

Social Responsibility in Environmental Marketing Planning of Petro Chemical Companies

Hashem Nikoumaram¹, Hossein Vazifedoust², Banafshe Golpour³

¹Department of Business Management, Science and Research Branch,

²Department of Business Management, Science and Research Branch,

³Department of Business Management, Science and Research Branch,

B.Golpour@gmail.com

Abstract: Petroleum industry performs a significant role in forming the economic, political, and social well-being of the nations. The petroleum industry is a high capital (asset) intensive industry. Considering the fact that petroleum and petrochemical products are inherently environmental pollutants; in current study petrochemical companies are evaluated to examine social responsibility in values, and environmental emphasis in their marketing planning. Iranian petrochemical companies were studied as an example of oil and petroleum producer and exporter. The survey question is: Is there a meaningful relationship between strategic marketing planning's approach and marketing performance? And research purpose is: determining the effective factors on social responsibilities in environmental marketing planning of petrochemical companies. Using Iisrel 8.7 validity and reliability of the structured questioner examined. Collected data from 59 Iranian petrochemical companies, factor analyzed by means of Spss 19. Results revealed in petrochemical companies there is no meaningful relationship between strategic marketing planning's approach and marketing performance, and the results also confirmed these factors as effective ones: organizational philosophy and values, social responsibility base strategies, planes and tools, customer guiding to sustainable development.

[Hashem Nikoumaram, Hossein Vazifedoust, Banafshe Golpour. **Social Responsibility in Environmental Marketing Planning of Petro Chemical Companies.** *J Am Sci* 2012;8(11):713-719]. (ISSN: 1545-1003). <http://www.americanscience.org>. 100

Keywords: Social Responsibility, Marketing Planning, Petroleum Companies

Introduction

The traditional company and company regulations only subject was increasing the profits of the company and its stockholders, and all regulations must be constructed around this objective. Supporters of company social responsibilities believe maximizing the profits is only one of the goals. Besides this goal, a company should also protect and improve the society's common wealth; the company regulations should maintain the balance between it and thus the concept of corporate social responsibilities as the obligation of its managers is defined (Zhang 2010). And also traditionally, the natural and physical environment, considered as an external influence on the process and content of managerial decision making, is now concerned as central to marketing and management strategy. Although the idea of integrating environmental issues into the process and the content of marketing strategy is not new (Kassarjian 1971; Henion and Kinnear 1976), the idea of integrating has derived into mainstream marketing consciousness over the past ten years (McDaniel and Rylander 1993; Drumwright 1994; Sheth and Parvatiyar 1995). Similarly, firms have already started included environmental criteria or environmental elements into their marketing strategies to be competitive in the marketplace. Consider the following developments within the investment, competitive, and regulatory

arenas that bring about environmental concerns real and immediate for businesses. There is now a general consensus within the business and consumer communities that the environmental or so-called green market appears to be real and increasing (Coddington 1993). The transitions in society are forcing companies to contemplate the views of various interest groups in decision making, specially the consumers. Also, consumer surveys over the past decade bring a light to a growing segment of consumers who either reward or intend to reward firms that address environmental concerns in their business and marketing practices and who penalize firms that seems to neglect the environmental imperatives (Carlson, Grove et al. 1996). Making relationships with customers, suppliers, employees, communities and other stakeholders can become central to competitiveness and form the foundation for a new, progressive and people centered corporate strategy This will show us the increased importance of corporate social responsibility (CSR) (Palazzi and Starcher 1997; Mazarr 1999).

Materials and Methods

However, there is no single, commonly recognized definition of corporate social responsibility (CSR), It generally guided to business decision making bonded to ethical values, compliance with legal requirements, and respect for people,

communities and the environment (Kärnä, Hansen et al. 2003). Company responsibilities are often classified to economic, social, and environmental categories (Peattie and Charter 1992; Peattie 2001). Corporate environmentalism, i.e. the recognition and integration of environmental concerns into a firm's decision-making process, is one way that business can address environmental issues. (Banerjee, Iyer et al. 2003)

About social responsibility, the different sectors of the economy need to be dealt with differently (Fiorino 1996). Considering to Banerjee's classification there is two types of industries high environmental impact [HEI] and moderate environmental impact [MEI] sectors (Banerjee, Iyer et al. 2003).

