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Identification and Prioritization of Barriers to Implement Green Supply Chain Management in Industry: A Case Study in Petrochemical Company of South Pars

Alireza Niazi, Mehrdad Nikbakht

Department of industrial engineering, Faculty of Engineering, Najafabad Branch, Islamic Azad University, Najafabad, Isfahan, Iran

(Ali.reza94@yahoo.com, Nikbakht2020@yahoo.com)

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A B S T R A C T

In recent years, Green Supply Chain Management (GSCM) has implemented by the most of industries. With various barriers to implement GSCM, they couldn’t improve performance of the process and products according to the requirements of the environmental regulations. The paper aims to identify and prioritize of barriers GSCM implementation in petrochemical industry. The GSCM barriers are identified by extraction from the literature and interviews with experts. The statistical population includes the personnel in a petrochemical company of South Pars in Persian Gulf. The paper uses Shapiro-Wilk test for the research variables normality check, and structural equations modeling technique for investigation of the relationships between the variables. Analytical Hierarchy Process (AHP) is used to give priorities for the barriers of the GSCM implementation. The identified barriers have significant impact on GSCM implementation. The regulations and laws, competitive market, technological infrastructure, and lack of top management commitment are finally identified the most important barriers on supply chain management implementation.

1. Introduction

The pollutions to the environment made by humane consumerism and industrial manufacturing have been recognized as threats for the human beings themselves by active Non-Governmental Organizations (NGOs). Hence, it is important for as many firms as possible to gait for it (Cao, 2011). Dangers of industries for the nature not only includes the environmental organisms life cycles, but also makes enormous tracks on the benefit making instructions, themselves, being suggested for any types of firms in the current competitive markets of recent decades which are, now much more than before, the shooting aim of naturists attacks and also media critics influenced by the environmental supporting organizations researching bulletins.

Beamon (1999) conducted a research to investigate the environmental factors leading to the development of an extended environmental supply chain, describe the elemental differences between the extended supply chain and the traditional supply chain, describe the additional challenges presented by the extension, present performance measures appropriate for the extended supply chain, and develop a general procedure towards achieving and maintaining the green supply chain. Sarkis (2003) designed a strategic decision framework for green supply chain management which is based on its previous literature and practice in the area of environmentally conscious business practices with a focus on the components and elements of green supply chain management and on how they serve as a foundation for the decision framework. It explored the applicability of a dynamic non-linear multi-attribute decision model, defined as the analytical network process (AHP), for decision making within the green supply chain. Srivastava (2007) has shown that a broad frame of reference for green supply chain management had not adequately been developed by the time. The paper focuses on the fact that regulatory bodies formulating regulations to meet societal and ecological concerns to facilitate growth of business and economy also suffer from the absence of green supply chain management. Petrochemical activities in its own turn can potentially pollute the environment because of their inevitable manufacturing quiddity. Therefore, large funds are required to compensate the damages made by lack of attention paid to the issue of environment retain. Preventing from an environmental pollution appearance leads to improve the long-term production process and achieve global markets which are recently much more considering the dangers disposable for the nature (Aslizadeh et al, 2010). Petrochemical industry, which occupies an important volume of Gross Domestic Production (GDP), confronts to different probabilities of polluting the environment directly or indirectly while every stages of the manufacturing technology are performed from extraction, to production, consumption and post-consumption utilizations. Hu and Hsu (2010) named management commitment, environmental policies, suppliers and effective relationships with relevant companies as the motivators for GSCM. The results of Arimura et al. (2011) study on Japanese factories showed a 40-percent increase of the probability of supplier environmental evaluation and a 50-percent increase of the environmental prohibitory activities acceptance by the supplier as consequences of International Standards Organization (ISO) 14001 implementation in the organizations. They added further that governmental programs encouraging voluntary EMS adoption helped GSCM practices increase. These programs increased the probabilities that facilities would assess their supplier's environmental performance and require suppliers to undertake specific environmental practices by 7% and 8%, respectively. The findings of their study suggested that there were significant effects of ISO 14001 and governmental promotion of voluntary action. Sarkis et al (2011) categorized and reviewed GSC management literature under nine broad organizational theories, with a special emphasis on investigation of adoption, diffusion and outcomes of GSC management practices, questions that have been worthy of investigation, and additional organizational theories which have been considered valuable for future GSC management research. Diabat and Govindan (2011) developed a model of the drivers affecting the implementation of green supply chain management using an interpretive structural modeling framework. The various drivers of green supply chain management were identified by them based on the GSM literature and on consultations with experts in the industry. Their model was validated by adapting on a case study involving a manufacturing firm in southern India. Wang et al (2011) studied a supply chain network design problem with environmental concerns. They proposed a multi-objective optimization model that captured the trade-off between the total cost and the environment influence. They conducted a comprehensive set of numerical experiments, the results of which showed the model could be applied as an effective tool in the strategic planning for green supply chain. Yeh and Chuang (2011) developed an optimum mathematical model for green partner selection, which involved four objectives including cost, time, product quality and green appraisal score. They solved the conflicting objectives by adoption of two multi-objective genetic algorithms to find the set of Pareto-optimal solutions, which utilized the weighted sum approach that can generate more number of solutions. Their experimental analysis introduced a {4, 4, 4, 4} supply chain network structure, and compared average number Pareto-optimal solutions and CPU times of two algorithms. Chiouet al (2011) studied on Taiwanese companies showed that selecting green suppliers ends in green innovations and competitive advantage. Ninlawan et al (2011) studied on Thai firms showed advanced economy has direct and indirect positive relationships with good performances in green supply chain itinerary. The results of Diabat and Govindan (2011) research on Indian organizations proved the fact that governmental regulations and reverse logistics are vital motivators for products designers and the suppliers' cooperation in order to reduce the negative impacts on environment. The Pandya Amit and Mavani Pratik (2012) showed in their study that environmental laws, brand image, innovation, costs reductions, new markets opportunities, and competitors' activities are the motivators of GSCM. Elhedhli and Merrick (2012) studied on the carbon emissions in transportations in the supply chain of firms with the consumption lied on the relationship between the vehicle weight and the exhaust emissions. They used Lagrangian relaxation in their model solutions and came into conclusion that the addition of carbon costs into the decision process for supply chain results in reducing the amount of vehicle kilometers travelled. Since the customer demands must still be met, the solution model suggests that more distribution centers be opened to decrease vehicle travel distances. Drawing on diffusion of innovation and ecological modernization theories, Zhu et al (2012) identified three types of industrial manufacturers (early adopters, followers, and laggards), based on the adoption of green supply chain management practices among Chinese manufacturers. Their test results indicated the existence of differences between these three types in terms of their environmental, operational, and economic performance. Data collected from 159 manufacturing managers were analyzed using a structural equation modeling methodology by Green Jr et al (2012). Manufacturing managers provided data reflecting the degree to which their organizations work with suppliers and customers to improve environmental sustainability of the supply chain. Their results showed a cyclic enhancement between organizational performance on environmental issues and the operational performance in manufacturing. Nature retaining has become one of prominent issues of both current and forthcoming decades (Brown, 2006). Although the objective of GSC policies and activities is to improve the environmental performance of the supply chain and the industry as a whole, it is nonsense to use other tools such as political supports so long as the barriers in the way of GSC achievement are still present. That is why the paper conducts a study on recognition and prioritizing such barriers. In fact, the contribution of the study is to focus on the barriers of GSCM implementation, especially in petrochemical industries.

