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Study the Barriers of Green Supply Chain Management Implementation in Iranian Industries Using Analytic Hierarchy Process

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ABSTRACT: Today's international business environment has forced many firms to focus on supply chain management to gain a competitive advantage. With the growing worldwide awareness of environmental protection and the corresponding increase in legislation and regulations, green supply chain management (GSCM) has become an important issue for companies to gain environmental sustainability. Manufacturing industries started adopting the green concept in their supply chain management recently to focus on environmental issues. But, industries still struggle to identify barriers hindering green supply chain management implementation. Now, many companies have begun to implement GSCM to consider environmental issues and the measurement of their suppliers' environmental performance. The GSCM literature has focused on helping suppliers improve their environmental performance by asking them to acquire certifications or implement green practices and have emerged as a way for firms to achieve profit and market share objectives by lowering environmental impacts and increasing ecological efficiency. This work focuses on identifying barriers to the implementation of GSCM in Iranian industries. A total of 20 barriers were identified, both through detailed literature and discussion with industrial experts. Essential barriers/priorities are identified through recourse to analytic hierarchy process (AHP).

KEYWORDS: Green Supply Chain Management (GSCM), Barriers, Implementation, Iranian industries, AHP.

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1. INTRODUCTION

Today, as never before, people are aware of the strong links between the economy and the environment. In the fields of business and management, organization faces greater responsibilities to minimize their impacts on the environment. One aspect of this duty includes implementing proactive approaches to environmental performance in the form of greening the supply chain (Sarkis et al., 2011). Environmental management is a "consistent set of administrative and operational policies and practices that considers the protection of the environment through the mitigation of environmental impacts and damage resulting from planning, implementation, operation, expansion, reallocation or deactivation of ventures or activities, including all of the product's life cycle phases". Environmental challenges, such as global warming, air and water pollution, acid rains, etc., have demanded great concern by organizations regarding their environmental management. Attempting to balance economic, environmental and social performance to achieve sustainable development is a major business objective of organizations due to the challenge of increasing environmental laws and regulations, demanding organizational stakeholders' pressures and gaining competitive advantage (Jabbour and Jabbour, 2009).

The integration of environmental concerns within supply chain management has itself evolved into a separate and growing field. However, in order to improve relations with the environment, organizations need to implement strategies to reduce the environmental impacts of the entire supply chain during the production, consumption, customer service and disposal of products. Programs such as design for the environment, life cycle analysis, total quality environmental management, GSCM and ISO 14000 standards are popular for environmentally conscious practices (Olugu et al., 2011). As environmental awareness increases, companies are learning to purchase goods and services from suppliers that can provide them with low cost, high quality, short lead time, etc., as well as attending to environmental standards and guidelines. Hazardous substances contained in raw materials provided by suppliers may cause serious environmental impact in the supply chain. Therefore, an environmentally conscious purchasing approach must be compliant with customers, laws, and regulations (Fu et al., 2012). Literature offers many studies and related evidence revealing the benefits of environmental initiatives for businesses. The identification of benefits for environmental initiatives and performance by businesses is important for dissemination of such initiatives in Small and Medium Enterprises (SMEs) and large enterprises (Jui and Ming-Lang Tseng, 2011).

Over the last decades, organizations have responded to environmental issues by implementing a number of environmental programs. In addition, researchers have categorized green supply practices into various dimensions using a variety of empirical studies and scales. Firstly, managers introduced end of pipe initiatives aimed at reducing energy consumption, emissions and waste. At the end of the 1980s, clean technologies were introduced along with programs for reducing the environmental impact of key steps in the production process. At the beginning of the 1990s, enterprises changed their operating procedures and introduced eco designs for modifying products and services (Andic et al., 2012). Currently, organizations are facing environmentally conscious firms that are developing GSCM practices toward a whole range of supply chains activities. Companies now implement both proactive and reactive methods to protect the environment. For instance, environmentally conscious design and manufacturing is a proactive method that aims to reduce the resource consumption, hazardous emission and energy usage by reengineering the design and manufacturing process and selecting appropriate materials (Humphreys et al., 2003a).

