Analyze, Evaluate and Prioritize Risks of Outsourcing Projects in the Section of Procurement of Esfahan Province Gas Company

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Abstract— One of the organizations that are outsourcing issues and the risks it faces, gas companies on Supply needed goods through outsourcing provide , the company is nearly all their needed goods done through outsourcing. Likewise, the institutional environment and the gas company is currently deciding and complex situations and synthesize information to achieve optimal decisions is extremely difficult, so another rule of thumb, the best speculation, not work on scientific analysis and should be careful decision. Considering the difficulties and shortcomings in the decision-making about the supply of goods required by suppliers, the company's outsourcing of risk assessment and decision making based on risk analysis seems necessary. The aim of this study provides a useful framework for assessing and analyzing risks conditions of uncertainty gas companies are outsourcing projects. In order to study the gas companies in the province to assist risk identification methods, risks involved in outsourcing supply contracts to identify and gas companies and potential Failure Modes and algorithm analysis (FMEA), based on the degree of risk preference (RPN) of the intensity, incidence and risk of discovery, quantify and prioritize the factors identified and were the corrective actions to control and mitigate risks presented. In this study, using interviews, surveys and meetings FMEA teams of experts were selected units. Based on the results obtained from, Injury factors, manpower, goods and the environment because of a lack of storage space is more important in outsourcing contracts, and the need to impose management controls higher. The application of these results an effective step in reducing the risk of outsourcing contracts in the gas province and gas companies use to identify and prioritize risks to the majority of the projects. It also helps to set priorities to reduce risk and increasing the percentage of successful contracts from other applications of this research.

Index Terms— Outsourcing, Risk, Prioritizing, Suppliers of Goods, Esfahan Gas Company, FMEA, RPN.

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1 INTRODUCTION

NO doubt, the growth, development, interaction and adaptation of technology to the global travel industry, in every moment looking for new tools to be effective. Improvement and excellence will not be achieved without the risk of purposeful movement in the world of fast and unstable, which requires increased skills and competitive strength of individuals and the organization. The important point is how to accurately measure new knowledge and insight based on risk management, while identifying and controlling risks, the risks from the threat turned into opportunities to improve the organization. Therefore a clear need for new approaches to assess and manage risk will be felt. In many organizations, outsourcing and divestiture activities with the goals of the project is to focus on core competencies, downsizing, the best practice is followed and cost control and transparency. Since the implementation of the outsourcing plan of the organization's activities for a certain period at a certain price (which is included in the outsourcing contract); a supplier and service provider transfers to outside organizations, a project is considered. Outsourcing refers to the delegation of authority and decision-making activities are repetitive and periodic internal company contractors outside in the form of a contract or

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memorandum of understanding.

What this means is that not only are delegated activities; but often the factors of production (labor, equipment, supplies, technology and other related assets) and decision authority (responsibility and right to make decisions about certain elements of the outsourced activity) associated with the divested. (Greaver, 1999)1 Despite the many advantages of outsourcing projects, but some of them also fails. The most important reasons for outsourcing project failures, lack of application of management techniques and procedures and risk assessment. (Amani 2004) Half of all outsourcing contracts due to the failure of the company to manage their risks by analyzing inappropriate. (Hall, 2003)International outsourcing is a 50% failure rate the organization of the nature of the risks in its international business decisions do not matter for of all the reasons for the failure of outsourcing, outsourcing is a lack of analysis of the decision (Meisler, 2004) 3. This aspect of outsourcing decisions recently taken into consideration, the elements of risk in the decision-making process is outsourcing) Bhattacharya et al, 2003) 4. In developed economies, the importance of risk management in achieving organizational goals is well-known achievements will be properly used.

While most developing countries have achieved this recognition is despite significant losses as a result of the lack of risk management systems on the property, assets, facilities and manpower into the community considerable efforts to maximize the benefits and minimize the damage and losses and financing opportunities for its compensation is not performed. The fact is more or less the same true in Iran. Devoted a separate part of the international standard PMBOK risk manage-

ment as one of the 12 districts of the knowledge areas of project management and resource management in a row, range and quality of the project shows the importance of this standard for project management. (Shahmyry, Riahi, 2010).

