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**Investigation of Project Risk Management in Project-Based Organizations  
Using the PMBOK Guideline  
Case Study: National Gas Company of Lorestan province**

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ABSTRACT

Project management approach is one of the crucial aspects of enhancing the operational efficiency of project-based organizations that makes optimum resources use possible. Risks management significantly affects operational effectiveness and performance efficiency in competitive organizations. These calls for a new management approach, such as the PMBOK project management standard that helps risks identification and methods of mitigating their adverse consequences. The aim is to focus on analysis of project-related processes in organizations using the PMBOK guideline risk management concept. The study is undertaken in the project-oriented Lorestan National Gas Company in Iran. The methodology involved using primary data using interviews of relevant stakeholders on project-management processes involving three major stages of data collection, process identification and process analysis based on the PMBOK. Results show the importance of risk management analysis in identifying major risk-generation areas required to take appropriate measures in averting or overcoming unexpected operational and performance challenges that affect organizational survival. Results further show the effectiveness of the proposed method in achieving a more effective project control system that makes it possible for on-time project scheduling, enhanced performance effectiveness, economic justification and organizational survival.

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## 1. Introduction

Project-based organization (BPO) refers to any formal organized group activities that are principally engaged in creating temporary project-based systems aimed at effective goal achievement. This has emerged as a conventional approach to modern group project management. Risk management is therefore, an integral part of effective project management that its incorporation into management thinking and practices is inadvertently crucial. Underestimating the importance of risk-taking in decision processes can incur large economic losses on project with dire consequences for its success. It could further increase the chances of failure in achieving organizational objectives in general and project goals in particular. Competitive nature of modern organizations makes group activities very crucial for successful project implementation as it expected to reduce project-completion time, energy saving and optimum resource uses. Project-performance enhancement is a necessary prerequisite for organizational competition and therefore, its long-term survival( Rehman et al,2012). Modern organizations have to have project management as part of their management strategy in order to help them effectively cope with ever-increasing challenges of projects formulation and implementation they get involved in. Project management is incorporated into organizational management system as a means of ensuring strategic alignment and effective resource utilization ( Voss and Kock, 2013). A main challenge is to provide effective methodologies required to facilitate appropriate and speedy coordination between sub-systems of a project. Each incoming project in an existing portfolio affects its schedule, the resources availability and the planned performance. There are no analytical solutions for the problem of dynamic scheduling of resources for multiple projects in real-time. Mathematical modeling approaches, like integer programming or network-based techniques, can hardly describe the complexity of real problems (Araújo et al, 2013). Rybka and Bondar (2013) for instance, have determined and compared the risk handling methods resulting from alterations to project documentation. Their analyses focused on two dimensions of environmental engineering projects—sewage systems construction and sewage treatment plants. They have offered a practical model for selecting risk control strategy and the most appropriate strategy for a particular project management scenario. From their perspective, document reviewing is a major way in collecting strategic data. Rehman et al (2012) have tested the practical factor which has greater effect on improving project management performance in the Saudi Arabian industrial organizations. These researchers have further examined the correlation between different criteria of executive performance. Their study found that application of evaluation model is likely to make a significant improvement in project management performance. Their results suggest that among all practical criteria, leadership has the greatest impact on project management performance that is based on implementation of project policies, strategies and its life cycle. Ping (1995) study of management performance in an aircraft-manufacturing plant in China which was based on the improvement of business processes found a whole variety of activities that a firm has to engage as a production undertaking to ensure its survival. These consist of establishing new planning and scheduling system, changing organization product planning from four levels to one ,creating four types of scheduling in planning unit, establishing new personal management system, redesigning assembly process, and design and implementation of a computerized information system to support redesign. Absence of organization cost management according to Adler and Smith (2009) can make project management

troublesome. Project managers in their view, are responsible for controlling and optimizing project management costs. They point out that a number of project managers are unaware of planning and project goals costs. Mac Arthur et al (1994) provided a strategy for evaluating the design of an information system for business process reengineering, a tool required to measure performance against defined project goals as a feedback system to plan necessary changes in the course of business enterprise. They demonstrated the contribution of computer simulation technology is a good study to design evaluation law and believes that the use of simulation requires a to performance improvement. Soderlund (2005) has critically investigated product development within project management formwork, based on experimental observations for project management analysis placing emphasis on knowledge and time. They explored the roles which project management has regarding production development framework.

