The Feasibility of the Design and Formulation of Risk Management System Inpetrochemical Industry (Case study: NPC Ilam Province)

Mehrdad Ghanbari. Ph. D.[1], Gholamreza Tabarrostami[2], Yusef Tabarrostami [3]

Published Online: Feb. 2015

Abstract

In this study to examine the feasibility of the design and formulation of risk management system in petrochemical industry we Ilam province. How to run this descriptive research-data collection methods and the work of the research questionnaire. Validity and reliability of the questionnaire 0.89% That is the mark of compliance tools. For the data analysis of descriptive statistics (mean, frequency, percentage, etc.) inferential statistics (correlation test and T-test and analysis of variance) based on statistical software SPSS 20 is used. The results of this research have shown that between risk variables with risk management system that includes: risk management committee created being possible, potential risk, risk analysis, risk assessment, risk, risk monitoring and improvement of communication and internal and external consultation in Ilam in the petrochemical ventures alpha 0.05relationship existed.

Key words: Risk management committee, the potential risk, risk analysis, risk assessment, risk monitoring, petrochemicals, Ilam

[1]Department of Accounting, Kermanshah Branch, **Islamic Azad University**, Kermanshah, Iran .
[2]Department of Accounting, Ilam Branch, **Islamic Azad University**, Ilam, Iran
[3]Department of Accounting, Eyvan_gharb Branch, **Islamic Azad University**, Ilam, Iran. (Corresponding Author)
(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

Introduction

The importance of oil, gas and petro chemistry in macro development process of our country is clear to everyone. Ilam is a province replete with oil sources and this province provides a good part of national income and wealth. However, due to environmental changes and increasing uncertainty in changing processes, risk is becoming an inseparable component of this industry. Among these uncertainties we can name unexpected fluctuations in the price of oil and its products, detriments resulted from explosions and big fires. We can manage the risks by implementation of an accurate and regular schedule in oil project, controlling employees and making them satisfied and committed, and administration of related programs. Today, Ilam's new petro chemistry base is recently established and is moving toward expanding products and their derivatives and building equipped production units. Establishment and starting these filtration units always have some consequences such as risk accumulation and various hazards. Among these risks we can name operational and market risks which are created as a result of obligatory and uncontrollable situations. In order to minimize these situation's negative effects, we should consider some plans in the framework of designing and administrating and compiling risk management. This integrated system is composed of operational and scientific functions. The managers can depict optimum situations to confront and face possible risks by acceptance and implementation of these functions (Evan millst, 2014). According to Burkett et al (2010), Enterprise risk management (ERM), with a holistic view, is considered continually as the best approach in management. Parsian (2008) in his research investigated risk management, risk dimensions, definition and its functions in financial organizations. In this research he illustrated the types and approaches of risk managements in financial and service organizations. Also according to economic systems and sudden changes in environmental factors, risk is parted to two major types in financial organizations: product market risk and capital market risk. Both these types are divided into various dimensions in the present research. The results of this article show that financial organizations' risk is increased a lot compared to past. Lots of risks are conventional, such as the risk of losing original and peripheral capital, gain rate and monetary risk. But some of them are created newly such as rule risks, currency rate risk and human source risk. Truman (2012) stated that banks as the most important monetary bases of country face various risks. The contrast of internal and external factors and expectations of beneficiaries created so many risks for the present and future time of active banks in country. Some of these emerging risks are operational risks, which can cause banks to be bankrupted if they are not managed accurately. One of the features of bank maturity is the definition of special and integrated processes for operational risk managements. In the present study, given the necessity of using an approach is England banking industry, HSBC bank is selected as the case of study. In this research we illustrate that operational and functional risks could have damages up to 193£ million during 2008-2011. The major cause of these risks is that managers do not make functional decisions toward investments in Far East exchanges and there is a ground for economic records. Tehrani and Peymani (2008) investigated risk management in interest-free banking. They found out that according to the records of interest-free banking, there the only difference among conventional and interest-free banking is of credit risk under the title of investment. So, in interest-free banking we should present approaches for credit risk management which are different from conventional banking. Also in some other researches (Kermani, 2002; Mahdavi Najm abadi, 2002; Khan and Ahmad, 2009) risk management is studied and some suggestions are presented toward controlling and decreasing these risks. Among the important reasons we can name the request for strategic thinking in using risk management, emerging state of the art technologies, difference in function and complexity, and the relation of environmental variables (Shafai, 2002). Zarandi and Shahrestani (2010) studied using risk management strategies in petrochemical industry. They found out that using risk management strategies in this industry they can

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

have an accurate evaluation of risk and finally increase security level of activities in order to have the best output. Jabari et al (2009) investigated the risk management and evaluation in petrochemical connection tubes and they came into the result that in Chlorine tube line, the third person damage index has the highest risk rate and design index has the lowest risk rate. In addition to that, we can optimize the situation of tube lines up to 22.9% by implementing the suggestions and approaches which are presented.