Risk management is the systematic process of identifying, analyzing and responding to project risk in order to maximize the results of positive events and minimizing the probability and consequences of adverse effects on project objectives. Project risk is an uncertain event or situation may be imminent in the case of a negative or positive impact on project objectives is effective (Gharachorloo, 2005). One of the organizations that are outsourcing issues and the risks it faces, gas companies on gas service to its customers, in order to study the gas company Esfahan method of risk identification, risks involved in outsourcing projects to identify and gas companies and potential failure modes and algorithm analysis (FMEA) is to quantify and prioritize risks.

The model used in this study is as follows:

1-Detection and identification of risk groups
2-Identify and define potential risks
3-Ability to detect the likelihood and severity of each risk
4-Calculate the risk priority number (RPN) for each risk
5-Risk analysis on RPN Asls
6-Development activities to reduce the risk of high RPN
7-Reassessment of risks by using a longer cycle FMEA

In this regard, the criteria and standards required and the risk groups are determined.

Several studies evaluating the design and performance evaluation parameters have been determined. The performance evaluation is discussed in relation to the indicators, the relevance of the indicators of organizational goals, alignment with organizational strategies, and reliability over time, enabling fast and accurate feedback. Garvyn his studies in 1993, has provided detailed performance indicators. In this study suggested five criteria are: quality, cost, delivery, service and flexibility. Quality performance indicators which include reliability, durability, and reliability of service, correspondence features, looks and quality are received. Cost includes initial cost, cost of operation and maintenance costs. Delivery time:

Indicators such as accuracy, adequacy, reliability, availability, speed, data access, quality, ease of ordering, the flexibility of ordering flexibility and ease of return shipping in the place.

Customer' services include support, technical support, and problem solving. Flexibility:

Flexibility in product flexibility and volume flexibility is included in the process.

In this study, the factors to be considered in risk groups and then check the list of specific areas of interest and potential risks FMEA techniques will be presented. This is a type of applied research work; the method is based on information collected during the survey and the so-sectional nature of the data based on the quantitative - qualitative and descriptive, comparative and semi-experimental. Data collection method in this thesis is the theoretical study of the type library (documents) in the field of applied research. Data collection for this thesis is the library reading books, papers, documents and to study, field interviews, questionnaires, observation and gas company database available at Esfahan. Given that most of this research is focused on the Isfahan Gas Company and the population of this study, is among managers and supervisors and personnel associated with the operation of the company. The research approach to the issue of risk and risk management is based on guidelines FMEA. Accordingly, in addition to explaining the basic definitions and concepts of risk management to the role and its position in the risk assessment process is discussed, then tried to combine and integrate basic concepts and indices of effective risk management process based on criteria FMEA models and model values for the deployment and evaluation of the risk management process have been achieved finally an approach for monitoring and evaluating its results are presented.

The objectives of this study can be summarized as follows:

1 - Provide a comprehensive framework for planning and risk management in Gas projects.

2 - Provide a way to prevent delay in gas supply projects.

3 - Provide a means to prevent an increase in the cost of gas supply projects.

4 Providing solutions for increasing safety in gas supply projects.

Gas Companies of the majority Esfahan their projects through a deal with the contractor to step enforce and planning to outsource the entire project is on the agenda. In order to properly use this approach to improve implementation of projects, proper risk assessment before outsourcing in the organization is essential. This paper aims to provide a suitable classification of risks and risk factors in outsourcing projects; the company has seen some solutions for the prevention, elimination or reduction of risky pay for this purpose, the FMEA techniques to identify and analyze risk factors and prioritize them by importance.

