Uncertain Supply Chain Management 2 (2014) 293–302

Contents lists available at GrowingScience

Uncertain Supply Chain Management

homepage: www.GrowingScience.com/uscm

Identification and ranking effective factors on establishment of green supply chain management in railway industry

Gholamreza Hashemzadeh, Mahmoud Modiri and Zakieh Rahimi*

Department of Management and Accounting, South Branch, Islamic Azad University, Tehran, Iran

C H R O N I C L E

Article history:
Received December 10, 2013
Received in revised format
16 March 2014
Accepted May 20 2014
Available online
May 29 2014

Keywords:
Supply Chain
Green Supply Chain Management
Environmental Requirements
DEMATEL
Fuzzy TOPSIS

A B S T R A C T

Globalization, intensification of governmental and non-governmental organization's provisions and squeeze and the demand of clients about concerning environmental affairs have motivated many organizations to start considering Green Supply Chain management in order to facilitate environmental and economic functions. Administration of green supply chain management unifies the management of supply chain with environment requirements during the functioning of levels of supply chain. This paper aims to identify green supply change management's factors in order to facilitate implementation of green supply chain management in rail industry. Thus, the effective factors of green supply chain management establishment are extracted and the method of interactions between sub-scales is studied by DEMATEL technique. The result specifies that reduction of production loss sub-scale is the most effective factor on other agents. In addition, the effective elements peered out by fuzzy TOPSIS that the scale of loss management stands on the first ranking and improvement of production process and interior environment management scales stand on the second and the third level and other scales follow them.

1. Introduction

According to previous standpoints, the aim of supply chain was improvement of functioning in order to improve firms' productivity and profitability, but enhancement of supply chain's environmental function and the importance of social charges and environmental destruction was disregarded (Handfield & Nichols, 2005). Recently, because of rapid industrialization of societies, there are intensive tendencies to environmental shortcomings (Zhu et al., 2008) and most governments start employing environmental preservation regulations. These days, we hear more about the terms like environment friendly Raw materials, reduction of fossil fuel consumption and recycling losses (Hajmohammad et al., 2013; Koplin et al., 2007). Therefore, the sequence of Green Supply Chain Management (GSCM) appeared (Imani & Ahmad, 2009). Therefore, implementation of GSCM among various industries especially in rail industry relies on its whole level of lifecycle. Hence, the main question of this research is to identify effective elements of implementation and establishment

* Corresponding author
E-mail address: rahimisarah@yahoo.com (Z. Rahimi)

doi: 10.5267/j.uscm.2014.5.007

of GSCM in rail industry simultaneously with supply chain general approaches and concerning environmental dilemmas. The aim of implementation of this research is also to identify and to rank effective elements on implementation of Green Supply Chain in rail industry in Iran.

2. 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 (Lewis & Gretsakis, 2001). 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 (Safarzadeh et al., 2011). 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 (Jen Lin et al., 2011). Therefore, concerning the growing anxiety about environment, beside the industry development, in SCM process the environment pollution should be regarded (Rao & Holt, 2005). Supply Chain Management plays essential role in preventing human, time and financial source loss (Stevels, 2002; Shen, 2013). One of the implementation tools of green supply chain is associated with Green Supply Chain (Balo et al., 2012; Chandra & Fisher, 2003). Greening the Supply Chain is a new concept (Samson & Simpson, 2008). 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).

2.1. The Impressive elements for establishment of Green Supply Chain Management

Some effective elements for establishment of Green Supply Chain in organizations, shown in Table 1:

