainable Supply Chain Management Strategies

SSCM strategy was considered on two levels: first as a singular concept, regardless of various specific strategies which are employed by oil distribution companies to support SSCM. In this case, SSCM strategy was composed of all items comprising the specific strategies; second, as specific strategies—Supplier Selection, Product Stewardship and Logistics Management [9].

a. Supplier Selection Strategy

Oil and gas distribution companies are confronted with a wide range of economic, environmental and social challenges in the management of a supply chain [23,24]. This is why SSCM in the oil industry has to cope with a broad variety of issues, ranging from the replacement of pollution effects, excessive energy and material consumption to biodiversity protection [25]. Instead of managing each potential issue separately, oil companies choose to conform to norms or to apply commonly accepted standards [26].

Oil and gas distribution companies may assess the environmental or social impact of suppliers by using codes of conduct, norms and standards and certification which authenticate the compliance [27]. All of these constitute criteria for performance improvements along the supply chain.

Since oil and gas distribution companies are governing their supply chains [28] they also evaluate their suppliers by establishing minimum requirements and standards. Therefore, suppliers can provide self-assessments on environmental or social requirements, which may be encouraged by providing incentives [29,30].

b. Product Stewardship Strategy

Product Stewardship strategy includes many aspects of sustainability such as reverse logistics and closed loop supply chains [31,32]. Lane and Watson (2012) [33] argue that Product Stewardship strategy is a fast expanding area that have an increasingly important role for conserving resources and is creating

a differentiation advantage for a firm [34]. Various scholars [35,36] find that stewardship related to environmental management is a strategy increasingly used in relation to material responsibility. The concept of Product stewardship evolved from responsible management of hazardous wastes towards a broader focus on resource conservation. Product Stewardship approaches have changed the relationship between the societal and material worlds [37] and new industrial sectors have arisen from these initiatives and resulted in the formation of partnerships [38]. The ultimate goal of engaging in Product Stewardship is to minimize the environmental impacts of the products through the life cycle [39].

c. Logistics Management

Grant et al. (2013) [40] argue that companies have come to realize that logistics services and expertise are the key elements in providing sustainable solutions. The development towards logistics as a sustainability enhancer comes both from suppliers rethinking their offering and from companies adjusting their view about their own logistics processes, increasingly regarded as strategic levers influencing their market position [41]. The trend towards sustainable logistics brings forward an increased level of cooperation among all actors involved in the supply chain, as they have to comply with more rigorous standards, agree on price tags and support binding regulations.

Grant et al. (2006) [42] argue that consumers have the power to enforce change through their buying decisions. However, they will also demand more transparency, especially when paying a premium for sustainable solutions, requesting comprehensive carbon accounting, controlling and management systems, standardized CO₂ labelling, etc. Currently, this transparency is provided mostly for green products within companies and is determined by promoting international standards that provide transparency regarding CO₂ emissions. Common standards and rules that apply to all actors in the business will therefore need to be introduced [40]. At the start, the industry will see a drive to implement accurate but feasible standards for CO₂ accounting and reporting across the sector.

2.2. Supply Chain Management Functions

A range of SCM functions exist, emphasizing different perspectives [43]. Hassini et al. [44] consider that the essential supply chain functions are planning and execution while other scholars [45,46] argue that SSCM requires a wider focus by extending towards coordination and collaboration. As a consequence, four SCM functions are considered in this paper: Planning, Execution, Coordination and Collaboration.

Developing a SSCM requires a focus on the supply chain and the active participation of supply chain members [47–49] and involves collaboration. Efficient planning and collaboration has been found to have a positive impact for supply chains on areas like waste elimination, material recycling or energy saving [50,51], the development of innovative environmental improvement processes [52,53] and the environmental impact information on purchased materials [54]. On the other hand, poor supply chain communication leads to insufficient information transfer [55] and affects the goal alignment [56], which is required for implementing environmental sustainability in supply chains [57].

