



Identifying and Ranking the Factors Influencing the Determination of the "Delivery Point" in International Natural Gas Sales Contracts (Case Study: Natural Gas Sales Contracts in LNG state)

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ABSTRACT

The analysis of the global environment of the energy industry and its developments shows that natural gas is the shaper of the world's energy future. The future of Iran, as the owner of the world's first gas resources, is undeniably tied to a category called "Natural gas". New developments, such as the environmental conditions of the world, the consequences of the war between Russia and Ukraine, the tensions in the Middle East region, and the prediction of a rise in the global price of crude oil in the near future have also increased the role and importance of natural gas. According to the analysis of British Petroleum (BP) and the International Energy Agency (IEA), the trend of natural gas consumption will continue at a faster pace until 2030. Therefore, in order to maintain Iran's superior position in the world markets and to timely use the advantage of the country's gas reserves so as to turn these reserves into more value-added capital, we need to further develop country's technical, political, marketing, legal, infrastructures etc. One of the main components of the legal infrastructure to create and develop market share in the global natural gas markets is to pay attention to the issue of how to design and regulate international natural gas sales contracts in accordance with the transfer method and the basic bottlenecks in it. One of the most important bottlenecks in international contracts for the sale of natural gas is the design and determination of the "Delivery Point", which can be different in different contracts, according to the method of transfer and the contingent factors of each contract. In this research, in order to identify the factors influencing the determination of the "Delivery Point" in the international contracts for the sale of natural gas in LNG form, the research literature was reviewed and interviews were conducted with experts, and the conceptual model of the research and their measurement indicators were designed. The collected indicators were distributed among the members of the statistical community in the form of a researcher-made questionnaire and their opinions were collected. According to the findings of this research, the results of the T-test indicated that the five main factors defined for this research are effective, according to the members of the study's statistical population, in determining the delivery point in international natural gas sales contracts with an emphasis on the LNG method. On the other hand, the Friedman ranking test was used to rank these factors in terms of their level of importance. Based on the test results, the contractual factor had the highest mean rank and, consequently, the greatest importance. The political, geographical, technical, and economic factors followed in terms of importance, respectively.

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1. Introduction

Natural gas plays an important role in meeting global energy needs. It can be transported through pipelines (Local or international) or in the form of liquefied natural gas (LNG). The construction of gas and LNG infrastructure requires large investments, which are concluded from the very first days through long-term contracts with reliable buyers. Historically, there was only one long-term segment for gas and LNG sales. This is how the delivery of LNG cargo, and gas export through the pipeline, were executed with a significant amount of contracts and financial shares that were closed through these contracts. In the 1990s, short-term markets began to emerge, providing new contractual arrangements for the sale of gas and LNG. As a result, the contract landscape for international gas and LNG transactions has become more diverse. Despite the growing role of spot or short-term transactions, a significant volume of gas and LNG is still traded under long-term contracts. After Russia's invasion of Ukraine, these traditional agreements may become even more important. This is due to the increasing geopolitical uncertainties and the need to ensure long-term energy security. Long-term contracts provide buyers and sellers with confidence that supply and demand will be predictable in the future, especially in conditions where political or economic disruptions could affect short-term markets (IEA, 2022). Furthermore, following Russia's invasion of Ukraine, many European countries have sought to reduce their dependence on Russian gas and diversify their energy supply sources. This has led to an increase in demand for long-term contracts with other gas producers, particularly through LNG methods. These contracts not only guarantee energy security but also help countries avoid price volatility in short-term markets (BP, 2023). Consequently, long-term contracts have gained greater importance as a key tool for managing

geopolitical and economic risks in the global gas and LNG industry.

Therefore, we see an increase in the interest of various actors, including energy market participants, regulators, as well as the general public, in long-term gas and LNG supply contracts (Ason, 2022). The past few years have also seen significant advances in liquefied natural gas (LNG) processing and distribution technologies, which have opened up new avenues for reliable energy supply at affordable prices. As a result, the number of LNG consuming countries has increased from 15 countries in 2005 to 48 countries in 2023 (IEA, 2023; Msakni & Haouari, 2018). Interestingly, natural gas is the only fossil fuel whose share of primary energy consumption is expected to increase. The International Energy Agency recently estimated that global demand for natural gas is expected to increase. For some emerging economies, this growth is even more impressive. As an example, China is expected to account for 40% of the global growth. One of the reasons for this growth in China is its interest in natural gas, which is and will be supplied from Russia because natural gas is considered the cleanest fossil fuel (Msakni & Haouari, 2018). Additionally various gas producing export countries such as Australia, America and Russia are launching huge plans to increase their capacity of LNG production by spending the required large investment. Therefore, it is important to pay attention to the legal issues of international natural gas sales agreements (GSA). The terms of international natural gas sales contracts are very important from a financial, legal and even political point of view, because gas contracts can have a significant impact on the economic future of countries due to their high financial volume. In the international gas sales contracts and specifically in the LNG state, there are many administrative, technical and legal bottlenecks: In international LNG sales contracts, key bottlenecks include complex regulatory approvals, technical challenges

in liquefaction and transportation, legal disputes over jurisdiction, price negotiation complexities, and ensuring long-term supply security amidst geopolitical risks, which are necessary to be investigated further, in order to avoid any implementation problems and the resulting consequences. I knowing and avoiding the bottlenecks of international natural gas sales contracts, can it greatly help to facilitate these types of contracts? One of the main bottlenecks in international natural gas sales contracts is the category of determining the "Delivery Point". Considering the special characteristics of natural gas, every international contract for the sale of natural gas has its own special conditions which naturally require attention and consideration. In all international contracts for the sale of natural gas, the issue of determining the "Delivery Point" is one of the most important issues, which is influenced by various geographical, political, economic, and other factors. From the legal point of view, the point of delivery or delivery of the goods is the point where the goods are in a state where the buyer can exercise ownership rights over them. Due to the lack of previous research resources in this field (IEA, 2021; Wood, 2018) we, in this research, seek to explain and analyze the concept of the "Delivery Point" in international gas sales contracts and explain the factors affecting the determination of the "Delivery Point" with an emphasis on the LNG along with their related indicators. And we also rank these factors based on their importance in international gas sales contracts.

2. Problem Definition

With the passage of time and in different eras, different fuels have been used, from wood to coal, oil and its derivatives, and natural gas. This rotation from wood to coal and from coal to oil and natural gas is due to each energy source having different characteristics compared to its previous source. For example,

the more favorable a fuel source is in terms of the amount of energy it releases, in terms of the technological needs of the day and in terms of the environment, the more attention and use that source has. Amongst all energy carriers, natural gas is more important and desirable because it has the highest ratio of hydrogen to carbon among fuels (Alikhani, 2016: 290; Busby, 2016; Seyedhashemi Toulon, 2019). Natural gas has a history of thousands of years, but its importance as a fuel used in our lives began in the early 1930s. At the end of the 20th century, it became clear that natural gas has become a very necessary and vital energy source in most of the industrialized world (Busby, 2010: 26; Demirbas, 2006).

Due to the following reasons, the role and importance of natural gas is increasing:

- Day by day, more natural gas resources are being discovered (IEA, 2023; BP, 2022), so that natural gas will become one of the most important natural fuel energy carriers in the 22nd century.
- By reducing carbon dioxide and stabilizing the entry of greenhouse gases into the atmosphere, natural gas can have a positive effect on the growing trend of global warming.
- Natural gas is a carrier of energy that can be used in many technologies and different parts of different industries as well as in household uses (IEA, 2022, EIA, 2023).
- If natural gas can be transferred through the global gas supply network, many people can get benefit from it. In this regard, Russia is still the largest exporter of natural gas in the world, most of which has been transported through pipelines and then in the form of LNG. But after the war in Ukraine, the export of Russian gas has been limited. Currently, Russia has a gas lock of about 75 to 85 billion cubic meters and does not know where to use this gas (Fars news Agency, 2023).

