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Identifying the Drivers of Green Supply Chain Management in Tile Industry using Delphi Technique

Mehrab RostamiFard[1], Hamideh Shekari[2*], Saeed Eslami[3]

[1]Department of Management, College of Humanities, Yazd science and Research Branch, Islamic Azad University, Yazd, Iran
[2]Department of Public Administration, Payame Noor University, Tehran, I. R. of Iran
[3]Department of Public Administration, Faculty member of Islamic Azad University, Science and Research Branch, Yazd, Iran
*Corresponding Author's Email: h.shekari@ymail.com

ABSTRACT: Supply chain management used to be widely understood as an integrated one-way manufacturing process, in which the raw material is converted to the finished product and then delivered to the customer. It merely centered on the procurement of raw material to make the final product. With increasing concern towards environmental protection, organizations have become more and more responsible for their products and overall sustainability. For companies to maintain their sustainability and competitiveness in the market, green supply chain management considers a systematic and integrated approach. The subject of green supply chain management has been increasingly discussed in recent years and has been recognized and incorporated by different industries. Tile industry is one of the Polluting industries. So the aim of this paper is determining the drivers of green supply chain management in Tile industry to put environmental activities into practice. The procedure we proposed to reach the above-stated research aim consists of conducting a Delphi study among the informed experts in Tile industry, asking them to identify the most effective drivers of green supply chain management. Forty-two measurement items are developed on the basis of the literature. Based on these items, the questionnaires were designed. The Results of two-round Delphi study showed that forty measurement items affect the GSCM in Tile industry. Finally these measurement items were ranked.

Key words: Green supply chain management, Tile industry, Environmental issues, Delphi study.

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INTRODUCTION

Supply chain management is the coordination and management of a complex network of activities involved in delivering a finished product to the end-user or customer (Ninlawan et al., 2010). Supply chain management has traditionally been viewed as a process wherein raw materials are converted into final products, then delivered to the end-consumer. It is important to note however that we live in a decade where environmental sustainability has been an important issue to business practice. Since the early 1990's, manufacturers have been faced with pressure to address Environmental Management in their supply chains (Fortes, 2009: 51). The traditional supply chain comprises five parts: raw material, industry, distribution, consumer, and waste. Each of the links in the supply chain can be a reason for pollution, waste, and other hazards to the environment. Regarding raw materials, a company may use environmentally harmful materials such as lead. However, organizations can put pressures on suppliers to use more environmentally friendly materials and processes. With increased pressures for environmental sustainability, it is expected that enterprises will need to implement strategies to reduce the environmental impacts of their products and services. To establish their environmental image, enterprises have to re-examine the purpose of their business. Success in addressing environmental items may provide new opportunities for competition, and new ways to add value to core business programs. Approaches, such as cleaner production, environmental management systems and eco-efficiency, have been implemented for green management practices. Since the environmental impacts occur at all stages of a product's life cycle, (Zhu et al., 2005: 450) GSCM has emerged as an important new innovation that helps organizations develop 'win-win' strategies that achieve profit and market share objectives by lowering their environmental risks and impacts, while raising their ecological efficiency (Zhu et al., 2007).

Green supply chain management (GSCM) has emerged as an important organizational strategy in modern business environment. It has been touted as an efficient approach to enhancing manufacturing sustainability. GSCM starts from adapting green materials, green manufacturing, green packaging and green transportation, and improves operations by employing environmental solutions Green supply chain management can be defined as integrating environmental issues into supply-chain management, including the processes from product design to end-of-life management of the product after its useful life (Aksoy et. al., 2014: 1106). The importance of environmental issues is continuously translated into regulations, which potentially has a tangible impact on supply chain management. As a consequence, there has been an increasing amount of research on the intersection between supply chain management and environmental factors (Jabali et al., 2012).

Literature Review

Green Supply Chain Management: By increasing the verity of client's concerned expectations toward the patterns, organizations interested in

increasing their flexibility in production lines and started improving and developing new products for customer's satisfaction, which has created the concept of Supply Chain. Supply Chain, is the entire activities associated with progress and exchange of goods from raw material level to deliver final consumer and the related information flow. Today, because of consumer's concern about environment and state environmental supporting organizations for optimum consumption of energy many producers have tried to supply energy efficient products. Therefore, concerning the growing anxiety about environment, beside the industry development, in SCM process the environment pollution should be regarded (Hashemzadeh et al., 2014: 293). Supply Chain Management plays essential role in preventing human, time and financial source loss (Shen et al., 2013). Greening the Supply Chain is a new concept. Therefore, it can be declared that the basis of GSCM is on unified management of environment and supply chain management for controlling environmental destructive effects in a lifecycle of production with information allotments and cooperation of all members of supply chain (Balon et al., 2012).