Supply chain collaboration influences supply chain sustainability through its effect on knowledge transfer and problem-solving associated with supply chain members [58,59]. For instance, codes of conduct are used to establish principles in supply chains and require communication to enforce those standards throughout the supply chain [60,61]. Hence, the communication may directly affect the social sustainability performance of the supply chain.

a. Planning

Supply chains in oil and gas distribution industry are complex, involving large numbers of suppliers and customers [62]. Hence, the planning process is complex and requires long-term demand, capacity, network and distribution planning [63], while purchasing, distribution and demand

fulfillment usually requires a medium to short-term perspective [64]. Adequate planning for setting up a sustainable supply chain is critical and a comprehensive long-term strategy is required [10].

b. Execution

Execution function includes managing orders, inventories, material flows and delivery, as well as warehousing and transportation [28]. Execution enables decisions regarding procurement, production, distribution and sales made during planning to be operationalized [64]. Efficient execution is highly dependent on supply chain planning, but also on coordination and collaboration [46].

c. Coordination

Coordination function involves monitoring of operations, analysis and process optimization in supply chain processes such as procurement and distribution [65]. SCM is accomplished through supply chain processes that cut across functional boundaries [66]. SSCM requires improved coordination between all supply chain stakeholders to be able to ascertain orientation toward cost or profit, or compliance with regulations [67]. As a consequence, Coordination activities affect supply chain sustainability by developing SSCM in the organization [68].

d. Collaboration

In the last years, a shift in academic discourse emerged towards supply chain collaboration and the importance of a cross-organisational focus [69]. Extending collaboration across organisational boundaries is a challenging and complex endeavour [65]. The findings emphasise the importance of developing supply chain visibility, trust, a common strategy and vision, effective change management processes as well as active relationship management [70].

Communication may be improved by information sharing and regular updates between supply chain members and by establishing a shared vision [71]. Internal relationship management have been associated with waste elimination and the reduction, prevention and control of pollution [72]. External relationship management associated with stakeholders regards outside actors such as governments, NGOs or customers which assert sustainability pressure on supply chains through legal demands, regulations, and by shaping public opinion [28] making external relationship management instrumental to SSCM.

3. The Conceptual Model

a. Supplier Selection Strategy

In this study, Supplier Selection strategy envisages items like sustainability requirements, environmental certification, code of business conduct, compliance with contract and quality standards compliance, technical capability and reputation or long term relationship (see Table 1).

Table 1. *Supplier Selection* strategy items.

Item	Description	Measurement
Sustainability requirements	The company takes into account, when choosing a supplier, its ability to meet sustainability requirements	1 = Very low to 5 = Very high
Environmental certification	The company takes into account, when choosing a supplier, its environmental certification	1 = Very low to 5 = Very high
Code of business conduct	The company takes into account, when choosing a supplier, its congruence with the code of business conduct	1 = Very low to 5 = Very high
Contract compliance	The company takes into account, when choosing a supplier, its commitment to contract requirements	1 = Very low to 5 = Very high
Quality standards compliance	The company takes into account, when choosing a supplier, its compliance with quality of service/product standards and regulations	1 = Very low to 5 = Very high

Table 1. *Cont.*

Item	Description	Measurement
Sustainable oriented technical capability	The company takes into account, when choosing a supplier, its sustainable oriented technical capability	1 = Very low to 5 = Very high
Reputation	The company takes into account, when choosing a supplier, its reputation	1 = Very low to 5 = Very high
Long term relationship	The company takes into account, when choosing a supplier, the likelihood of long term relationship	1 = Very low to 5 = Very high

b. Product Stewardship Strategy

Product Stewardship strategy comprises, in this study, items related to safety warning compliance, supplier involvement, safety compliance, environment-friendly alternative materials or safe and ecological packaging (see Table 2).

Table 2. Product Stewardship strategy items.