However, in fact, natural gas has its own issues for consideration. For example, the supply and demand of natural gas in the world markets is less than oil, and its transfer from one place to another is very expensive and difficult. But since most of the natural gas fields in the world are far from the consumption market, the costs related to the production, processing and transportation of natural gas are high. In such a situation, gas transmission by means of new solutions along with cost reduction is of particular importance. This problem has caused the creation of different methods for natural gas transmission. Pipelines and LNG are among the most important and widely used natural gas transportation methods. Investigations have shown that it is possible and practical to transfer natural gas to long distances at a lower price through LNG. LNG transportation costs per mile are lower than pipeline. Another major advantage of this method is the easier transportation of liquefied natural gas to long distances and the reduction of political problems in terms of crossing international waters (Qanvati-Nasab, 2021: 36-29; Rahimi and Dehghani, 2019: 14-22).

On the other hand, the amount of energy that natural gas releases in a certain volume is less. However, due to the continuous increase in the price of oil and environmental concerns about the level of air pollution, natural gas has become one of the most important sources of clean energy in the world. Also, the consequences of the war between Russia and Ukraine and the lack of a vision for the end of the war, as well as the sanctions imposed against Russia, have caused global imbalances in the players of the energy industry (Alikhani, 2016: 2; Hirani). et al., 2016). Price volatility and supply disruptions following Russia's invasion of Ukraine have negatively affected the performance of several gas and LNG supply contracts. Parties to gas contracts have also faced unprecedented demands from regulators regarding their contractual rights.

The prolonged period of market uncertainty has led to an increased emphasis on risk management activities by industry participants and has recently led to a significant increase in disputes under long-term contracts. In parallel, the urgent need to reduce dependence on Russian gas imports has sparked a search for additional supplies and led to the signing of dozens of new LNG contracts this year, including more than 25 signed by US producers (for more than 35 million metric tons per year). Although the legal and commercial aspects of these new contracts are generally confidential, the reported contract terms (mostly between 15 and 25 years) and the estimated average new contract duration of nearly 20 years indicate a significant increase in long-term contracts. This in turn means a deviation from the previous trend in favor of shorter deals (Ason, 2022: 17-18).

But in general, based on the statistics and the results of expert studies regarding the advantages and disadvantages of natural gas, it can be argued that natural gas is facing an increasing acceptance at the global level and a certain trend. natural gas has become an essential energy source in most of the industrialized world (U.S. Energy Information Administration (EIA), 2006; Mitchell et al., 2012; Roberts, 2014: 135; Robinson and Holland, 2021; Rahimi, 2016: 98; Seyedhashmi Toulon, 2019: 25; Shiriavskaya et al., 2021: 2). Many countries are lucky enough to have at least some natural gas reserves, but there are other countries such as Japan that have to import almost all the gas they need. Most of the places containing rich oil resources also have natural gas resources. Russia, the Middle East (specially Iran & Qatar), Mexico, some parts of South America and the countries located on the edge of the North Sea of Europe are among these (Busby, 1380: 17). But the distribution of natural gas reserves in the world is asymmetric and due to the set of positive characteristics of natural gas, the global demand for it is increasing (Roberts, 2014: 135;

Augusta et al., 2021: 5). For example, based on the analysis provided by the BP Energy Studies Center, in the time horizon of 2035, natural gas will have the highest consumption growth rate, which will be supported by strong supply growth (BP, 2016). It is especially supported by American shale gas and LNG liquefied gas and by environmental policies (Hajian and Mousavi, 2015: 82).

On the other hand, in recent years, in addition to its conventional sources, gas production has become possible from unconventional sources as well (Samadi and Meibodi, 2014). As the first holder of conventional gas reserves in the world and the fourth producer, Iran intends to increase its share in the global gas trade by entering the gas competition. Meanwhile, according to the latest estimates made by BP in 2023, Iran has the first natural gas reserves in the world (18%) (BP, 2023; EIA, 2023). Finally, it can be concluded in this section that the current developments in the field of world energy diplomacy indicate that in the not so distant years, there will be countries with superior economic power that dominate the world's energy resources, especially oil and gas. Therefore, identifying and providing the necessary infrastructure for the production, marketing and global sale of natural gas will be one of the priorities of the National Iranian Oil Company (NIOC), (Stevens, 2015: 2; Shiravi, 2012).

In this regard, one of the most important areas that can maintain Iran's public and national interests in the field of economy and politics at the international level is the commercialization of energy, including gas supply through sales contracts of which gas transfer is an important factor in this regard. (Hajian and Mousavi, 2015: 82). Meanwhile, in the studies conducted by the European Parliament, it has been determined that there is a possibility of exporting gas to Europe from 12 countries. Iran is one of these countries and has the suitable source of gas supply to this continent. Europe is looking for

the diversification of energy supply sources of the green continent and Iran will also find a suitable capacity to increase gas exports with the development of new phases of South Pars which can be connected to the European gas network from eight routes (Mohammadi et al., 2015: 2). Russia's various political challenges with the European Union and the interruption of Russian natural gas exports to Europe several times since 2006, the consequences of Russia's war with Ukraine and the surplus of Russia's gas balance, the tensions in the Middle East and the forecast increase in global oil prices. It has set a special position for Iran's gas export and considering the transferring is an important issue. Because of several disputes with Turkey in sales contract and different aspects to this business, Iran has to look for other transmission methods, the other choice is LNG transmission. All these arguments indicate that the future of Iran is undeniably tied to a category called "gas". Therefore, it is necessary to carry out basic studies and measures in all the infrastructural aspects of this industry. Contracts for the sale and transfer of natural gas are always among the most important contracts in the world's oil and gas industry, and due to the growing use of natural gas fuel instead of oil, the importance of such contracts is becoming more and more clear (NikBakhsh Sharafshade, 2013: 1; Ason, 2022).

Long-term gas and LNG supply contracts, which serve as the main examples of international gas contracts, contain strong provisions that define the rights and obligations of the parties. International gas contracts operate in a dynamic market environment. There are many challenges facing these contracts, which always require improvement of contract conditions and sometimes immediate responses from the parties (Ason, 2022). Therefore, one of these basic challenges is paying attention to the legal issues of international gas sales contracts. Paying attention to the bottlenecks of international natural gas sales contracts can greatly help in facilitating these types

of contracts. One of the main bottlenecks in international natural gas sales contracts is the category of determining the "Delivery Point". Considering the special characteristics of natural gas, every international contract for the sale of natural gas has its own conditions and naturally requires special attention and considerations. In all international contracts for the sale of natural gas, the issue of determining the "Delivery Point" is one of the most important issues, which is influenced by various geographical, political, economic, and other factors. From the legal point of view, the point of delivery or delivery of the goods is the point where the goods are in a state where the buyer can exercise ownership rights over them. The term transfer of ownership has the meaning that a person, by virtue of a contract or a deed, transfers the ownership of which he has a financial burden to another person, so that his ownership is lost as soon as this transfer is made and the ownership of another person or persons takes the place of his ownership (Qanawati, 2013: 30). Due to the lack of research resources in this field, in this research, we seek to explain and analyze the concept of the "Delivery Point" in international gas sales contracts and explain the factors affecting the determination of the "Delivery Point" along with the indicators related to them, as well as the ranking. These factors are based on the level of importance in international gas sales contracts.