Project control unit and project management are two important management elements in various manufacturing and commercial entities. Many organizations function without having to have appropriate project control units. Projects in these organizations are frequently initiated and implemented without due regards for incorporation of competent project controllers, whose sustained efforts are crucial in overcoming potential challenges and operational deficiencies. These render risk-taking and risk management as the major prerequisites for successful project implementation. It is because of such considerations that the Project Risk Management of PMBOK standard is selected as one of the nine knowledge areas to be applied in analyzing the performance assessment of the project-related processes in Lorestan Gas Company as a project-oriented entity and identifying ways of enhancing its operational viability.

## **2. Definitions and Concepts**

### **2.1. Definition of project-based organizations**

Project-based organizations (BPO) refers to various forms of organization which is engaged in manufacturing temporary systems to implementation of project activities. In recent years, BPOs As emerging organizational forms are of great consideration.

### **2.2. Project definition and management**

According to the project management organization (PMI) " project is a temporary effort to create a different product, service or result" and "project management is applying knowledge, skill, tools and techniques in project activities to meet project needs and requirements."

### **2.3. What is PMBOK**

PMBOK is a standard provided by PMI which is nonprofit and international institute This organization has provided several standards, the most famous of which is PMBOK. This standard is popular universally and no other standard can compete with it. One of the PMBOK advices which is exist in PRINC2 is customization tailor the standard. The management team should measure the circumstances and choose some parts of the standard that are necessary for work and perform them by a certain amount of the proper details.

### 2.4. Project Risk Management

Risk management is inevitable. Even in project which are not managing in an organized way, risk management is performed unsystematically and inductively. What is important is that by making risk management systematic, maximum product results from this context. If opportunities and threats are left to themselves, a lot of problems that could be removed, will be problematic and many valuable opportunities that could turned into benefits will lost. Thus some activities should be done to attract or remove them. These activities from the risk management . In table(1), the project risk management processes has been shown.

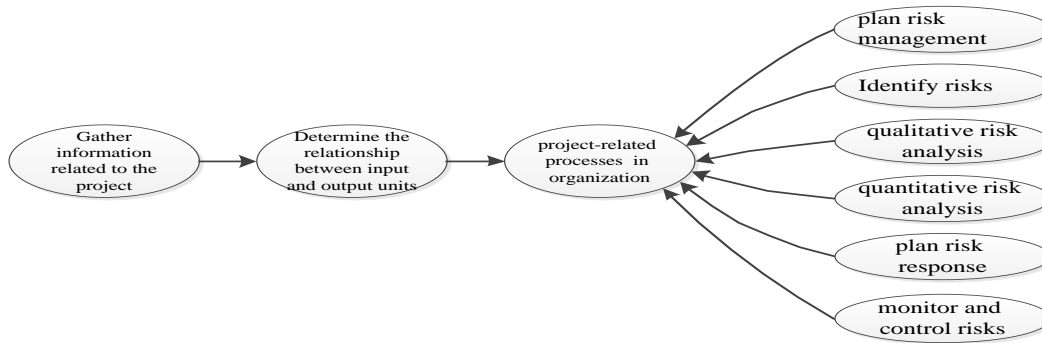
**Table 1** project risk management processes

process group	project risk management processes
Programming	Plan risk management
	Identify risks
	Qualitative risk analysis
	Quantitative risk analysis
	Plan risk response
Monitoring and Control	monitor and control risks

### 3. Paper explanation and research method

Risk management in project-based organizations is one of the best sources that can help identify and handle risks and manage them using the PMBOK standards. The process involved collecting data from interviewing the project-related employees complemented by through survey of secondary data available from consultant's reports and documents. They are gathered on issues involving processes of data collection, project-formation processes identification and processes analyses based on risk management area within the PMBOK standard, figure (1) shows the schematic steps of proposed methodology. Relationship between input and output of units has been determined by analyzing the data gathered, this will led to recognize project-related processes in organization. in order to correct defects and refine this processes in the organization the project-related processes should be analyzed based on project risk management processes of PMBOK guideline.