Table 1
Effective elements on Green Supply Chain establishment

Feature	References
1. Environmental Competence 2. Pollution Control 3. Environmental Management 4. Environmental Collaboration 5. Green Production	Akman & Piskin, 2013; Cousins et al., 2004
1. Interior Environmental Management 2.Green Supply Chain Management external methods 3.Investment Retrieval 4.Environmental Compatible Sketching	Zhu & Sarkis, 2004; Hillary, 2000
1. Packaging vicissitude or reconciliation 2. Green Marketing	Envirowise, 2001; Zhu & Sarkis, 2006
1. Green Purchase 2.Green Sketching 3. Product Resumption 4.Collabrating with suppliers and customers.	(Lin, 2013; Farahani, 2009)
1. Resumption Sketch 2.Loss Management	Envirowise, 2001; Shen & Yand Tam, 2002; Ofori et al., 2002
1.Environmental Compatible Designing 2.Green Production 3.Green Purchase	Zhu & Sarkis, 2006; Srivastava, 2007; Starkley, 2000; Lamming & Hampson, 1996
1. Green Production 2. Suppliers' demands 3. Supplier's Flexibility 4. Collaboration of Suppliers with Products' Designers 5.Clients' Demand Provision	Tseng et a, 2011; Zhu & Sarkis, 2006
1. Lifecycle Assessment 2. Loss Control	Srivastava, 2007; Envirowise, 2001; Starkley, 2000; Green et al., 1996
1. Senior Management Assert 2.Middle –level Management Assert 3.Product Quality Management 4.Environmental Evaluation Program 5.Certificate prehension 6. Environmental Protection Law Support	Morrow & Rondinelli, 2002; Ninlawan et al., 2010
1. Pollution Control 2. Environmental Management 3.Management Assert 4.Green Designing 5. Green Purchase 6.Clean Technology 7. Staff Training	Shen et al., 2013
1.Environmental Requirements Statements 2.Information Sharing 3.Collabration	Theyel, 2002
1.Environmental Management 2.Supplier's Flexibility 3.Close Communication with Suppliers	Tseng, & Chui , 2013
1. Green Designing 2.Green Market 3. Interior Management 4.Resunption 4.Investment 5. Investment Return	Stevels, 2002; Eiadet et al. (2008)
1.Green Distribution Procedure 2.Green Product Distribution 3. Supply Chain Advanced Inspection	Bowen et al., 2001

In this article regarding to revising the literature and expert's interview, there are 10 main scales with 36 sub-scales for establishment of Green Supply Chain in Railway industry have identified and by Fuzzy screening through them there are seven main scales with 20 sub-scales specified.

There are many studies associated with Green Supply Chain Management (GSCM). Lin (2013), for instance, proposed a method for assessment of GSCM by considering three scales and eight sub-scales selected which employing DIMATEL technique and the communication of sub-scales were identified as Green Purchase, Green Designing, Resumption, Collaboration with Legislators and Stockholders according the acquired results of DIMATEL.

Shen et al. (2013) investigated supplier's turnover in green supply chain by applying Fuzzy TOPSIS in auto industry. They identified pollution control, environmental management, management assessment, green designing, purchasing environmentally friendly materials, clean technology, and staff training as important criteria. Tseng and Chui (2013) identified tendencies towards stable environmental activities for improving supply chain in developed organizations in which the technique collective decisions in Fuzzy environment and for ranking options (Four Suppliers) 7 scales were detected. In acquired results, environmental management, supplier's flexibility and close communications of suppliers received the maximum weight compared with the other elements.

Zhu and Sarkis (2007) studied the barriers and effective motives in implementation of green supply chain in auto industry in China. Brorson et al. (2009) studied the impression of ISO14001 in three major GSCM activities in Swedish firms. Lee, et al. (2009) performed a survey for the evaluation of suppliers in GSCM to identify premier Green suppliers and collaboration with them in Green Supply Chain in LED producer companies in Taiwan with the DELFI method and Fuzzy analytical hierarchy process (AHP) in order to identify scales and options ranking studied.

Zhu et al. (2008) studied the communication and effects of two other elements in organization learning and senior management assessment on executive activities for attaining GSCM in productive firms in chain. They concluded that both elements had direct impact on organizations' turnover in field of GSCM. Securing and Muller (2008) studied the history of supply chain and Green Supply chain. Linton et al. (2007) illustrated the concepts and doctrines of stable and Green Supply Chain.

2. Methods

The current research concerning the functional approach and follows descriptive survey style . For gathering the information the library method and field study have been used in railway industry with sending questionnaires to experts and interviewing. The statistical community of this research is The Tehran Subway Operation Company and the statistic samples are the number of experts who are completely dominant to Green Supply Chain which they were 25 people to identification of elements and their number for ranking and identification about quality of communication through sub-scales were four people. The research's questions follow as:

1. What are the effective elements for establishment of Green Supply Chain Management in railway industry?
2. How much do these elements weight?
3. How is the efficiency and impressibility of scales and sub-scales on each other?
4. How is the ranking of elements?