Banerjee's study was founded on significant differences that are recorded along four dimensions: amount of pollution, level of public concern, stringency of environmental regulations, and environmental liability risks. First, there is empirical evidence that amount of pollution and its toxicity is differing from industry to industry. The EPA, on the basis of the Toxic Chemical Release Inventory, has consistently rated the chemical industry as one of the biggest polluters (Ochsner 1997; Hoffman 1999) and labeled utilities and manufacturing industries "dirty" (Levy 1995; Ochsner 1997). Second, level of public concern for the environment varies with industry, and its impact will be more acute on dirty industries, such as chemicals, than on "clean" ones, such as consulting. Third, firms in dirty industries are more severely regulated than their clean counterparts, so the cost of compliance is significantly higher (Lanjouw and Mody 1996; Jaffe and Palmer 1997). Fourth and last, environmental litigation disproportionately affects smokestack industries that face greater environmental liability risks (Hoffman 1999). Has documented a 5400% increase in environmental cases filed in the courts between 1970 and 1993. These dimensions justify our operationalization, enabling us to test for the moderating role of industry.

The importance of the petroleum industry is not confined to the national economy of the Middle Eastern countries. Oil from the Middle Eastern countries (specifically the Persian Gulf) explains for 17% of US imported oil, and it is expected that the dependence of US on the Middle East oil will escalate (Cohen 2006). Middle East oil is not just important because it is the fuel for the economic growth in the world but also because access to it and its use are becoming intimately intertwined with national security (Salameh 2003). In the US, the petroleum industry supports more than 9.2 million jobs, and accounts for 7.5% of the GDP. During 2004–2007, the petroleum industry created about 2 million jobs (Ernst

and Young 2008). The International Energy Administration (IEA) forecast suggests that out of the total \$22 trillion investment in the energy section during 2006–2030, \$9.6 trillion dollars should be in the petroleum industry. Accordingly, petroleum industry plays a significant role in shaping the economic, political, and social well-being of the nations. The petroleum industry is a high capital (asset) intensive industry. From the production/operations management perspective, the petroleum industry has several unique characteristics that distinguish it from other industries (Varma, Wadhwa et al. 2008): As a result the current research's concern is evaluation of Social Responsibility in Environmental Marketing Planning of Petro Chemical Companies.

Marketing connects the company and its markets in a societal context. Fulfilling the needs of customers in a profitable way is the core of marketing ideology and in turn is a core of the market economy. Environmental or green marketing recognized as a tool towards sustainable development and satisfaction of different stakeholders.

Objectives of the study

The objective of current study is recognizing the effective factors on social responsibility in environmental marketing planning, and also, the research's hypothesize is: There is no meaningful relationship between moderate approach to strategic marketing planning and marketing performance.

Data Collection

Current study's data was collected via structured quantitative questionnaire, with 28 items and 3 dimensions (Dimensions of environmental marketing strategies, marketing structures, and environmental marketing functions).

Iran was selected as the representative country in the Middle East because of its major role in petroleum industry in the world. Iran is the fourth oil producer in the world, has the second largest reservoirs of oil and gas in the world, and is a major power in the international oil and gas market. In addition, the implementation of socially responsible practices is industry dependent (King, Lenox et al. 2005). The petroleum industry is one of those industries that are required to implement and integrate environmentally regulated practices. Therefore, it provides a suitable context to examine the effect of social responsibility on organizational performance. Data collected from sales and marketing managers of 59 Iranian petrochemical companies.

Research independent variables were (marketing units) used in the empirical study and their relationship to the model of environmental marketing.

The theoretical framework of the study is showed in figure 1. The model is based on the integrated model of marketing planning (Kärnä, Hansen et al. 2003). Concepts by (Ansoff 1965) have especially inspired the conceptual ideas and the hierarchy presented in the model. The model contains the usual components of marketing planning presented in marketing textbooks (Kotler 1972). However, the background ideology and hierarchical structure differ notably from the most common models, e.g. the frequently-used four P model, presented in marketing textbooks. Environmental marketing in this model means that environmental issues are genuinely integrated into marketing decisions on three hierarchical levels: marketing strategies, structures and functions. Environmental marketing planning should be based on business values emphasizing social and environmental responsibility.