This paper will focus on the factors influencing on the implementation of the green supply chain management as a whole. Since these factors have a priority in their natures as a set, the papers attempts to find the optimal order and give so optimal priorities that a management team can easily assigns the budget in a way that the highest levels of GSCM implementation could be accomplished. The paper is organized as to explain the methodology, first, and then to describe the method in details. It will, finally, come into a conclusion that how a GSCM implementation is best accomplished if the priority of the factors, influencing on the process is of importance in a management decision.

2. Methodology

A variety of factors influence on the levels of GSCM implementation is achieved. The factors are of so diversity that a managerial team cannot make so an absolute decision that which of the factors are best to be taken into consideration in order to most achieve the GSCM implementation when the relevant budget to do the process is limited. The following sections show the stages which are performed by the authors in order to fulfill the objective of prioritization the factors which influence on the GSCM implementation in an organization. The study starts with recognizing the barriers against the GSCM implementation, and continues with factors analysis, designing/modeling, normality test of data, causing relationships investigation, and finally prioritizing the barriers through AHP. To recognize the barriers against the achievement of the GSCM implementation, it is better to investigate the factors affecting GSCM from literature including laws and regulations about environment affairs, markets competitiveness, technologies infrastructures strength, management commitment, sufficiency of motivators or encouragers from governments, green manufacturing, costs of implementation, demand level, public awareness, industrial waste handling, suppliers' reluctance/enthusiasm, organizational culture supportiveness, and human capital.

2.1. Exploratory factors analysis of green supply chain barriers

The barriers against the implementation of GSCM are the variables of this study. After putting the factors influencing on GSCM implementation, the barriers are recognizable. Thirteen variables were recognized by the help of factor-analysis technique in SPSS software. Four major factors were determined: Internal barriers, External barriers, Technical barriers, and Stakeholders reluctance.

2.2. Modeling procedure / Study designation

To model the study, one should know the main variables and the factors which can affect it in any possible way that either the modeler can control or not. Independent variables (including Internal barriers, External barriers, Technical barriers, and Stakeholders reluctance) and the dependent variable (Green Supply Chain) are all shown in the conceptual model in figure 1.