3. Research Literature Review

International gas sales contracts include agreements and commitments between countries or international companies for the purchase and sale of natural gas. These contracts are usually signed for a long period of time and based on specific contract terms. International gas sales contracts can be signed bilaterally or multilaterally between countries. In bilateral agreements, only two countries

are involved, while in multilateral agreements, several countries may be involved. The things that are usually considered in international gas sales contracts are:

- Gas price: Contracts usually determine the conditions for determining the price of gas. This price may be fixed or determined based on some market indicators.
- Volume and delivery time: Contracts usually specify how much gas should be delivered and when.
- Payment conditions: Contracts also determine conditions for payment to the seller. These conditions may include determining the time of payment and the method of payment.
- Contract conditions: Contracts usually also specify other conditions, such as: conditions for the transfer of gas ownership ("Delivery Point"), obligations related to gas quality and responsibilities of the parties to the contract. Considering the importance of gas in the energy industry, concluding gas contracts is a necessity in order to ensure the establishment of international cooperation, guarantee energy supply and industrial development.

One of the key points in international gas contracts is transparency. These contracts must have full transparency and assure the parties that all the terms and conditions in these contracts are correctly foreseen. One of the main bottlenecks in natural gas sales contracts is the issue of determining the "Delivery Point". Therefore, according to the nature of the topic of this research, the research literature is divided into two main parts. In the first part, we analyze and explain the legal nature of the concept of delivery and submission in different legal systems, and then in the second part of the research background, we try to explain the factors affecting the determination of the "Delivery Point" in international gas

sales contracts. We use the pipeline and LNG transmission, and at the end of this section, the conceptual model of the research, which is a combination of the research background and experts' opinion, is presented.

3.1. The First Part of the Background of the Research: Analysis and Explanation of the Legal Nature of Delivery and Submission

All legal systems agree that the purpose of the sales contract is to transfer ownership from the seller to the buyer. However, legal systems differ on when and how to transfer ownership, so that the drafters of the Vienna Convention in 1980 preferred to be silent about the time of transfer of ownership in the international sale of goods. In fact, in the analysis of the transfer of ownership process, we are faced with two basic questions:

- Does the sales contract itself directly cause the transfer of ownership without the need of any intermediary?
- Does the sales contract create the transfer of ownership immediately?

The answers of legal systems to these two questions are not the same. Some consider the transfer of ownership to be a direct and immediate effect of the sale contract, and others consider other legal actions necessary in addition to the sale contract to realize the transfer of ownership (Amini, 2012: 36; Faizi-Chekap and Mousavi, 1400). The transfer of ownership is the main purpose of sale in all legal systems, but the time of transfer of ownership to the buyer is different in different legal systems according to the type of goods (Qanvati, 2012: 59; Faizi-Chekap and Mousavi, 1400). Ownership may be transferred to the buyer upon conclusion of the contract, delivery of the goods, completion of the contract, or at any time agreed upon by the parties. The relationship between delivery and ownership is well reflected in the Rome

legal system, since in Rome law, ownership is transferred to the buyer upon delivery of the goods. Surrender is an important step in sales contracts, because the buyer can exercise most aspects of his ownership rights on the seller when the seller is in his possession and control by real and material or hypothetical and immaterial handover. In this regard, it is necessary to examine the relationship between the concepts of surrender and ownership in the legal systems of Iran, England and the International Sales Convention (Vienna Convention). Of course, the Vienna Convention, because it does not contain provisions regarding the transfer of ownership, can be less effective in this direction than the laws of England and Iran (Olumi-Yazdi, 2001: 67; Faizi-Chekap and Mousavi, 2020). Regarding the determination of the time and legal analysis of the ownership transfer process in sales contracts, there is a fundamental difference between two views: the view that considers the sale contract insufficient for the transfer of ownership and the view that considers the sale contract sufficient for the transfer of ownership. German laws on one hand and French and Iranian laws on the other hand are good examples to explain these two views. Carefully in the analytical bases regarding the time and manner of transfer of ownership in sales contracts in the three legal systems of Germany, France and Iran, it shows well that the fundamental difference is actually the degree of adherence of each system to two important legal principles, i.e. respect for freedom and independence of will and guaranteeing security of transactions and protection of third parties return on the other hand. Affected by their historical, economic and social conditions, some systems have paid more attention to the first principle and others to the second principle (Amini, 2004: 173). In general, and by examining different analysis regarding the nature of submission in different legal systems, it can be concluded

that there are similar elements in the concept of submission in different legal systems, which are somehow compatible with the Vienna Convention. Surrender, whether physical and material or hypothetical and judicial, in most legal systems indicates the transfer of control of the seller to the buyer. Before handing over, although the buyer acquires the property of the seller, the effects and manifestations of this ownership, especially in relation to third parties, are revealed by handing over. A transfer of ownership, when not accompanied by a surrender, will have no significant effect. Surrender, whether physical or judicial, enables the buyer to exercise his ownership rights over the seller. Surrender occurs when the seller stops exercising control and possession and places the seller in a situation that allows the buyer to exercise this control. In this sense, delivery is different from bill and receipt of goods. The issue is the time and method of transferring ownership to the buyer. The Vienna Convention has left the answer to these two questions to the domestic law of the country whose law can be applied as the governing law of the contract. In English law, the parties can agree on the time of transfer of ownership from the seller to the buyer, but if the subject of the contract is a general obligation or a general contract, it is not possible to transfer ownership before determining and assigning one of the general persons to the contract. In Iranian law, ownership is transferred at the same time as the sale is concluded, provided that the seller has the ability to transfer. The parties can also agree on the transfer of ownership at another time, provided that the subject of the sale contract can accept the transfer at that time. Iranian law is similar to English law because the total ownership of the seller cannot be transferred to the buyer in either of the two systems. But the difference between English and Iranian law is that in English law, the parties can agree on the transfer of ownership before concluding the

contract, while in Iranian law, the parties cannot retroactively apply the effect of the contract. In any case, the differences are small and uniform regulations such as the Vienna Convention, which cleverly refrained from raising the issue of the time of ownership transfer, are compatible with both systems (Olumi-Yazdi, 2010: 92-92). Finally, it can be concluded in this part of the research literature that determining the transfer point of contractual liability risk in international gas sales and transportation contracts is very important in the political and economic situation of the owners of these tanks and the contractors of these contracts. In addition, how the risk is distributed and the point of its transfer will affect the contractual and financial situation surrounding the aforementioned contracts. In natural gas sales and transportation projects through pipeline or LNG, the parties to the contract usually foresee the point of transfer of ownership, risk and goods in the contract, and in case the governing law is not determined and the territorial regulations are silent, the provisions of the Vienna Convention and Incoterms regarding the transfer of liability risk can govern these contracts (FeiziChekap and Mousavi, 2020). In energy transfer projects, which involve the sea transport of goods by ship, the point of transfer of contractual responsibility will be according to the agreement of the will of the parties or the provisions of maritime transport conventions or other relevant international regulations. In the Vienna Convention, the main rule in determining the point of transfer of liability is that it is transferred by submitting the risk, but there are exceptional cases for determining the point of risk transfer, where another solution is accepted, which is the time of concluding the contract, as far as today LNG sales is in CIF term and usually is not transferred to another place as reselling, title transfer letter and Authorization To Sell and Collect letter has not an important role in LNG business as in the other fossil energy carriers.