The core of environmental marketing is the strategic product and customer decisions in which environmental issues are emphasized and environmental strengths are used as a competitive advantage. Implementation of the strategies is not possible without structures (e.g. management systems, organization, contact channels) taking environmental issues into account. Marketing structures and functions (communication, advertising, personal relationships) should be planned so that they carry out and support the environmental marketing strategies. However, an insufficient relationship among strategies, structures, and functions can lead to unfounded claims about a company's environmental performance. This kind of green washing^o is the misuse of the principles of environmental marketing. (Juslin and Olsson 1997) The integration of environmental issues into business values and marketing planning examined in this study tests, by using the terminology of Miles and Covin (2000), if corporations are adopting the compliance model or the strategic model of environmental management (Miles and Covin 2000). Also the desired direction of a new marketing orientation suggested by (Sheth and Parvatiyar 1995) is tested by examining the dimensions of social responsibility in relation to environmental marketing. Furthermore, green innovations as a source of competitive advantage proposed by Porter and van der Linde (1995) fit well in this theoretical framework (Porter and Van der Linde 1995).

Operationalization of variables used to measure business values and environmental marketing planning are presented within the results of a series of factor analyses Overall the operationalizations used in this study are not industry specific and can be applied to any industry sector.

Instrument development

The scale items were chosen originally to reflect The 3 dimensions of environmental marketing strategies (abbreviate to EMS), marketing structures (abbreviate to MS), environmental marketing functions (abbreviate to EMF) factors representing each of these variants of mentioned dimension were anticipated to appear. The 28 items were factor analyzed based on quota sample of 72 Iranian petroleum companies.

A validated scales wherever possible but adapted the scales to reveal the context of our study. As our study associated to Marketing planning and petroleum companies, two engineers and one marketing researcher appraised the survey instrument for validity. The instrument was also evaluated by a focus group of five people to discover any ambiguities in wording and format.

The questionnaire was originally formed in English and then translated into Persian by a bilingual interpreter. It was then back translated from the Persian into English by another bilingual interpreter. There were few discrepancies, and all were resolved before distributing the questionnaire. All items were calibrated on a seven-point Likert scale (from 1 = strongly disagree to 7 = strongly agree).

Data collection

Constructed questionnaire disseminated between 72 Iranian petrochemical companies in Tehran. In order to limit unanswered questions an interviewer was attend to answer any existing question. Sales and Marketing managers was asked to fill the questionnaires. All of them were men, with age between 35 and 65.

Instrument Validation

In first step data analysis was examining the measurement instrument validity and reliability by means of LISREL. Initially, unidimensionality was tested to ensure that each measurement item had only one underlying construct. None of the items was rejected for this reason. The fit indices showed that the model fit was good: the normed X^2 was 1.77 the RMSEA was 0.086, the standardized root mean-square residual (RMR) was 0.040, the goodness-of-fit index (GFI) was 0.82, the adjusted GFI (AGFI) was 0.80, the comparative fit index (CFI) was 0.89, and the normed fit index (NFI) was 0.94. In order to validate the survey instrument, convergent and discriminant validity tests were conducted (table 1). The composite reliability (CR) and Cronbach's for all constructs was more than 0.7. The average variance extracted (AVE) for each construct exceeded 0.5. Therefore, the convergent validity for the constructs was confirmed.

The discriminant validity of the measurement model was estimated by correlating the square root of the AVE for each construct with the correlations between that construct and others. Discriminant validity was formed because the AVE for a given construct excelled the correlations between it and others.

A constrained test was performed for discriminant validity. Its results showed that all χ^2 statistics ($D\chi^2$ ranging from 587 to

808) were significant, revealing that the measurement model was significantly better than the alternatives (obtained by combining pairs of latent constructs). Thus, the discriminant validity of the instrument was established.

After confirming validity and reliability, collected data examined for correlations

Exploratory factor analysis (EFA) which is a complex, multi-step process, was applied to evaluate Social Responsibility in environmental marketing planning of petro chemical companies.

Table 1 Convergent validity results calculated via Lisrel.

