

Identifying and Prioritizing Factors Affecting Contractor Tendencies while Contracting Construction Projects

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ABSTRACT

Proper outsourcing of long-term construction projects is a major challenge for energy service companies. In this research, the factors affecting the tendencies of highly ranked contractors while contracting construction projects of National Iranian Gas Company are identified and prioritized. The particular group studied consisted of contractors submitting tenders to East Azerbaijan gas company tenders in recent years. The contractor list of the company's Gas office revealed 64 high-ranking companies of which 55 were included in the statistical sample in accordance with Cochran's formula. For collecting data, the researcher created a questionnaire. The questionnaire's reliability was 0.865 as assessed by experts from the company and university professors. Illustrative statistics were used in the study with the Kolmogorov- Smirnov test being used for testing the data normality. Having confirmed the normality of collected data, for testing the hypothesis, one sample t-tests were used to test the hypotheses. The important significant factors so identified could be classified into four types: Logistic, Contracting, Managerial, and Environmental.

Keywords: Contracting projects, Construction Companies, Logistical Factors, Managerial Factors, East Azerbaijan Gas Company

1 INTRODUCTION

Construction is a basic activity involved in the development of any country. One cannot imagine trade and commerce being conducted without production or production being carried out without construction. Construction design plays a central role in development, which is the main objective of any government in the contemporary era. Any development framework is based on converting exhaustible capitals such as oil, gas, mines and so on as well as reproducible human and physical capital. Construction contributes to the infrastructure needed to achieve economic development.

East Azerbaijan Gas Company is an important part of Iran Gas National Company. It is responsible for transferring gas to all consumers in East Azerbaijan province. In addition to its service-orientation, this company is responsible for developing gas networks for urban, rural and industrial parts of the province. The design and operation of the gas networks are conducted by the company's engineering management unit while design activity is undertaken by executive contractors, which act as representatives of the employers in question with respect to monitoring and coordinating projects. Among the problems encountered recently by this firm as well as many similar companies in other regions or countries (Kenyatta, Alkizim, & Mbiti, 2015; Wu, 2010) concern the lack of

interest in tendering for operating gas networks among contractors with high rankings and high experience in (Odeyinka & Kaka, 2005; Odeyinka, Lowe, & Kaka, 2008; Ruuska & Vartiainen, 2005). According to investigations, the average number of practitioners authorized to take part in East Azerbaijan Gas Company tenders during the last four recent years reduced from 8 to 4. Further, according to the tendering commission, only 10% of them had high ranks 1 tender out of 3 (33%) had to be revised not having -reached minimum expectations in terms of financial suggestions or for having produced infeasible pricing suggestions. It should be noted that, due to a lack of sufficient experience or other managerial weaknesses, many of the contractors selected are unable to complete projects without delay. This factor is not only imposing high costs on the gas company but also depriving public of these facilities. According to some, performance weaknesses in terms of engineering management and design are causing contractor dissatisfaction. The resulting lack of collaboration with respect to recent tenders has been leading to problems such as being inattentive to customer calls, delays in checking and approving contractor status, a lack of providing project liquidity in time by the respective employers, high increases in material costs and wages, imbalances in some projects, a general lack of providing materials in time for projects, an inability to deliver piping paths on time or allocate relevant lands to reduce gas pressure stations and for cathode protection. During recent years, many of the actions initiated during recent years—such as mechanizing document checking systems, providing the main materials for projects by the respective employers, considering the balance among all projects, interacting with other organizations and offices for the purpose of obtaining a license for piping, decentralizing monitoring systems, divesting monitoring to towns around the projects while performing location services to get the contractors' satisfaction, and persuading contractors to participate in the tendering process—haven't yielded any significant results. Since contractor's satisfaction and therefore their lack of interest in participating in the tendering process directly related to services delivered to them by the respective employers in contract framework among them (Odeyinka & Kaka, 2005), this paper seeks to identify factors which persuade contractors to take part in tenders. Specifically, we want to know what are the causes behind the contractors' unsatisfactory response to undertaking gas construction projects.

2 LITERATURE REVIEW

Researchers from a range of disciplines have already sought to identify factors affecting the contractors' tendencies and decisions about project contracting and its consequences. This section discusses the factors under four major categories.