Item	Description	Measurement
Safety warning compliance	The company takes into account, when choosing a supplier, that its products have product safety warning to comply with existing regulations	1 = Very low to 5 = Very high
Suppliers involvement	The company takes into account, when choosing a supplier, its involvement during new product/service development	1 = Very low to 5 = Very high
Safety compliance	The company takes into account, when choosing a supplier, its safety legislation compliance and history	1 = Very low to 5 = Very high
Environment-friendly alternative materials	The company takes into account, when choosing a supplier, environment-friendly alternative materials whenever possible	1 = Very low to 5 = Very high
Safe and ecological packaging	The company takes into account, when choosing a supplier, that packaging is safe and ecological	1 = Very low to 5 = Very high

c. Logistics Management

Logistics Management strategy comprises items like recycle/reuse containers, use of fuel efficient vehicles, use of recyclable packaging systems, environmental-friendly transport mode, transport safety training, safety and health risks of transport mode and inspection and maintenance of vehicles (see Table 3).

Table 3. Logistics Management strategy items.

Item	Description	Measurement
Focus on recycle/reuse containers	The company encourage suppliers to focus on recycle/reuse containers	1 = Very low to 5 = Very high
Use of fuel efficient vehicles	The company supports use of fuel efficient vehicles	1 = Very low to 5 = Very high
Use of recyclable packaging systems	The company encourage suppliers to use recyclable packaging systems	1 = Very low to 5 = Very high
Preference for environmental-friendly transport modes	The company prefers environmental-friendly transport modes	1 = Very low to 5 = Very high
Transport safety training focus	The company encourages suppliers to implement transport safety training	1 = Very low to 5 = Very high
Safety & health risks of transport mode	The company takes into account the safety & health risks of transport mode	1 = Very low to 5 = Very high
Responsible inspection & maintenance of vehicles	The company implements inspection & maintenance of vehicles on a responsible manner	1 = Very low to 5 = Very high

Supply Chain Management Functions

a. Planning

Planning function comprises items like commitment, long-term focus on sustainability goals, focus on SSCM goals, sustainable investments, incentives for SSCM, and research in sustainability of supply chains, transport and warehousing planning and renewability of resources (see Table 4).

Table 4. Planning items.

Item	Description	Measurement
Commitment	Top management supports SSCM implementation in the supply chain	1 = Very low to 5 = Very high
Long-term focus on sustainability goals	Sustainability is included in the company's long-term strategy	1 = Very low to 5 = Very high
Focus on SSCM competitive advantages	The company is committed to achieve sustainable competitive advantages	1 = Very low to 5 = Very high
Sustainable investments	Company's investment decisions are done by considering the economic, social and environmental effects	1 = Very low to 5 = Very high
Incentives for SSCM	Incentives for SSCM implementation are included in company's plans	1 = Very low to 5 = Very high
Research in sustainability of supply chains	The company is performing research into effects of its sustainability efforts in its supply chains	1 = Very low to 5 = Very high
Sustainability oriented transport planning	The company is planning transportation modes by considering sustainability	1 = Very low to 5 = Very high
Sustainability oriented warehousing planning	The company is planning locations for warehouses by considering sustainability	1 = Very low to 5 = Very high
Renewability of resources	In the company's planning use of renewable materials and energy is considered	1 = Very low to 5 = Very high

b. Execution

In this paper, Execution function comprises operational accuracy focus, customer satisfaction focus, efficiency in transportation, efficiency in warehousing, measurement and performance tracking, health and safety measures, waste and recycling management and maintenance of equipment (see Table 5).

Table 5. Execution items.

Item	Description	Measurement
Operational accuracy	Company is considering timeliness and correctness in executing supply chain activities	1 = Very low to 5 = Very high
Customer satisfaction focus	Company considers meeting expectations of internal/external customers as critical	1 = Very low to 5 = Very high
Efficiency in transportation	Company is considering methods to assess efficiency in transportation in the supply chain	1 = Very low to 5 = Very high
Efficiency in warehousing	Company is considering methods to assess efficiency in warehousing	1 = Very low to 5 = Very high
Sustainability performance tracking	Company is using tools for tracking sustainability performance in its supply chain	1 = Very low to 5 = Very high
Health and safety implementation	Company monitors accident rates and take preventive measures to avoid accidents	1 = Very low to 5 = Very high
Waste and recycling management focus	Company is implementing waste and recycling management actions in its supply chain	1 = Very low to 5 = Very high
Sustainable maintenance of equipment	Company is approaching vehicles and machinery maintenance in a sustainable manner	1 = Very low to 5 = Very high

c. Coordination

Coordination function is described in the study using the following items: Supply chain alignment, supply chain costs focus, supply chain profits focus, compliance, contribution for local community, cost allocations for unaccounted supply chain impacts and empowerment (see Table 6).