GSCM has gained popularity with both academics and practitioners to aim in reducing waste and preserving the quality of product-life and the natural resources. The literature in GSCM has been growing as organizations and researchers begin to realize that the management of environmental programs and operations do not end at the boundaries of the organization (Zhu et al., 2005: 451). GSCM's definition has ranged from green purchasing to integrated supply chains flowing from supplier, to manufacturer, to customer and reverse logistics, which is "closing the loop" as defined by supply chain management literature (Zhu and Sarkis, 2004).

GSCM is "Integrating environment thinking into supply chain management, including product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumers, and end-of-life management if the product after its useful life" (Srivastava, 2007). GSCM can be considered as a more advanced management practice considered to other environmental approaches such as cleaner production and environmental management (Chang et al., 2013: 199).

There are different motivators for companies to switch to 'green' in their supply chain. Although some of the motivators are quite unclear. Some organizations are simply doing this because it is the right thing to do for the environment. Perhaps some are more radical to environmental change. Profitability and cost reduction are the other motivators for businesses to become 'green' in the supply chain (Darnall et al., 2008). The other reason is GSCM practices are only about 'win-win relationships on environmental and economic performance' (Fortes, 2009: 57). Supply chain greening initiatives have benefits on the level of the individual firm as well as on the national level. For individual firm Supply chain greening programs bring distinct competitive advantages in terms of lower Costs, Greener Products and better integration with suppliers (Gilbert, 2000). On a national level, Greening of Supply Chains Can Stimulate Markets for green products, while also creates incentives for SMEs to adopt better environmental practices (Handfield et al., 2005).

GSCM involves green initiative in all of the stages of production from purchasing raw material to final customer. So, some of the most important issues discussed in GSCM are green purchasing, green production, green marketing, green consumption, green Distribution, green design, green HR and reverse logistics. The mentioned issues are discussed in following sections.

Green purchasing Practices: Green purchasing is defined as an environmentally conscious purchasing initiative that tries to ensure that purchased products or materials meet environmental objectives set by the purchasing firm, such as reducing the sources of wastages, promoting recycling, reuse, resource reduction, and substitution of materials (Luthra et. al., 2014: 120).

The business reasons for which companies adopt environmentally preferable purchasing practices to help improve the environment include (Huang, 2001): Responding to customer interest in environmentally friendly products and practices, distinguishing a company and its products from competitors, Pursuing cost Savings. Zsidisin and Hendrick (1998) identified key factors for environmental purchasing such as providing design specification to suppliers that include environmental requirements for purchased items, cooperation with suppliers for environmental objectives, environmental audit for supplier's internal management and suppliers' ISO14001 certification (Zsidisin and Hendrick, 1998).

Green production: Green production practices and use of cleaner technologies refer to the different aspects of environmental protection including reduction of pollution causing substances and conservation of renewable and non-renewable natural resources (Luthra et. al., 2014: 120). The greening of industry largely refers to the greening of production, as pollutants are largely generated during the production process of goods and services. Greening of production refers to the following aspects of environmental protection (Rao, 2004): Reduction of pollution causing substances (e.g solid and liquid wastes, air missions, noise) and Conservation of renewable and non-renewable natural resources

For green production, we should use green manufacturing strategies. Green manufacturing

strategies signify the search for value adding technologies that can resolve the issue of generation of higher output with minimum consumption and maximum conservation of resources, yet enabling the balance between the economy and physical environment. The vision of green manufacturing strategy may be characterized as a symbol of harmony between business and environment. The mission would be value creation to produce more or less effective tools for green manufacturing strategies through waste reduction, waste control, waste avoidance and waste prevention. The outcomes of these tools are zero pollution, zero defects, zero downtime and zero inventories (Dangayach, and Deshmukh, 2001).

