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Investigating the Impact of Sanctions on Expenditures on Development of South Pars Gas Field: Comparing Internal Contractors with Foreign Contractors

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ABSTRACT

Projects are affected by many internal and external factors, which could be initiated domestically or internationally. The South Pars as a mega gas field in Iran requires billions of dollars for development and gas extraction. Its development has taken a rather long time and faced many challenges over the last two decades due to several problems, especially international barriers. In this work, the effects of sanctions on the expenditure on selected activities in developing South Pars field are investigated to compare internal contractors with foreign contractors. The main purpose of this research is to calculate the cost of the selected activities of South Pars phases and compare the performance of the internal contractors under sanctions conditions with that of the foreign contractors under normal (when no sanctions are imposed on Iran) conditions. For this purpose, 18 activities, which were similar in all South Pars contracts, were selected. In three sections, after applying relative indices, global inflation, and technology by using inferential statistics, the total cost of the selected activities done by the internal and foreign contractors was evaluated . Based on the statistical analysis, there was no significant difference between the expenditure on the selected activities performed by the internal contractors and foreign contractors under sanctions.

1. Introduction

Identifying the impact of conditions and different contractors on the selected activities can minimize the implementing costs in these fields and other similar projects. Also, it can prevent the loss of financial funds, human resources, optimization of the consumption, and sale of extracted gas from this field. Due to the existing economic conditions and the need for scarce financial resources in the country, the results of this article have a significant impact on resolving existing currency challenges.

In this paper, initially, South Pars gas field is described. Then, the problem statement, importance, necessity, statistical society, research objectives and questions, data collection, and analysis methods are explained.

In the implementation of South Pars phases and similar projects, the existence of contractors and relevant contracts as well as different international conditions can affect all implementation stages. Due to the sanctions imposed on Iran, and the withdrawal of international contracting companies, the implementation of hydrocarbon field projects has been virtually assigned to internal contractors or consortium companies. The same applies to South Pars gas field and the related projects.

We will examine the effect of different conditions on the expenses of implementing selected South Pars activities in various sectors. To this end, 18 activities which were

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identical to all contracts of South Pars gas field development were chosen. Onshore, offshore, and drilling sections were selected, and the corresponding expenses were analyzed and compared by using relevant indicators. These indicators were selected by using the inventive design and considering the price and technology changes between the 10 internal contractors and the 10 foreign contractors.

2. Literature Review

2.1. South Pars Gas Field

Iran is ranked first in the world by storing 953 trillion cubic feet of gas storages, which are often in the gas fields, oilfields, and gas caps. The country's largest gas field is South Pars gas field, which has a storage area about 507 trillion cubic feet along with the border between Iran and Qatar. About a third of Iran's total gas reserves are accumulated in this vast area. Iran and Qatar have always competed for excellence in the exploitation of hydrocarbon resources from the start of gas production in this area.

2.2. Operating Phases

Operating phases are the phases in which the operation of the three parts, namely onshore, offshore, and drilling, has been completed, and natural gas is being extracted. These phases can have the same standard design and daily gas production of 1,765 million cubic feet per phase.

Phase 1	
Phases 2 and 3	equivalent to two standard phases
Phases 4 and 5	equivalent to two standard phases
Phases 6,7 and 8	equivalent to two standard phases
Phases 9 and 10	equivalent to two standard phases
Phase 12	equivalent to two standard phases
Phases 15 and 16	equivalent to two standard phases
Phases 17 and 18	equivalent to two standard phases
Phase 19	

2.3. Economic Sanctions

Economic sanctions are designed to influence the policies of the target countries by putting economic pressure on and forcing them to accept their demands. (Huffaer & Scott, Hamid Reza Derakhshan, 2014). Economic sanctions are generally considered to be classified into two major types, or they are applied to two areas:

- Imposing a trade sanction in which exports to and imports from the sanctioned country are targeted, limited, or suspended.
- Appling restrictions and terminating financial relations.