Table 6. Coordination items.

Item	Description	Measurement
Supply chain alignment	Company is aware of the degree of synchronisation of all member of its supply chain	1 = Very low to 5 = Very high
Supply chain costs focus	Company is considering cost allocations for operations in its supply chain	1 = Very low to 5 = Very high
Supply chain profits focus	Company considers revenue per unit of output as critical in the supply chain members' assessment	1 = Very low to 5 = Very high
Compliance with regulations	Company is monitoring the degree of compliance with government or industry regulations of all members of its supply chain	1 = Very low to 5 = Very high
Contributions for local community	Company considers benefits provided for local communities where operations are taking place	1 = Very low to 5 = Very high
Risk mitigation	Company is allocating resources for negative environmental impacts of its supply chain	1 = Very low to 5 = Very high
Empowerment	Company is considering training and support for stakeholders	1 = Very low to 5 = Very high

d. Collaboration

The following items were considered in the paper to describe Collaboration function: information sharing, process integration, attitude towards SSCM, external relationship management, internal relationship management and shared vision (see Table 7).

Table 7. Collaboration items.

Item	Description	Measurement
Information sharing	Company is encouraging information sharing and regular updates among its supply chain members	1 = Very low to 5 = Very high
Process integration	Company is encouraging extensive integration of processes among its supply chain members	1 = Very low to 5 = Very high
Attitude towards SSCM	Company is encouraging an increased awareness of SSCM values and aims among its supply chain members	1 = Very low to 5 = Very high
External relationship management	Company is performing sustainability assessment for external stakeholders	1 = Very low to 5 = Very high
Internal relationship management	Company is performing sustainability assessment for internal stakeholders	1 = Very low to 5 = Very high
Shared vision	Company is encouraging awareness of sustainability values and strategy	1 = Very low to 5 = Very high

The conceptual model is presented below (see Figure 1).

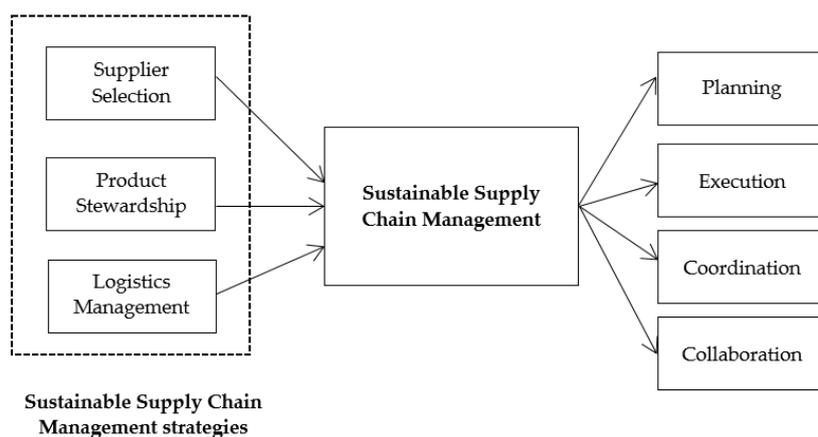


Figure 1. Conceptual research model.

4. Materials and Methods

For this study, a questionnaire was developed, based on the literature review as well as input from academia and experts from companies operating in the oil and gas distribution industry.

The survey population consisted of companies operating in oil and gas distribution industry from Romania and Republic of Moldova. Top executives were investigated, such as Chief Executive Officers, Chief Procurement Officers or Chief Financial Officers.

The questionnaire was mailed to 255 companies, for Romanian based companies from a database used for a previously published study. For Republic of Moldova the authors used contact data made available by Romanian companies which accepted to participate in the study, using snowball sampling. We received 83 answers (32.5% response rate, with 2 one-month apart reminders), out of which 79 were valid (see Table 8), a percentage in line with other studies in the industry [73,74]. To reduce the bias of self-reporting, a detailed description of each item was included as appendix to the questionnaire. At the same time, the authors compared the answers from companies in Romania with those received from companies in Republic of Moldova and found no significant differences between them.