In this article for analyzing data two methods of Multi Attribute Decision Making "MADM" used: fuzzy TOPSIS technique for ranking the importance of elements and DEMATEL technique for determination of communication between sub scales and their collaboration and influence.

3.1 DEMATEL

DEMATEL technique performed by Gabus and Fontela (1971). DEMATEL technique is a decision making technique for utilizing experts' activities in field of extracting a system's elements and their systematic structuring and by usage of the Graphs thesis, hierarchical structure of current elements in system, including the communications counteract influence and dud effect and defines the acrimony of the numerical score and accepts the non-transmittal terms. The process of conducting DEMATEL technique follows as:

1. Modeling the Straight relevance Matrix
2. Modeling X Matrix: that each of its elements is the average of the elements in straight experts Matrix.
3. Normalizing the straight relevance Matrix:

$$M = \lambda * \mathrm{X} \qquad \lambda = \frac{1}{max \sum_{j=1}^{n} a_{ij}} \tag{1}$$

4. Total Relation Matrix:

$$S = M \times (1 - M)^{-1} \tag{2}$$

5. Modeling the Casual Diagram

Aggregation of each line's elements (R) and aggregation of each column (J) so the horizontal vector (R+J) is the efficient in system and the vertical vector(R-J) is the effectiveness of each element.

2.2. Fuzzy TOPSIS

TOPSIS is one of the multi index decision making methods which raking "n" number of options regarding the scale m (Asgharpour, 2011). The basis of this method is to choose an option which has the least distance with the ideal desirable answer and the most distance with the undesirable ideal answer. The Fuzzy logic can be established among different decision making techniques. One of the techniques is technique for order performance by similarity to ideal solution (TOPSIS) by employing the Fuzzy logic changing it to Fuzzy TOPSIS and we use triangular numbers for our implementation as follows,

1. Modeling the decision making Matrix:

$$D = \begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1n} \\ x_{21} & x_{22} & \cdots & x_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ x_{m1} & x_{m2} & \cdots & x_{mn} \end{bmatrix} \tag{3}$$

If three angular Fuzzy numbers have been used, the function of $\tilde{\mathrm{x}}_{\mathrm{ij}} = (\mathrm{a}_{\mathrm{ij}}, \mathrm{b}_{\mathrm{ij}}, \mathrm{c}_{\mathrm{ij}})$ option (i=1,2,…,m) related in *j* scale is (j=1,2,..,n). If the decision making committee consists of *k* members and Fuzzy ranking on the *k* members $\tilde{\mathrm{x}}_{\mathrm{ijk}} = (\mathrm{a}_{\mathrm{ijk}}, \mathrm{b}_{\mathrm{ijk}}, \mathrm{c}_{\mathrm{ijk}})$ (three angular Fuzzy numbers) for *m* equals to i=1,2,…,m and j=1,2,…,n regarding the combined Fuzzy ranking scales $\tilde{\mathrm{x}}_{\mathrm{ij}} = (\mathrm{a}_{\mathrm{ij}}, \mathrm{b}_{\mathrm{ij}}, \mathrm{c}_{\mathrm{ij}})$ the options can be resulted:

$$a_{ij} = Min_k \{a_{ijk}\}. \quad b_{ij} = \frac{\sum_{k=1}^{k} b_{ijk}}{k}، \quad c_{ij} = Max_k \{c_{ijk}\} \tag{4}$$

3. Determining the weight matrix criteria

$$\widetilde{W} = [\widetilde{w}_1, \widetilde{w}_2, \dots, \widetilde{w}_n] \tag{5}$$

If three angular Fuzzy numbers are used, each component w_j (components' weight) will be defined as $\widetilde{W}_j = [\widetilde{w}_{j1}, \widetilde{w}_{j2}, \widetilde{w}_{j3}]$. If the decision making committee consists of k members and the number k member's importance is $\widetilde{W}_j = (w_{jk1}, w_{jk2}, w_{jk3})$ (three angular Fuzzy number) for j=1,2,…,n ranking component Fuzzy $\widetilde{W}_j = (w_{j1}, w_{j2}, w_{j3})$ can be obtained from following formulation:

$$w_{j1} = Min_k\{w_{jk1}\} \qquad w_{j2} = \frac{\sum_{k=1}^{k} w_{jk2}}{k} \qquad w_{j3} = Max_k\{w_{jk3}\} \tag{6}$$