Green marketing: Green or environmental marketing consists of all activities designed to generate and facilitate any exchanges intended to satisfy human needs or wants, such that the satisfaction of these needs and wants occurs, with minimal detrimental impact on the natural environment. Green marketing has become an important method for companies to remain profitable and competitive as the public and governments are more concerned about environmental issues (Luthra et. al., 2014: 120). Environmental friendly, environmental marketing, ecological marketing or green marketing, is the marketing of products that are presumed to be environmentally safe. By implication, green marketing refers to the process of marketing products and services based on their environmental benefits. That is, such benefits must be environmentally friendly. Hence, the obvious assumption of green marketing is that consumers would view a product or service greenness as a benefit and therefore base their consumption behaviour accordingly (Ibok and Etuk, 2014: 48).

An effective green marketing strategy should be endorsed by the principles of enviropreneurial marketing, which refers to "the process for formulating and implementing entrepreneurial and environmentally beneficial marketing activities with the goal of creating revenue by providing exchanges that satisfy a firm's economic and social performance objectives." Enviropreneurial marketing is featured by an innovation and technology solution to meet the environmental needs, an entrepreneurial orientation, and confluence of social, environmental and economic performances (Chan et. al., 2012: 558).

Green consumption: Green consumption is a construct under the concept of green marketing, meaning responsible consumption behaviour that is aimed at sustainable environment. The consumers who are socially responsible and who sees environmental protection as key in their consumption experience is regarded as green consumers. That is why they are often described as environmental friendly consumers. These consumers see the environment as worth being sustainable and they translate this into their consumption behaviour by buying or consuming biodegradable or recyclable products that will not litter or pollute the environment; thereby preserving the environment for the future (Ibok and Etuk, 2014: 48).

Green logistics: Logistics is the integrated management of all the activities required to move products through the supply chain. Green Logistics is concerned with producing and distributing goods in a sustainable way, taking account of environmental and social factors (Luthra et. al., 2014: 121) In contrast to the delivery of product from a warehouse, for example, to the customers, reverse logistics involves the movement in the opposite direction Reuse, remanufacture, and recycle of returned products are definitely useful to reduce the environmental impact of a supply chain (Chan et al., 2012: 559). Reverse logistics is the process of retrieving the product from the end consumer for the purposes of capturing value or proper disposal (Ninlawan et al., 2010).

Green design: Green design has been used extensively in the literature to denote designing products with certain environmental considerations. It is the systematic consideration of design issues associated with environmental safety and health over the full product life cycle during new production and process development. Its scope encompasses many disciplines, including environmental risk management, product safety, occupational health and safety, pollution prevention, resource conservation and waste management. The aim is to develop an understanding of how design decisions affect a product's environmental compatibility (Srivastava, 2007).

Green Distribution: Green distribution is consists of green packaging and green logistics. Packaging characteristics such as size, shape, and materials have an impact on distribution because of their affect on the transport characteristics of the product. Better packaging, along with rearranged loading patterns, can reduce materials usage, increase space utilization in the warehouse and in the trailer, and reduce the amount of handling required (Ho et al., 2009).

Green HR: Green HR refers to the contribution of people management policies and activities towards this broader agenda. Green HR has to be instilled in the mind of everyone in the organization. For this, the organization should communicate a lot to edify the concept towards motivating all in order to implement and flourish this concept. Green HR involves two essential elements: environmentally friendly HR practices and the continuation of knowledge capital (Khasnabis and Choudhury, 2011).

MATERIAL AND METHODS

The aim of this paper is determining the drivers of Green supply chain management in order to put environmental activities into practice in Tile industry. This type of industry is a polluting industry and has significant environmental and economic concerns within Iran and has faced increased pressures from the government and the public. These types of industries have to improve their environmental performance for survival. This study has two phases. In the first phase forty-two measurement items were developed on the basis of the literature. Forty-two measurement items are developed on the basis of the literature. In the second phase, we conduct a Delphi study among the informed experts in Tile industry, asking them to identify the most effective drivers of green supply chain management.