3.2. The Second Part of the Background of the Research: Factors Affecting the Determination of the “Delivery Point” in International Contracts for the Sale of Natural Gas

The international contract for the sale of natural gas or the agreement for the sale and purchase of natural gas will determine a certain point, usually called the point of delivery or sometimes called the point of sale, at which point the seller's obligations to deliver the gas to the buyer will be implemented.. This point requires precise definition, as does the nature of the seller's delivery obligation. The point of delivery will be identified in a relevant agreement with a lexical explanation and possibly by adding an outline to show the necessary details (Roberts, 2014: 135). The “Delivery Point” is a point that is clearly defined and at that point, the ownership and risk of the sold gas is transferred from the seller to the buyer. In international contracts for the sale of natural gas, often a detailed plan of the pipeline systems and facilities related to the “Delivery Point” completes the definition of the “Delivery Point”. The specifications of the “Delivery Point” often include the specifications of the delivery pressure, or its minimum and maximum values, as well as the quality specifications that are directly mentioned in the contract or indirectly by referring to the agreement related to the transportation (Wood, 2018; IGU, 2021). The “Delivery Point” is the point where the gas is transferred from the seller to the buyer and is the focal point between

the upstream and downstream interests. The “Delivery Point” is usually defined in the international natural gas sales contract as a precise geographic location and a specific point between the seller's gas production facility and the buyer's gas facility. Also, the “Delivery Point” can be defined and determined among the gas transportation facilities. The definition of the “Delivery Point” is often accompanied by an outline in the international gas sales contract for graphic representation. The “Delivery Point” may be the point of connection of the gas producing equipment to the pipeline that delivers the gas through these facilities, which is often called the “plant gate” or “backdoor sales” (Roberts, 2014: 135).

3.2.1. Types of “Delivery Point” Modes in International Gas Sales Contracts Through the Pipeline

In the international contracts for the sale of natural gas by pipeline, the process of gas transfer and delivery is carried out through pipelines, so there are at least five different modes in the definition and determination of the “Delivery Point”, which are mentioned in this section.

1. Gas delivery at the seller's production facility: as shown in (Figure 1), in this case, the gas “Delivery Point” is determined at the outlet of the natural gas seller's facility and from this point, the ownership and the resulting risk is transferred from the seller to the buyer. Naturally, in this situation and according to the situation of the “Delivery Point”, the majority of the risks will be borne by the buyer.

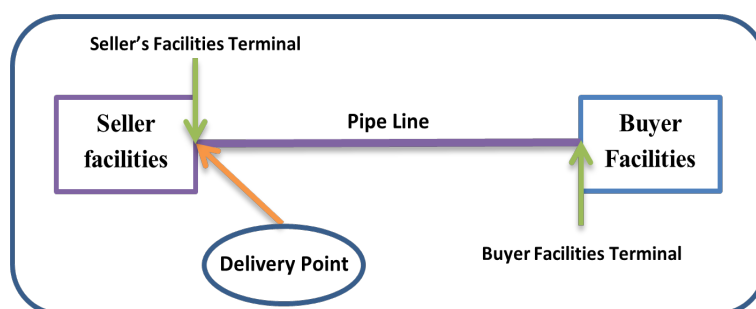


Figure 1: the First Mode of Determining the “Delivery Point”: Gas Delivery at the Outlet of the Seller's Facility (Roberts, 2014: 136)

2. Gas delivery at the buyer's delivery facility: as shown in (Figure 2), in this case, the gas "Delivery Point" is determined at the entrance of the buyer's gas delivery facility, and from this point, ownership and risk as

a result, it is transferred from the seller to the buyer. Naturally, in this situation and according to the situation of the "Delivery Point", most of the risks will be borne by the seller.

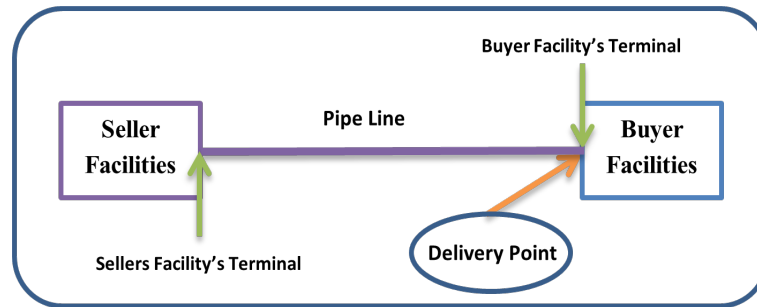


Figure 2. The Second Mode of Determining the "Delivery Point", Gas Delivery at the Buyer's Delivery Facility (Roberts, 2014: 136)

3. Delivery of gas at an alternative "Delivery Point" in the buyer's delivery facility: In the international natural gas sales contract, there may be a specified alternative "Delivery Point" where the buyer's or seller's facilities are designed to meet this possibility. In such a case, this advantage is created for the seller that if there is a problem in the supply of gas at the main "Delivery Point", the delivery of gas will be made through an alternative "Delivery Point", and increasing the overall level of transportation to the buyer is in the seller's favor (Roberts, 2014: 136). Alternative "Delivery Point" formulation assumes that a primary "Delivery Point" is specified in

the contract, with an alternative "Delivery Point" (or alternative points), the alternative "Delivery Point" may be defined and determined from the beginning in the contract or during the implementation of the contract will be identified and defined. The alternate "Delivery Point" will actually back up the original "Delivery Point". The international gas sales contract can also have multiple "Delivery Points". Also, the international contract for the sale of natural gas can include a mechanism through which the "Delivery Point" can be changed at different times based on the negotiations between the seller and the buyer and the agreement reached (Roberts, 2014: 136-137).

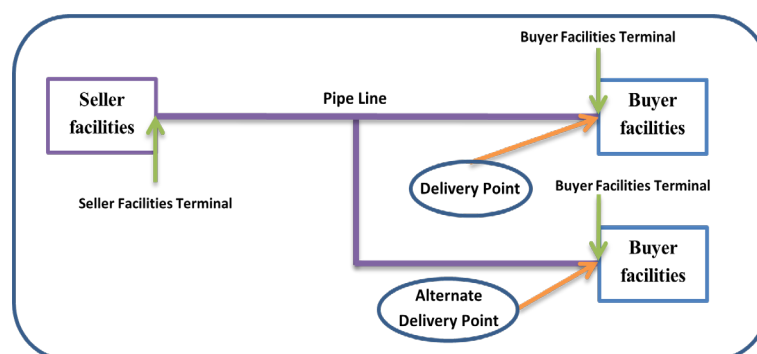


Figure 3. The Third Mode of Determining the "Delivery Point", Gas Delivery at the Alternative "Delivery Point" in the Buyer's Delivery Facility (Roberts, 2014: 136)

4. Gas delivery to the gas transmission network agreed between the seller and the buyer: the "Delivery Point" can be the entry point to a gas transmission network. The buyer can take responsibility for transporting gas through this network and separately, from the gas transmission network, the amount of gas delivered with a certain quality by the seller to the gas transmission network. Taking delivery of gas by the seller to the network creates for the buyer the right to deliver gas from the network in the quantity and quality provided by the seller to the network at a separate "Delivery Point". As a result, the gas transmission network may face an imbalance resulting from the gas withdrawal by the buyer in an amount less or more than the amount delivered

by the seller. If such a situation occurs, the contractual requirements will be applied to each of the parties in the international gas sales contract. For example, the buyer has to reserve the capacity of the network for the amount of gas that will be delivered by the seller, to the equivalent amount of gas in order to maintain the integrity of the network. In this case, the buyer must be sure that in the international natural gas sales contract, provisions have been made to cover any liability due to non-delivery of gas or shortfall in gas delivery from the seller to the network. Because in this case, in case of any problem, the gas transmission network will be the party of account with the buyer. In (Figure 4), the mode of gas delivery at the entrance of the gas transmission network is shown.