FMEA is a systematic tool based on teamwork that define, identify, assess, prevent, eliminate or control the circumstances, causes and effects of potential errors in a system, process, project or service to be handled and product or service before they reach the final customer. (Rezaei & Seyedi & Nurrie, 2005) This method of analysis for detecting error conditions and analyze the impact of the scenarios on the reliability of the system is the causes and effects of the crisis caused by the detected error necessary measures will be prioritized according to the severity of the impact. (Tapia et al., 2011) The main objective of failure modes and effects analysis, discover and prioritize these cases to evaluate the degree of risk preference (RPN) is the product of the three concepts of probability of failure, the failure intensity and the ability to detect failure (Segismundo & Augusto & Miguel, 2008) These three factors are estimated by experts based on a scale of 1 to 10. The index is a measure of the degree of risk priority of failure risks, to rank failures and prioritize the measures used. The background suggests, more research has been done in the field of outsourced IT projects and risks related to outsourcing in the gas industry and the use of FMEA in this area of research has been done. Also, in most studies, only the identified risks in

this area have few of them have been identified risk analysis and risk factors reviewed have this aspect of the study is unique. Another aspect of this research is to identify factors that were considered important and provide corrective measures to reduce the risk level is low.

2 MATERIALS AND METHODS

Research methods for applied research work, the nature of the data, quantitative - qualitative and descriptive study of the issue - it is about mining. Identification of risk factors associated with the literature review and interviews and meetings with experts in this field has been done FMEA teams both theoretical and practical aspects that should be considered.

The structure determination techniques to assess and prioritize risk factors and prioritize based FMEA RPN number are done. To collect and record the deterioration factors, the incidence and likelihood of meeting FMEA teams were formed using the Delphi method to survey. It is noteworthy to gather expert opinions, FMEA is a technique that requires a team of qualified experts who have a deep understanding of the subject studied and select the desired number of qualified experts, they depend on the characteristics of the study using this method does not depend on the number of samples. The most important criteria for selecting the experts in this study, having adequate knowledge about risk assessment techniques using FMEA and outsourcing companies have been evaluated. Participants in the research were corporate executives and experts of the implementation and operation of projects, the study population will consist of the units. Given that the number of members of the FMEA is usually considered to be 4 to 6 servings and of course, up to the limits defined in the FMEA depends on the number, ten experts and project managers now have enough knowledge about the risks of their projects and outsourcing, according to the supervisor of the project were selected for data collection. In general, the gas company operating in Esfahan, this study is as follows;

1 review of literature and previous studies related

2 identify and define risk groups for application of FMEA techniques in identifying outsourcing and identify the most important risks in outsourcing projects, reviewing the literature expressions as well as interviews and formation of expert teams FMEA and the method of brainstorming.

3 Extraction of the general categories of causes and risk factors associated with states of the form teams FMEA and rating measures the probability of occurrence, the severity and likelihood of using the Delphi method. And calculated as the mean opinion scores for the index

4 Calculate the risk priority score (RPN) is obtained by multiplying the scores for the three aforementioned criteria and prioritize risk factors

5 provide corrective measures to reduce the risks associated with interviews and surveys of experts.

Having identified eight major processes of project implementation and network of branches, parts identification process and subsequent errors, the main causes of errors, the effects of

errors and controls identified were in the study, 151 cases of risk in the project were to identify and analyze were analyzed. Then assign points to three criteria: occurrence, severity and likelihood of using the Delphi method. The following tables are based on SAE-J-1739 standard were extracted.

TABLE 1
TABLE OF THE FACTORS LIKELY CAUSES OF FAILURE

Rating	Risk rate	Probability of risk
10	More than 1 in 3	The risk is almost inevitable
9	1 of 3	Very much
8	1 of 8	High
7	1 of 20	Repeated threats
6	1 of 80	Average
5	1 in 400	Less than Average
4	1 in 2000	Case dangers
3	1 in 15,000	Low
2	1 in 15 million	Risks comparatively rare
1	Less than 15000000	Unlikely - the risk is unlikely

TABLE 2
TABLE OF STATES FACTOR FAILURE

Description	severity of the effect	Rating
Every failure leads to customer dissatisfaction or a worker.	Dangerous	10
Failure or non-compliance with the state law	Serious	9
Fail, causing the device to fail and it is unusable.	Very much	8
Dissatisfied customers will be highly appreciable.	High	7
Failure, the cause is a bad product or its subsidiaries.	Average	6
Customer dissatisfaction operating systems or products will be a significant impact.	Low	5
With little change in the product or process can be prevailed upon failure	Very low	4
Failure causes inconvenience to the customer, but the process or product he can prevail	Minor	3
Failure may not be visible to the customer.	Very minor	2
Failure of the client to fail and have no effect on the product or process	No	1