Measurement items extracted from literature review

Forty-two measurement items affecting Green supply chain management were developed on the basis of the literature review:

1. Developing environmental and technical standards for purchasing raw materials (Webb, 2009).
2. Paying attention to the customer about environmental problems of products (Yang et al., 2013: 62).
3. Extra equipment sale (Lee et al., 2014).
4. Paying attention to the customer in product Design (Chan et al., 2012: 625).
5. Informing the customers about the environmental issues of the company (Shang et al., 2010: 1223).
6. Waste sale (Lee et al., 2014).
7. Paying attention to the customer for Green Packaging (Chan et al., 2012: 625).
8. Adjust necessary rules for reduction of materials consumption (Stokes and Tohamy, 2009: 8).
9. Using advanced technologies for optimizing energy consumption (Zhu et al., 2008b: 579)
10. Training right consumption patterns of energy (Zhu et al., 2005: 461)
11. Selecting suppliers according to environmental criteria (Chan et al., 2012: 625).
12. Updating environmental information in company's portal (Shang et al., 2010: 1223).
13. Reduction of energy consumption (Zhu et al., 2005: 461).
14. Developing environmental and technical standards for purchasing machinery, equipment and instruments (Lai et al., 2011).
15. Continuous checkup of machinery and instruments erosion (Zhu et al., 2005: 458).
16. Checkup of stages of manufacturing processes (Rao and Holt, 2005: 911).
17. Existence of advanced carrying system to reduce wastes (Zhu et al., 2005: 458).
18. Internal waste recovery (Shue, 2008: 20).
19. Soil, water and air pollution by products (Rao, 2004: 297).
20. Soil, water and air pollution by wastes (Rao, 2004: 303).
21. Soil, water and air pollution in the process of Internal recovery (Rao and Holt, 2005: 907).
22. Product recovery at the end of its life cycle (Stokes and Tohamy, 2009: 8).
23. Product life cycle (Stokes and Tohamy, 2009: 8).
24. Training personnel about environmental issues (Nuttall, 2008: 10).
25. Encouraging personnel to research about environment (Harris and Crane, 2002).
26. External waste recovery (Zhu et al., 2012: 176).
27. Greening organizational culture (Harris and Crane, 2002).
28. Environmental compliance and auditing programs (Lee et al., 2014).
29. Fluidity of information (Zhu et al., 2007).
30. Support for GSCM from senior and mid-level managers (Shang et al., 2010: 1223).
31. Total quality environmental management (Taghaboni-Dutta, 2010: 7320).
32. ISO 14001 certification (Lai et al., 2011).
33. Environmental management systems exist (Zhu et al., 2012: 176).
34. Providing design specification to suppliers (Zhu et al., 2008a: 9).
35. Cooperation with suppliers for environmental objectives (Rao, 2004: 297).
36. Environmental audit for suppliers (Zhu et al., 2012: 176).
37. Controlling Suppliers' ISO14000 certification (Zhu et al., 2012: 176).
38. Green Packaging (Wang et al., 2013: 268).
39. Design of products for reduced consumption of material/energy (Chien, 2014).
40. Design of products for reuse, recycle, recovery of material, component parts (Chen and Shue, 2009: 668).
41. Design of products to avoid or reduce use of hazardous of products and/or their manufacturing process (Shang et al., 2010).
42. Designing products according to customers' needs (Zhu et al., 2008a: 9).

Based on these items, the first round questionnaire was designed.

1. Data analysis using Delphi Study

To find drivers of green supply chain management, Delphi method was employed. Although we could select the critical variables through the traditional statistical analysis methods, Delphi method was used as a stronger methodology. Delphi is a

method of popular survey technique that brings consensus of opinions among a set of experts or panelists (informed individuals) by maintaining the unanimity among them. The Delphi process was originally developed and conducted by RAND Corporation during 1950 with the objective of building consensus among the opinions of a group of experts. Thereafter, various applications of Delphi have been evolved worldwide. The application of Delphi process includes planning, decision making, forecasting, impact assessment, etc. Delphi process has also been used for various purposes like setting 'goals', finding 'problems', forecasting, developing system.

Based on Forty-two measurement items in pervious section, the first round questionnaire was designed. Five-point Likert scales, ranging from five, "very important" to one, "not very important" were used for scoring of each indicator in the questionnaire. A panel of 15 members from informed individuals of tile industry was formed. Table 1 shows the information about the panel in each round.