The present research investigates the possibility of measurement and regularization of risk management system in Ilam to answer the following question:

Are risk management system factors in Ilam's petrochemistry feasible?

Research hypotheses

A) Main hypothesis

The factors of Ilam's risk management system in petrochemistry are recognizable.

B) Sub hypotheses

1. Creation of risk management committee in Ilam's petrochemistry is feasible.
2. Detection of potential sources of risk in Ilam's petrochemistry is feasible.
3. Risk analysis in Ilam's petrochemistry is feasible.
4. Risk evaluation in Ilam's petrochemistry is feasible.
5. Risk optimization in Ilam's petrochemistry is feasible.
6. Risk monitoring in Ilam's petrochemistry is feasible.
7. Risk connection, internal and external consultation in Ilam's petrochemistry is feasible.

Research method

Choosing a research method is the most appropriate and the best way to achieve the purpose of study. As we cannot achieve to our destination without using suitable and comfortable paths and roads, we cannot achieve to the purpose of the study without using an appropriate research method according to scientific standards. In other words, every research topic has its own suiting method. The author is expected to detect the most suitable method before beginning the research process and to mention it in the right section in the body of research (Seyyed Abbas zadeh, 2001, p150).

This research is functional in terms of purpose and has survey-descriptive method in data collection. We tried to evaluate the level and the rate of correlation between variables in addition to the investigation of the relation between them and studying each relation. Correlation test will be used in this study. So, the investigation and evaluation of all factors of design and collection in risk management fluctuations will be considered. These factors may have effects on general risk management system. The final result is the optimization of possibility measurement and designing risk management system in Ilam's petrochemistry.

As we mentioned earlier, the present study is considered to be a survey in terms of data collection, process and presenting the conclusion. In survey approach, the author does not manipulate the environment and collects data in the natural process of occurrences. The question in the present study is possibility measurement and designing risk management system in Ilam's petrochemistry. The most important internal factors are as following:

1. Creation of risk management.
2. Detection of potential sources of risk.
3. Risk analysis.
4. Risk evaluation.
5. Risk optimization.
6. Risk monitoring.
7. Risk connection, internal and external consultation.

Knowledge and awareness of managers and authorities, who are in charge of extraction specifically petrochemistry, of possibility measurement factors and designation and risk management, specifically the policies and managers' financial decisions can have significant effects on increasing profitability and decreasing loses and detriments caused by financial risks, real and legal investments,

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

financial market risks and also decreasing risk compensation expenses.

The main framework of our question is the "What" and "essence" of the research and will seek that kind of view point. In other words, in the present study we will seek to answer the following questions:

1. What is the nature of the present situation?
2. What is the relation between occurrences?
3. What is the present situation? (Sarmad et al, 2004, pp 82, 83)

In the present study determining the designing mechanism and collection of risk management, in however form, will exist before and after the study.

The priority of other research questions:

1. To what extent is the creation of risk management committee in Ilam's petrochemistry needed or feasible?
2. To what extent is the detection of potential sources of risk in Ilam's petrochemistry needed or feasible?
3. To what extent is the risk analysis in Ilam's petrochemistry needed or feasible?
4. To what extent is the risk evaluation in Ilam's petrochemistry needed or feasible?
5. To what extent is the risk optimization in Ilam's petrochemistry needed or feasible?
6. To what extent is the risk monitoring in Ilam's petrochemistry needed or feasible?
7. To what extent is the risk connection, internal and external consultation in Ilam's petrochemistry needed or feasible?

Population and sampling method

A collection of participants of people who have at least one common feature, compose the population of the study. Usually in every research, the population is statistical and the author is willing to carry out a study about the feature or features of variables. Ilam's petrochemistry is increasing or decreasing forces because it is newly established. So the population of the present study is nearly 2500 people. Among this population we carried out sampling using Cochran sampling formula:

We used Cochran in estimating the volume of sample as below, (Rafi pour, 377, 383) where we have:

$$n = \frac{\frac{t^2 \times p \times q}{d^2}}{1 + \frac{1}{N}\left(\frac{t^2 \times p \times q}{d^2} - 1\right)}$$

n: volume of sample

N: total number of population

T: the value obtained in right or left side of the formula (verbal possibility percent with curve level)

d: confidence degree (statistical confidence percent)

P: certain feature in sample

q: no certain feature in sample

According to the previous explanations we will have:

n =?