4. Scale up Fuzzy decision matrix

$$\tilde{r}_{ij} = \left(\frac{a_{ij}}{C_j^*}, \frac{b_{ij}}{C_j^*}, \frac{c_{ij}}{C_j^*}\right), \qquad \tilde{r}_{ij} = \left(\frac{a_j^-}{c_{ij}}, \frac{a_j^-}{b_{ij}}, \frac{a_j^-}{a_{ij}}\right), C_j^* = \max_i c_{ij}, \;\; a_j^- = min_i a_{ij} \tag{7}$$

So the Scaled-up FUZZY decision Matrix ($\tilde{R}$) results in following formulation:

$$\tilde{R} = [\tilde{r}_{ij}]_{m\times n} \quad i = 1,2,\dots,m \;; \quad j = 1,2,\dots,n \tag{8}$$

5. Determination of the weighted Fuzzy decision Matrix

$$\tilde{v}_{ij} = \tilde{r}_{ij}.\widetilde{w}_j \quad \rightarrow \quad \tilde{V} = [\tilde{v}_{ij}]_{m\times n} \quad i = 1,2,\dots,m\,; \quad j = 1,2,\dots,n \tag{9}$$

$$\tilde{v}_{ij} = \tilde{r}_{ij}.\widetilde{w}_j = \left(\frac{a_{ij}}{C_j^*}, \frac{b_{ij}}{C_j^*}, \frac{c_{ij}}{C_j^*}\right).(w_{j1}, w_{j2}, w_{j3}) = \left(\frac{a_{ij}}{C_j^*}.w_{j1}; \frac{b_{ij}}{C_j^*}.w_{j2}; \frac{c_{ij}}{C_j^*}.w_{j3}\right) \tag{10}$$

$$\tilde{v}_{ij} = \tilde{r}_{ij}.\widetilde{w}_j = \left(\frac{a_j^-}{c_{ij}}, \frac{a_j^-}{b_{ij}}, \frac{a_j^-}{a_{ij}}\right).(w_{j1}, w_{j2}, w_{j3}) = \left(\frac{a_j^-}{c_{ij}}.w_{j1}; \frac{a_j^-}{b_{ij}}.w_{j2}; \frac{a_j^-}{a_{ij}}.w_{j3}\right) \tag{11}$$

6. Fuzzy Positive Ideal Solution (FPIS, A*) and Fuzzy Negative Ideal Solution (FNIS, A$^-$):

$$A^* = \{\tilde{v}_1^*, \tilde{v}_2^*, \dots, \tilde{v}_n^*\} \quad A^- = \{\tilde{v}_1^-, \tilde{v}_2^-, \dots, \tilde{v}_n^-\} \tag{12}$$

$$\tilde{v}_i^* = Max_i\{\tilde{v}_{ij1}\} \quad i = 1,2,\dots,m, j = 1,2,\dots,n \tag{13}$$

$$\tilde{v}_i^- = Min_i\{\tilde{v}_{ij1}\} \quad i = 1,2,\dots,m, j = 1,2,\dots,n \tag{14}$$

7. Computation of distance from Ideal solution and Negative Ideal Solution:

$$S_i^* = \sum_{j=1}^{n} d(\tilde{v}_{ij}, \tilde{v}_j^{\,*}) \quad , i = 1,2,\dots,m \tag{15}$$

$$S_i^* = \sum_{j=1}^{n} d(\tilde{v}_{ij}, \tilde{v}_j^{\,-}), \quad i = 1,2,\dots,m \tag{16}$$

$$d_v(\widetilde{M}_1, \widetilde{M}_2) = \sqrt{\frac{1}{3}[(a_1 - a_2)^2 + (b_1 - b_2)^2 + (c_1 - c_2)^2]} \tag{17}$$

8. Similarity Index Computation:

$$CC_i = \frac{S_i^-}{S_i^* + S_i^-} \quad i = 1,2,\dots,m \tag{18}$$

4. Result

As mentioned before, 10 main scales with 36 sub scales for esablishment of Green Chain Supply have been identified. Then with screening and weighting Fuzzy and decimal (Table 2), finally 20 sub-scales determined which classified in 7 major group (the main criteria) (Table 3). At last, according the results mentioned in Table 3, the sub-scales with had the heavier weights selected.