2.3. Questionnaire (validity and reliability)

Upon the conceptual model shown above, a questionnaire were composed for this study by the authors; the questionnaire consisted of twelve questions for Internal barriers, nine questions for External barriers, nine questions for Technical barriers, nine questions for Stakeholders reluctance, and seven questions for the dependent (functional) variable of the study (i.e. GSC). Cronbach Alpha in SPSS application was used to measure the reliability of the questionnaire, LISREL application measured the combinatorial reliability of the questionnaire, and three techniques were used to measure the validity of the questionnaire (including content-specious validity test based on well-grounded experts, structurally-convergent, and recognizing validity tests using LISREL application).

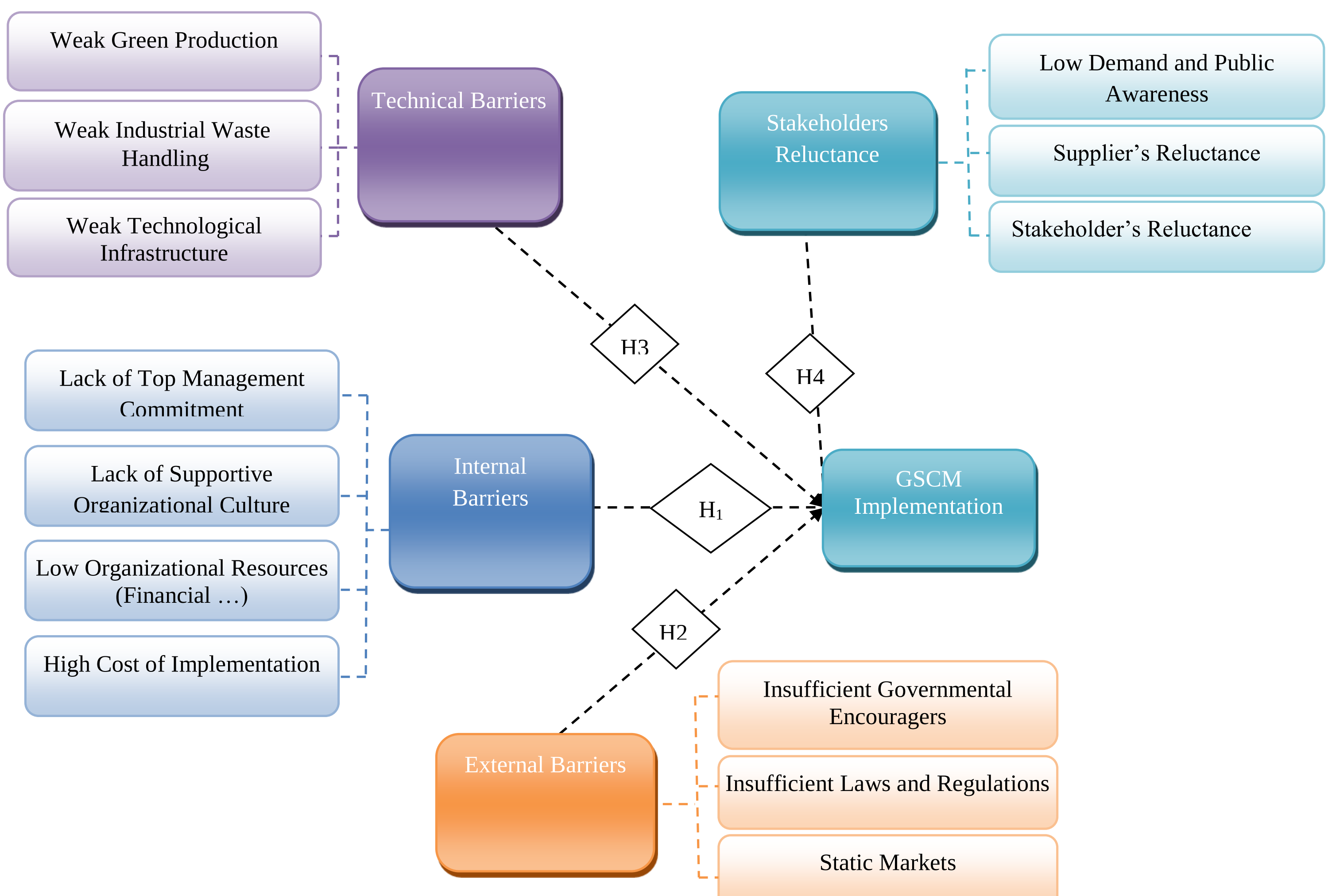

Figure 1. Conceptual Model of GSCM Implementation Barriers

2.4. Population, sampling, statistic

The study population included 284 personnel in one of the petrochemical companies in Pars South Energy Economic Zone. Due to finite population size, Snedecor and Cochran (1989) equation was used to determine the sample size ($n = 164$) with the error, wining probability, and standard statistic values, $\epsilon = 0.05$, $p = 0.05$, and $z^2 = 3.84$, respectively. The questionnaire was distributed amongst the sample and all were collected after some days.

2.5. Normality test of variables

As a prerequisite step before the structural equations are formed, the data should be normally distributed. To testify the normality of study variables, Shapiro and Wilk (1965) test in SPSS application was used to verify if the data is distributed normally.