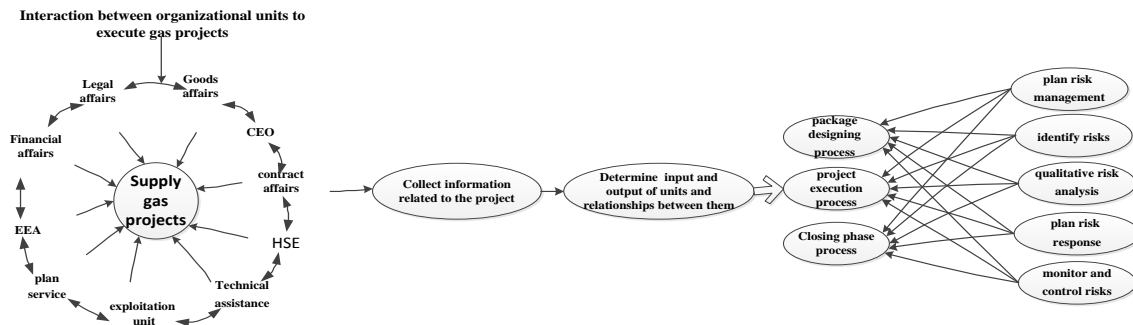
Qualitative Risk Analysis process was applied here as opposed to quantitative method to analyze and assess the project-related risks in organizations. The Delphi method is used in this study in order to enhance the reliability and validity of data and accuracy of the results particularly on input and output of units.



**Figure 1** Application of the PMBOK standard risk management area in project-based organizations

**4. Investigation of risk management area in the organization:**

Definitions which exist both in the PMBOK standard and project-related processes in organization have been identified and documented. The incomplete processes were subsequently rectified and modified. Those which were not available were defined based on risk management area within the PMBOK standard. Figure (2) represents various stages of applying risk management standards PMBOK in the Lorestan Gas Corporation. In Table (2), Results of analysis are shown.



**Figure 2** stages of application risk management standards PMBOK in the gas company

**Table 2** project risk management processes

<b>Process</b>	<b>process group</b>	<b>Available at organization</b>	<b>Defined for the organization</b>
Plan Risk Management	Programming	there is no documented program in the organization	Risk Management Plan has been designed and shown in table (3)
identify risks	Programming	governmental or people disagreement, improper selection of contractor, shortages budget, shortages of goods	Improper or incomplete package design
perform qualitative risk analysis	Programming	risks are not analyzed in the organization	According to occurrence probability and impact of risks, shortages of goods and budget will have a significant impact on project management
plan risk responses	Programming	Existence of the technical committee for contractors evaluation, to avoid choosing inappropriate contractor	To prevent risks in the organization preventive actions are defined included: _training the designer staffs in order to prevent inappropriate or incomplete design of the projects package _ designing inventory control system and re-order point in order to avoid shortage of goods, attempting to gain financial budget before finishing in order to avoid shortage of goods _ Specifying re-order point for budget in order to avoid shortage of budget _obtaining the necessary permissions before starting the project in order to avoid project conflict
monitor and control risks	Monitoring and Control	There is no monitoring and control to prevent the risk in the organization	Monitoring the risk response plan and evaluation the risk management process

More details of the organizational risk management scheme and their diagnostic properties can be observed in the table (3).

**Table 3** Risk Management Plan

<b>Identification of risk negatively impact</b>	<b>Probability of Occurrence</b>	<b>Importance</b>	<b>risk response plan</b>	<b>Roles and Responsibilities</b>
Improper or incomplete package design	Low	High	training the designer staffs unit, quick remove defects when faced with the risk	execution and engineering assistance
Shortages of goods	High	High	designing inventory control system and re-order point	Chief of goods affairs
Shortages of budget	High	Medium	attempting to gain financial budget before finishing, Specifying re-order point for budget	Chief of financial affairs
governmental or people disagreement	Low	High	Obtaining the necessary permissions before starting the project, quick action to get permission when faced with the risk	Chief of legal affairs
Improper selection of contractor	Low	Low	Existence of the technical committee to contractors evaluation	Chief of Contracts affairs