Table 8. The sample structure.

Characteristics (Control Variables) $n = 79$		Number of Surveyed Companies	Share in the Sample
Age (years)	<5	1	1.27%
	5–10 years	12	15.19%
	10–15	26	32.91%
	15–20	27	34.18%
	>20	13	16.46%
Size (no. of employees)	<50	3	3.80%
	50–249	32	40.51%
	>250	44	55.70%
Characteristics (Descriptive, not control variables)			
Country	Romania	68	86.07%
	Republic of Moldova	11	13.93%

Exploratory Factor Analysis (EFA) was used to measure both SCM functions and SSCM strategies by using the principal component method. In order to determine the factors retained for analysis, the factors with eigenvalues higher than 1 were selected [75].

Tables 9 and 10 show the results of the factor analysis.

For the SSCM strategies items (see Table 9), three factors were derived from the analysis. The three factors explain, respectively, 71.9% and 76.8% of the variance in their measurement items, well above the threshold of 60% [75].

As for the SCM functions items (see Table 10), the factor analysis reveals the presence of four factors as proposed in our framework. No items were removed.

For the reliability test, the Cronbach's alpha values for all factors are above 0.70 (see Table 11) [76], with the correlations between independent variables relatively weak, an indication of low multicollinearity.

Table 9. Results of Exploratory Factor Analysis (EFA) for Sustainable Supply Chain Management (SSCM) strategies.

SSCM Strategy					
Supplier Selection		Product Stewardship		Logistics Management	
Items	Factor Loading	Items	Factor Loading	Items	Factor Loading
Sustainability requirements	0.86	Safety warning compliance	0.77	Recycle/reuse containers	0.76
Environmental certification	0.82	Involvement	0.76	Use of fuel efficient vehicles	0.74
Code of business conduct	0.68	Safety legislation	0.75	Use of recyclable packaging systems	0.74
Contract compliance	0.55	Environment-friendly alternative materials	0.65	Preference for environmental-friendly transport mode	0.72
Quality of service/product	0.75	Safe and ecological packaging	0.63	Transport safety training	0.61
Technical capability	0.69			Safety & health risks of transport mode	0.85
Reputation	0.53			Inspection & maintenance of vehicles	0.83
Long term relationship	0.65				

Table 10. Results of EFA for Supply Chain Management (SCM) functions.

SCM Function			
Planning		Execution	
Item	Factor Loading	Item	Factor Loading
Commitment	0.87	Operational accuracy	0.81
Long-term focus on sustainability goals	0.81	Customer satisfaction focus	0.89
Focus on SSCM competitive advantages	0.79	Efficiency in transportation	0.76
Sustainable investments	0.74	Efficiency in warehousing	0.76
Incentives for SSCM	0.76	Sustainability performance tracking	0.74
Research in sustainability of supply chains	0.70	Health and safety implementation	0.71
Sustainability oriented transport planning	0.72	Waste and recycling management focus	0.71
Sustainability oriented warehousing planning	0.71	Sustainable maintenance of equipment	0.70
Renewability of resources	0.70		
Coordination		Collaboration	
Item	Factor Loading	Item	Factor Loading
Supply chain alignment	0.76	Information sharing	0.84
Supply chain costs focus	0.78	Process integration	0.85
Supply chain profits focus	0.71	Attitude towards SSCM	0.70
Compliance with regulations	0.88	External relationship management	0.79
Contributions for local community	0.72	Internal relationship management	0.86
Risk mitigation	0.80	Shared vision	0.71
Empowerment	0.71		

Table 11. Results of correlation analysis.