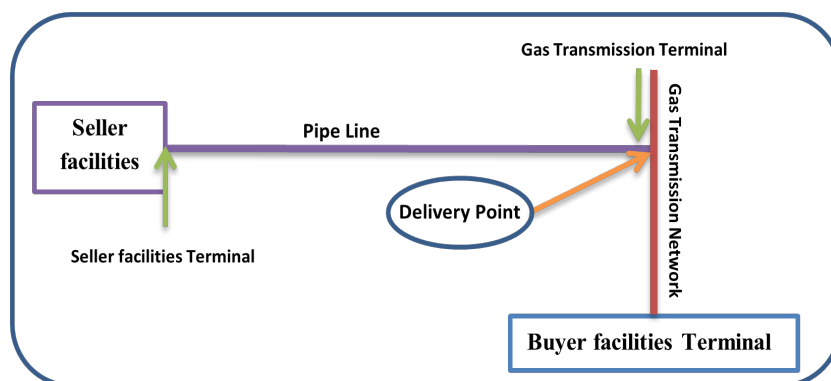


Figure 4. The Fourth Mode of Determining the "Delivery Point", Gas Delivery at the Entrance of the Gas Transmission Network (Roberts, 2014: 137)

5. Delivery of gas by the seller at the destination and at the entry point of the buyer's facility: in this case, the seller's duty is to provide the gas to the buyer at the "Delivery Point", which is defined as a point outside a gas transmission network. In this case, the responsibility of reserving capacity in the gas transmission network as well as the responsibility of delivering gas to the network will be with the seller.

Therefore, in this case, the seller must ensure the existence of appropriate mechanisms and guarantees in the international gas sales contract from the buyer to cover any negligence in gas delivery or delivery of gas exceeding the contractual amount. In diagram number (Figure 5), the state of gas delivery at the destination and at the gas "Delivery Point" at the entrance of the buyer's facility is shown (Roberts, 2014: 138-137).

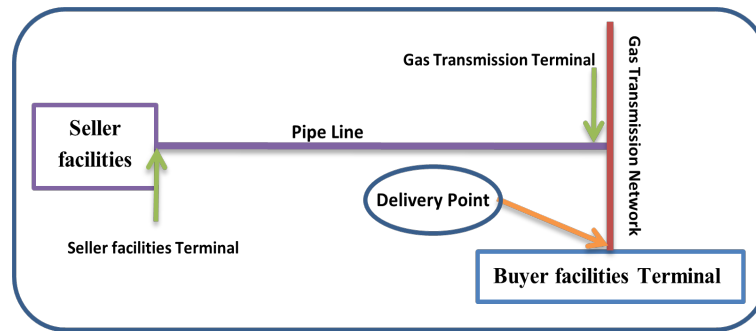


Figure 5. The Fifth Mode of Determining the “Delivery Point”, Gas Delivery at the Destination and at the Entrance of the Buyer's Facility

3.2.2. Considerations Related to the “Delivery Point” in International Gas Sales Contracts Through LNG

In order to better explain the considerations related to determining the “Delivery Point” in LNG sales contracts, it is necessary to first familiarize ourselves with the LNG supply chain process and the main challenges in it. As previously mentioned in parts of this research, the role of natural gas in the global energy market has forced the energy industry to launch complex multi-billion-dollar supply chains with the aim of ensuring the timely delivery of LNG around the world with the required volumes and with it is the cheapest cost. Typically, an LNG supply chain consists of the following four main stages:

1. Exploration and Production
2. Processing and liquefaction, in which the natural gas is cooled to minus 162 degrees Celsius and as a result its volume is reduced approximately 600 times
3. Transportation, in which LNG is transported in liquid form using cryogenic ships
4. Regasification and distribution, in which LNG is converted into its gaseous state and distributed to end users (Msakni & Haouari, 2018: 394).

The LNG producer concludes long-term contracts that specify the required monthly or annual delivery quantities at the destination

ports (Andersson et al., 2017). It is the producer's responsibility to deliver the LNG to customers while also being responsible for production and inventory management. The producer creates an annual delivery schedule for each customer that specifies the port of loading and unloading for each LNG shipment, as well as the departure and arrival dates for a period of 12 to 18 months (Rakke et al., 2011). Typically, the goal of an annual delivery schedule is to provide long-term contracts at minimum cost. When planning for the annual delivery schedule, inventory management should be considered as it is of critical importance in the LNG industry. The inventory level must be maintained within certain limits. If the inventory level is too high or too low, production may be forced to shut down, which may cause heavy losses and thus be unfavorable. In addition to inventory constraints, the planned annual delivery schedule must be feasible according to ship and hub availability at various ports. It is customary to assign most, but not all, production capacity to medium-term and long-term contracts (Stålhane et al., 2012). For example, Russian liquefaction plants have contracted the Yamal and Sakhalin Energy projects in the form of medium- and long-term contracts, which count for approximately 90 and 95% of annual production, respectively (GIGNL, 2019). Excess LNG production is usually sold to various spot markets, providing an opportunity for the producer to earn more

or reduce production inventory pressure. Selecting the spot market for service and time is also usually part of the ADP planning process, considering logistic capacity. (Schütz, 2020).

The design, operation and control of these stages creates serious challenges for the scientific and research community. Articles in this field cover three levels of standard decision-making: 1- strategic, 2- tactical and 3- operational. The strategic level focuses on long-term planning of facilities, fleets and infrastructure, as well as on setting up long-term contracts involving periodic deliveries of LNG over long periods of time (typically 20-25 years). The tactical level (mid-term) focuses on the design of an annual delivery plan that specifies delivery quantities along with a practical delivery plan with the aim of implementing long-term (compulsory) contracts with minimal operating costs. The (short-term) operational planning phase aims to create a detailed delivery schedule that takes into account the annual delivery schedule while integrating opportunities to sell excess LNG quantities in the spot market. Typically, the time horizon of an action plan is three months (Msakni & Haouari, 2018: 394).

In this regard, Koza et al. (2017) have investigated the strategic issues caused by the LNG supply chain. The issues identified by the researchers are: 1- The cost of building LNG storage ports in different places in Asia and Europe; 2- Capacity of storage ports and 3- Fleet of LNG ships (owned or leased) to transfer LNG from producer to storage ports (Msakni & Haouari, 2018: 394). For example, one of the features that distinguishes LNG transportation from other marine cargoes is the possibility of using boiled gas. Due to its low boiling point, LNG vaporizes (boils) and the gas from the boiling is usually used as a fuel for the carrier (Goel et al., 2012). Another fundamental problem for the annual delivery schedule with a planning horizon of about one year is that

seasonal changes in speed can be expected, which may affect the quality of the solutions. The use of fixed sailing time may also cause scheduling problems in practice, so seasonal sailing time should also be considered (Schütz, 2020).

Another major problem in selling LNG with an annual delivery schedule has been inspired by the Yamal project located on the Yamal Peninsula in northern Russia. To transport LNG from Thabita to customers, specially developed ice-cold LNG carriers are needed due to the presence of sea ice. These ice LNG carriers are designed to work in Arctic waters and the northern Sea route, but in open waters, normal LNG carriers perform better. As the eastbound route from Thabita to Asia may not be available during the winter due to environmental conditions, Asian customers are serviced through a transit port in Europe. By using a transshipment port, the producer avoids longer than necessary open-water voyages with ice LNG carriers, as conventional LNG carriers can pick up LNG and deliver it to customers. Direct routes and transfers are different in terms of distance and therefore shipping time as well as costs. Then the manufacturer must decide not only about the departure dates, but also through which route to serve its customers. Introducing a transit port to the network provides more flexibility, but also makes planning the annual delivery schedule more challenging. Another problem with the annual LNG delivery schedule in the transportation sector is that in each shipment, LNG is only allowed to be moved at most once. This problem has appeared in recent years with the entry of the Yamal LNG project into production (Schütz, 2020). Another important consideration that should be considered in the procurement and delivery of LNG is the quasi-monopoly of ownership of the equipment in the hands of major producers, so its transportation is almost impossible for

the manufacturer without a specified ship.