N = 2500

t = 1/96
d = 0/05
p = 0/5
q = 0/5

$$n = \frac{384.16}{1 + 0.0004(384.16 - 1)} = 153.264 \approx 153$$

Considering N,t,d,q,p, and volume of sample consisting professionals and managers of different units (management, inspection, financial, official, branch, accounting,…) nearly

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

153 people are estimated. This calculation is done with error level of 5%.

Instrumentation (questionnaires features)

The most common and ordinary instrument for data collection in human science majors, is questionnaire. So the questionnaires are so important in the studies of human science majors. Questionnaire act as a measuring tool and it converts quantitative data to qualitative data. The questionnaires used in the present study are of closed type (index) in relation to every variable of the research as followings: variables of designation of risk management system, creation of risk management, detection of potential sources of risk, risk analysis, risk evaluation, risk optimization, risk monitoring, risk connection and internal and external consultation. The answers of the questionnaire are in 5 scale Likert measure from 1 to 5 points. So we consider number 3 as the mean answer.

Reliability and validity of questionnaire

Validity

Validity concept implies the measurement accuracy and answers the question: how much can the instrument measure the specified feature? (Khaki, 2005, p 288) Validity is rooted in the word "valid" meaning permitted and accurate and validity is the state of being accurate. In the questionnaire of the present research we used content validity to make sure of choosing a right tool for measurement. So, we designed and provided a questionnaire for the present study , first by using the opinions of experienced professors, professionals and research experts, studying similar questionnaires, articles, books and journals and also initially distributing the questionnaires among some people in population and modification and obviating vague points in questions. The importance of validity is due to the point that inappropriate and insufficient measurements can void and devalue every scientific research.

Reliability

Reliability of a measurement tool is that if we measure the same feature with the same tool, we will come into similar, accurate and reliable results (Houman, 1995). Not having sufficient reliability means intangibility of the questions, no relation between questions and hypotheses etc. Usually the domain of confidence coefficient is from 0 (no relation) to +1 (complete relation). In the present study we use Chronbach alpha to measure the reliability of the questionnaire. This approach is used to calculate the internal systematicity of measuring tools such as questionnaires or tests which measure different features. So we experimentally distributed 30 questionnaires among samples of research and determined the reliability. To calculate chronbach alpha coefficient we should first calculate the variance of every sub questions' marks and total variance.

We calculated chronbach alpha using this formula (Sarmad et al, 2006).

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} S_i^2}{\sigma^2}\right)$$

Where,

k: number of questions

S_i^2 : The j[th] question's variance

σ^2 : Total variance

Table1. Chronbach alpha of the research questionnaire

no. of items	Chronbach alpha
19	0.897

According to table1 above, alpha coefficient calculated by SPSS software for 19-item questionnaire is 0.897. So because Chronbach alpha is higher than 0.70, the questionnaire has the required reliability. Alpha coefficient does not show the chance and possibility, but

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

illustrates the effect of variables of the research. Because, first it measured the certain features meant by the research, and second, the interpretation of all participants was the same.

Statistical analysis of research data

In this research according to the approach of data analysis, the descriptive variables of the study are: mean, frequency, frequency percent, etc. to determine the hypotheses of research we used Parametric inference approaches (correlation and T test and variance analysis) according to SPSS20 software.

Research findings

Descriptive statistics

Table2. Gender of participants

	frequency	percent	Accumulate frequency
Female	25	0/17	0/17
Male	128	0/83	0/100
total	153	0/100	

According to table2 above, among the total 153 statistical samples in experiment group, 25 persons are female and 128 persons are male.