Most supply chain management innovations in the 20th century aimed to reduce waste for economic rather than environmental reasons, and it was not until the turn of the 21st century that the term green, with reference to protecting the environment, gained widespread use and

recognition. Recent studies mention that in the next couple of decades, most manufacturers will face environmental issues in Asia (Zhu et al., 2012). Most Iranian industries will have to develop supply chains from an environmental sustainability point of view by modifying traditional SCM to GSCM through initiation of green procurement strategies. Jung (2011) defined Green supply chain (GSC) as one of the "main efforts aiming to integrate environmental parameters (or requirements) with supply chain management systems." As Bose and Pal (2012) address, in recent years, green supply chain management (GSCM) initiatives have gained substantial prominence. Srivastava (2007) describes GSCM as a combination of environmental thinking and supply chain management (SCM) encompassing product design, material sourcing and selection, manufacturing processes, delivery of the final product to the consumer, and end of life management of the product. Firms typically expect their suppliers to go beyond environmental compliance and undertake efficient, green product design, life cycle assessment and other related activities (Zhu et al., 2012).

Due to governmental legislation and an increased awareness among people of protecting the environment, firms cannot ignore environmental issues if they want to maintain their competitive advantage in this globalization trend. Growing environmental concerns means it is necessary to consider environmental pollution issues that accompany industrial development in supply chain management activities, leading to the emerging concept of green supply chain management (GSCM). In recent years, companies have implemented several regulatory checks and programs to ensure that suppliers can provide materials and services both with high quality and also dedicated to environmental standards (Diabat and Kannan, 2011). GSCM is generally recognized as monitoring suppliers based on their environmental performance and having collaboration only with green suppliers that satisfy environmental standards. Procurement/purchasing decisions will affect green supply chains through the purchase of materials which are either recyclable/reusable or have already been recycled. During adoption of GSCM in traditional SCM, some hurdles can be anticipated due to the expected transition. These hurdles are called barriers and industries must equip themselves to remove them. However, it will be impossible to eradicate all barriers simultaneously. Hence, industries should identify those barriers which have essentially to be removed in the initial stages of GSCM adoption (Tseng and Chiu, 2013).

This paper has, as its goal, the identification of barriers so that they might be eradicated during GSCM implementation in industries through the Analytical Hierarchy Process (AHP). The extensive application of the analytic hierarchy process (AHP) method is due to its simplicity, ease of use, and flexibility. This study was undertaken in various industries in Iran. The results might also impact environmental adoption ensuring easier eradication of essential barriers. It can also be extended to all industries in Iran. The resulting discussions and conclusions are achieved from a survey, site visits, and interviews.

2. LITERATURE REVIEW

GSCM, a cross disciplinary field, has been growing in recent years with increasing interest from both academia and industry. Increasing environmental consciousness and commitment of businesses, governments, groups and individuals have all inspired development of procurement and purchasing policies that incorporate environmental requirements, thereby proving their collective bargaining and buying power. GSCM is a tremendous concept to instill environmental thinking in traditional Supply Chain Management. It cuts across varied boundaries (business activities integrating sourcing, making, and delivery processes) of supply chain management (Zhu et al., 2012). GSCM considers emphasizing environmental issues in supply chain management, in both upstream and downstream business enterprises. Zhu et al. (2012) argued that "GSCM is still relatively novel (innovative) for most organizations in many industries and countries". Research on GSCM usually focuses on aspects such as green

purchasing, internal environmental operations management, or green logistics, as against taking an integrative, whole supply chain approach. Many authors suggest that green supply chain research should move from subjective studies towards an experimental and theory grounded approach. Barriers to GSCM implementation in SMEs are different from those of larger enterprises in many ways including: generation of less environmental data; fewer resources (less environmental expertise/experience, technical, financial, time), environmental performance being driven by personal views of business owners; no common access points and differences in organizational structure (Borade et al., 2013).