2-1 MANAGERIAL FACTORS

The managerial factors identified pertain mostly to decisions, approaches and acts of the assigning corporations with respect to the following issues: maintaining the stability of the company's officials and project supervisors during project implementation (Tran & Carmichael, 2013; Zakaria, Ismail, & Yusof, 2012), rates of using empowered and experienced employers for monitoring projects (Carmichael & Balatbat, 2010), bureaucracy and documentation processes (Kissi, Ahadzie, & Badu, 2014; Xiong, Skitmore, & Xia, 2015), dealing with contractors' problems related to projects and coordinating the pony (Al Mohsin, Alnuaimi, & Al Tobi, 2014; Choi, Abeysekera, & Ramachandra, 2010; Odeyinka & Kaka, 2005; Ramachandra & Rotimi, 2011; Xiong et

al., 2014; Zakaria, Ismail, & Yusof, 2013b), the degree of monitoring for optimizing collaboration between project designers or engineers with underwriters as project contractors (Ramachandra & Rotimi, 2015; Tran, 2013; Zakaria et al., 2012; Zakaria, Ismail, & Yusof, 2013a), and liberalizing financial guarantees (Al Mohsin et al., 2014; Ramachandra, 2013; Xiong et al., 2014; Zhao, Hwang, Pheng Low, & Wu, 2014).

2-2. CONTRACTING FACTORS

These refer to the process of holding tenders and the corresponding contract criteria (Odeyinka & Kaka, 2005; Zakaria et al., 2013b). Transparency of the contract criteria, forecasting the amendments and adjustments due to the real inflation in the content of specific contracts (Carmichael & Balatbat, 2010; Choi et al., 2010; Wu, 2010; Xia, Xiong, Skitmore, Wu, & Hu, 2015), monetary considerations pertaining to contractor performance or work done (Azman, Dzulkalnine, Hamid, & Beng, 2014; Carmichael & Balatbat, 2010; Kenyatta et al., 2015; Ramachandra, 2013), banking guarantees to participate in the tendering process, and guaranteeing the contract implementation processes are some of the important contracting factors (Al Mohsin et al., 2014; Odeyinka & Kaka, 2005; Odeyinka et al., 2008).

2-3. LOGISTIC FACTORS

Logistic factors mainly refer to the following items: timely deliberations on the materials required from corporations to the respective contractors in accordance with contract contents (Choi et al., 2010; Qureshi & Kang, 2015; Ruuska & Vartiainen, 2005), providing agile payment authorizations and liquidity for pony commodity and statutory deductions to the organization concerned on behalf of the company (Al Mohsin et al., 2014; Choi et al., 2010; Finnerty, 2013; Ramachandra & Rotimi, 2011), and eliminating legal barriers or internal circulars related to insurance and job security issues faced by contractors (Al Haadir & Panuwatwanich, 2011; Kissi et al., 2014).

2.4- ENVIRONMENTAL FACTORS

Environmental factors refer mainly to climate and atmospheric conditions and situations in project work zone (Al Haadir & Panuwatwanich, 2011; Ruuska & Vartiainen, 2005; Wu, 2010), the quality of local and regional workforces in terms of the skills required and rates of payment (Carmichael & Balatbat, 2010; Xia et al., 2015; Xiong et al., 2014), current local and regional economic conditions with regard to inflation and recession (Finnerty, 2013; Xia et al., 2015), the presence or absence of opponents to the project, the levels of social security in project site areas (Xiong et al., 2015; Zhao et al., 2014), and timely issuance of permits related to implementation from the other relevant organizations or the regional government (Azman et al., 2014; Odeyinka & Kaka, 2005; Zakaria et al., 2012; Zhao et al., 2014).

3. INSTRUMENTS AND METHOD

The research was descriptive from the viewpoint of method, empirical from the viewpoint of purpose and synchronic from the viewpoint of time.

From the viewpoint of method, this research is empirical and the research results are of practical nature; they can be used in different gas companies operating in different provinces in the Islamic Republic of Iran. From the viewpoint of research process, it is combinational, the research aim is to be illustrative through demonstrations and clarifications of the phenomena under study. From the viewpoint of research logic it is inductive. The sample studied was drawn from East Azerbaijan gas Company and consisted of contractors with high rankings, who were responsible for construction and gas projects for the company. All persons answering our questionnaire were direct managers from 55 companies operating in the same province. 64 firms were identified as deserving high ranks according to the list of 306 contracting firms provided by East Azerbaijan Gas Company. According to Cochran’s formula, the error possibility associated with this sample size (55) is just 5% at a confidence level of 95%. Two methodological tools were used in this study. To gather relevant data, first a literature review (books, thesis, articles, research magazines, documents and so forth) was conducted with the actual data coming from responses to a questionnaire followed by a selection of interviews. In order to calculate Cronbach Alpha, the 55 responses to the questionnaire were entered into SPSS to calculate the reliability of measurement. The Cronbach Alpha value so determined was 0.865. □

4. FINDINGS

The demographic properties of the statistical sample (of size 55) are shown in Table 1.