2.4. Noneconomic Sanctions

These sanctions are usually imposed before the economic sanctions and are aimed at persuading the target country to change its policy. Noneconomic sanctions depending on the country and circumstances include:

- Cancellation of multilateral meetings;
- Refusal to grant visas;
- Reduction in the level of political representation;
- Prevention of the target country from joining international organizations;
- Opposition to the host country for hosting international meetings;
- Refusal of official aid and assistance in a critical crisis;
- Disconnecting telephone, radio, satellite, sea and land communications.

2.5. Effectiveness of Sanctions

From the standpoint of international trade principles, any sanctions comprise ordered interference with free trade and cause "trade distortion." Business distortion is costly, and both parties often incur costs. Prohibiting imports from or refusing exports to a country will make imports and exports more expensive. It is stated that the goal of the sanctions is to increase trade costs and trade diversion in the target country. However, the cost of sanctions varies according to the countries involved, as well as depending on the involved sector (Emadi, 2012).

Sanctioning the targeted government avoids financial transactions, money transfers, and investment. The sanctioning country uses its influence in international financial institutions to disrupt any financial relationship or technical assistance or even blocks the sanctioned country's assets.

The effectiveness of unilateral sanctions is usually very low unless the sanctioning country has an economic power superior to the target country, and there is a great deal of interdependence between the two countries.

Strategic economic sanctions are different from regular sanctions, which are used for other economic or non-strategic interests, and sanctions for strategic purposes are usually replaced with the war option. Therefore, the cost of economic sanctions is far less than the war, and it can entirely be justified by the country or countries executing economic sanctions.

The transition to economic sanctions for strategic purposes is usually performed in four steps:

- Encouraging the target country privately and through bilateral negotiations;
- Publicly requesting the target country and publicly announcing it;
- Consulting with allies for further action and system action if needed;
- Imposing the sanction at a noneconomic level.

2.6. The International Sanctions Trend on Iran's Oil and Gas Industry

In recent years, Iran's oil and gas sector has become the main focus of competition, like a double-edged sword between Iran and the United States. Although Iran ranks third, second, and fifth in terms of crude oil, natural gas reserves, and crude oil production respectively, it is in the first place in terms of total hydrocarbon reserves (crude oil and natural gas). Therefore, Iran takes an exceptional position in the world energy market, and no country or international corporation can overlook the economic and political benefits of cooperating with Iran and the vital value of making energy contracts with Iran. However, in recent years, due to the sanctions imposed on Iran, especially in the oil and gas industry, the risk of investment and activity in the Iranian oil and gas industry has increased in comparison to the other oil-rich countries in the Middle East region. The US has recently tightened its sanctions against the Islamic Republic of Iran by imposing pressure on foreign companies to choose between Iran and the US markets.

According to the country's statistical reports on oil purchase, Iran has had great difficulty in finding financial institutions to pay for energy-consuming companies and in receiving incomes from selling oil and its products since the beginning of the sanctions imposed on Iran. European and Middle Eastern banks refuse to issue letters of credit (LC) to Iranian financial institutions, which makes it difficult for the customers to pay for the oil purchased from Iran. Shipping companies also prevent transporting their tankers to Iranian oil terminals. Moreover, international insurance companies are reluctant to insure Iran-linked oil shipments. Therefore, Iran will increasingly find fewer financial institutions to deal with, and Chinese banks may be the last source of financing for trade with Iran.

Banks which are still trading with Iran pose many problems for the Iranian side. Reports indicate that some Iranian government officials have complained that Iran's most important oil buyers who purchased oil in the dollar or euro currencies have not been able to pay the price of Iranian crude oil, which has led to a currency shortage, and as a result, the central bank has attempted to strengthen Rial currency power in the Middle East.

2.7. Research Background

Among the similar researches in the field of oil and gas industry from the perspective of economic and financial, we address the following.