		Mean	SD	CA	SSCM Strategy			SCM Function				
					Supplier Selection	Product Stewardship	Logistics Management	Planning	Execution	Coordination	Collaboration	
SSCM Strategy	Supplier Selection	3.69	0.75	0.90	1							
	Product Stewardship	3.59	0.62	0.83	0.41 ***	1						
	Logistics Management	3.26	0.91	0.89	0.61 ***	0.34 **	1					
SCM Function	Planning	3.70	0.83	0.72	0.26 *	0.01	0.34 **	1				
	Execution	3.92	0.71	0.86	0.30 **	0.08	0.36 ***	0.46 ***	1			
	Coordination	3.07	1.03	0.92	0.61 ***	0.45 ***	0.78 **	0.13	0.20	1		
	Collaboration	3.18	0.49	0.72	0.47 ***	0.36 ***	0.48 ***	0.20	0.41 ***	0.54 ***	1	

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

5. Analysis and Discussion

A multiple regression analysis was conducted to understand the relationship between SSCM strategies and Supply Chain Management, considered as the sum of all functions. Two control variables were used to test the regression model, namely company size and company age (see Table 12).

Table 12. Regression results between SSCM strategy and Supply Chain Management.

Variables		Supply Chain Management (All SCM Functions)			
		Model 1	Model 2	Model 3	Model 4
SSCM Strategy	Supplier Selection	0.39 **	0.38 *	0.31 *	0.39 ***
	Product Stewardship	0.48 ***	0.40 ***	0.39 ***	0.41 ***
	Logistics Management	0.37 ***	0.37 ***	0.37 ***	0.37 ***
Control Variables					
	Size		0.04		0.02
	Age			0.08	0.15
Regression Results					
	F	41.16 ***	27.12 ***	28.25 ***	17.95 ***
	R ²	0.51	0.52	0.52	0.55
	Adjusted R ²	0.50	0.50	0.51	0.52

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

The first model tests the relationship between SSCM strategies and SCM as a whole, this means considering all the functions, without control variables.

The second model tests the relationship between SSCM strategies and SCM as a whole, with control variable Size included.

The third model tests the relationship between SSCM strategies and SCM as a whole, with control variable Age included.

The fourth model tests the relationship between SSCM strategies and SCM as a whole, with all control variables included.

All models are highly significant, with around half of the variation in the SCM functions can be explained by Supplier Selection, Product Stewardship and Logistics Management strategies. Overall, Product Stewardship has the most impact, while Logistics Management has a lesser impact overall.

Another multiple regression analysis was conducted to understand the relationship between each SSCM strategy and with each SCM function, without (a) and with (b) control variables included (see Table 13).

Table 13. Regression results between SSCM strategies and SCM functions.

Variables		SCM Function							
		Planning		Execution		Coordination		Collaboration	
		a	b	a	b	a	b	a	b
SSCM Strategy	Supplier Selection	0.37 **	0.39 ***	0.26	0.22	0.32 **	0.42 ***	0.51 ***	0.55 ***
	Product Stewardship	0.40 **	0.52 ***	0.23	0.20	0.36 **	0.44 ***	0.54 ***	0.58 ***
	Logistics Management	0.28 *	0.21	0.34 **	0.39 **	0.29	0.18	0.14	0.12
Control Variables									
	Size		0.11		0.19		0.16		0.12
	Age		0.26		0.23		0.26 *		0.00
Regression Results									
	F	23.95 ***	11.22 ***	14.84 ***	7.93 ***	15.61 ***	7.84 ***	22.33 ***	11.62 ***
	R ²	0.38	0.43	0.28	0.31	0.27	0.31	0.38	0.41
	Adjusted R ²	0.37	0.39	0.27	0.27	0.25	0.28	0.37	0.37

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

The models of all regression analyses, with and without control variables, are highly significant. About 35% of the variance in each SCM functions is explained by SSCM strategy.

Generally, we find Logistics Management strategy to influence more the Execution and Planning functions; Product Stewardship is more important for Planning, Coordination and Collaboration functions; overall, Execution functions seems least influenced by SSCM strategies, except Product Stewardship; Logistics Management strategy does not influence much Coordination and Collaboration.

6. Conclusions

This study seeks to understand the impact of SSCM strategies on SCM functions in companies operating in the oil and gas distribution industry. It explores the influence of three SSCM strategies—Supplier Selection, Product Stewardship and Logistics Management—on four SCM functions—Planning, Execution, Coordination and Collaboration. The main findings of our analyses are as follows.