2.6. Structural equations modeling

To investigate the causing relationships between the dependent and independent variables of the study, and to answer the basic questions the study was made up of, SMART PLS application was used in order to model the structural equations and finally in order to best fit the model.

2.7. Prioritizing the barriers of green supply chain management implementation

Non-uniformity of the barriers against the GSCM implementation in importance leads to highlight the need for an MCDM technique to assign weights to each one based on pairwise comparisons, best one of which is the AHP. The non-deterministic evaluations of the study suggest we use fuzzy version of AHP.

3. Discussion on results

The study stages have their own results which are discussed here separately. That is why the authors decided to put the results in the order they are obtained, separately. Although some have been gained simultaneously, the separations show the difference in contexts or methodologies.

3.1. Exploratory factors analysis results

To check whether the research data are suitable for the exploratory factors analysis, KMO test was used and the resulting value was calculated equal to 0.835 which shows the suitability of the sample size to the factors analysis. As illustrated in table 1, four of the variables have total eigenvalues more than 1 which show the possibility of dividing the variables into four parts. The four variables discussed above have influence on more than 69% of variables standard deviation determination.

It is a high importance that the factors to be analyzed are categorized in some subsets in order to eliminate the correlation effects of the factors in the decision making process. When the correlations are ignored, the decision making process is influenced invisibly. The factor analysis procedure does the classification task for the authors precisely. Table 2 reflects how to classify the thirteen variables into four parts.

Table 1. The number of identified criteria

Variables	**Eigenvalues**		
	Total	**Percentage**	**Cumulative percentage**
1	2.88	0.222	0.222
2	2.56	0.197	0.419
3	1.87	0.144	0.563
4	1.69	0.13	0.693
Bartle Test			KMO=0.835
Sig=0.000df=78Chi Square=228.08			

The factors are named based on their head factors' names (*Internal barriers, External barriers, Technical barriers, and Stakeholders reluctance*). To measure how much a factor influence on the implementation level of GSC, a questionnaire is organized to ask the relevant experts and also those who confront the barriers against the GSC management.

Table 2. Variables classification

Variables	**Index 1**	**Index 2**	**Index 3**	**Index 4**
Lack of top management commitment	0.56			
Lack of supportive organizational culture	0.63			
Weak organizational resources	0.71			
High cost of implementation	0.66			
Insufficient governmental encouragers		0.57		
Insufficient laws and regulations		0.61		
Static markets		0.64		
Weak green productions			0.52	
Weak industrial waste handling			0.60	
Weak technological infrastructure			0.55	

Low demands and public awareness	0.64
Supplier's reluctance	0.65
Stakeholder's reluctance	0.53

3.2. Questionnaire reliability result

To check the reliability of the questions in the questionnaire, Cronbach alphas of all the factors were calculated (See table 3).

Table 3. Cronbach alphas results

Variable	Number of questions	Variable alpha
Internal barriers	12	0.758
External barriers	9	0.724
Technical barriers	9	0.811
Stakeholders' reluctance	9	0.758
GSCM	15	0.855

The Cronbach alphas in table 3 generally show the overall reliability of the questionnaire as whole. The combinatory reliability technique results by LISREL application also show more-than-0.7 values for all the thirteen variables of the study; a good sign to show the combinatorial reliability of the variables in general.

3.3. Questionnaire validity result

Verifying factors analysis test by the help of LISREL application was used to determine if the questionnaire is valid or not. The figure 2 illustrates the structural – convergent validity of a variable (internal barriers against GSCM implementation) as an example of all. The first step of verifying factors analysis check the relationships between the relative twelve questions and the indices of internal barriers (including *lack of top management commitment, lack of a supportive organizational culture, organizational resources weakness and high costs of GSCM implementation*), and the second stage check the relationships between the indices themselves.

The factors in figure 3 are as follows, Management: lack of top management commitment, Culture: lack of a supportive organizational culture, Resource: organizational resources weaknesses and Cost: high costs of GSCM implementation.

The convergent validity is verified due to higher-than-0.5 values of factor loads and also extracted variance mean. The recognizing validity is also verified for all the four indices due to the higher values of variance means of all the indices than the square values of their correlations with other indices (the correlation of indices 1 and 2 is 0.67 as an example of this discussion).