However, most of the literature on LNG supply chain optimization has focused on tactical problems that require the creation of an annual delivery schedule, where the time horizon is usually considered to be 12 months.

In this part of the research, we mainly focus on contractual issues and specifically on the category of determining the "Delivery Point" in LNG sales contracts. Therefore, it is important to emphasize the issues and challenges affecting the determination of the LNG "Delivery Point". Considering the issues and challenges in the field of transportation and delivery of natural gas in the form of LNG, from a technical point of view, the LNG "Delivery Point" is actually the place where LNG is delivered from the carrier ship to the buyer's terminal, located in the connecting flange of the carrier manifold and the discharge system, which is part of the terminal. In other words, the "Delivery Point" in LNG gas transportation is the exit point or the "Delivery Point" of gaseous fuel from the terminal to the transmission system, and in LNG transportation, the ship-to-ship delivery term is impossible and therefore meaningless. The "Delivery Point", in future contracts or other derivatives, is the place where the physical goods underlying the contract are delivered. Buyers of futures contracts seeking to maintain their positions must be prepared to accept delivery and pay the agreed price for the physical commodity. However, the "Delivery Point" only applies to futures contracts that specify the physical delivery of the asset. Contracts that are settled in cash do not involve physical delivery. Therefore, the "Delivery Point" is a vital element in writing LNG sales contracts. The chosen "Delivery Point" affects the net delivery price or cost price of the underlying asset. The delivery conditions also guarantee the value of the delivered goods. With physical delivery, the price of the goods is different according to the transportation

costs from the origin to the place of delivery. Therefore, to determine a unit price of a good for contract purposes, the point of delivery is an essential detail. Most futures market operators trade speculatively, and most of them do not consider the delivery of physical goods in future contracts. These speculative buyers buy futures contracts because they believe the price of the underlying commodity will rise, not because they are interested in delivering a few thousand barrels of oil or cubic meters of gas. Delivery requires having the resources to store and market these resources to end buyers. Buyers of futures contracts who wish to receive a physical commodity often hope to lock in the price of the commodity they use in production. By buying a futures contract, they hope to reduce the risk of adverse price changes in an asset (commonly known as "Hedging"). The "Delivery Point" for most natural gas and liquefied natural gas (LNG) futures on the New York Mercantile Exchange is a natural gas pipeline located in Erath, Louisiana (Chen, 2022). Therefore, in LNG sales contracts, due to various technical reasons and the complexity of transportation and delivery, the "Delivery Point" is usually determined at the buyer's entry facility in the destination country.

3.3. The Set of Factors Affecting the Determination of the "Delivery Point" in International Gas Sales Contracts

In general, it can be said that the field of international natural gas sales contracts, both inside and outside the country, has very limited study resources. By reviewing the limited literature of the research, we also realize that in the category of factors affecting the determination of the "Delivery Point" in the international contracts for natural gas carpets, not much has been clearly mentioned. The set of points that can be implicitly extracted from the available sources is that the determination of the "Delivery Point" in international contracts for natural gas can be

different depending on the conditions of each contract and is influenced by geographical, political, economic, technical and other factors. Therefore, in this research, due to the existing limitations, the mixed research method was used. After collecting library information, in-depth interviews with Iran's oil and gas industry experts as a statistical sample, supplementary information, the research was revised and finally the conceptual model of this research which shows the macro factors affecting the determination of the "Delivery Point" as well as their measurement indicators and explains the factors affecting the determination of the "Delivery Point" in international natural gas sales

contracts with Emphasis on the LNG method is finalized. In order to test the suitability and validity of the results and findings of this research, a researcher-made questionnaire was designed based on the indicators identified in the qualitative phase of the research. The researcher-made questionnaire was used to collect the opinions of managers, oil and gas industry experts, and academic researchers. Academic staff engaged in teaching and researching in the field of oil and gas in Tehran state universities were distributed and their opinions were collected and analyzed. In (Figure 6), the conceptual model taken from the qualitative part of the research is shown.

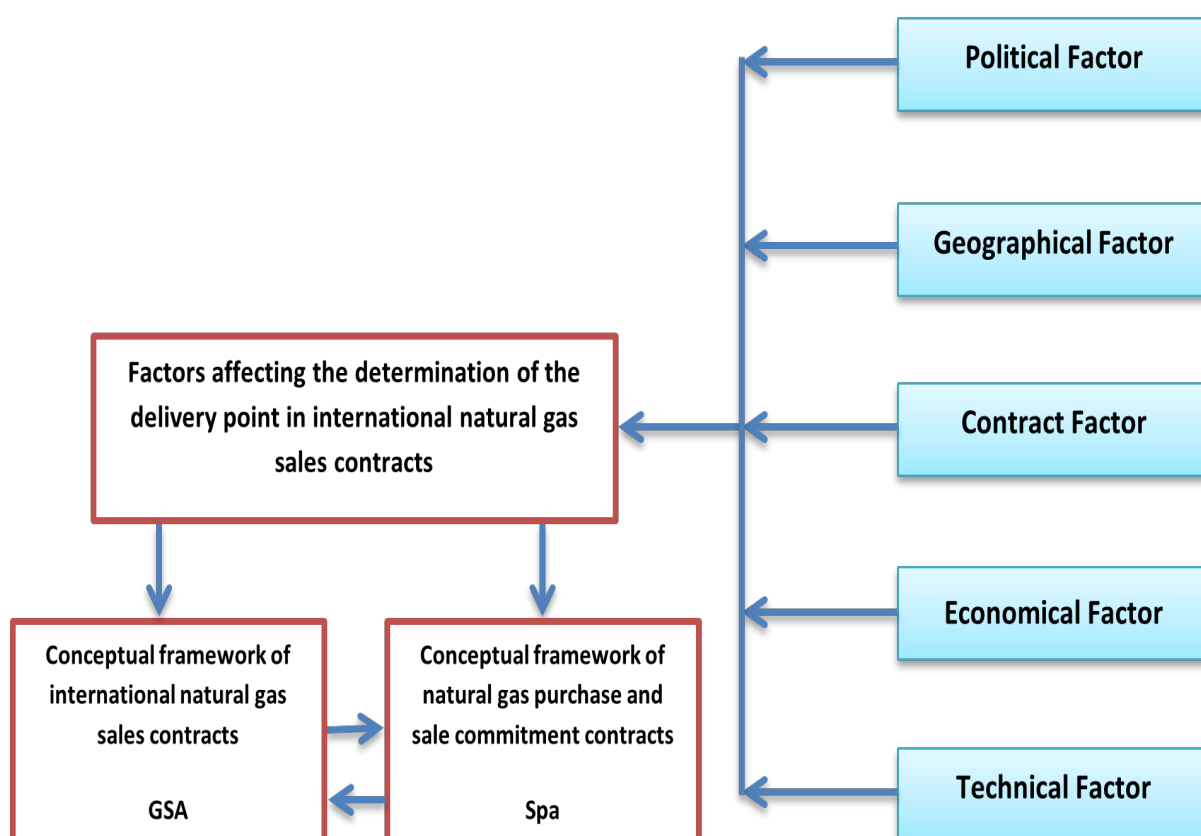


Figure 6. Conceptual Model of the Research: the Set of Macro Factors Affecting the Determination of the "Delivery Point" in International Contracts for the Sale of Natural Gas Using the LNG Method

As shown in (Figure 6), a total of 5 categories of main macro factors affecting the determination of the "Delivery Point" in international gas sales contracts along with the measurement

indicators of these factors were identified in the qualitative part of the research and designed. The measurement indices of each of these factors are also shown in (Table 1).