Linbrown (2011) explored new investments in the petroleum industry, which indicate that the cost of investing in oil and gas resources, especially in North America, has sharply increased. The primary feature of new oil resources is their high costs accounting for more than a third of the total investment in this industry.

Jaw (2011) also funded projects for hydrocarbon fields and bank capital constraints. The failure of financial markets and the international banking system has shadowed the global economy, which has led to an increase in development and implementation costs for oil and gas projects.

Philip Daniel (2011) reviewed the financial framework as well as the old and new challenges of oil contracts. He reported that it is possible to define new projects in the upstream sector of the oil and gas industry.

Moreover, Akhavan (2014) examined the requirements for South Pars gas field development contracts from three aspects of time, expenses, and repayment during the period.

Khalili Iraqi et al. (2014) used real powers as a technique which is generally very suitable for evaluating economic projects with financial returns under the uncertainty conditions to estimate the South Pars gas field development project. In this context, the weaknesses of traditional financial evaluation methods such as discounted cash flows and present net value were addressed and compared with conventional methods. Further, he determined that it is possible to determine the optimal time for the development of the phases using this approach. It is suggested that this approach, i.e. the economic evaluation of investment projects in various applications, should be used under uncertainty conditions.

In addition, Khazani et al. (2014) explored the exploitation of Iran's oil and gas fields shared with the Persian Gulf countries and outlined the current strengths and weaknesses of the extraction of the shared reservoirs. Based on the research findings, revising the current regime of extraction from the joint oil and gas reservoirs and taking steps towards the implementation of unit management on such reservoirs is an inevitable necessity to increase Iran's economic benefits in the gas extraction of the shared fields.

Javadi et al. (2017) investigated the relationship between some financial variables of the oil and gas companies within the Organization of the Petroleum Exporting Countries (OPEC). Furthermore, Javadi et al. (2018) measured the financial performance of the companies affiliated to the National Iranian Gas Company

(NIGC) which receives its gas from different phases of South Pars gas field. Although these two recent studies were in the field of oil and gas, especially in the context of Iran, they have not considered the cost of the development of South Pars gas field.

With regard to the above review, it can be concluded that the nontechnical aspect of the oil and gas industry in Iran is a rather untouched area, and there are very few studies in this context.

3. Research Methodology

In this part, first, the factors affecting the increase in the expenditure on selected activities in the development of South Pars gas field and the relevant indicators are described. Then, the process of selecting South Pars phases is divided into several components which provide the basis for the present research.

In this study, the two primary states are compared with each other:

- The first phase of implementation by the foreign company under unconventional conditions.
- The second phase of implementation by the internal contractors under sanction conditions.

The 18 selected activities in South Pars gas phases are analyzed and the costs of the 10 internal contractors and the 10 foreign contractors were compared.

3.1. Effectiveness of Factors Influencing the Expenditure on Selected Activities

Factors affecting the expenditures on the chosen activities in the development of South Pars gas field are considered in three general categories.

3.1.1. Factors Affected by Sanctions

This group relates to the factors which lead to international sanctions. These sanctions have imposed three types of restrictions, namely restrictions on imports, restrictions on exports, and difficulty in transferring the currency resources, on the project expenditures. The above limitations ultimately reflect their effect by increasing the presence of intermediaries and segmentation, raising exchange costs, reducing Iran's foreign exchange earnings, and increasing the exchange rate in the costs of the project.

3.1.2. Factors Affected by International Price Changes

Considering the global nature of the oil and gas superstructures implementation, changes in international prices also impact on the implementation of these types of projects. Therefore, worldwide inflation is considered to be an effective factor in raising costs. Foreign investment can change the price of engineering services (design), the price of materials and equipment (procurement), and other external resources necessary to help advance the project. In order to determine the real costs of the project, it is essential to consider the differences caused by changes in external prices in the costs associated with design, procurement, and construction phases.