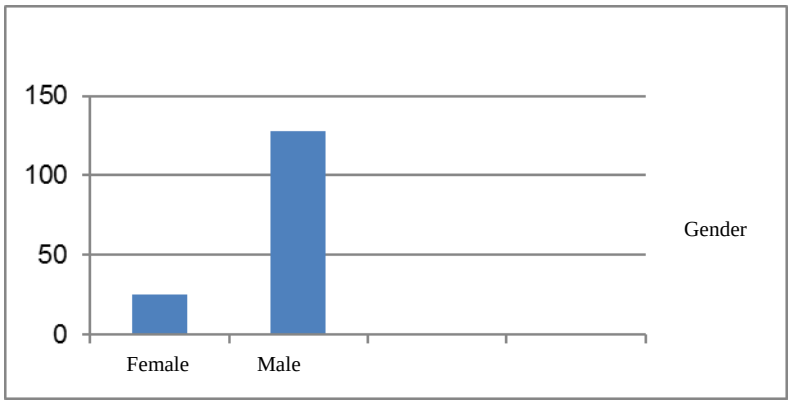

Fig 1. The gender of participants

Table3. The status of the participants

	Frequency	Percent	Accumulate percent
Less than 25 years	21	0/13	0/13
25 to 35 years	84	0/54	0/67
36 to 45 years	28	0/18	0/85
46 to 55 years	12	0/09	0/94
Higher than 55 years	8	0/06	100
total	153	100	

According to table3 above, among 153 participants, 21 persons are lower than 25 years, 84 persons are between 25 and 35 years, 28 people are between 36 and 45 years, 12 people are between 46 and 55 years, and 8 people are higher than 55 years old.

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

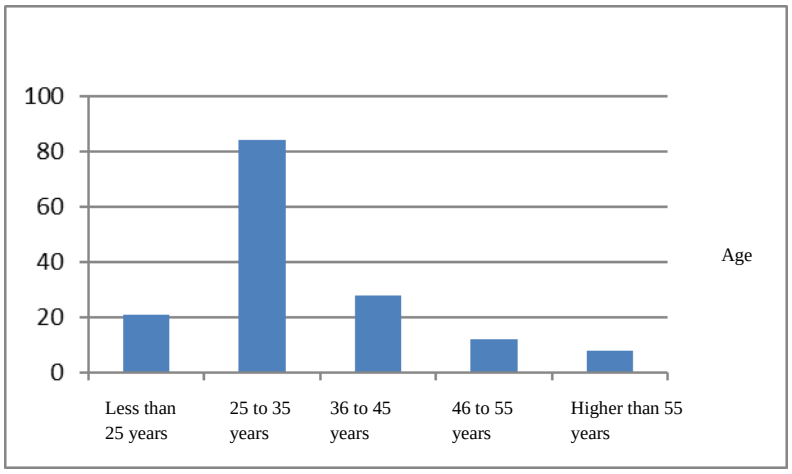

Fig 2. The status of participants

Table4. Educational status

	Frequency	Percent	Accumulate percent
Lower than high school	0	0/0	0/0
High school	5	0/03	0/03
AA	15	0/09	0/12
BA	113	0/73	0/85
MA and higher	20	0/15	100
total	153	100	

According to table4 above, among 153 participants, 0 persons have lower high school degree, 5 persons have high school degree, 15 people have AA degree, 113 people have BA degree, and 20 people have MA and higher degrees.

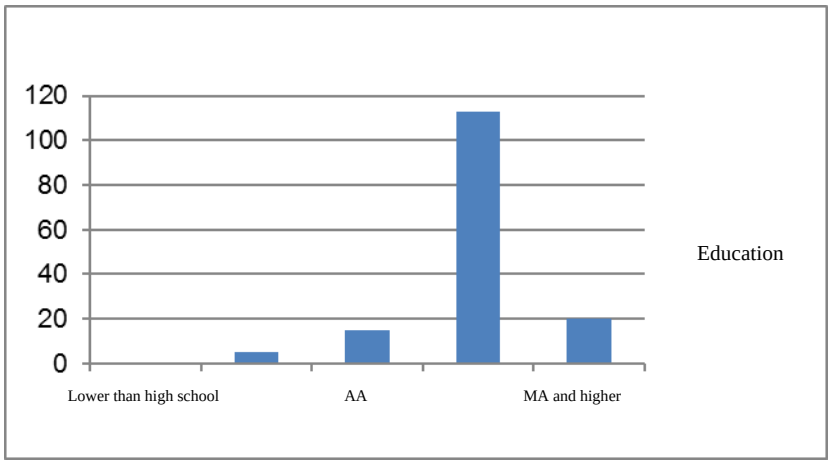

Fig 3. Education, Inferential stats

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

H1: The factors of Ilam's risk management system in petrochemistry are recognizable.