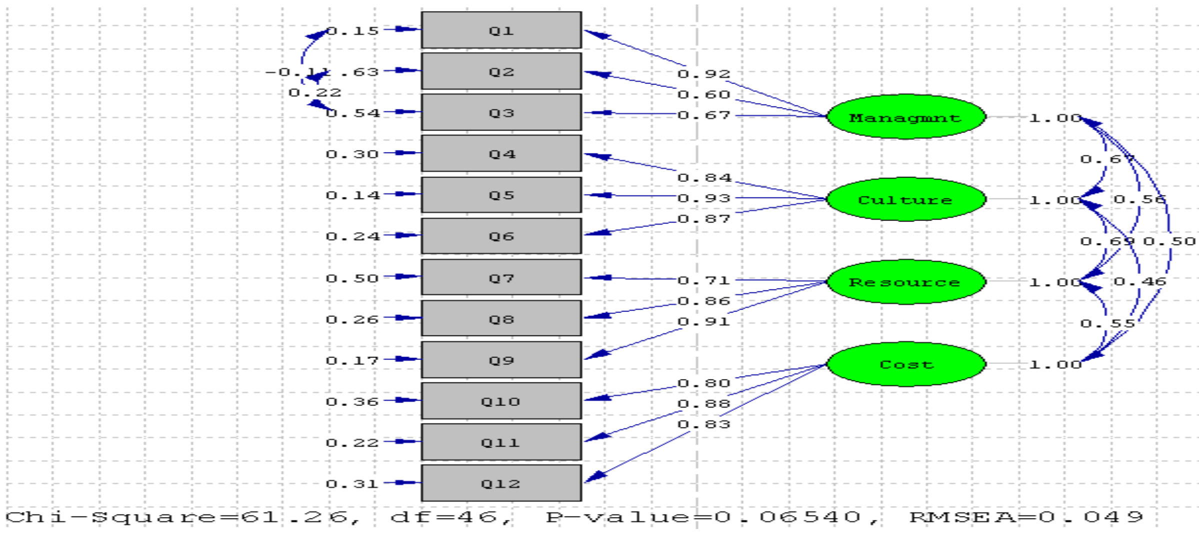

Figure 2. Internal barriers first order factor analysis in approximately normal mode

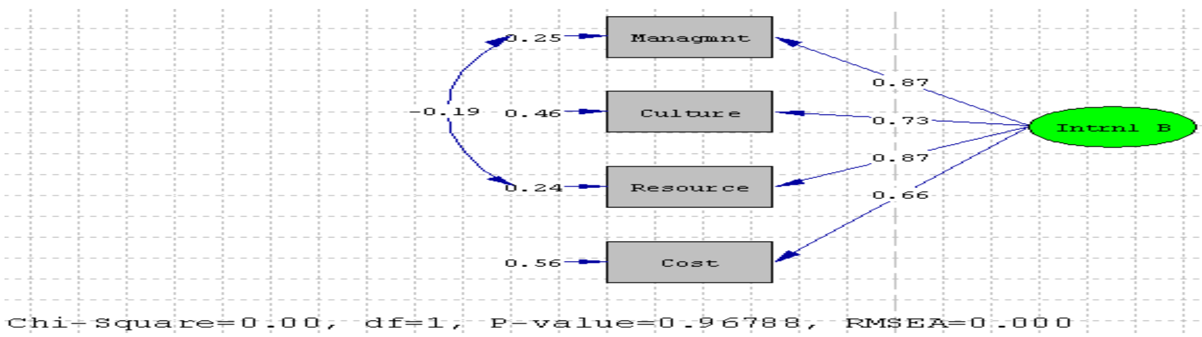

Figure 3. Internal barriers second order factor analysis in approximately normal mode

Table 4. The results of first order factor analysis of internal barriers

Components	Question	Index loads	Extracted variance means
Lack of top management commitment	1	0.92	0.552
	2	0.60	
	3	0.67	
Lack of supportive organizational culture	4	0.84	0.776
	5	0.93	
	6	0.87	
Weak organizational resources	7	0.71	0.691
	8	0.86	
	9	0.91	
High cost of implementation	10	0.80	0.701
	11	0.88	
	12	0.83	

Chi-square:61.26, df:46 , P-value= 0.0654 RMSEA: 0.49

Table 5 shows the verification of convergent validity as a consequence of higher-than-0-5 values of factor loads and the extracted variance mean.

Table 5. The results of first order factor analysis of internal barriers

Components	Index loads	Extracted variance means	Structure
Lack of top management commitment	0.87	0.682	Internal barriers
Lack of supportive organizational culture	0.73		
Weak organizational resources	0.87		
High cost of implementation	0.66		
Chi-square:0.000, df:1 , P-value=0.96788 RMSEA: 0.000			

3.4. Variables normality test results

The normality values of variables in this study are verified due to higher-than-0.05 significance levels for all the indices as illustrated in table 6.

3.5. Investigating the causing relationships between variables

To build a hierarchical structure, it is essential to know also how the factors impact each other. Figure 4 shows structural model of the study in approximately normal mode. As seen in the figure, the route coefficient or the impact level of each independent variables on the dependent variable (e.g. 0.219 is the route coefficient or the impact level of independent variable of internal barriers on the dependent variable of GSCM implementation and also the aggregate value of all the independent variables on the dependent variable is equal to 0.445).