3.1.3. Factors Influenced by the Implementation of the Economic Development Plan Focusing on the Targeted Subsidy Scheme

Another factor directly and indirectly affecting the costs of implementing development projects is the implementation of a plan for economic transformation which concentrates on a targeted subsidy scheme. The plan, in the form of eliminating subsidies of energy carriers and some of the essential commodities, has led to a rise in prices of many goods and services, construction costs, transportation costs, and prices of mechanical, electrical, and industrial products. Moreover, these developments eventually affect the producer price index.

The factors described above have, directly and indirectly, increased spending on South Pars development projects and raised the actual costs of these projects.

3.2. Index of Measuring the Factors Affecting Expenditure on South Pars Development Projects

3.2.1. Index of Rising Expenditures Due to the Sanctions

- Mediation cost index of foreign purchases;
- Index of the cost of transferring foreign currency.

Table 1 - Sanctions adjustment coefficients

Index	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Brokers Fee	100	108	108	108	108	108	114	117	117	117	117
Transfer Fee	100	104	104	104	104	104	104	105	105	105	105
Average	100	106	106	106	106	106	109	111	111	111	111

Table 2 - Adjustment coefficients of international price changes

Index	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Capex and Opex Cost: Upstream Oil & Gas	100	104.3	113.7	115.5	116.4	117.9	109.9	104.8	105.6	106.5	107.3
International Index of Oil & Gas Equipment	100	99.1	101.2	103.9	105.2	106.8	106.8	106.1	106.9	107.9	108.8
International Index of Oil & Gas Pipes	100	102.3	93.8	101.5	103.2	99.8	98.6	99.3	99.3	99.4	99.4
Index of Renting Drilling Rigs	100	91.2	93.6	110.3	142.0	146.0	96.0	72.4	71.2	70.4	69.2
Average	100	99.2	100.6	107.8	116.7	117.6	102.8	95.7	95.8	96.1	96.2

3.2.2. Index of the International Changes in Equipment and Service Price

- Indicator of capital expenditures and operations in the oil and gas upstream activities;
- The international price index of equipment;
- The international index of oil and gas pipelines;
- The cost of renting drilling rigs.

3.2.3. Internal Index

- Indicative price of industrial goods;
- Electricity price index;
- Mechanical equipment prices;
- The freight price index;
- Property price index;
- Service price index.

3.3. Mann-Whitney Test

The Mann-Whitney test is a comparative test to compare the status of two independent groups. When the data of a study are qualitatively sequential or abnormal, it is better to use this test, which is a nonparametric test and equivalent to two independent *t* tests of samples. In this case, we do not use two independent *t* tests of the samples because the average of the variables measured on an orderly scale will not have significant meanings. For example, when we want to compare the height of two groups of women and men, it is better to sort people by height and rank them to compare their mean height. Suppose that we want to compare two traditional and new methods of teaching students of a school. The students are randomly selected, and the subjects are randomly reassigned to each of the two methods (n_1 in the first method and n_2 in the second method, where, $n_1 + n_2 = N$); after the training ends, a single test is performed on all of them. Then, their grades are considered and ranked in order. Next, in the following index, we compute the sum of the ratings of each group and name them R_1 and R_2.

The Mann-Whitney test statistic is now defined by:

$$W = n_1 \times n_2 + \frac{n1(n1+1)}{2} - R_1$$
$$W' = n_1 \times n_2 + \frac{n2(n2+1)}{2} - R_2 \quad (1)$$

If the size of the two groups are not equal, then *n1* is considered to be the smaller group, and *n2* will be the larger group. Calculating either of *W* or *W'* is enough because they are related as given by:

$$W + W' = n_1 \times n_2 \quad (2)$$

In this test, the hypotheses are as follows:

Table 3 - Adjustment coefficients of internal indicators

Index	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Industrial Goods Price Index	100	122.0	188.3	244.0	329.3	362.0	360.5	373.5	402.8	418.5	436.8
Electricity Price Index	100	115.7	135.4	217	257	279	282	295	325	358	366
Mechanical Price Index	100	110.5	129.3	185	228	248	257	268	299	310	329
Freight and Fuel Price Index	100	106	113.5	128	154	200	251	273	309	312	331
Building Price Index	100	113.2	135.5	189.0	226.0	244.4	238.8	251.1	283.8	311.6	320.8
Services Price Index	100	111.8	128.5	157.6	201.5	253.2	288.2	313.1	364.9	390.2	410.3
Average	100	113.2	138.4	187	233	264	279	296	331	350	365

H_0: There is no difference between the two groups.
H_1: There is a difference between the two groups.