The variables of Ilam's designing petrochemistry risk management system	T value	sig	Degree of freedom	mean
	18.748	0.000	152	4.789

According to table5 above, investigations on the results of this hypothesis, in relation to the correlation test of recognizing the variables of Ilam's designing petrochemistry risk management system, have shown that according to the t value equal to 18.748, and significance level of 0, the acceptance of test and significant relation of The variables of Ilam's designing petrochemistry risk management system is confirmed. Because in the confidence level of 0.05%, T value obtained is more than average value obtained from the questionnaire.

Now we use regression to analyze the relation between variables and risk management system. The pertaining results are presented in the table below:

Table6: regression test results of H1

Change sources	Model	Sum of squares	Mean of squares	F	Degree of freedom	sig	R square
The factors of Ilam's risk management system in petrochemistry are recognizable.	regression	7/464	7/464	2/17	1	./000	0/317
	remaining	367/438	3/434		152		
	total	374/902			153		

The results of table6 show that F value obtained for regression analysis in the factors of Ilam's risk management system in petrochemistry with degree of freedom equal to 1 and 152 is as: mean of R squares are 0.2317 and F is 2.17. All these numbers illustrate that the factors of Ilam's risk management system in petrochemistry are recognizable and the hypothesis is confirmed. (sig ≤0.05)

H2: Creation of risk management committee in Ilam's petrochemistry is feasible .

Table7. t test results of H2

Creation of risk management committee in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	9.682	0.001	152	3.877

According to table7 above, in this hypothesis according to the fact that significance level or sig is lower than 0.05 alpha and with a high confidence level and possible error coefficient lower than 5%, it is clear that Creation of risk management committee in Ilam's petrochemistry. The results of test show that (t=9.682) the potential of creation of risk management committee in Ilam's petrochemistry exists and the hypothesis is confirmed.

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

H3: Detection of potential sources of risk in Ilam's petrochemistry is feasible .

Table8. The results of t test for H3

potential sources of risk in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	7.326	0.000	152	5.0188

According to table8 above, investigation of the results of this hypothesis feasibility of detection of potential sources of risk in Ilam's petrochemistry, show that according to t value equal to 7.326 and sig=0.000, the acceptance of examination and confirmation of hypothesis is approved and significance of detection of potential sources of risk in Ilam's petrochemistry is confirmed, because in significance level of 0.05%, the t value is higher than sig level.

H4: Risk analysis in Ilam's petrochemistry is feasible .

Table9. The results of t test for H4

Risk analysis in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	3.967	0.002	152	4.0118

According to Table9 above, investigation of the results of this hypothesis feasibility of Risk analysis in Ilam's petrochemistry, show that according to t value equal to 3.967 and sig=0.002, the acceptance of examination and confirmation of hypothesis is approved and significance of Risk analysis in Ilam's petrochemistry is confirmed, because in significance level of 0.05%, the t value is higher than sig level.

H5: Risk evaluation in Ilam's petrochemistry is feasible .

Table10. The results of t test for H5

Risk evaluation in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	4.632	0.000	152	3.9888

According to table10 above, investigation of the results of this hypothesis feasibility of risk evaluation in Ilam's petrochemistry, show that according to t value equal to 4.632 and sig=0.001, the acceptance of examination and confirmation of hypothesis is approved and significance of risk evaluation in Ilam's petrochemistry is confirmed, because in significance level of 0.05%, the t value is higher than sig level.

H6: Risk optimization in Ilam's petrochemistry is feasible .

Table11. The results of t test for H6

Risk optimization in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	8.765	0.000	152	6.2022

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

According to table11 above, investigation of the results of this hypothesis feasibility of risk optimization in Ilam's petrochemistry, show that according to t value equal to 8.765 and sig=0.000, the acceptance of examination and confirmation of hypothesis is approved and significance of risk optimization in Ilam's petrochemistry is confirmed, because in significance level of 0.05%, the t value is higher than sig level.

H7: Risk monitoring in Ilam's petrochemistry is feasible .

Table12. The results of t test for H7

Risk monitoring in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	4.234	0.001	152	4.8773

According to table12 above, investigation of the results of this hypothesis feasibility of risk monitoring in Ilam's petrochemistry, show that according to t value equal to 4.234 and sig=0.001, the acceptance of examination and confirmation of hypothesis is approved and significance of risk monitoring in Ilam's petrochemistry is confirmed, because in significance level of 0.05%, the t value is higher than sig level.

H8: Risk connection, internal and external consultation in Ilam's petrochemistry is feasible.