Table 3

Screening and weighting Fuzzy and decimal

Name of	Scale	Sub Scale	Fuzzy Normalized	Decimal Normalized	Normalized
C_1	Interior Environmental Management	s_1	0.0401571	0.0391694	0.039663
		s_2	0.0395564	0.0387986	0.039178
		s_3	0.0381238	0.0373154	0.03772
		s_4	0.0221812	0.0226859	0.022434
		s_5	0.033549	0.0328659	0.033207
C_2	Designing Improvement	s_6	0.0159889	0.0174274	0.016708
		s_7	0.0203327	0.0212364	0.020785
		s_8	0.0249538	0.0250624	0.025008
C_3	Production Process Improvement	s_9	0.0269871	0.0268489	0.026918
		s_{10}	0.0260629	0.0261073	0.026085
		s_{11}	0.0318392	0.0313153	0.031577
		s_{12}	0.0154806	0.0166689	0.016075
		s_{13}	0.0304529	0.0302029	0.030328
		s_{14}	0.0319778	0.0313827	0.03168
		s_{15}	0.022597	0.227365	0.022667
		s_{16}	0.034658	0.0339614	0.03431
C_4	Non Production resource management	s_{17}	0.033549	0.0328491	0.033199
		s_{18}	0.0348429	0.0342985	0.034571
C_5	Loss Management	s_{19}	0.038586	0.0376862	0.038136
		s_{20}	0.0374769	0.0365739	0.037025
C_6	Education and culture building	s_{21}	0.0279113	0.0276411	0.027776
		s_{22}	0.0271719	0.0272534	0.027213
		s_{23}	0.0121996	0.0136183	0.012909
		s_{24}	0.0170518	0.0181689	0.01761
		s_{25}	0.0228281	0.0234443	0.023136
C_7	Environmental external management	s_{26}	0.038586	0.0376862	0.038136
		s_{27}	0.0324861	0.0320738	0.03228
		s_{28}	0.0371534	0.0362031	0.036678
		s_{29}	0.0319778	0.0313153	0.031647
C_8	Final production turnover improvement	s_{30}	0.0288817	0.0287366	0.028809
		s_{31}	0.030268	0.0298321	0.03005
C_9	Logistic	s_{32}	0.0207486	0.0212364	0.020993
		s_{33}	0.0169131	0.0181858	0.017549
		s_{34}	0.0155268	0.017006	0.016266
C_{10}	External impressions	s_{35}	0.0254621	0.0257365	0.025599
		s_{36}	0.0154806	0.0166689	0.016075

Table 3

Descending order of sub-scales by Normalized weight

Sub Scale	Name of Sub Scale	Normalized Weight	Rank
Senior and Middle Management Assert	S_1	0.039663	1
Obtaining environmental management certificates	S_2	0.039178	2
Loss Decrease	S_{19}	0.038136	3
Obtaining ISO1400 Certificate by Suppliers	S_{26}	0.038136	4
Environmental policies and politics	S_3	0.03772	5
Waste management System	S_{20}	0.037025	6
Compliance the environmental guidelines by suppliers	S_{28}	0.036678	7
Modifying consumption patterns	S_{18}	0.034571	8
Optimizing energy consumption	S_{16}	0.03431	9
Implementation of environmental audits	S_5	0.033207	10
Management and control of harmful plants	S_{17}	0.033199	11
Selecting and evaluation of suppliers' performance	S_{27}	0.03228	12
Reduce production waste	S_{14}	0.03168	13
Cooperation and exchange of views with stockholders	S_{29}	0.031647	14
Reduce emissions by internal processes	S_{11}	0.031577	15
Reverse logistics system	S_{13}	0.030328	16
Adopting of clean technology equipment	S_{31}	0.03005	17
Emission reduction due to final production	S_{30}	0.028809	18
Participation of all employees	S_{21}	0.027776	19
Increasing knowledge and awareness	S_{22}	0.027213	20

Next, by implementation of DMATEL technique the amount of R+J, R-J and R, J are computed shown in Table 4.