If the sample size was less than 20, then the Mann-Whitney table must be used to reject the zero hypothesis. If the sample size was greater than 20, then by using the mean and variance of the following indices, which have a standard normal distribution, we can compare the value at a level of significance of 0.05 with a value of 1.96 in the standard normal table.

$$U = Z = \frac{\left| W - \frac{n1\,n2}{2} \right|}{\sqrt{\frac{n1n2(n1+n2+1)}{12}}} \quad (3)$$

4. Results

4.1. Data Analysis

Table 4 lists the overhead costs of the 18 selected activities in South Pars gas field development calculated using time-driven activity based costing (TDABC). These costs are broken down into the internal contractors and the foreign contractors. One of the main elements of the cost is the overhead costs (expenses) which are not directly involved in the manufacture of goods and products; thus, it is not easy to include these costs in the production of a specific product.

At the beginning of the documentation and reports available to National Iranian Oil Company (NIOC), expenditures paid to the contractors in the selected activities were extracted. Then, taking into account the indicators described in the previous section, the expenditures on the selected field development activities were calculated in million dollars for the foreign contractors and the internal contractors.

4.2. Opportunity Cost

The opportunity cost of a resource is the value of the alternative source use, which is more valuable after its current use. According to the available documents (National Iranian Oil Company), the daily income of South Pars in 2013 (Annually extraction expenditures) was 7 million dollars for each phase. Therefore, considering the 10 phases of the project, these expenditures are expected to reach about 2.5 billion dollars in revenue per year. Specifically, the delays in the extraction from this field every day, every month, and every year will cause extensive economic damages to the country. The selected activities done the internal contractors compared with the foreign contractors in the long-term horizon creates an opportunity cost equivalent to a lower income due to this delay. Table 6 tabulates the opportunity cost of each activity,

Table 4 - Overhead costs of the 18 selected activities c

Part	Activities Description	Internal Contractors		Foreign Contractors	
		Time Consumed (Day)	Allocated Overhead	Time Consumed (Day)	Allocated Overhead
Onshore	Procurement Activities	1750	20.43	900	19.31
	Supply of Equipment	750	8.76	250	5.36
	Supply of Bulk Material	500	5.84	200	4.29
	Supply of Spare Parts	500	5.84	100	2.15
	Site Establishment	750	8.76	200	4.29
	Plant Construction	3000	35.02	1600	34.33
	Pre-Commissioning	500	5.84	150	3.22
	Construction Camp	1250	14.59	600	12.87
	Site Work	500	5.84	200	4.29
Offshore	Mobilization/Demobilization	250	2.92	80	1.72
	Start-up Activities	500	5.84	150	3.22
	Pre-Commissioning test	500	5.84	250	5.36
Drilling	Appraisal Wells	2500	29.19	1300	27.89
	Deviated Wells	4250	49.62	2200	47.20
	Logistic Base Services	750	8.76	325	6.97
	Yard Fabrication	1500	17.51	600	12.87
	Detailed Engineering	500	5.84	275	5.90
	Material Procurement	1250	14.59	175	3.75
	Sum	21500	251	9555	205