Recent years have witnessed a growing interest in examining special challenges that hinder SMEs from taking up GSCM. Many studies confirm that adoption of GSCM in SMEs is unhurried (Sarkis et al., 2011). Carter and Rogers (2008) mention that organizations fail to adopt environmental initiatives due to internal factors including sunk costs, improper communication structures, internal politics, and institutional norms. Hillary (2004) has classified internal and external barriers to implementation of environmental initiatives in SMEs. Kogg (2003) pointed out that lack of influence is an important barrier to implementing GSCM practices in industries. Sometimes green products customers might switch over to other normal products, resulting in a negative motivation for new firms to engage in GSCM practices. Later, in 2009 Thune and Muller investigated the status quo of GSCM implementation in the German automotive industry from a practitioner's point of view. They also analyzed other perspectives including time of implementation, driving forces, relevance of intended goals, their specific realization and adoption of eco programs with suppliers/customers, and also internal and external barriers.

It is evident from literature that both academicians and practitioners are fully aware and are interested in analyzing barriers to GSCM adoption (Diabat and Govindan, 2011). Min and Kim (2012) reviewed 519 articles on GSCM published between 1995 and December 31, 2010. Of these 519 articles, only a few were from developing countries. Some GSCM studies are summarized here. Mudgal et al. (2010) investigated and ranked barriers against GSCM adoption based on an exhaustive questionnaire from more than 100 industries in different sectors by using interpretative structural modeling (ISM). Luthra et al. (2011) analyzed important barriers to GSCM adoption from an Indian perspective and identified contextual relationships among 11 barriers helped by ISM. Toke et al. (2012) ranked interactions and evaluated critical success factors for GSCM adoption in the Indian manufacturing sector through an analytical hierarchy approach. Mathiyazhagan et al., (2013) analyzed the relationship between 26 barriers and identified the most influential in GSCM adoption in the automobile industry aided by ISM in the Indian perspective. In addition, Zhu et al. (2012) pointed out that lack of external cooperation and diffusion are proven obstacles to GSCM's operational performance. Even with so many barriers against GSCM implementation, recent years have witnessed large changes in Iranian SME's. Taking this further, Iranian SME's have started manufacturing/ supplying products to multinational companies (MNC).

To date, only a few research studies have attempted to analyze barriers to GSCM implementation from an Iranian industry perspective. Most studies dealt with a limited number of barriers. In addition, researchers have not undertaken the analysis with different industrial perspectives from the Iranian context. Clearly, there is little work on the analysis and identification of important barriers to GSCM implementation in an Iranian scenario. There is also no work on the identification of essential barriers which need to be removed for GSCM adoption. Mudgal et al. (2010) and Mathiyazhagan et al. (2013) found that various automotive industries had differing judgments about barriers to GSCM adoption. Hence, it is clear that globally, not all industries share similar opinions. A literature gap exists in the identification of essential barriers against GSCM implementation. Similar studies were conducted on industries

in China and Malaysia (Wooi and Zailani, 2010), but different industries have different opinions about GSCM adoption. Furthermore, different countries will obviously have varied opinions about the pressures or barriers against GSCM implementation; every country has its own environmental policies and environmental regulations. Regulations and policies vary depending on the people, culture, and the politics of that country. Similarly, Iranian industries also have different opinions about barriers against GSCM adoption (Luthra et al., 2011).

3. PROBLEM DEFINITION

Applying green procurement preferences to promote environmental initiatives is encouraged by governments in many countries. While GSCM issues are currently highly relevant for export industries, this issue is expected to influence the whole Iranian industry in a significant way. Industries should consider green issues as green/eco products can provide them with great marketing advantages and a good corporate image. Also, by promoting eco products, industries can make their own contribution to economic benefits and environmental protection for society at large (Zhu et al., 2012). Hence, Iranian industry should adopt a proactive approach to address issues of green supply chain/green purchasing for future competitiveness. The basic reasons for attention to GSCM issues are summarized below (Mudgal et al., 2010):

- Increasing pollution and less resource availability has forced industries to focus on low energy consumptions and less resource use which can be offset through GSCM;
- Increasing environmental consciousness by customers has made industries adopt greenness in supply chains to ensure continued market share and sustained industrial environment;
- The presence of various barriers makes GSCM implementation complicated in industries.