Table 1 Demographic properties of the statistical sample

Cumulative frequency percentage	Frequency percentage	Frequency	Education
7	7	4	Diploma
82	75	41	BS
981	16	9	MA
100	2	1	PHD
	100	55	Total

The results from the normality test for the variables under survey as calculated by the SPSS 23 software are shown in Table 2 . □

Table 2 Normality test for research variables

Component's name	Mean	Std. deviation	Kolmogorov-Smirnov Z value	Significance level
Managerial factors	3.4961	0.7473	1.284	0.074
Contracting factors	3.1364	0.6983	0.767	0.598
Logistic factors	3.7455	0.7873	1.216	0.104
Environmental factors	3.6691	0.7172	1.116	0.166

Hypothesis 1: Managerial performance of the monitoring system affects the lack of interest of high ranked contractors.

Table 3 lists the output from a Minitab test carried out at a confidence level of 95%.

Table 3 Single-sample t-test results for the first hypothesis□

Component	Sig. level	t-statistic	Std. deviation	Mean	Test result
Managerial factors	0.001	7.48	1.30	3.49	Rejection of the null hypothesis

Since the significance level for Hypothesis 2 was 0.001, the null hypotheses was rejected. In other words, managerial performance while monitoring systems affects contractor's lack of interest in undertaking projects.

Hypothesis 2: Contracting factors affect the lack of interest in contracting on the part of highly ranked contractors.

The output from the Minitab test of Hypothesis 2 is presented in Table 4. As it can be seen, significance level of this hypothesis is 0.025, so null hypothesis is rejected, in other words, contracting factors affect contractor's lack of interest in undertaking projects.

Table 4 Single-sample t-test results for the second hypothesis□

Component	Sig. level	t-statistic	Std. deviation	Mean	Test result
Contracting factors	0.025	1.96	1.26	3.13	Rejection of the null hypothesis

Hypothesis 3: Project logistics affect the lack of interest on the part of highly ranked contractors.

Table 5 Single-sample t-test results for the third hypothesis□

Component	Sig. level	t-statistic	Std. deviation	Mean	Test Result
Logistic factors	0.001	10.18	1.21	3.74	Rejection of the null hypothesis

The output from the Minitab is presented in Table 5. As can be seen, the significance level for this hypothesis is 0.000, so the null hypothesis is rejected. In other words, project logistics affect on the contractor's lack of interest in undertaking the project.

Hypothesis 4: Environmental factors affect the lack of interest in undertaking projects on the part of highly ranked contractors.

Table 6 Single-sample t-test results for the fourth hypothesis□

Component	Sig. level	t-tatistic	Std. deviation	Mean	Test Result
Environmental factors	0.00	9.41	1.179	3.67	Rejection of the null hypothesis

It can be seen from the Minitab outputs presented in Table 6 that the significance level for this hypothesis was 0.00, so null hypothesis is rejected. In other words, environmental

factors significantly affect highly ranked contractors' lack of interest in the contracting gas projects.

Finally, the importance of each component under study was assessed using the experts' opinions. The component priorities as assessed by the experts after multiplying the weights with component means are presented in Table 7.

Table 7) weights and priorities of the understudied components

Components	Relative mean	Weight	Mean	Priority in terms of importance
Logistic factors	1.19	0.32	3.74	1
Environmental factors	0.84	0.23	3.6691	2
Contracting factors	0.78	0.25	3.1364	3
Managerial factors	0.70	0.20	3.5	4

5. CONCLUSION

The aim of the study reported in this paper was to identify and prioritize the factors affecting on contractors' tendencies with respect to undertaking construction projects for the East Azerbaijan Gas Company. To do this, firstly, the factors underlying the lack of interest in participating in construction projects on the part of highly ranked contractors identified by the lack of interest to participate in the company's tendering were assessed. The factors could be categorized into managerial, contracting, logistics and environmental groups on the basis of a literature review followed by a checking process involving domain experts. Next, based on the four factors, a survey questionnaire was defined and administered to 55 contractors ranked highly by the gas company. The responses were analyzed using well-known statistical processes. The results have shown that managerial, contracting, logistics as well as environmental factors explain the empirically observed contractor dissatisfaction. Also, from the viewpoint of high ranked contractors, logistical factors play a greater role (followed by environmental, contracting and managerial factors, in that order) in determining the dissatisfaction observed with respect to highly ranked contractors engaged in the tendering process of East Azerbaijan Gas Company tenders. Next, the average scores for each factor group were multiplied by the corresponding relative weights as assessed through expert opinions. The findings are available in Table 7. Again, the finding was that logistical factors (followed by environmental, contracting and managerial factors, in that order) have been having a greater impact on the dissatisfaction observed among highly ranking contractors engaging in the tendering processes of the gas company.

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