TABLE 3
TABLE OF RISK FACTORS DETECTED FAILURE MODES

Rating	Ability to detect	Discovered by chance Risk Control Option
10	Absolutely no	There is no control or if there is not able to detect potential danger.
9	Very minimal	There is very little likelihood that the current controls and risk tracking revealed
8	Negligible	There is little likelihood that the tracking and control of the risk of revealed.
7	Very low	There is very little likelihood that the current controls and risk tracking revealed.
6	Low	There is little likelihood that the tracking and control of the risk of revealed.
5	Average	In half of the cases it is probable that the existing risk control and tracking can be revealed.
4	relatively high	There is a relatively high probability of detection and risk controls revealed.
3	High	There is a strong likelihood that the current controls

		and risk tracking revealed.
2	Very much	There is a risk that the controls are very likely to be tracked and detected.
1	Almost certain	Almost certainly present a potential risk tracking and control is evident.

The product of three factors, the risk priority numbers are obtained. In order to analyze and propose necessary actions resulting risks were classified into 5 levels and risks number 49, the highest priority number is 252 and the lowest priority number is 27.

The following calculations in SPSS Tables risk levels as follows:

TABLE 4
TABLE TO DETERMINE THE LEVEL OF RISK, AND ACTIONS

Actions	risk percent	Rating	level of risk
Very urgent need for action, and formed a crisis committee to the fast action.	4.1	208.61 to Top	Very High
Requires immediate action must be taken by senior management with clear projection	16.3	163 to 207	High
Require the attention of senior management and control plans and procedures must be properly prepared	20.4	118 to 162	Middle
Managed by written procedures and guidelines control	24.5	73 to 117	Low
Work is controlled by routine methods	32.7	1 and 72	Very low

The classification is based on the coefficients in Table 4 and the risks resulting from risk factors are classified and to prioritize corrective measures recommended to reduce risks causes higher levels of risk factors for the investigation and the actions are prioritized. So with that obtained RPN ranking of the risk levels are very high, high, medium, low and very low in Tables 5, 6, 7 and 8 are presented.

TABLE 5
RANKING OF THE VERY HIGH RISK

Proposed actions	RPN	Risk factors	Priority	No
-Covered space especially built environment -Commercial Deleted some cases	252	Injury manpower, goods and the environment because of a lack of storage space	1	1

-Providing instruction, designing the layout, storage and maintenance products -Commercial Deleted some cases	252	Injury manpower, goods and the environment due to lack of instructions, layout, storage and maintenance products	2	2

TABLE 6
RANKING OF RISKS WITH HIGH LEVEL

The proposed actions	RPN	Risk factors	Priority	No
Train and empower employees, Use of force expert	196	Product quality due to incomplete documentation mismatches by non-specialist staff	3	1
Two-stage selection of suppliers	189	Supply prematurely due to poor or lack of one-stop supplier of choice to choose the appropriate supplier	4	2
Train and empower employees, Use of force expert	180	Supplier withdrew because of a delay in the adjustment of the contract (by expert non-expert) and the signing of the	5	3
Education and Culture, Supervision of the employer and the relevant authorities	175	Accident due to negligence in handling of goods in warehouse	6	4
Supply Specialist , Related training	168	Procurement Officer popular choice because of the poor quality (due to lack of power)	7	5
-Technical evaluation of suppliers Commercial use of experts in Technical Committees Use of technical advisors,	168	Prematurely due to poor supply of goods or deselect the appropriate supplier (due to lack of technical evaluation)	8	6
Co-financing fund contract	168	Delays in contract performance due to failure to provide timely advance payment (no funding)	9	7
Supply of Tools and Equipment Warehousing Removal In some cases,	168	Injury manpower, goods and the environment for installation, storage and maintenance products are substandard (lack of tools)	10	8