Many studies analyzed GSCM adoption in industries, but they failed to analyze insights into barriers against GSCM adoption. Because every country has its own environmental policies and regulations, earlier studies in countries such as China do not seem to have had any impact in the Iranian context. Research is needed on the identification of barriers for GSCM adoption in an Iranian scenario. Although Iranian industries are geared up to eradicate barriers for green implementation, they are still at an initial stage and they struggle to identify barriers for eradication in initial GSCM adoption. Through detailed literature and discussions with industrial experts, 20 barriers have been identified and categorized based on their meaning and similarities. Those with more than 10 years' experience in purchasing, supply chain management, and working in environmental management departments of industry were chosen as experts and targeted for this study.

4. METHODOLOGY

Based on literature reviews and discussions with the industrial experts, the most common barriers accepted by various organizations were identified. From these identified common barriers, the essential key barriers were picked using an AHP approach.

4.1 Overview of AHP

AHP is a widely used and well known decision support tool in business industries. The foundation of Analytic Hierarchy Process (AHP) is a set of axioms which carefully delimits the scope of the problem environment. The AHP methodology compares criteria, or alternatives with respect to a criterion, in a natural, pair wise mode (Saaty, 1986). The three steps of the AHP methodology are: (1) identifying barriers and structuring a hierarchy prioritization model;

(2) constructing a questionnaire and collecting data; and (3) determining normalized weights for each barrier category and each specific barrier.

4.2. Data Collection

In this section, the identification of barriers for GSCM implementation was done using the AHP approach. After the survey, 20 common barriers were identified and risen to a priority level of concern. The 20 barriers used in this phase are provided in Table 2. This phase is categorized into four hierarchy decision process levels and the same is shown in Fig 1. The four level hierarchy processes are described as below: **Level I**: The objective/overall goal; **Level II**: This level represents the barrier category; **Level III**: This level of the hierarchy contains specific barriers; **Level IV**: Priorities of essential barriers are found at this level.

The 20 barriers identified were sent to 10 relevant experts. Participating experts were requested to give the pair wise comparison weight from Saaty's method of nine point scale values (1–9) as shown in Table 1. The pair wise comparison matrix for the main barrier category is shown in Table 3, and the detailed AHP weights for barrier categories are depicted in Table 4.

Table 1: Scale of preference between two elements (Saaty, 1980)

Preference weights/level of importance	**Definition**	**Explanation**
1	Equally preferred	Two activities contribute equally to the objective.
3	Moderately	Experience and judgment slightly favor one activity over another 0).
5	Strongly	Experience and judgment strongly or essentially favor one activity over another.
7	Very strongly	An activity is strongly favored over another and its dominance demonstrated in practice.
9	Extremely	The evidence favoring one activity over another is of the highest degree possible for Affirmation.
2,4,6,8	Intermediate values	Used to represent a compromise between preferences listed above.
Reciprocals	Reciprocals for inverse comparison	

Table 2: Criteria and sub-criteria for barrier identification

Barrier category	Specific barrier
Outsourcing	Complexity in measuring and monitoring suppliers' environmental practices (O1) No proper training/reward system for suppliers (O2) Lack of government support to adopt Environmental friendly policies (O3)
Technology	Fear of failure (T1) Lack of effective environmental measures (T2) Lack of new technology, materials and processes (T3) Current practice lacks flexibility to switch over to new System (T4) Lack of technical expertise (T5)
Knowledge	Lack of Environmental Knowledge (K1) Lack of green system exposure to professionals (K2) Hesitation/fear to convert to new systems (K3) No specific environmental goals (K4)
Financial	High investments and less return-on-Investments (F1) Expenditure in collecting used products (F2) Cost of environment friendly packaging (F3)
Involvement and support	Lack of customer awareness and pressure about GSCM (IS1) Lack of Corporate Social Responsibility (IS2) Lack of support and guidance from regulatory Authorities (IS3) Market competition and uncertainty (IS4) Lack of awareness of the environmental impacts on Business (IS5)

Table 3: Pair wise comparison matrix for barrier category

	O	T	K	F	IS
O	1.00	0.87	2.89	0.78	2.19
T	1.15	1.00	2.63	3.43	2.10
K	0.35	0.38	1.00	1.80	1.59
F	1.28	0.29	0.56	1.00	2.90
IS	0.46	0.48	0.63	0.34	1.00