Source: calculated using TDABC for the 18 selected activities

Table 5 - Material and equipment costs classified based on

Type of Contractors	Contractors	Onshore									Offshore			Drilling						Sum
		Procurement Activities	Supply of Equipment	Supply of Bulk Material	Supply of Spare Parts	Site Establishment	Plant Contraction	Pre-Commissioning test	Construction Camp	Site Work	Mobilization/ Demobilization	Star-up Activities	Pre-Commissioning test	Appraisal Wells	Deviated Wells	Logistic Base Services	Yard Fabrication	Detailed Engineering	Material Procurement	Sum (Million USD)
Internal Contractors	Aria Naft Shahab	82	1005	967	20	69	638	47	35	166	29	79	14	141	420	38	39	92	198	4080
	Petro Paydar	76	935	899	18	64	593	44	33	154	32	74	13	132	391	36	37	85	185	3799
	Petro Sina	78	965	928	19	66	612	45	34	159	26	76	14	136	404	37	38	88	191	3799
	Petro Pars	68	841	809	17	58	534	39	30	139	25	66	12	118	352	32	33	77	166	3416
	IDRO	90	1106	1064	22	76	702	52	39	182	34	87	16	156	462	42	43	101	218	4490
	OIEC	80	985	948	19	67	625	46	35	162	28	78	14	139	412	38	38	90	194	3998
	MAPNA	73	894	860	18	61	568	42	31	147	29	71	13	126	374	34	35	82	177	3634
	IOEC	98	1206	1160	24	83	765	56	42	199	40	95	17	170	504	46	47	110	238	4901
	NIDC	80	985	948	19	67	625	46	35	162	26	78	14	139	412	38	38	90	194	3996
	ISOICO	86	1055	1015	21	72	670	49	37	174	34	83	15	148	441	40	41	96	208	4287
SUM		809	9977	9598	197	683	6332	465	350	1645	303	788	140	1404	4173	380	390	912	1970	40516
Foreign Contractors	Eni	22	384	238	6	14	269	17	16	113	14	21	8	41	162	16	18	46	88	1493
	State Oil	23	395	245	6	14	277	17	16	117	14	21	8	43	166	17	19	48	91	1537
	Total	22	391	243	7	14	274	17	16	115	12	21	7	42	165	17	19	47	90	1521
	Toyo	22	380	236	7	14	266	17	16	112	10	21	6	41	160	16	18	46	87	1474
	Daelim	23	399	248	8	14	280	17	17	118	13	22	8	43	168	17	19	48	91	1553
	GS	23	403	250	6	14	283	18	17	119	14	22	8	43	170	17	19	49	92	1567
	Hyundai	23	397	247	6	14	278	17	16	117	14	22	5	43	167	17	19	48	91	1542
	Samsung	23	401	249	9	14	281	17	17	118	12	22	8	43	169	17	19	48	92	1561
	Sagadril	22	388	241	6	14	272	17	16	114	11	21	8	42	163	17	18	47	89	1505
	Schlumberger	37	652	405	10	23	457	28	27	192	15	22	9	43	275	28	31	79	149	2484
Sum		241	4191	2601	71	150	2938	183	173	1236	129	214	76	424	1764	180	199	506	960	16236

Table 6 - The opportunity cost of the internal contractors

Activities Description	Delay (Day)	The Portion of each Activity	Daily Revenue of South Pars	Opportunity Cost (Million USD)
Procurement Activities	35	0.10	18	46
Supply of Equipment	21	0.07	18	26
Supply of Bulk Material	13	0.05	18	11
Supply of Spare Parts	17	0.02	18	6
Site Establishment	23	0.04	18	17
Plant Construction	58	0.02	18	21
Pre-Commissioning	15	0.01	18	3
Construction Camp	27	0.02	18	10
Site Work	13	0.04	18	9
Mobilization/Demobilization	7	0.01	18	1
Start-up Activities	15	0.01	18	3
Pre-Commissioning test	10	0.01	18	2
Appraisal Wells	50	0.08	18	72
Deviated Wells	85	0.04	18	62
Logistic Base Services	18	0.08	18	26
Yard Fabrication	38	0.03	18	20
Detailed Engineering	9	0.02	18	3
Material Procurement	45	0.35	18	282
Total	498	1.00	324	637

demonstrates the comparison of the execution time between the internal contractors and foreign contractors, and presents the effect of delays on the gas production in South Pars.