The study proves that oil and gas companies' sustainability strategies in supply chains definitely impacts the way SCM functions are implemented in companies, both overall, if considering SCM as being comprised of all four functions described in the study, and separately, especially in terms of Planning and Collaboration. The conclusions had to consider the fact that SCM functions are actually interconnected, while SSCM strategies are not mutually exclusive.

We found out that Supplier Selection strategy is influencing the Planning function more than others in terms of sustainability requirements, by considering the ability to meet sustainability requirements of the supply chain. Of course, these requirements may be internal or external, still they exist and has to be incorporated in oil and gas distribution companies long and medium terms strategies and policies. The focus on long term relationships gets oil and gas companies, when choosing a supplier, to consider a more comprehensive set of factors and to be more willing to invest in them. Another influence regards environmental certification, an increasing number of companies paying attention to certification, which sometimes may be compulsory of specific markets, especially in Romania as a member of European Union. Last but not least, we found out that reputation influences Planning. A corollary of the previous items, the reputation of the supplier in terms of environmental compliance may prove decisive in setting up a long-term relationship.

Supplier Selection strategy impacts upon Execution function in terms of contract and quality standards compliance. As a consequence, oil and gas distribution companies have to continuously monitor and assess their supplier commitment to contract requirements and its compliance with quality of service/product standards and regulations. Another area of interest is suppliers' sustainable oriented technical capability—its capability to possess equipment and technologies.

In terms of Coordination and Collaboration functions, Supplier Selection strategy gives credit to the congruence of suppliers with the industry and oil and gas company code of business conduct.

Product Stewardship strategy determines in the Execution function the focus on safety compliance, namely the company takes into account, when choosing a supplier, its safety legislation compliance and history. For some respondents, this was, at least partially, similar with reputation, and further efforts were required to differentiate the two concepts. The suppliers' propensity to use environment-friendly alternative materials whenever possible or to ensure that their packaging is safe and ecological proved to be less important. That was not a surprise since we do not differentiate in our study downstream or upstream suppliers. Finally, adequate information for customers and users in the form of safety warning compliance must to be considered. The oil and gas distribution companies take into account, when choosing a supplier, products that have product safety warnings complying with existing regulations. Collaboration function is influenced by Product Stewardship in terms of suppliers' involvement in the development of new products/services or in the development of new ones.

In terms of Logistics Management strategy, it has an impact on Planning by making the oil and gas distribution companies to by encouraging suppliers to focus on recycle/reuse containers and include this focus on their plans and operational programs, and to consider use of recyclable packaging systems

both for themselves and their suppliers. Again, since we do not use as a control variable the position of the company—downstream or upstream suppliers—the results were mixed.

In terms of Execution function, use of fuel efficient vehicles, to some extent even hybrid or electric vehicles may become part of their business model. As a consequence, preference for environmental-friendly transport modes has to be considered by oil and gas distribution companies, making them prone to use more fuel efficient suppliers both from corporate social responsibility reasons and to cut costs. All this may determine a need for transport safety training focus, adequate consideration of safety and health risks of transport mode and responsible inspection and maintenance of vehicles.

There are several shortcomings of the study. First, the intermingling of the SCM functions, which are hard to differentiate in actual business processes, proved to be difficult to be understood by some respondents. Second, the fact that SSCM strategies are not mutually exclusive, while in the research model they are considered independent. Third, a small sample, but this is a common occurrence for the industry since the oil and gas distribution companies are less willing to get involved.

Overall, the findings of this study can be used by companies operating in oil and gas distribution to design SSCM strategies to better address the requirements for more environmentally and socially responsible activities in their supply chains and to optimize their SCM to better cope with Sustainable Supply Chain Management requirements and expectations. Since it is one of the first studies analyzing the impact of SSCM strategies on SCM, this may provide a scientific pillar for CEOs and SSCM supervisors to better substantiate their programs.

The results open new research directions in terms of including other elements in the analysis, such as the impact of digitalization [77–79] or innovation based strategies, like adoptive [80] upon Sustainable Supply Chain Management.

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