Item	Std.loading	t-Value	AVE	CR	Alpha
EMF1	0.76	15.7	0.75	0.92	0.92
EMF2	0.98	14.5	0.76	0.92	0.92
EMF3	0.78	16.9	0.98	0.92	0.92
EMF4	0.85	16.1	0.78	0.94	0.90
EMF5	0.79	15.5	0.85	0.76	0.91
EMF6	0.85	15.5	0.73	0.98	0.79
EMF7	0.81	15.4	0.	0.78	0.93
EMF8	0.90	13.2	0.76	0.85	0.85
EMF9	0.91	16.4	0.98	0.76	0.92
EMF10	0.79	15.5	0.78	0.91	0.92
EMF11	0.93	18.7	0.85	0.79	0.89
EMS1	0.85	18.9	0.74	0.93	0.87
EMS2	0.90	16.4	0.91	0.85	0.97
EMS3	0.68	14.0	0.79	0.90	0.92
MS1	0.94	13.2	0.93	0.91	0.91
MS2	0.68	16.5	0.85	0.89	0.79
MS3	0.98	11.3	0.90	0.91	0.93
MS4	0.68	18.8	0.76	0.79	0.85
CSR1	0.94	18.1	0.76	0.93	0.90
CSR2	0.95	13.2	0.98	0.85	0.93
CSR3	0.93	16.4	0.78	0.87	0.90
CSR4	0.85	11.3	0.85	0.88	0.89
CSR5	0.93	20.2	0.76	0.95	0.92
CSR6	0.85	12.8	0.89	0.91	0.92
CSR7	0.94	13.3	0.88	0.94	0.93
CSR8	0.98	11.3	0.77	0.91	0.94
CSR9	0.95	17.0	0.89	0.98	0.89
CSR10	0.90	17.2	0.93	0.92	0.97
CSR11	0.90	15.1	0.92	0.98	0.91

Exploratory factor analysis (EFA) could be described as orderly simplification of interrelated measures (Suhr and Colorado 2006). EFA, traditionally, has been used to explore the possible underlying factor structure of a set of observed variables without imposing a preconceived structure on the outcome (Child 2006). By performing EFA, the underlying factor structure is identified (Suhr and Colorado 2006). The first step when performing a factor analysis is to assess the suitability of the data for factor analysis. This involves inspecting the correlation matrix for coefficients of .3 and above, and calculating the Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) and Bartlett's Test of Sphericity (Ferguson and Cox 1993). This information can be obtained from SPSS in the same analysis as used for Factor Extraction (Table 2).

Table 2. Extraction Method: Principal Component Analysis. Spss. Calculated by Authors

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	1.865	5.651	5.651	1.865	5.651	5.651
2	1.755	5.318	10.970	1.755	5.318	10.970
3	1.683	5.100	16.069	1.683	5.100	16.069
4	1.516	4.593	20.662	1.516	4.593	20.662
5	1.445	4.378	25.040	1.445	4.378	25.040
6	1.365	4.136	29.176	1.365	4.136	29.176
7	1.329	4.027	33.204	1.329	4.027	33.204
8	1.293	3.919	37.122	1.293	3.919	37.122
9	1.275	3.862	40.985	1.275	3.862	40.985
10	1.173	3.553	44.538	1.173	3.553	44.538
11	1.158	3.508	48.046	1.158	3.508	48.046
12	1.131	3.427	51.473	1.131	3.427	51.473
13	1.080	3.272	54.745	1.080	3.272	54.745
14	1.053	3.190	57.935	1.053	3.190	57.935
15	1.017	3.082	61.017	1.017	3.082	61.017
16	1.005	3.046	64.063	1.005	3.046	64.063
17	.954	2.892	66.955			
18	.936	2.837	69.792			
19	.908	2.752	72.544			
20	.882	2.671	75.215			
21	.828	2.510	77.726			
22	.787	2.386	80.111			
23	.740	2.242	82.353			
24	.709	2.147	84.500			
25	.699	2.118	86.618			
26	.659	1.996	88.614			
27	.623	1.889	90.503			
28	.615	1.863	92.366			
29	.577	1.748	94.115			
30	.568	1.721	95.836			
31	.519	1.574	97.410			
32	.496	1.503	98.912			
33	.359	1.088	100.000			

Results

Considering table 3 the components that have an eigen value of 1 or more is considered to determine how many factors to extract. As it's showed in Cumulative % column first 16 factors components explain a total of 66.857 percent of the variance.

As table 5 shows, main loading on component

As table 5 shows, main loading on component 1 (**Environmental Marketing Functions**) are items **EMF1, EMF2, EMF3, EMF6, EMF7**. The main Items on component 2 (**Environmental Marketing Structure**) are, **EMS1, EMS2**. The main items on third component (**Company Social Responsibility**) are **CSR1, CSR2, CSR3**. The significant results of

conducting EFA show the main items of first component.