4.3. Cost After Using Indicators

In order to calculate the final coefficients adjustment of each activity, the average relevant indices (as described in the third section) have been considered. Since expenditures on the foreign contractors have been extracted based on the documents issued in 2003 and the foreign contractors were obtained in the same year, 2003 was chosen as the base year. Therefore, in order to equalize and compare the costs, the costs of the internal contractors were divided by the average indicators obtained in the year 2003. Moreover, they were calculated based on the base year (2003) expenditures.

4.4. Inferential analysis

In the inferential statistics section, the normalization of variables is first checked. Then, an appropriate sampling method is selected to compare the contractors. Based on the Shapiro-Wilkes test used herein, two assumptions are considered:

H_0: The associated variable has a normal distribution.

H_1: The associated variable does not have a normal distribution.

The results of the Shapiro-Wilkes test are presented in Table 8:

4.5. Comparing Total Expenditures on the Internal Contractors and the Foreign Contractors

In order to compare the costs of the internal contractors and foreign contractors, three areas of onshore, offshore, and drilling were used. Statistical assumptions are defined as follows:

H_0: There is no significant difference between the total expenditures on the selected activities of the internal and foreign contractor in South Pars field development.

H_1: There is a significant difference between the total expenditures on the selected activities of the internal and foreign contractor in South Pars field development.

The corresponding results of the Mann-Whitney test are presented in Table 9:

The findings in the above table show that after applying international price changes and internal indices, the significance level of the Mann-Whitney statistics is higher than 0.05, and thus the zero hypothesis is accepted. In other words, although the expenditures on the internal contractors are higher than those on the foreign contractors, the internal contractors do not significantly differ from the external contractors at a 95% confidence level.

Table 7 - Total cost (applying to international price changes and the internal indices)

Type of Contractors	Contractors	Onshore									Offshore			Drilling						Sum
		Procurement Activities	Supply of Equipment	Supply of Bulk Material	Supply of Spare Parts	Site Establishment	Plant Contraction	Pre-Commissioning test	Construction Camp	Site Work	Mobilization/ Demobilization	Star-up Activities	Pre-Commissioning test	Appraisal Wells	Deviated Wells	Logistic Base Services	Yard Fabrication	Detailed Engineering	Material Procurement	Sum (Million USD)
Internal Contractors	Aria Naft Shahab	36	435	419	9	30	277	21	16	72	13	35	6	63	184	17	18	40	86	1776
	Petro Paydar	34	405	389	8	28	258	19	15	67	14	32	6	58	172	16	17	37	81	1656
	Petro Sina	35	418	402	8	29	266	20	15	69	11	33	6	60	177	16	17	38	83	1705
	Petro Pars	30	364	350	7	25	232	17	13	60	11	29	5	52	155	14	15	33	72	1487
	IDRO	40	479	461	10	33	306	23	18	79	15	38	7	69	202	19	19	44	95	1957
	OIEC	35	427	410	9	30	272	20	16	71	12	34	6	61	180	17	17	39	85	1741
	MAPNA	32	387	373	8	27	247	18	14	64	13	31	6	55	164	15	16	36	77	1582
	IOEC	43	523	503	11	36	333	25	19	86	17	41	7	75	221	20	21	48	103	2133
	NIDC	36	427	411	9	30	272	20	16	71	11	34	6	62	181	17	17	39	85	1743
	ISOICO	38	457	440	9	32	292	22	17	76	15	36	7	65	193	18	19	42	91	1868
	Opportunity Cost	25	10	4	2	6	8	1	4	4	1	1	1	28	24	10	8	1	111	250
SUM		384	4333	4162	90	306	2765	205	162	719	133	345	64	649	1852	178	184	399	970	17898
Foreign Contractors	Eni	24	384	238	6	14	272	17	17	114	14	21	8		166	17	19	47	88	1508
	State Oil	24	396	246	6	14	280	17	18	117	14	22	8	45	170	18	20	48	91	1553
	Total	24	392	243	8	14	277	17	17	116	12	21	7	44	169	17	19	47	90	1535
	Toyo	24	380	236	7	14	270	17	18	113	10	21	7	44	166	17	20	46	87	1497
	Daelim	26	400	248	8	15	283	18	18	118	13	22	9	46	174	18	20	49	92	1577
	GS	26	404	251	6	15	287	18	18	119	14	22	9	47	175	18	20	50	93	1591
	Hyundai	25	398	247	6	15	283	18	18	118	14	22	6	46	172	18	21	49	91	1565
	Samsung	25	402	249	9	15	284	18	18	119	12	22	9	46	174	18	21	49	92	1582
	Sagadril	24	388	241	6	14	276	17	18	115	11	21	9	45	168	17	20	48	89	1528
	Schlumberger	39	653	405	10	24	460	29	28	193	15	22	10	46	279	29	33	79	150	2504
Sum		260	4196	2605	73	154	2972	186	186	1240	131	217	81	452	1812	187	212	512	964	16440