Table 4
The summary of calculation for (R+J), (R-J), (R), (J)

Priority order	Name of Sub Scale	R-J	Priority order	Name of Sub Scale	R+J
1	C5	1.459	1	C13	6.307
2	C1	1.415	2	C2	6.134
3	C19	1.009	3	C15	5.931
4	C10	0.943	4	C6	5.870
5	C20	0.916	5	C10	5.728
6	C4	0.644	6	C5	5.716
7	C7	0.34	7	C3	5.675
8	C17	0.311	8	C7	5.490
9	C14	0.247	9	C16	5.437
10	C8	-0.05	10	C18	5.214
11	C11	-0.24	11	C8	5.170
12	C9	-0.3	12	C12	5.132
13	C16	-0.45	13	C4	5.078
14	C6	-0.46	14	C17	5.049
15	C12	-0.51	15	C9	4.843
16	C18	-0.59	16	C19	4.822
17	C2	-0.62	17	C20	4.664
18	C15	-0.7	18	C11	4.657
19	C13	-1.21	19	C1	4.456
20	C3	-2.14	20	C14	4.446

Table 5
Linguistic variables to rank the options

importance	Very poor	poor	Average poor	Akin	Average good	Good	Very good
Fuzzy Number	(0,0,1)	(0,1,3)	(1,3,5)	(3,5,7)	(5,7,9)	(7,9,10)	(9,10,10)

Table 6
Green Supply Chain Scales' Ranking

Options	contraction	Distance from Positive ideal	Distance from Negative ideal	Similarity Index	Ranking
Loss Management	A_4	11.670	12.121	0.547	1
Product Process improvement	A_2	11.461	12.264	0.517	2
Interior environmental Management	A_1	12.185	11.518	0.509	3
Non-Production resource management	A_3	10.590	12.775	0.486	4
Environmental external management	A_6	18.640	9.433	0.484	5
Final production turnover improvement	A_7	11.911	11.194	0.429	6
Education and culture building	A_5	13.429	10.081	0.336	7

5. Conclusion

Studying the literature of the research and interviewing experts, 10 scales with 36 sub-scales identified and by screening them, 7 main scales and 20 sub-scales were selected. The results of our investigation have illustrated that the reduction of production loss had the strongest impact on other sub-scales. In addition, obtaining environmental management certificates and reduction of interior product process' pollution as the other sub-scale have maintained the minority interaction with other elements. Regarding the influence of the elements, Loss reduction element has been the most influential elements among the others and the reduction of interior process' pollution sub-scale stands on the second place. Other sub-scales stand respectively on following places from the influential point of view. The obtained results from the Fuzzy TOPSIS technique illustrates that the loss management stands on first place. Therefore, the organization for implying Green Supply Chain Management should invest more on loss management element. The improvement of production process and interior environmental management stand on the second and the third place. The other subscales stand on other rankings. Therefore, regarding the obtained results, it is suggested that the organizations start establishing and codifying a systematic and regular plan for proper implementation of waste system for industrial waste disposal which is harmful for environment. In addition, it is expected from the company, due to the importance of the improvement of production process' element, to choose the raw material, which is not harmful for environment and to replace the substances, which are environmentally friendly. In addition, controlling the pollutants in production process plays a vital role in achieving environmental targets in Supply Chain. It is advised to the company to apply the new technologies for reduction of pollutants in inter organizational process. It's also recommended the clean technologies for optimizing the energy consuming inside the organization applied in order to prevent the resource loss.

References

Akman ,G. & Piskin, H. (2013). Evaluating green performance of suppliers via ANP and TOPSIS. *Journal of Industrial Engineering*, 60,106-115

Asgharpour, J. (2011). Multi Index Decision making. 9th ed., Tehran University Publications, Tehran.

Azar, A. (2012). *Strategic Decision Making with MADM*. Negah e Danesh Publications, Tehran

Balon, V., Sharma, A. K., Barua, M. K., & Katiyar, R. (2012). A Performance Measurement of Green Supply Chain Management in Indian Auto Industries. In *National Conference on Emerging Challenges for Sustainable Business* (p. 1577).