Table 1. ?

The title of the Factor	Measurement indicators
Indicators for measuring the political factor (9 indicators)	<ol style="list-style-type: none"> 1. The degree of political dependence of the seller and buyer countries on the sale and purchase of natural gas 2. The state of international relations between the seller and buyer countries of natural gas 3. Regional and extra-regional political blocs in the world that somehow affect the political relations of countries 4. The state of political relations between natural gas seller and buyer countries 5. History and extent of political differences between natural gas seller and buyer countries 6. Regional and extra-regional security situation. between the countries that sell and buy natural gas 7. The domestic political situation governing the countries that sell and buy natural gas 8. The state of economic and political ideology of the countries that sell and buy natural gas 9. The state of political stability in the countries that sell and buy natural gas.
Indicators for measuring the geographical factor (4 indicators)	<ol style="list-style-type: none"> 1. The size of the geographical distance between the seller country and the buyer of natural gas 2. Having a common water or land border between the seller country and the buyer of natural gas 3. The existence of networks, ports and infrastructures of gas transmission lines in the geographical area between the seller. and the buyer of natural gas 4. The state and natural features of the geographic distance between the country of the seller and the buyer of natural gas.
Contractual factor measurement indicators (6 indicators)	<ol style="list-style-type: none"> 1. The type of contract agreed for the sale of natural gas (gas field assignment contract to the buyer, gas supply and delivery contract, LNG method) 2. The legal system in each of the natural gas seller and buyer countries 3. The gas price formula mechanism and Payment of the gas price from the buyer to the seller 4. The status of the designed guarantee mechanisms (the obligation to receive) in the gas sale contract 5. The law governing the international gas sale contract, as well as the law governing the settlement of disputes 6. The penalty mechanism and procedure determined in the international natural gas sales contract.
Technical factor measurement indicators (6 indicators)	<ol style="list-style-type: none"> 1. The volume and amount of natural gas agreed to be delivered from the seller to the buyer of natural gas 2. The quality standards agreed for the delivery of natural gas from the seller to the buyer of natural gas 3. The state of the calorific value of the natural gas agreed to be delivered from the seller to the buyer Natural gas 4. The lifespan and condition of the pipelines used to transfer gas from the seller to the buyer of natural gas 5. Environmental issues and restrictions raised in each of the natural gas seller and buyer countries 6. The location of the system Measurement in the process of natural gas delivery from the seller to the buyer.
Indicators for measuring the economic factor (4 indicators)	<ol style="list-style-type: none"> 1. The current situation of supply and demand in the international markets of natural gas in the world and the region 2. The situation of the price of natural gas in the international markets of natural gas in the world and the region 3. The economic situation of the countries that sell and buy natural gas in terms of parameters Macroeconomics (income, foreign exchange reserves, etc.) 4. The role of the government in the economy of countries that sell and buy natural gas.

4. Field Study and Research Data Collection Process

In this research, the socio-statistics investigated includes managers of the oil industry, internal experts who have a history of scientific and executive activity in the Iranian oil and gas industry and also academic faculty members of Tehran, Allameh Tabatabai and Shahid Beheshti universities, who are engaged in research and scientific and executive activities in the fields of economics and oil and gas law. According to the definition of the statistical population of the research and also due to the limitation in access to all members of the statistical population, a non-probability sampling method was used. Finally, the possibility of face-to-face interview and completion of the questionnaire was provided to 30 people and the research questionnaire was completed by them. The final research questionnaire consists of 2 parts. In the first part of the questionnaire, individual characteristics were examined through qualitative questions created by the researcher. The second part of the final research questionnaire includes the indicators collected from the research literature and the qualitative part of the research that was obtained through interviews with experts, which was then used to obtain the opinion of the members of

the statistical community about the factors and indicators that are effective in determining the "Delivery Point" which is provided in international natural gas sales contracts. This section includes 29 questions that were finalized after a trial implementation phase. Also, in this research, to determine the range of questionnaire answers, we tried to use the methods that lead to the desired results. Therefore, a five-point Likert response scale was used for this purpose. The validity of the questionnaire has been examined based on content validity and construct validity. Content validity was confirmed through the expert opinion of experts as well as the expert opinion of researchers. Confirmatory factor analysis (CFA) technique has also been used to check construct validity. In this research, due to the multi-level model and the multiplicity of model indicators, Partial Least Squares (PLS) method using SMARTPLS version 2 software was used to validate the model. The PLS estimation method determines the coefficients in such a way that the resulting model has the most power of interpretation and explanation, meaning that the model can predict the final dependent variable with the highest precision and accuracy. As shown in (Table 2) and (Table 3), all correlation coefficients are positive and significant at an error level of less than 1%.

Table 2. Validity, Reliability and Descriptive Index of the Research Conceptual Model

Variables	AVE	AVE	R ²	Cronbach's alpha	GOF
Political factor	0.562	0.895	0.684	0.870	0.622
Geographical factor	0.509	0.912	0.699	0.893	
Contractual Factor	0.570	0.929	0.608	0.915	
Technical Factor	0.572	0.929	0.655	0.913	
Economical Factor	0.796	0.970	0.000	0.969	

Table 3. Correlation Matrix and Separate Validity for the Conceptual Model of the Research

Hidden Variables	(1)	(2)	(3)	(4)	(5)
Political factor	0.794				
Geographical factor	0.601	0.714			
Contractual Factor	0.533	0.658	0.755		
Technical Factor	0.635	0.668	0.609	0.756	
Economical Factor	0.640	0.572	0.400	0.397	0.714

* All correlation coefficients are significant at the error level of less than 1%.

** The root mean square root shows the average explained variance (AVE).

The correlation matrix provides valuable insights into the relationships between the latent variables in the conceptual model. The strong correlations between factors like Political, Geographical, and Contractual highlight their interdependence in natural gas agreements. Meanwhile, the Economical Factor stands out as a distinct but still significant component. These findings can guide further analysis and decision-making in the context of international natural gas sales contracts.

5. Inferential Analysis of Research Data

In this research, the collected data were summarized and classified using descriptive statistics indicators such as frequency distribution table setting, graph drawing, calculation of central and dispersion indices. In order to select the generalities of the inferential statistics test (parametric or non-parametric statistics), a normality test was performed on the research data. The preference of the researcher is to use the parametric part of inferential statistics to answer the research

questions. Because parametric statistics have more diversity and higher accuracy. The main condition for using parametric statistics is the normality of the distribution of data collected for research. Kolmogorov-Smirnov test was used to determine the normality of the research data (Momeni, 2016). The results of the normality test showed that the research data follows the normal distribution, so the use of the parametric part of inferential statistics is allowed. Therefore, in this research, sample T-Test tests have been used to identify factors affecting the determination of the "Delivery Point" in international natural gas sales contracts. Friedman's test was also used to rank the identified factors in terms of importance. The first main question raised in this research is what are the factors influencing the determination of the "Delivery Point" in international natural gas sales contracts? In order to answer this research question, one-sample t-test (t-test) was used. This test forms two hypotheses for and against. In the zero hypothesis, the determined factors defined in the research are assumed to be effective, and in the one hypothesis, which is known as the opposite hypothesis, the defined factors are not assumed to be effective. The results of a sample T-Test test to answer the research question are shown in (Table 4).