The structural equations technique in SMART PLS application was used to test if there are any linear relationships between the questions and the hypotheses of the research, as a very important prerequisite to found the structural equations based on Hair et al (2011). If the linear relationship between the indices is high, the model fitness deteriorates. Variance Inflation Factor (VIF) is calculated in this study to check the linear relationships discussed above. If the value of VIF is 5 or higher, it is inferred that more than 80%, an index shows is determined by the other index (having the linear relationship), therefore there is no more need to keep that index in the model (Grewal et al, 2004). Table 7 illustrates the linear relationships between the study indices where R^2 stands for the square value of factor load.

Table 6. The variables Shapiro-Wilk test results

Component	Shapiro-Wilk value	Significance level	Variable	Shapiro-Wilk value	Significance level

Lack of top management commitment	0.934	0.537	Internal barriers	0.891	0.342
Lack of supportive organizational culture	0.936	0.586			
Weak organizational resources	0.893	0.335			
High cost of implementation	0.967	0.849			
Insufficient governmental encourages	0.875	0.256	External barriers	0.911	0.339
Insufficient laws and regulations	0.874	0.254			
Static markets	0.887	0.312			
Weak green productions	0.881	0.307	Technical barriers	0.926	0.428
Weak industrial waste handling	0.896	0.346			
Weak technological infrastructure	0.852	0.166			
Low demands and public awareness	0.915	0.450	Stakeholders' reluctance	0.865	0.089
Supplier's reluctance	0.919	0.461			
Stakeholder's reluctance	0.925	0.426			
			GSCM not implied	0.887	0.199

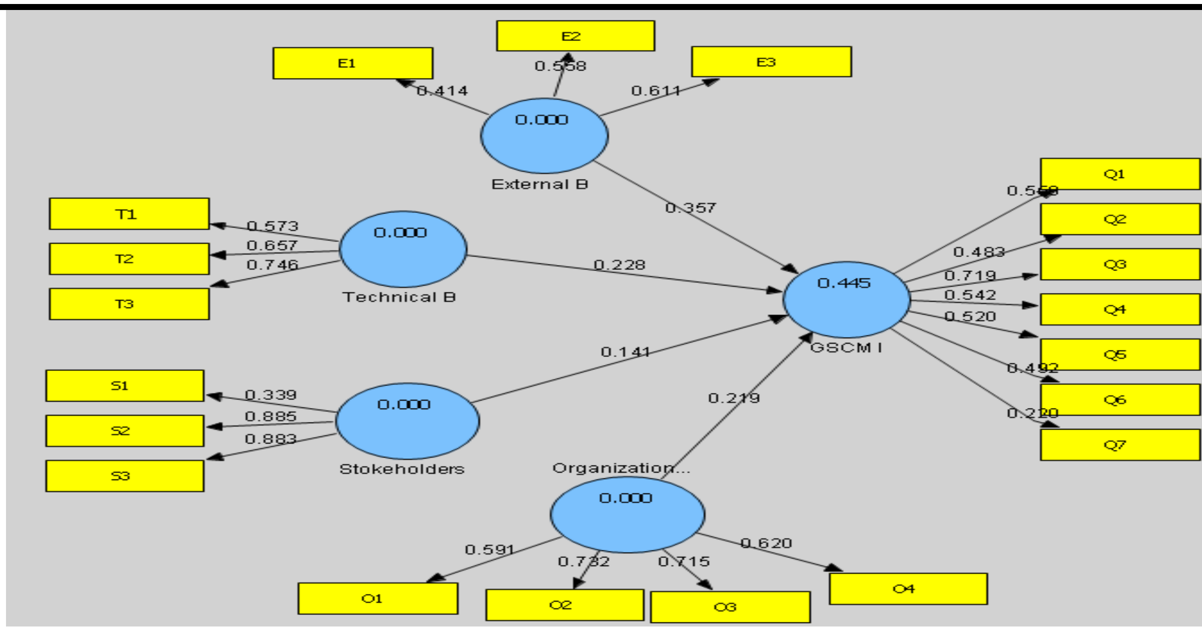

Figure 4. Structural model of the study in approximately normal mode

Table 7. Checking the linear relationship between main variables indices

Structure	Criterion	Index load	R^2	VIF=$\frac{1}{1-R^2}$	Not linear relationship
Internal barriers	O1	0.591	0.349	1.536	☑
	O2	0.732	0.536	2.155	☑

	O3	0.725	0.526	2.11	☑
	O4	0.620	0.384	1.623	☑
External barriers	E1	0.414	0.171	1.206	☑
	E2	0.558	0.311	1.451	☑
	E3	0.611	0.373	1.595	☑
Technical barriers	T1	0.573	0.328	1.488	☑
	T2	0.657	0.432	1.761	☑
	T3	0.746	0.557	2.257	☑
Stakeholder's reluctance	S1	0.339	0.115	1.13	☑
	S2	0.885	0.783	4.608	☑
	S3	0.883	0.780	4.545	☑

Figure 4 and 5 (showing structural models in approximately normal and in significance levels modes, respectively) illustrate the influence values and the significant impacts of the barriers on the GSCM implementation. As shown, the relationship is significant due the higher value of T, the test coefficient, than 1.96.