Table 1- Information about the panel in each round

Round	No. of distributed questionnaires	No. of valid returned questionnaires	Response Rate
1	15	11	0.73
2	11	11	1.00

Table 2- Result of One-Sample Test for first round

	Test Value = 3					
	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
VAR00001	9.815	10	.000	1.54545	1.1946	1.8963
VAR00002	12.264	10	.000	1.72727	1.4135	2.0411
VAR00003	12.264	10	.000	1.72727	1.4135	2.0411
VAR00004	6.708	10	.000	1.63636	1.0928	2.1799
VAR00005	3.634	10	.005	1.18182	0.4571	1.9065
VAR00006	7.016	10	.000	1.45455	0.9926	1.9164
VAR00007	8.050	10	.000	1.63636	1.1834	2.0893
VAR00008	6.708	10	.000	1.36364	0.9107	1.8166
VAR00009	12.264	10	.000	1.72727	1.4135	2.0411
VAR00010	14.907	10	.000	1.81818	1.5464	2.0899
VAR00011	14.907	10	.000	1.81818	1.5464	2.0899
VAR00012	-6.500	10	.000	-1.18182	-1.5869	-0.7767
VAR00013	7.455	10	.000	1.54545	1.0836	2.0074
VAR00014	5.369	10	.000	1.27273	0.7445	1.8009
VAR00015	5.590	10	.000	1.36364	0.8201	1.9072
VAR00016	3.708	10	.004	1.00000	0.3991	1.6009
VAR00017	5.590	10	.000	1.36364	0.8201	1.9072
VAR00018	5.221	10	.000	1.18182	0.6775	1.6862
VAR00019	3.614	10	.005	0.81818	0.3138	1.3225
VAR00020	3.105	10	.011	0.81818	0.2311	1.4053
VAR00021	10.757	10	.000	1.63636	1.2974	1.9753
VAR00022	3.833	10	.003	1.09091	0.4568	1.7250
VAR00023	1.896	10	.087	.72727	-0.1273	1.5819
VAR00024	4.667	10	.001	1.27273	0.6651	1.8804
VAR00025	2.887	10	.016	.90909	0.2074	1.6108
VAR00026	3.317	10	.008	1.00000	0.3282	1.6718
VAR00027	7.455	10	.000	1.54545	1.0836	2.0074
VAR00028	8.859	10	.000	1.72727	1.2928	2.1617
VAR00029	9.815	10	.000	1.54545	1.1946	1.8963
VAR00030	4.183	10	.002	1.27273	0.5948	1.9506
VAR00031	8.050	10	.000	1.63636	1.1834	2.0893
VAR00032	8.050	10	.000	1.63636	1.1834	2.0893
VAR00033	8.050	10	.000	1.63636	1.1834	2.0893
VAR00034	6.249	10	.000	1.54545	0.9944	2.0965
VAR00035	4.667	10	.001	1.27273	0.6651	1.8804
VAR00036	8.050	10	.000	1.63636	1.1834	2.0893
VAR00037	10.757	10	.000	1.63636	1.2974	1.9753
VAR00038	6.708	10	.000	1.09091	0.7286	1.4533
VAR00039	6.708	10	.000	1.36364	0.9107	1.8166
VAR00040	9.238	10	.000	1.45455	1.1037	1.8054
VAR00041	8.859	10	.000	1.72727	1.2928	2.1617
VAR00042	-6.528	10	.000	-1.27273	-1.7072	-0.8383

The results of the first round of Delphi technique are shown in Tables 2 and 3. Table 2 shows the results of One-Sample Test for the Forty-two measurement items. As we can see in this table the items 12 (Updating environmental information in company's portal) and 42 (Designing products according to customers' needs) should be deleted.

Table 3 shows the result of Kendall's W test for the first round. Since the Kendall's W of this round is 0.309 and less than 0.5, so we continue the Delphi study. Based on the remained Forty measurement items in this round, the second round questionnaire was designed.

Table 3- Result of Kendall's W test for first round

N	11
Kendall's Wa	0.309
Chi-Square	139.173
df	41
Asymp. Sig.	.000

a. Kendall's Coefficient of Concordance

The results of the second round of Delphi technique are shown in Tables 4 and 5. Table 4 shows the results of One-Sample Test for the forty measurement items. As we can see in this table none of the items should be deleted. All the remained items affect the green supply chain management.