## 5. Discussion

Results indicate that organizational risk management processes seem to have been underestimated in management processes in general and the project risk management in particular. Results further show that authorities in organizations seem to do well in defining the short-term and long-term goals and strategies for the organization. It also shows that by focusing on these management approaches, the managers succeed in reducing the incidences of deviating from standard management procedures and focus on those which are likely to help achieve the organizational goals. These are secured by identifying the activity areas which can potentially generate deficiencies in project process performance. Results show that improper or incomplete design of packages may not be diagnosed in the early stages and package passes the procedures of contractor selection, then during execution by the contractor found that there are inappropriate or incomplete in designation and the case of gas injection in the consumer domain is likely to prove problematic. Results show that staff training in the design unit is likely to mitigate the adverse consequences during the operational stages of gas delivery. Results show the importance of prompt measures as a means of rectifying the incomplete or poor designing of the gas conveyance and distribution system must be carried out in order to reduce the chances of queuing for gas delivery. Results further show that incidences of shortages on accessories and appurtenances are important impediments to operational efficiency in the gas-related projects. Results show that an effective manner in which to deal with these risks is the incorporation of a practically effective inventory control system in conjunction with a re-order point for the accessories required for proper functioning of the system. It was found that insufficient financial allocation or deficit budget to finance the project is another

deficiency in the management domain. It was observed that in the process, some contractors have no option but to use their own financial resources to meet the execution requirements of the project in hand, and under circumstances, where these are completely depleted, the project has to stop. Results show that continuation of such state of affairs is clearly incompatible with the risk management approach as prescribed by the PMBOK standard framework. It was found that effective risk management plan, necessitates effective evaluation and assessment of risk responses monitoring as well as risk management procedure in project-related organizations such as the Lorestan Gas Corporation.

Araúzo et al,2013 have examined coordination between different projects. Rybka and Bondar ,2013 have provided a risk control strategy based on two projects within the water and sewage systems which was not only based on the PMBOK guideline but also is used on specific projects. Whereas, this article is applied to amend the scope of the risk management process of projects in project-based organizations and is based on PMBOK project management guideline. Rehman et al, 2012 have introduced leadership as a major factor in increasing performance of project management and risk management and processes improvement based on it have not been considered. Soderlund, 2005 has considered knowledge and time aspects of project management. Adler and Smith ,2009 have focused on organizational and project management costs . Mac Arthur et al ,1994 have evaluated information systems and business process and have not noticed the risk management and reform processes. Ping ,1995 in his investigation has depicted what a airplane company do and has not discussions about process improvement and risk management.

## 6. Conclusion

Effective project-management involves a complicated process under dynamic and uncertain environmental conditions which yields fruitful results with application of scientific management concepts. That would make it possible for the projects to be executed within a prescribed plan within the time and cost constraints. Experiences show that any deviation from the agreed plan and incongruence emerging during planning and implementation phases of projects in whatever sector is rooted in poor risk management. This paper has analyses risk management area within the PMBOK guideline framework in the project-based National Gas Company of the Lorestan province in Iran, where risk-taking strategy is hardly taken seriously. Risk Management Plan has been designed for the organization and risks was identified. Qualitative risk analysis showed that according to probability and impact of risks, shortages of goods and budget are two important risks which have significant impact on project management. Risk response plan which include staffs training, designing inventory control system and re-order point for goods and budget, preparing necessary permissions before starting the project and Existence of the technical committee was defined to avoid or overcome the risks. Monitoring the risk response plan and evaluation the risk management processes was necessary to ensure the implementing of what has been defined.

As a counter-strategy to the prevailing practices, risk identification approaches in project-related processes have to be incorporated in decision-making systems. That includes definition of planned risk responses as a means of forecasting or extrapolating the probability of risks recurring and its significance for the organizational prosperity, success and survival.



The overall conclusion being that managers in command of project-based organizations, are advised to analyze and assess the prevailing organizational processes involving the risk management area of PMBOK guideline. This would be instrumental in improving risk-control capability of the client organization by institutionalization of optimal resources use needed for organizational effectiveness and sustainability.

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