Table 8 - Shapiro-Wilks test results (after international price changes and internal indices)

Test Type	Condition	Significance Level	Statistics	Research Variables
Nonparametric	Abnormal	0.001	0.747	Onshore
Nonparametric	Abnormal	0.001	0.786	Offshore
Nonparametric	Abnormal	0.001	0.765	Drilling
Nonparametric	Abnormal	0.013	0.753	Total Cost

Table 9 - Results of the Mann-Whitney test

Significance Level	Statistics	Total Cost	Number	Contractor
0.085	-1.72	17898	10	Internal
		16440	10	Foreign
		34338	20	Total

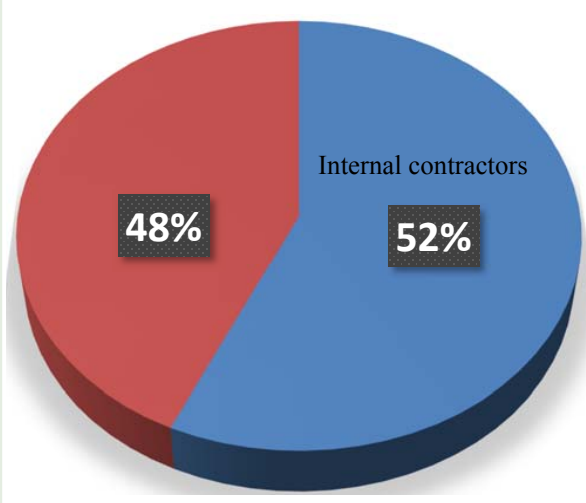

Figure 1: Comparing the total cost of the internal and foreign contractors after applying all indicators

5. Conclusions

According to the results of the statistical data analysis, after excluding the effects of normal-condition indicators, the implementing expenditures on the selected activities of the internal contractors do not significantly differ from that of the foreign contractors. In other words, there is no significant difference in the presence of sanctions.

The obtained results demonstrate that the development costs of this field by the internal contractors under international sanctions are higher than those by the foreign contractors under normal conditions, which means that the sanctions do not have any significant effect on the expenditures on these activities, and the other factors and indicators must also be evaluated.

Taking into account the nature of South Pars gas field and its daily revenue, expediting the development of South Pars phases can add around 10 billion dollars to Iran's profits and prevents current losses due to the slow extraction from this shared zone. Therefore, any delays in the extraction from this field will cause a great deal of unpredictability for the country.

Further, the higher total cost of the internal contractors compared to that of the foreign contractors means that the profit margin of South Pars gas field is lower than that of consuming or exporting gas products, which results in the further loss of rare financial resources of the country.

Since, based on the research findings, the sanctions alone have not had a significant impact on the internal contractors in comparison with the external contractors, it is imperative to meticulously consider other factors, especially internal factors, and take necessary corrective action.

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