Table 4: AHP weights for barrier category

O	0.245
T	0.339
K	0.151
F	0.166
IS	0.099

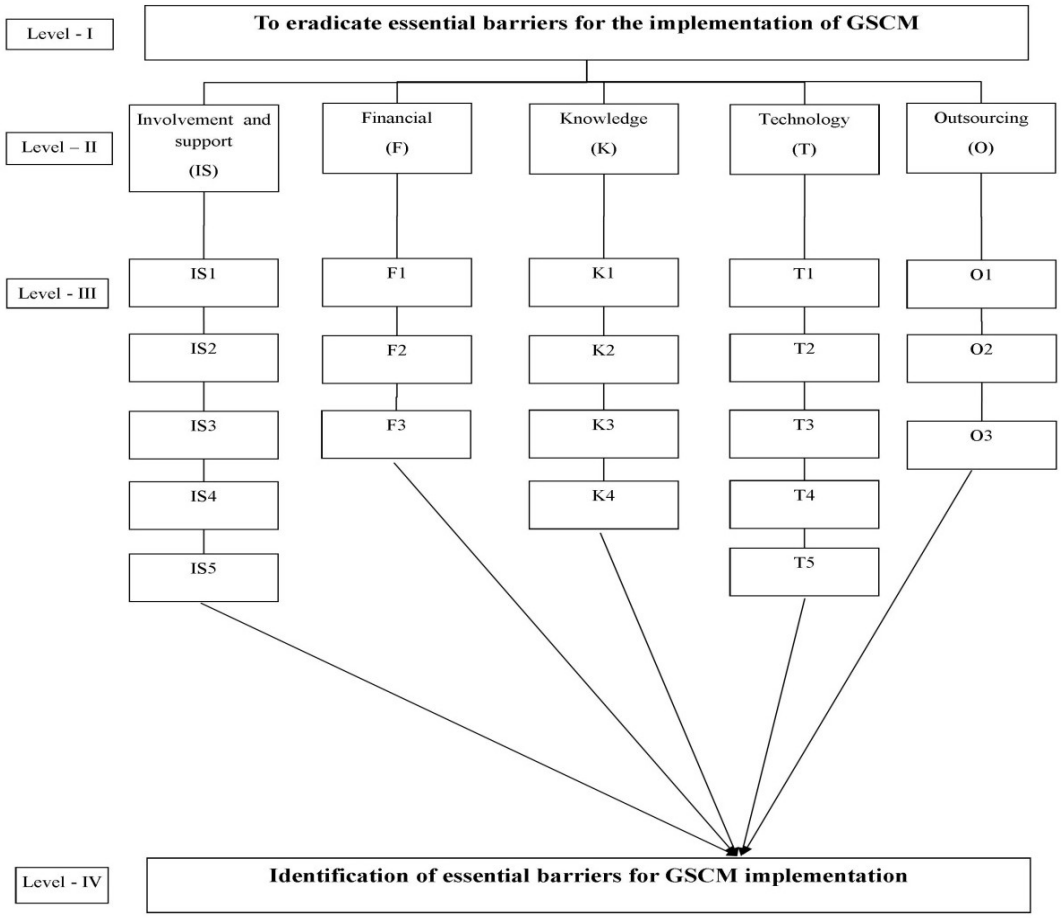

Fig 1: AHP framework for identifying barriers of GSCM implementation

5. RESULT AND DISCUSSIONS

5.1. Barrier Category

We infer from Table 4 that the technology barrier is the first priority among the barrier categories. Technology change is an expensive and crucial barrier for GSCM implementation. The outsourcing barrier category receives the next highest weight. Green purchasing was explored to determine the key factors affecting the buying firms' choice of suppliers, including major barriers and obstacles. The financial barrier category obtained less than half of the weight of the technology barrier category, thereby showing that industries commonly need more finances to extend their environmental management systems. Economy is critical in

implementing GSCM (Ninlawan et al., 2010). The knowledge barrier category ranks fourth. Björklund et al. (2012) has found that there is a lack of knowledge in measuring environmental performance in supply chain management, which reveals that the involvement and support barrier category is not essential for comparison with other barrier categories.