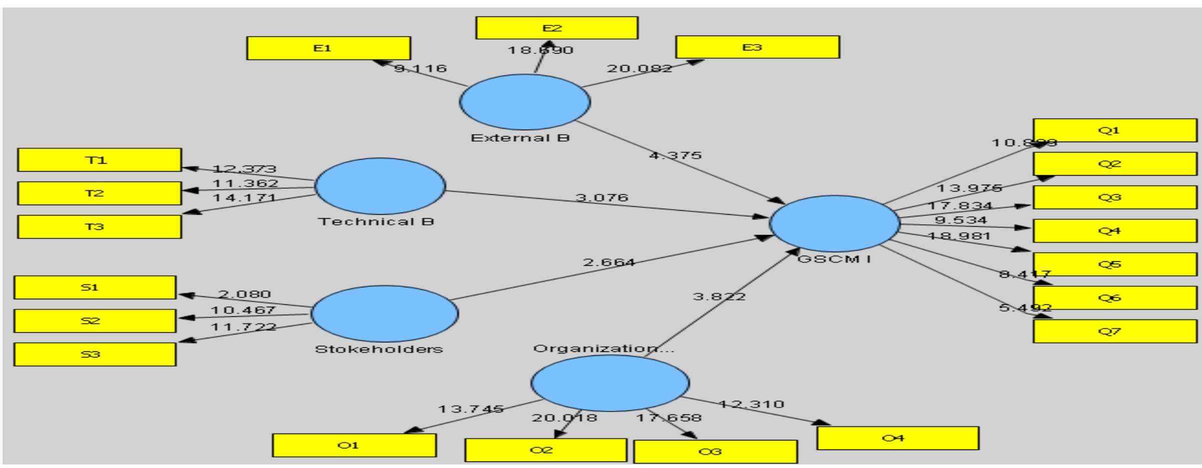

Figure 5. Structural model of the study in significance levels mode

The results of the tests for the relationships among the independent variables (*lack of top management commitment, lack of a supportive organizational culture, organizational resources weakness and high costs of GSC implementation*) and the dependent variable (*GSCM implementation in the organization*) of the study are illustrated in table 8.

Table 8. Accreditation of research questions

Research Question	**Route Coefficient**	**t value**	**Test Result**	R^2

Internal barriers have significant influence on GSCM implementation in petrochemical industries.	0.219	4.375	$H_{1\ verified}$	0.445
External barriers have significant influence on GSCM implementation in petrochemical industries.	0.357	3.822	$H_{1\ verified}$	
Technical barriers have significant influence on GSCM implementation in petrochemical industries.	0.228	3.076	$H_{1\ verified}$	
Stakeholder's reluctance has significant influence on GSCM implementation in petrochemical industries.	0.141	2.664	$H_{1\ verified}$	

As shown in table 8, all the four questions of the research are accredited. The variables generally determine 45% of all the changes in GSC implementation in petrochemical industry in Iran.

3.6. Fitting the model

The fitness of the model is evaluated based on two indices, R^2 index and GoF index. Chin (1998) introduced three values 0.19, 0.33, and 0.67 for *weak, average, and strong* verbal measures for R^2, respectively. Therefore, the resulting value of R^2 in this model (0.445) is evaluated as *relatively desirable.*

The general fitness of the model is calculated in two sections. The GoF value could be calculated through the following equation:

$$goF = \sqrt{\overline{communalities}} \times \sqrt{\overline{R^2}} \qquad \text{(Eq. 1)}$$

Where $\overline{\text{communalities}}$ is obtained from common values of hidden first-ordered variables-structural indices of the study. The values are as illustrated in table 9, based on the SMART PLS outputs.

Table 9. Model's general fitting results

Structure	Criterion	Index load	Communalities	$\overline{Communalities}$	$R^2 = \overline{R^2}$	GoF
Internal Barriers	O1	0.591	0.449	0.433	0.445	0.439
	O2	0.732				
	O3	0.725				
	O4	0.620				
External barriers	E1	0.414	0.285			
	E2	0.558				
	E3	0.611				

Technical barriers	T1	0,537	0.439
	T2	0.657	
	T3	0.746	
Stakeholder's reluctance	S1	0.339	0.559
	S2	0.885	
	S3	0.883	

Wetzels et al (2009) introduced the three values of 0.01, 0.25, and 0.36 for weak, average, and strong for GoF value. 0.439 is evaluated as very desirable for the model fitness.

4. Prioritized barriers against green supply chain management implementation

To assign ranks to the barriers against GSCM implementation and their components, nine experts gave ideas and suggestions. Figure 7 illustrates the whole evaluations and comparisons results in numerical data and the order in which the information were made up.