TABLE 7
RANKING RISK WITH MODERATE LEVEL

The proposed actions	RPN	Risk factors	Priority	No
- Train and empower employees Use of force expert -	150	Ensuring goods are delayed due to delays in setting up the contract (by expert non-expert) and the signing of the	11	1
Supply of Equipment - - Warehousing Removal In some cases,	150	Idling Shipping (delayed delivery of the goods to the warehouse) due to lack of equipment	12	2
Quality evaluation of suppliers	147	Prematurely due to poor supply of goods or deselect the appropriate	13	3

		supplier (due to lack of quality evaluation)		
-Prices updates at intervals of three months Modify the terms of the Treaty -	140	Supplier is not winning right now because of the lack of suppliers in the bidding	14	4
Include the packing and shipping methods, and how the provisions of the Treaty	140	Delays in the receipt of goods or receipt of defective goods for damage to goods (freight Bavsylh inappropriate)	15	5
Include the packing and shipping methods, and how the provisions of the Treaty	140	Delays in the receipt of goods or receipt of defective goods for damage to goods (poor packaging)	16	6
- Use an appropriate means of transport - Supervision of the employer and the relevant authorities - In terms of the methods and manner of packing and transporting and unloading the provisions of the Treaty	140	Accident and return the goods to the warehouse due to damage during transport (use of unsuitable means of transport)	17	7
In terms of the methods and manner of packing and transporting and unloading the provisions of the Treaty	140	Delays in the receipt of goods or receipt of defective goods for damage to goods (not loaded correctly)	18	8
-In terms of the methods and manner of packing and transporting and unloading the provisions of the Treaty Supervising the unloading -	125	Damage to goods during unloading due to lack of necessary equipment	19	9
- Train and empower employees Use of force expert -	120	Inadequate supply of quality goods due to delays in setting up the contract (by expert non-expert) and the signing of the	20	10

3 DISCUSSION

As described above, previous research in the domain of information technology outsourcing risk and gas industry in the areas examined in this study, i.e., little work has been done
And in cases expressed only the risks in this field and few of them take the risk analysis and risk factors identified were reviewed. The FMEA technique has been used in the service sector outsourcing and little research has been done. In this regard, the research conducted by Bhattacharya et al, the two main categories of risks opportunity employer and provider of services are fragmented. This paper presents a basic framework for risk identification outsourcing of information systems in e-business firms with proposed (Bhattacharya et al., 2003). In another article, Currie categories the risk of in five categories of risk, delivery, integration, operations management, trade relations between the two parties, and changes in the classification they provide a framework for the assessment is based on knowledge management (Currie, 2003). Bahli & Rivard using the theory of contract costs
and using risk-stratified into three groups Ebert et overall risk of the contract, employer's risks and risk provisioning provided by risk factors using partial least-squares method has been evaluated (Bahli & Rivard, 2005). Osei-Bryson & Ngwenyama age and risks for both employer and provider review in a way that benefits both the employer and the supplier is considered. In this study, a mathematical model to analyze the proposed

IS outsourcing risks and factors lie down bargaining as the main risks have been identified (Osei-Bryson & Ngwenyama, 2006). Aundhe and Mathew declared risks can be categorized into three groups on the risks associated with the project, risks and risks related to macroeconomic relationships have been categorized and then use the inductive method based on theory, Grand risk analysis and establish relationships between them have (Aundhe and Mathew, 2009). Chou and Chou described the three phases of information systems outsourcing life cycle and risks associated with them, employers' perspectives and risks in three broad categories of risk prior to contract risks and risk of the contract after the contract provide. Also, issues such as the success of IT outsourcing projects, quality assessment methods, and techniques of project management are reviewed. (Chou and Chou, 2009) Lacity & Khan & Willcocks studied risks from the point of view of the employer and an academic perspective presented and applied to outsource IT projects. Those into three categories of risk, contract risk, employer and provider split (Lacity & Khan & Willcocks, 2009).
Nakatsu & Iacovou to identify the most important risk factors in the development of software outsourcing projects; inside and outside the country and the employer pay. They fall into three general categories of risk, risk factors that are shared within and outside the country,
Risks which are outside of the country are of great and unique risks which are outside the country, divide (Nakatsu & Iacovou, 2009). Abdullah & Verner presented a framework

for analyzing the risks of IT outsourcing. This framework is based on the opinions of their customers' and for this purpose a study of nine cases of failed outsourcing projects the main areas for critical risks identified in the project and risk factors were then related to each field.