Bowen, F., Cousins, P., Lamming, R, & Faruk, A. (2001). Horses for courses: Explaining the gap between the theory and practice of green supply. *Journal of greener Management International*, 35, 41-60

Bowen, F., Cousins, P., Lamming, R. & Faruk, A. (2001). The role of supply management capabilities in green supply. *Production and Operations Management*, 10(2), 174-189

Brorson, T., Nawrocka, D. & Lindhqvist, T. (2009). ISO 14001 in environmental supply chain practices. *Journal of Cleaner Production*, 17(16), 1435-1443

Chandra, P. & Fisher, L. (2003). Coordination of production and distribution planning. *MSc Thesis, Faculty of Management, MC Gill University*.

Cousins, P., Lamming, R. & Bowen, F. (2004). The role of Risk in environment related supplier initiatives. *International Journal of Operation and Production Management*, 24(6), 554-565

Eiadet, M., Kelly, A., & Roche, F. (2008). Green and Competitive? An empirical test of the meditating role of environmental innovation strategy. *Journal of World Business*, 43(2), 131-145

Emiliani, M.L. (2000). Supporting small businesses in their transition to lean production. *International Journal of Supply Chain Management*, 5(2), 66-70

Envirowise, M. (2001). *Cost and environmental benefits from supply chain partnerships: Mentor guide*.

Farahani, Z.R., Asgari, N. & Davarzani, H. (2009). *Supply chain and logistic in national, International and governmental environment*. Springer-Verlag Berlin Heidelberg

Gabus, A. & Fontela, E. (1971). *World problems an invitation to further thought within the framework of DEMATEL*. Switzerland Geneva: Battelle Geneva Research Centre.

Green, K., Morton, B., & New, S. (1996). Purchasing and environmental management: interactions, policies and opportunities. *Business Strategy and the Environment*, *5*(3), 188-197.

Hajmohammad, S., Vachon, S., Klassen, R. D., & Gavronski, I. (2013). Lean management and supply management: their role in green practices and performance. *Journal of Cleaner Production*, *39*, 312-320.

Handfield, R.B. & Nichols, E.L. (2005). *Introduction to supply chain management*. Prentice Hall, New Jersey, USA.

Hillary, R. (2000). The eco-management and audit scheme, ISO 14001 and the smaller firm. *Small and medium-sized enterprises and the environment: Business imperatives*, *1*(80), 128-147.

Imani, D, M. & Ahmad, i,A. (2009). Green Supply Chain Management the new strategy for obtaining competition preference. *Car and Industry related Engendering,* 1(10), 14-19.

Lin, R. J. (2013). Using fuzzy DEMATEL to evaluate the green supply chain management practices. *Journal of Cleaner Production*, *40*, 32-39.

Lin, R. J., Chen, R. H., & Nguyen, T. H. (2011). Green supply chain management performance in automobile manufacturing industry under uncertainty. *Procedia-Social and Behavioral Sciences*, *25*, 233-245.

Kahraman, C., Sezi, C., Nüfer ,.Y. & Murat, G. (2007). Fuzzy Multi Criteria Evaluation of Industrial Robotic Systems. *Computers and Industrial Engineering*, 52(4), 414-433

Koplin, J., Seuring, S. & Mesterharm, M. (2007). Incorporating sustainability into supply management in the automotive industry: The case of Volkswagen. *Journal of Cleaner Production*, 15(11-12), 1053-1062

Lamming, R. & Hampson, J. (1996). The Environment as a supply chain management issue. *Journal of British Journal Management*, Special issue, 45-62

Lee, A.H., Kang, H.Y., Hsu, C.F. & Chu Hung, H. (2009). A Green supplier selection model for high-tech industry. *Expert Systems with Applications*, 36(4), 7914-7927

Lewis, H. & Gretsakis, J. (2001). *A Global guide to designing greener goods*. Sheffield, U.K, and Greenleaf Publishing.