1. **EMF 1:** Frequency company procedures: examining environmental information in business decision making
2. **EMF 2:** Frequency company procedures: consideration of environmental concerns in strategic planning
3. **EMF 3:** Frequency company procedures: inviting input from environmental groups when making environmental business decisions
4. **EMF 6:** Certification leads to a price premium for the product in question.

5. **EMF 7:** How strong an impact have environmental issues had in pricing of a company's products (e.g. green premium).

The most significant result about the first component is **EMF 1** which is the highest loading of component. The primitive loadings second component or (**Environmental Marketing Structure**) was 2 items:

1. **EMS 1:** In your strategic product decisions, how much is the environmental friendliness of the product emphasized?
2. **EMS 2:** When selecting your most important customer group(s), how important is their level of environmental awareness in your decision making.

There are three items extracted for indicating the third component:

1. **CSR 1:** Companies should redirect their customers towards less environmentally harmful consumption.
2. **CSR 2:** Companies should use marketing tools to redirect customer behaviour towards environmentally sustainable consumption.
3. **CSR 3:** Environmentally friendly products are a necessity in the future and the price will include the associated costs.

Considering the highest loading on each of the components, the nature of underlying latent variable represented by each component was identified and they are present as follows:

First component: **EMF 1**

Second component: **EMS 1**

Third component: **CSR3**

Considering table 3 the components that have an eigen value of 1 or more is considered to determine how many factors to extract. As it's showed in Cumulative % column first 16 factors components explain a total of 64.063 percent of the variance from 28 factors 16 factor extracted the 4 and the most important items are as the following:

1. organizational philosophy and values,
2. social responsibility base strategies,
3. planes and tools,
4. customer guiding to sustainable development

Discussion of findings

Study's results revealed that despite the fact that the majority of petrochemical companies were being committed to environmental issues in implementing strategic planning and applying and enforcement ideas and policies they didn't work well and they need for motivation and education.

To evaluated organizations are suggested to, reduce the meaningful distance between strategic and policies making and operational levels.

Considering the results of the curve estimation via regression, the most compatible

functions with the proposed problem were found to be of cubic and quadratic types. In other words, in case one wants to find a relationship between the company social responsibility (environmental marketing functions), environmental marketing strategies, marketing structures parameters, the best function to fit the problem will be of cubic or quadratic type. Finding the exact function is out of the scope of this research and is another story; therefore, it is suggested to other researchers to continue the subject by going for finding the mathematical relationships as a suggestion for further studies.

Conclusion

The current study evaluated the role of environmental issues -as social responsibility- in Marketing planning of Petrochemical companies. , the scale has been tested using exploratory factor analysis on a sample of 72 Iranian Petroleum companies. After analyzing the results of factor analyzes the research question which was about meaningful relationship between moderate approach to strategic marketing planning and marketing performance answer is revealed. Although all the companies has a great considerations about environmental issues but there was not a significant correlation between strategic marketing planning and marketing performances. Research purpose was find out the effective factors on social responsibilities in environmental marketing planning of petrochemical companies the following facto

Regarding the current world's economy, political, and as a result social situation has a great impact on companies different attitudes especially on strategic planning of petroleum companies because of its prominent role, as a suggestion for future research evaluating the economical and political on environmental planning could be a effective help to supporting social responsibility of organizations.

Corresponding Author:

Banafshe Golpour

Department of Business Management, Science and Research Branch

E-mail: B.Golpour@gmail.com

References

1. Ansoff, H. I. (1965). Corporate strategy: An analytic approach to business policy for growth and expansion, McGraw-Hill New York.
2. Banerjee, S. B., E. S. Iyer, et al. (2003). "Corporate environmentalism: antecedents and influence of industry type." Journal of marketing: 106-122.
3. Carlson, L., S. J. Grove, et al. (1996). "Does environmental advertising reflect integrated