Table 4- Result of One-Sample Test for second round

	Test Value = 3					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
VAR00001	21.000	10	.000	1.90909	1.7065	2.1116
VAR00002	14.907	10	.000	1.81818	1.5464	2.0899
VAR00003	14.907	10	.000	1.81818	1.5464	2.0899
VAR00004	6.708	10	.000	1.63636	1.0928	2.1799
VAR00005	4.404	10	.001	1.36364	0.6737	2.0535
VAR00006	8.050	10	.000	1.63636	1.1834	2.0893
VAR00007	8.859	10	.000	1.72727	1.2928	2.1617
VAR00008	12.264	10	.000	1.72727	1.4135	2.0411
VAR00009	21.000	10	.000	1.90909	1.7065	2.1116
VAR00011	21.000	10	.000	1.90909	1.7065	2.1116
VAR00013	8.859	10	.000	1.72727	1.2928	2.1617
VAR00014	8.050	10	.000	1.63636	1.1834	2.0893
VAR00015	5.882	10	.000	1.45455	0.9035	2.0056
VAR00016	3.993	10	.003	1.18182	0.5223	1.8413
VAR00017	8.859	10	.000	1.72727	1.2928	2.1617
VAR00018	12.264	10	.000	1.72727	1.4135	2.0411
VAR00019	7.016	10	.000	1.45455	0.9926	1.9164
VAR00020	4.183	10	.002	1.27273	0.5948	1.9506
VAR00021	10.757	10	.000	1.63636	1.2974	1.9753
VAR00022	10.000	10	.000	1.81818	1.4131	2.2233
VAR00023	4.658	10	.001	1.45455	0.7587	2.1504
VAR00024	8.859	10	.000	1.72727	1.2928	2.1617
VAR00025	8.859	10	.000	1.72727	1.2928	2.1617
VAR00026	6.249	10	.000	1.54545	0.9944	2.0965
VAR00027	8.859	10	.000	1.72727	1.2928	2.1617
VAR00028	10.000	10	.000	1.81818	1.4131	2.2233
VAR00029	21.000	10	.000	1.90909	1.7065	2.1116
VAR00030	5.871	10	.000	1.63636	1.0153	2.2574
VAR00032	21.000	10	.000	1.90909	1.7065	2.1116
VAR00033	21.000	10	.000	1.90909	1.7065	2.1116
VAR00034	8.859	10	.000	1.72727	1.2928	2.1617
VAR00035	8.859	10	.000	1.72727	1.2928	2.1617
VAR00036	21.000	10	.000	1.90909	1.7065	2.1116
VAR00037	21.000	10	.000	1.90909	1.7065	2.1116
VAR00038	7.455	10	.000	1.54545	1.0836	2.0074
VAR00039	14.907	10	.000	1.81818	1.5464	2.0899
VAR00040	21.000	10	.000	1.90909	1.7065	2.1116
VAR00041	10.000	10	.000	1.81818	1.4131	2.2233

Table 5- Result of Kendall's W test for second round

N	11
Kendall's Wa	0.549
Chi-Square	168.862
df	41
Asymp. Sig.	0.102

a. Kendall's Coefficient of Concordance

Table 5 shows the result of Kendall's W test for the second round. Since the Kendall's W of this round is 0.309 and less than 0.5, so we continue the Delphi study. Based on the remained Forty measurement items in this round, the second round questionnaire was designed.

Since the Kendall's W of the third round is 0.549 and more than 0.5, so we stop the Delphi study. The final drivers of virtuous organization and their rank according to expert's responses and Kendall's test can be seen in table 6.