Linton, J.D., Klassen, R., & Vaidvanathan, J. (2007). Sustainable supply chains: An introduction. *Journal of Operation Management*, 25(6), 1075-1082

Morrow, D., & Rondinelli, D. (2002). Adopting Corporate Environmental Management Systems: Motivations and Results of ISO 14001 and EMAS Certification. *European Management Journal*, *20*(2), 159-171.

Ninlawan, C., Seksan, P., Tossapol, K., & Pilada, W. (2010). The implementation of green supply chain management practices in electronics industry. In *Proceedings of International Multi Conference of Engineers and Computer Scientists* (Vol. 8).

Ofori, G., Gang, G., & Briffett, C. (2002). Implementing environmental management systems in construction: lessons from quality systems. *Building and Environment*, *37*(12), 1397-1407.

Rao, P., & Holt, D. (2005). Do green supply chains lead to competitiveness and economic performance?. *International Journal of Operations & Production Management*, *25*(9), 898-916.

Safarzadeh, H., Masdar, M. & Mosveh Mobarakeh, A. (2011). Concepts Supply Chain, Thesis's and usages, 1st ed., ketab e Mehraban e Nashr Publication, Tehran.

Samson, A. and Simpson, D. (2008). Developing strategies for green supply chain management. *Journal of Operation and Production Management*, 27(1), 28-48

Securing, S., & Muller, M. (2008). From a literature review on a conceptual for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710

Shen, L.Y., & Tam, V. (2002). Implementation of environmental management in the Hong Kong construction industry. *International Journal of Project Management*, 20(7), 535-543

Shen,L., Olfat, L., Govindan, K., Khodaverdi, R., & Diabat, A. (2013). A fuzzy multi criteria approach for evaluating green suppliers performance in green supply chain with linguistic preferences. *Journal of Resources, Conservation and Recycling*, 74,170-179

Srivastava, S. K. (2007). Green supply chain management: A state of the art literature review, *International Journal of Management Review*, 9(1), 53-80

Starkley, R. (2000). *Environmental Management Tools, Some Options for Small and Medium Sized Enterprises and the Environment*. Greenleaf Publishing Sheffield, UK

Stevels A. (2002). *Green supply chain management Much More Than Questionnaires and ISO 1400*, IEEE, 96-100.

Theyel, G. (2002). Customer and supplier relations for environmental performance. *Journal of Greener Management International*, 35, 61-69

Tseng, M. L., & Chiu, A. S. (2013). Evaluating firm's green supply chain management in linguistic preferences. *Journal of cleaner production*, *40*, 22-31.

Verma, R., & Vhatkar, V. (2005). REVERSE LOGISTICS: An Important dimension of Supply Chain Management. *National Institute of Industrial Engineering, Mumbai, PGDIE Class of.*

Wu, K. J., Tseng, M. L., & Vy, T. (2011). Evaluation the drivers of green supply chain management practices in uncertainty. *Procedia-Social and Behavioral Sciences*, *25*, 384-397.

Wu, J., Dunn, S. & Forman, H. (2012). A study on green supply chain management practice among large global corporation. *Journal of Supply Chain and Operation Management*, 10(1), 182-194

Zhu, Q. & Sarkis, J. (2006). An inter sectoral comparison of green supply chain management in the china: Drivers and practice. *Journal of Cleaner Production*, 14(5), 427-786

Zhu, Q. & Sarkis, J. (2004). Relationships between operational practices and performance among early adopters of green supply chain management practices in Chinese manufacturing enterprises. *Journal of Operation Management*, 22(3), 265-289

Zhu, Q., Arkis, J. & Lai, K.H. (2008). Green Supply Chain Management Implication for closing the loop. *Journal of Transportation Research Part E: Logistics and Transportation Review*, 44(1), 1-18.

Zhu, Q., Sarkis, J., Cordeiro, J., & Hung Lai, K. (2008). Firm Level correlates of emergent green supply chain management practices in the Chinese context. *Journal of Omega*, 36(4), 577-591

Zhu, Q., & Sarkis, J. (2007). The moderating effect of institutional pressures on emergent green supply chain practices and performance. *International Journal of Production Research*, 45(18-19), 4333-4355

Zhu, Q. & Sarkis, J. (2006). An inter-sector comparison of green supply chain management in china: Drivers and practices. *Journal of Cleaner Production*, 14(5), 472-486.