The main areas of risk are: complexity, contract, financial, legal, organizational environment, planning and control, project scope and requirements, team and customer risk and complexity of the work to be presented in all cases studied (Abdullah & Verner, 2012). But in this study to enhance the success rate of outsourcing in the gas company FMEA method for evaluating and related risk analysis has been used in the service sector, while this technique is used in the equipment. Compared with previous studies, these study shows, the risk identification using literature and expert opinion, provide risk segmentation, provide a framework for assessing risk and prioritizing risk factors in the company, while previous research has been done all these things together and each of these sections of the cases presented above.

The current approach paper, the major advantage is that the primary focus of the study with regard to quality, costs and risks that have the greatest impact on the success of outsourcing projects, the focus and avoids wasting resources and reducing the likelihood of success of this approach in the corporation. The framework proposed in this study can be a good understanding of the obstacles to the successful implementation of outsourcing projects Gas Company, barriers and priorities and strategies for facing them show. However, given the lack of specialized and integrated into the FMEA in Isfahan Gas Company and personal opinions on the results of a study for future research and technique of FMEA team in the company, AHP and fuzzy TOPSIS methods to prevent individuals' opinions using fuzzy logic

And a matrix of pairwise comparisons and to produce comprehensive and the results of the data collection and long time periods recommended for several different time periods.

Also, further research would be risks, reason and critical success factors in organizations studied through qualitative methods such as fault tree analysis and modulation techniques used in this study are derived and other relevant organizations were also studied.

4 CONCLUSIONS

According to the results of the study, the risk scenarios and risk analysis software have been considered according to the criteria in Table (9) is presented.

TABLE 8
RISK FACTORS PROCUREMENT PROCESSES

RPN-NORM	RPN	Name Process	Number Process
215	548	Control of goods	1
1000	2546	Purchase of goods	2
465	1184	Goods Receipt and Quarantine	3
432	1099	Storage, maintenance and delivery of goods to the applicant	4

The results presented in Table (8) review processes for im-

plementation, coordination and obtaining the necessary permits and drilling pipe laying operations and construction and installation of gas pressure reduction stations are the highest risk factors, the projects are now in operation at higher risk. This study can serve as a tool to measure risk and helping to make decisions about the company's plans for future outsourcing helpful. However, given the lack of specialized and integrated into the FMEA in Isfahan Gas Company and personal opinions on the results, for future research, the technique of FMEA team and a team of the company,

AHP and fuzzy TOPSIS methods to prevent individuals' opinions using fuzzy logic and a matrix of pairwise comparisons and to create a comprehensive collection of information on research results in long periods several different time period is recommended. Also, further research would be risks, reasons and critical success factors in organizations studied through qualitative methods such as fault tree analysis and modulation techniques used in this study are derived and other relevant organizations were also studied. In this regard, according to the general guidelines, the following corrective actions proposed to improve outsourcing the company projects recommended:

* Funding funds contract simultaneously

* Embedded environment, especially roofed space in warehouse

* Planning for comprehensive and outsourcing projects now

* Use of managers and consultants with experience, expertise and knowledge in the field of outsourcing

* Evaluate and select contractors based on performance and the expertise, experience and *Financial ability continuous monitoring and control of performance by contractors.

* Establish a comprehensive computerized system between companies and contractors to follow and supervising communication and coordination between departments in high-performing facilities and provide unified and codified guidelines.

* Providing written instructions regarding the storage, maintenance, transportation and unloading.

* Training courses including introductory courses for staff standards storage, storing, transporting and unloading

* Culture and creating something constructive engagement between employers and contractors

* Explaining the importance of all phases of the project to the supervisors and the contractor

* In terms of the methods and manner of packing and transporting and unloading goods in terms of modularity

* Update the estimate price of the Treaty on quarterly intervals

* Planning warehousing Removal In some cases,

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