Table13. The results of t test for H8

Risk connection, internal and external consultation in Ilam's petrochemistry	T value	sig	Degree of freedom	mean
	4.897	0.002	152	3.4225

According to table13 above, investigation of the results of this hypothesis feasibility of risk connection, internal and external consultation in Ilam's petrochemistry, show that according to t value equal to 4.897 and sig=0.002, the acceptance of examination and confirmation of hypothesis is approved and significance of risk connection, internal and external consultation in Ilam's petrochemistry is confirmed, because in significance level of 0.05%, the t value is higher than sig level.

Conclusion

What is clear and possible is that institutions and big foundations all over the world are facing challenges and dangers during work processes and daily activities. The involvement of these risks in all these institutions and financial bases were able to deeply effect on decreasing the domain of activities, decreasing credit and confidence between beneficiaries and clients and decreasing productivity. So, lots of attempts and different fundamental researches are carried out in order to create approaches to solve these challenges and to create an environment with clear and risk- free activities (Clever 2011). Among the functional approaches which managers and petrochemistry beneficiaries in international level use to create balance or significant increase in risks imposed on their activities, is the designation possibility measurement and compiling risk management system. Hence so many determined and programmed mechanisms are defined to impede forming risks, managing risks and to decrease the possible effects of risks. Not paying attention to risks in petrochemistry industry will have dangerous consequences which can even cause giant hazards and losses. So due to the mentioned risks in economic activities and also the possibility of severe crashes specifically in creditable industrial foundations all over the world, paying attention to these risks is

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)

considered necessary in the agendas of economic foundations.

Suggestions:

1. It is suggested that, according to loss statistics and detriments on province's petrochemistry in recent years, we should try to investigate the most important systemic weak points that can make the ground for creation of future risks.
2. It is suggested that, using the experiences of managers and using consultant companies outside the organization, we should try to analyze and study each risk imposing on petrochemistry.
3. It is suggested that, with improvement of self-evaluation mechanisms or comprehensive evaluation of organization by personnel training and also using special expert forces try to process the financial risks in petrochemistry.
4. It is suggested that, using strong points and fulcrums of inside and outside of the organization, try to convert the threats caused by risks to new opportunities for promotion of organization.
5. It is suggested that, try to evaluate every risk imposing to petrochemistry by professional group weekly, monthly or annually.
6. It is suggested that, try to increase financial petrochemistry transactions with other banks and close consultant companies to determine the domains and patterns of ordinary and abnormal risks.

Reference

1. Parker, G. , *risk management, risk management dimensions*. Translated by : Parsian , A. financial researches journal. period 4. No 1. 2008.
2. Parker, G. (2008). *Risk management, risk management dimensions, definition and function in financial organizations*. Tehran University. Financial researches. Period4. No 2. Spring 2008.
3. Tehrani, R. and Peymani, M. (2008). Comparative analysis of common risk criteria (variance and Beta) and non-approving criteria (semi variance and non-approving Beta). Financial researches journal. Period 10. No 26. Fall and winter 2008. Pp 7-92.
4. Jabbari, M. , Asilian, H. , Mortazavi, B., Zarrin ghalam, A., Haji zadeh , I., Khanin, A. (2009). *Investigation and analysis of petrochemical connection tube line*. Industry engineering professional journal. Period 43. No 1. Fall 2009. Pp 13-23.
5. Zarandi, M. , Shahrestani, S. (2010). *Using risk management strategies in petrochemical industry*. Business management. Insurance branch.
6. Sha'fi, F. (2002). *Strategic view point in project management*. Oil ministry of Islamic republic of Iran.
7. burkett, j., cheslawski, j., Kirschner,G., Pratt, T.J. and Rangelova, D., 2010.*Holistic approach to setting Risk limitsERM for the Masses*, Casualty Actuarialsociety E-Forum
8. Burkett, J., Cheslawski, J., Kirschner, G., Pratt, T.J. and Rangelova, D., 2010. Holistic approach to setting risk limits ERM for the masses, Casualty Actuarial Society E-Forum.
9. Dr Evan Mills, Munich.2009, innovation energy insurance facilityintroduced to cover risk in developing countries,pp 100.
10. Mills, Evan. 2014. EnergyIQ for Action-oriented Benchmarking: Final Report. California Energy Commission.
11. Truman, I. (2012). "Value at Risk & Bank Capital Management.". In the proceedings of the 3rd International Conference on Hedge Funds & 2nd International Workshop on Multi-Attribute Portfolio Selection, Montreal, Canada .

(DOI: dx.doi.org/14.9831/1444-8939.2015/3-2/MAGNT.187)