- marketing communications?: An empirical investigation." Journal of Business Research **37**(3): 225-232.
4. Child, D. (2006). The essentials of factor analysis, Continuum Intl Pub Group.
 5. Coddington, W. (1993). Environmental marketing: positive strategies for reaching the green consumer, McGraw-hill New York.
 6. Cohen, A. (2006). "US Interests and Central Asia Energy Security." Background(1984): 10.
 7. Drumwright, M. E. (1994). "Socially responsible organizational buying: environmental concern as a noneconomic buying criterion." The Journal of Marketing: 1-19.
 8. Ernst and Young (2008). International GAAP 2008: generally accepted accounting practice under international financial reporting standards, Wiley.
 9. Ferguson, E. and T. Cox (1993). "Exploratory factor analysis: a users' guide." International Journal of Selection and Assessment **1**(2): 84-94.
 10. Fiorino, D. J. (1996). "Toward a new system of environmental regulation: The case for an industry sector approach." Envtl. L. **26**: 457.
 11. Henion, K. E. and T. C. Kinnear (1976). Ecological marketing, American Marketing Association Chicago.
 12. Hoffman, A. J. (1999). "Institutional evolution and change: Environmentalism and the US chemical industry." Academy of Management Journal: 351-371.
 13. Jaffe, A. B. and K. Palmer (1997). "Environmental regulation and innovation: a panel data study." Review of Economics and Statistics **79**(4): 610-619.
 14. Juslin, P. and H. Olsson (1997). "Thurstonian and Brunswikian origins of uncertainty in judgment: A sampling model of confidence in sensory discrimination." Psychological review **104**(2): 344.
 15. Kärnä, J., E. Hansen, et al. (2003). "Social responsibility in environmental marketing planning." European Journal of Marketing **37**(5/6): 848-871.
 16. Kassarian, H. H. (1971). "Incorporating ecology into marketing strategy: the case of air pollution." The Journal of Marketing: 61-65.
 17. King, A. A., M. J. Lenox, et al. (2005). "The strategic use of decentralized institutions: Exploring certification with the ISO 14001 management standard." The Academy of Management Journal: 1091-1106.
 18. Kotler, P. (1972). Marketing-management, Pearson Education India.
 19. Lanjouw, J. O. and A. Mody (1996). "Innovation and the international diffusion of environmentally responsive technology." Research Policy **25**(4): 549-571.
 20. Levy, D. L. (1995). "The environmental practices and performance of transnational corporations." Transnational Corporations **4**(1): 44-67.
 21. Mazarr, M. J. (1999). Global trends 2005: An owner's manual for the next decade, Palgrave MacMillan.
 22. McDaniel, S. W. and D. H. Rylander (1993). "Strategic green marketing." Journal of Consumer Marketing **10**(3): 4-10.
 23. Miles, M. P. and J. G. Covin (2000). "Environmental marketing: A source of reputational, competitive, and financial advantage." Journal of Business Ethics **23**(3): 299-311.
 24. Ochsner, M. (1997). "Pollution prevention: an overview of regulatory incentives and barriers." NYU Envtl. LJ **6**: 586.
 25. Palazzi, M. and G. Starcher (1997). Corporate social responsibility and business success, European Bahá'i Business Forum.
 26. Peattie, K. (2001). "Towards sustainability: the third age of green marketing." The Marketing Review **2**(2): 129-146.
 27. Peattie, K. and M. Charter (1992). "Green marketing." Publishing, London.
 28. Porter, M. E. and C. Van der Linde (1995). "Green and competitive: ending the stalemate." Reader In Business And The Environment: 61.
 29. Salameh, M. G. (2003). "Quest for Middle East oil: the US versus the Asia-Pacific region." Energy Policy **31**(11): 1085-1091.
 30. Sheth, J. N. and A. Parvatiyar (1995). "Ecological imperatives and the role of marketing." Environmental marketing: Strategies, practice, theory, and research: 3-20.
 31. Sheth, J. N. and A. Parvatiyar (1995). "Relationship marketing in consumer markets: antecedents and consequences." Journal of the Academy of marketing Science **23**(4): 255-271.
 32. Suhr, D. D. and U. o. N. Colorado (2006). Exploratory or confirmatory factor analysis?, SAS Institute Cary.
 33. Varma, S., S. Wadhwa, et al. (2008). "Evaluating petroleum supply chain performance: Application of analytical hierarchy process to balanced scorecard." Asia Pacific Journal of Marketing and Logistics **20**(3): 343-356.
 34. Zhang, X. (2010). Corporate Social Responsibility Index System of China's Oil Companies, IEEE.

6/6/2012