4.1. Inconsistency test of pairwise comparisons matrix

In an analytical hierarchy process, it is necessary to obtain the amount of inconsistency between the evaluations in comparing different factors together. Table 10 reflects the results of consistency test proposed by Gogus and Boucher (1989). All the consistency indices in table 10 are 0.1 or less, hence, there is generally a consistent matrix of pairwise comparisons.

Fuzzy Number	Crisp Number	Fuzzy Number	Crisp Number
$\tilde{1}^{-1}$	.75.	$\tilde{1}$	1.5
$\tilde{3}^{-1}$	.375	$\tilde{3}$	3
$\tilde{5}^{-1}$	.208	$\tilde{5}$	5
$\tilde{7}^{-1}$	.146	$\tilde{7}$	7
$\tilde{9}^{-1}$	.113	$\tilde{9}$	9

Crisp and Fuzzy numbers in the mode: $\alpha = .5 \ and \ \lambda = .5$

1	1.34	1.64	1.42
0.849	1	1.24	1.52
0.667	0.875	1	1.55
0.762	0.715	0.717	1

Pairwise comparisons between GSCM implementation barriers

.305	.409	0.5	.433
.259	.305	.378	.464
.203	.267	.305	.473
.232	.219	.219	.305

Normalization

Final main GSCM implementation barriers weights	
External barriers	0.315
Internal barriers	0.265
Technical barriers	0.232
Stakeholders' reluctance	0

Final internal barriers criteria weights	
Lack of top management commitment	0.34
High cost of implementation	0.263
Lack of supportive organizational culture	0.215
Weak organizational resources	0.181

Final external barriers criteria weights	
Insufficient laws and Regulations	0.422
Static markets	0.318
Insufficient governmental encouragers	0.26

Final technical barriers criteria weights	
Weak technological infrastructures	0.404
Weak green production	0.317
Weak industrial waste handling	0.279

Final stakeholders reluctance criteria weights	
Low demands and public awareness	0.358
Supplier's reluctance	0.343
Stakeholder's reluctance	0.299

Figure 7. The whole evaluations and comparisons results in numerical data

Table 10. Gogus and Boucher (1989) test results

Pairwise comparisons matrix	CI ^{m}	CR ^{m}	CI ^{g}	CR ^{g}
Main barriers	0.002	0.000	0.03	0.04
External Criteria	0.000	0.001	0.000	0.003
Internal Criteria	0.000	0.005	0.005	0.000
Technical Criteria	0.000	0.05	0.07	0,08
Stakeholders' Reluctance Criteria	0.001	0.001	0.001	0.000

4.2. Final weights of the barriers of green supply chain management implementation

As table 11 illustrates the final weights obtained for the barriers against GSCM implementation, the Non-sufficient regulations about environment, non-competitive market, weak technological infrastructure, and lack of top management commitment in the organizations are the most important barriers against GSCM implementation.

Table 11. The final weights obtained for the barriers of GSCM implementation

Criterion	Weight	Ranking
Insufficient Laws and regulations	0.133	1
Static markets	0.1	2
Weak technological infrastructures	0.093	3
Lack of top management commitment	0.09	4
Insufficient governmental encouragers	0.082	5
Weak green productions	0.073	6
High costs of implementation	0.07	7
Low demands and public awareness	0.067	8
Weak industrial wastes handling	0.064	9
Supplier's reluctance	0.064	10
Lack of supportive organizational culture	0.057	11
Stakeholder's reluctance	0.056	12
Weal organizational resources	0.048	13

5. Conclusion

In the current competitive industrializations, environmental pollution is an inevitable side effect. Regarding the environmental aspect of a monetary-based industry as a whole supply chain leads to a concept of interesting study, called green supply chain management. The aim of this paper is to find the priorities of the barriers GSCM implementation in a petrochemical company which has many pollution possibilities to environment. The paper uses factor analysis methods, questionnaires, reliability and validity tests, correlation tests, and AHP to achieve the goal. The results show all the independent variables (lack of top management commitment, lack of a supportive organizational culture, organizational resources weakness and high costs of GSCM implementation) have significant impact on the dependent variable (GSCM implementation in the organization) of the study. These four variables could predict 44.5% of the GSCM implementation variance value. Internal barriers in the organization including lack of top management commitment, lack of a supportive organizational culture, weakness of organizational resources (financial, humane, etc.), and high costs of implementation have significant negative impacts on green supply chain management implementation. The condition of local, national, and international overall binding regulations, a multi-dimensional supervision upon it, desirable governmental encouragers for the organizations, non-deterministic surroundings of a highly competing atmosphere for the organization, are all the factors which improve the implementation of GSCM. External barriers such as insufficient motivators and encouragers from government for GSCM implementation and insufficient governmental regulations have significant negative impacts on GSCM implementation. The technical barriers including weal green manufacturing, weak industrial waste handling, and weak technological infrastructures have all significant negative impacts. Stakeholder's reluctance including low demands, low public awareness, supplier's reluctance, and stakeholder's reluctance have all significant negative impacts on implement green supply chain management.

6. References

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