Table 6 – Ranking the final drivers of green supply chain management

Measurement Items	Mean rank based on Kendall's test	Rank
Environmental management systems exist	25.32	1
Using advanced technologies for optimizing energy consumption	25.05	2
Selecting suppliers according to environmental criteria	25.05	3
Environmental audit for suppliers	25.05	4
Fluidity of information	24.86	5
Total quality environmental management	24.86	6
Training right consumption patterns of energy	24.82	7
ISO 14001 certification	24.82	8
Controlling Suppliers' ISO14000 certification	24.82	9
Design of products for reuse, recycle, recovery of material, component parts	24.82	10
Developing environmental and technical standards for purchasing raw materials	24.77	11
Product recovery at the end of its life cycle	24.64	12
Environmental compliance and auditing programs	24.64	13
Design of products to avoid or reduce use of hazardous of products and/or their manufacturing process	24.64	14
Extra equipment sale	23.50	15
Design of products for reduced consumption of material/energy	23.27	16
Paying attention to the customer about environmental problems of products	23.18	17
Providing design specification to suppliers	23.14	18
Existence of advanced carrying system to reduce wastes	23.09	19
Reduction of energy consumption	22.91	20
Greening organizational culture	22.86	21
Cooperation with suppliers for environmental objectives	22.86	22
Paying attention to the customer for Green Packaging	22.64	23
Paying attention to the customer in product Design	22.59	24
Training personnel about environmental issues	22.59	25
Encouraging personnel to research about environment	22.59	26
Support for GSCM from senior and mid-level managers	22.27	27
Internal waste recovery	21.55	28
Adjust necessary rules for reduction of materials consumption	21.41	29
Developing environmental and technical standards for purchasing machinery, quipment and instruments	21.27	30
Waste sale	20.86	31
External waste recovery	20.45	32
Product life cycle	20.27	33
Soil, water and air pollution in the process of Internal recovery	19.77	34
Green Packaging	19.45	35
Continuous checkup of machinery and instruments erosion	19.36	36
Informing the customers about the environmental issues of the company	18.45	37
Soil, water and air pollution by products	17.77	38
Soil, water and air pollution by wastes	17.68	39
Checkup of stages of manufacturing processes	15.45	40

DISCUSSION AND CONCLUSION

GSCM can reduce the ecological impact of industrial activity without sacrificing quality, cost, reliability, performance or energy utilization efficiency. It involves a paradigm shift, going from end-of-pipe control to meet environmental regulations to the situation of not only minimizing ecological damage, but also leading to overall economic profit. The area throws various challenges to practitioners, academicians and researchers.

Although the current development in GSCM research is encouraging, it is being conducted in clusters. It is, therefore, necessary that interactions between these research efforts be studied in order to develop interrelationships and determine the global effect of this field. Literature on integrated business strategy (comprising product and process design, manufacturing, marketing, RL and regulatory compliance) in the context of GSCM is at the level of thought papers and frameworks only. More research is needed in determining how companies should best select products for each outlet to maximize returns, while still protecting brand integrity. Further, GSCM deserves special attention in terms of resource commitment within a firm/supply chain. GSCM seems a promising area for trying out new operations research techniques and for using traditional techniques for overall GSCM Design. The problem is complex and challenging, as a very large number of parameters, decision variables and constraints are involved along with a large number of estimation requirements such as those of expected demands and returns and cost criteria associated with each decision. Perhaps, a combination of various tools and techniques (both traditional and new) may be combined for the purpose of formulation, approximation, analysis and solution of such complex problems. Many changes in concepts, technologies and players can be expected in the years ahead. We can expect a steady growth in the area of recovery/re-use/remanufacture of items and a quantum leap in the area of RL. Moreover, the rules that govern the attractiveness of recovery/re-use of products, materials and components are undergoing changes at the local, state, national and global levels. Major producers of virgin items, many of whom have not been particularly active in various Rs, are likely to increase their activities in response to public, regulatory and market forces. In many cases, they will probably work in partnership or even joint ventures with entrepreneurial firms.

Iranian organizations continue to struggle to improve their environmental image through cleaner production and investment in environmental protection. They seek to develop systematic and integrated approaches to environmental management such as industrial ecology and GSCM for moving towards closed-loop or cyclical industrial systems. Iranian organizations have made some progress in adoption of GSCM practices. Iranian companies have begun to change their focus from single plant improvements to the whole supply chains. However, GSCM is still a new concept in Iran. Some Iranian enterprises have recognized its importance and tried to put it into practice, but most of these enterprises may lack experience as well as necessary tools and management skills like some of the companies in tile industry. So in this paper we identified the drivers affecting Green supply chain management in order to put environmental activities into practice in Tile industry. The industry which is a polluting industry in Iran. Contribution of this paper is that, the enterprises in Tile industry could identify the factors that have effect on GSCM and develop the program of factory to greening the environment.

In summary for improving the performance, the enterprises in Tile industry should develop necessary standards in material, machines, equipments, instruments purchasing and also in product and process designing; implement environmental standards such as ISO14000; reduce energy and material consumption; train employees about environmental issues, etc.

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