5.2. Barrier Ranking For Gscm Implementation in Iranian Industries

The ranking of specific barriers is shown in Table 5 revealing that overall ranking is based on the global weight values of the AHP approach. Global weights are obtained by multiplying the relative weight of barrier category values with the relative weights of each specific barrier. The result of each barrier, based on barrier categories, is discussed in the following sections:

5.2.1. Technology

Industries need to develop and update themselves on new trends and technologies when implementing GSCM (Mudgal et al., 2010). In the technology barrier category, a lack of new technology, materials and processes (T3) barrier ranks first. SMEs are usually slow to respond to the challenge of improving environmental performance as they lack new technical resources (Massoud et al., 2010). Current practice lacks flexibility to switch over to new System (T4) barrier is next to T3 barrier. Lack of effective environmental measures (T2) barrier comes third. It shows that Iranian industries have started to design and incorporate recycling and reusing properties for products to be reused in the future. Fear of failure (T1) barrier's weight is slightly less than T2 barrier's weight. It is clear that Fear of failure barrier (T1) is followed by the Lack of technical expertise barrier (T5).

5.2.2. Outsourcing

In this category, of the three barriers, O1 (Complexity in measuring and monitoring suppliers' environmental practices) is the most essential barrier. The normalized global weight of O1 shows that most Iranian industries do not have proper monitoring/measuring systems for their suppliers' environmental practices. Due to lack of direction and legislation on environmental management, industries do not know what they should measure and how to measure what should be measured (Shaw et al., 2010). Next is No proper training/reward system for suppliers (O2) barrier. Massoud et al. (2010) have confirmed that "lack of government support and incentive" is a significant barrier to acquiring an environmental certificate. In this category, the last barrier is the Lack of government support to adopt Environmental friendly policies (O3). The O3 barrier's weight and rank demonstrates that industries have been forced to focus on new technology trends that help the environment.

5.2.3. Financial

In GSCM implementation, the lack of financial support is usually considered as the most important constraint to environmental actions (Zhang. et al., 2009). In this barrier category, Cost of environment friendly packaging (F3) are a dominant barrier. High investments and less return on Investments (F1) barrier acts is next to F3 barrier based on its weight. Compared to developed countries, Iran has a long loan sanctioning process, one that requires more time and extensive documents. Expenditure in collecting used products (F2) barrier ranks third. A significant financial barrier to environmental technology improvement is the effect of collection and treatment costs and prices to dispose of hazardous materials (Mudgal et al., 2010).

5.2.4. Knowledge

The Knowledge barrier category is comprised of four barriers. Lack of green system exposure professionals (K2) barrier come first in this category. The survey results show that professionals in industries are less exposed to green systems. The succeeding barrier is "No specific

environmental goals" (K4) barrier. Industries are reluctant to take responsibility to adopt and update environmental issues. Lack of Environmental Knowledge (K1) barrier is placed in third. Mudgal et al. (2010) show that there is "lack of preparedness owing to the low level of uptake of environmental management systems due to ignorance and lack of awareness of benefits which in turn becomes a significant barrier." Another important barrier under technology is Hesitation/fear to convert to new systems (K3).

5.2.5. Involvement and Support

In implementing any system, involvement and support of management is important especially in issues such as GSCM adoption (Mudgal et al., 2010). GSCM did not evolve alone. There are many corporate and industrial environmental philosophies and practices closely linked to and in support of green supply chain management. This survey revealed that Market competition and uncertainty barrier (IS4) obtained the lowest weights. Under this category, Lack of awareness of the environmental impacts on Business (IS5) barrier come first. Lack of support and guidance from regulatory Authorities (IS3) barrier is next to IS5. Lack of Corporate Social Responsibility (IS2) barrier is in third place, following the IS3 barrier. Lack of customer awareness and pressure about GSCM (IS1) barrier is ranked next to the IS2 barrier.

This paper discusses identification of barriers from an organizational point of view. AHP is used to provide a simple approach and helps decision makers to identify barriers. Using the AHP framework ensures that qualitative judgment is quantified to provide a highly precise comparison and to reduce or to eliminate any unbalanced scale of judgments, uncertainty, and imprecision among the pair-wise comparisons. Both the identification of barriers and the insights on GSCM provided contribute to the importance of this survey.

Table 5: Local and global weights of all barrier categories and specific barriers for the implementation of GSCM

Barrier category	Relative weights using AHP	Barriers	Relative weights using AHP	Global weights using AHP	Rank
O	0.245	O1	0.638	0.15631	1
		O2	0.233	0.057085	6
		O3	0.129	0.031605	14
T	0.339	T1	0.134	0.045426	9
		T2	0.217	0.073563	5
		T3	0.304	0.103056	2
		T4	0.294	0.099666	3
		T5	0.051	0.017289	18
K	0.15	K1	0.232	0.0348	12
		K2	0.367	0.05505	7
		K3	0.149	0.02235	16
		K4	0.252	0.0378	10
F	0.165	F1	0.311	0.051315	8
		F2	0.224	0.03696	11
		F3	0.465	0.076725	4
		IS1	0.133	0.013167	19
		IS2	0.178	0.017622	17

IS	0.099	IS3	0.249	0.024651	15
		IS4	0.121	0.011979	20
		IS5	0.319	0.031581	13

6. CONCLUSIONS AND IMPLICATIONS

6.1. Concluding Remarks

Environmental concerns are significant matters due to the economical–ecological effects. Particularly, with rising knowledge of environment protection, companies are enforced to implement ecological practices to improve green image. The GSCM is a vigorous way to differentiate a corporation from its competitors. A GSCM takes the form of a network with multiple divisions and relationships. The GSCM performance measurement that merely considers the initial inputs and the final outputs is in general insufficient since it ignores the relations amongst the divisions.

Regarding the results obtained from data analysis, we present the following conclusions. GSCM implementation in industries is crucial and requires coordination from all level of the workforce, from bottom line employee to top management. Identification of essential barriers for GSCM implementation is tricky due to its numerous characteristics. This paper has attempted to present a benchmarking framework to ease these complicated elements and to trim down barrier identification difficulties to make managers' efforts towards environmental improvement a little easier. A literature review reveals the existence of more studies identifying barriers for GSCM adoption within industries. It is not possible to remove all obstacles when starting GSCM implementation in industries. This paper has provided industries with extensive solutions for identification of barriers, and it provides a benchmark that may assist them during their GSCM implementation. The study revealed that Iranian industries still struggle to prioritize environmental performance improvements over economic performance. Iranian industries also have low awareness on sharing of environmental knowledge and updating environmental technologies. However, they are interested in improving environmental performance.

In our explorative research, we were able to determine the barriers to be eradicated and those which are essential for GSCM adoption. 20 barriers, under five barrier categories, from literature and industrial discussion were examined. During GSCM adoption, it is not possible to eradicate all these barriers initially and so industries must identify which barrier is a major obstacle for GSCM implementation. The proposed AHP approach is used to give rank (priorities) to these twenty barriers based upon judgments of industrial experts. The AHP results clearly show that the technology barrier category is the leading barrier category. Lack of technology is the most important obstacle during GSCM adoption. Outsourcing, financial concerns, and knowledge barrier categories are the next priorities. But because the involvement and support barrier category ranks last, that ranking reveals that industries, although involved in motivating their systems for GSCM adoption, still face a considerable gap. Compared to the technology barrier category, the involvement and support barrier category is not essential in the industrial expert's point of view.

6.2. Managerial Implications

It is evident from the results that identification of barriers in industries during GSCM adoption is helpful to ensure a pollution free environment. The most important Level 2 and specific Level 3 barrier categories are considered. The technology barrier category is important during GSCM adoption and industries need to concentrate more on technological development. The outcome of this research helps to adopt GSCM easily in industries in the Iranian scenario. This work can be extremely useful to industries that need to convert their traditional supply chain management

to GSCM. However, industries cannot eradicate all barriers simultaneously and hence should be ready to afford time to eradicate them one after another. In this research, 20 barriers, under five barrier categories relevant to GSCM implementation were considered, with the help of literature and experts discussion. Further studies can address more barrier categories and barriers. Various sectors in industry could also be considered for exhaustive investigation leading to further improved ways for GSCM implementation.

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ETHICAL CONSIDERATION

Authenticity of the texts, honesty and fidelity has been observed.

AUTHOR CONTRIBUTIONS

Planning and writing of the manuscript was done by the authors.

CONFLICT OF INTEREST

Author/s confirmed no conflict of interest.

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