Table 4. The Results of the t-test to Identify Factors Affecting the Determination of the "Delivery Point" in Contracts

Description	Amount	Degrees of freedom	T	Average	Difference in averages	Standard deviation	Significant level
Political agent	30	29	11.973	3.8344	.83444	.38172	.000
Geographical factor	30	29	8.259	3.7767	.77667	.51507	.000
Contract agent	30	29	11.912	3.9800	.98000	.45059	.000
Technical agent	30	29	.107	3.0133	.01333	.68568	.016
Economic factor	30	29	1.792	3.2333	.23333	.71310	.014

The t value calculated for the 5 factors of the conceptual model of the research is greater than the t value of the normal distribution

table (1.96) and the significance level is also less than (0.05) (Momeni, 2016). According to these results, it can be concluded that all the 5 main

factors that make up the conceptual model of the research are effective in determining the "Delivery Point" in international natural gas sales contracts according to the members of the statistical community studied. The second main question raised in this research, which we seek to answer, is the ranking of factors affecting the "Delivery Point" in international gas sales contracts in terms of their importance in the studied statistical population. To answer this research question, Friedman's ranking test was used. The results of the Friedman test for the ranking of the factors are shown in the (Table 3).

Table 5. Friedman's Test Results for Ranking the Factors Affecting the Determination of the "Delivery Point"

Title of Factors	(Mean Rank)
Political factors	4.63
Geographic factors	4.23
Contract agents	4.85
Technical factors	2.95
Economic factors	2.38

As shown in (Table 5), the contractual factor with an average rank (4.85) has the highest importance. Also, the political factor is ranked second with an average rating (4.63). The geographical factor with an average rating (4.23) ranks third, and the technical factor ranks fourth with an average rating (2.95) and finally the economic factor with an average rating (2.38) is placed in the fifth place. It should be kept in mind that the unit of analysis in this research is the organization; therefore, the calculated framework is based on organizational level variables and extra-organizational variables are not included in this framework.

6. Conclusion and Suggestions

In this research, we seek to explain and analyze the factors influencing the determination of the "Delivery Point" in international contracts for the sale of natural gas, emphasizing the LNG

state. Due to the lack of research resources in this field, it is necessary to use mixed and discovery-based research methods in order to conduct the research. Therefore, in order to identify the factors influencing the determination of the "Delivery Point" in international contracts for the sale of natural gas, and, after studying the research literature, in-depth interviews were conducted with experts in the oil and gas industry as well as negotiators of international contracts for the sale of natural gas. Members of the scientific boards of faculties of state universities in Tehran were interviewed and finally the conceptual model of the research along with the measurement indicators of each department was finalized. In order to increase the scientific validity of the conceptual model of this research, a survey was conducted among the members of the research statistical community about the indicators and factors of the model in the form of a researcher-made questionnaire. The results of the t-test showed that the 5 main factors defined for this research are effective in determining the "Delivery Point" in international natural gas sales contracts, emphasizing the LNG method, according to the members of the research statistical community. On the other hand, Friedman's ranking test was used to rank these factors in terms of importance. Based on the results of the test, the contract factor has the highest rank average and is therefore the most important. Political, geographical, technical and economic factors were placed in the next ranks in order of importance. Based on the investigations and studies conducted by the researcher, the results of this research are consistent with the opinion of experts and similar studies and confirm the previous findings. The noteworthy point in this research, which has not been observed in other similar studies and is a kind of innovation specific to this research, is the identification of a relatively complete set of factors affecting the determination of the "Delivery Point" in international contracts for the sale of natural

gas and their complete approval. It is based on the data collected from the statistical population of the research. This research finding is completely unique to this research and has not been observed in other research literature so far. Also, according to the findings of this research, a set of practical suggestions are presented for oil industry managers and negotiators of international contracts for the sale of natural gas:

1. As inferred from the results of this research, the 5 main factors of the conceptual model of this research (contractual, political, geographical, technical and economic factors) as effective factors in determining the "Delivery Point" in international contracts for the sale of natural gas was identified. Therefore, considering the importance of determining the "Delivery Point" in the contracts, it is suggested that before conducting any negotiations and setting up the contract for the sale of natural gas, the five factors identified in this research should be carefully and sensitively studied in order to help to make the process of negotiations and setting up the contract more efficient.
2. According to the results of this research, the contractual factor is the most important in determining the "Delivery Point" in international natural gas sales contracts. Political, geographical, technical and economic factors were placed in the next ranks in order of importance. Therefore, it is recommended that the indicators of the contractual agent be analyzed and researched separately and in accordance with the target markets for the sale of natural gas, and the relationships between the indicators planned in this research for the contractual agent are also analyzed and explained
3. Considering the sensitivity and importance of each of the five dimensions identified in this research, it is recommended that each of these factors be investigated and deeply analyzed separately so that more dimensions and angles of the factors should be clarified.
4. It is strongly recommended that the relationship between these factors and their synergism be analyzed in a separate research format. As these factors have a mutual effect on each other in terms of implementation and operation, and, in the case of not paying attention to this key and important category, it is not possible to use the maximum capacity and abilities of these factors in order to determine the optimal "Delivery Point" used in international contracts for the sale of natural gas.
5. It is strongly recommended that recent political developments in the process of power sharing in the world (formation of new corridors) and its impact on international natural gas sales contracts as well as LNG delivery issues should be analyzed in a separate research.
6. According to what was discovered and identified in the case of LNG production in Iran, that due to the lack of free carrier ships and no interest of shipping Iranian produced LNG by International LNG Tanker fleets, the importance of delivery to the buyer's facilities is one of the main challenges of sales during the sanctions. In addition, to receiving the payment from the buyer, will be the provision of LNG carriers and shipment of produced LNG as well as changing documents and origin of the Iranian LNG.

References

- Agosta, Alessandro; Boccara, Gillian; Bresciani, Giorgio; Heringa, Berend; Browne, Nicholas (2021). The impact of decarbonization on the gas and LNG industry. McKinsey Insights, McKinsey & Company.
- Alikhani, Muhammad (2009). Investigating the

- legal status of the sale and price in international gas sales contracts. *International Legal Journal*, International Legal Affairs Center publication of the Vice President of Legal and Presidential Affairs, year 26, number 4.
- Alikhani-Chamgardani, Mohammad (2016). Gas sales contract. Master's thesis, Shahid Beheshti University, Faculty of Law.
- Amini, Mansour (2004). Transfer of ownership in sales contracts in the legal systems of Germany, France and Iran. *Legal Research Quarterly of Shahid Beheshti University*, No. 37.
- Andersson, H.; Christiansen, M.; Desaulniers, G.; Rakke, J.G (2017). Creating annual delivery programs of liquefied natural gas. *Optim. Eng.*, 18, 299 - 316. [Google Scholar]
- Ason, Agnieszka (2022). International Gas Contracts. Research Paper, Oxford Institute for Energy Studies.
- BP p.l.c. (2016). *Energy Outlook. Outlook to 2035*, 2016 Edition, London, United Kingdom.
- BP p.l.c. (2017). *BP Statistical Review of World Energy*. London, United Kingdom.
- Busby, Rebecca L. (2002). Natural gas in non-technical language. Translated by: Alireza Hamidi Younesi, Tehran: Institute of International Energy Studies Publications.
- Chapter 4 (2006). *Natural Gas. International Energy Outlook*, Energy Information Administration Report (An, Official Statistics from U.S Government). (<http://www.eia.doe.gov>).
- Chen, James (2022). "Delivery Point": What It Is, How It Works, Examples. <https://www.investopedia.com/terms/d/delivery-point.asp>.
- Demirbas, A. (2006). The Importance of Natural Gas as a World Fuel. *Energy Sources*, and Part B: *Energy and Planning*, Vol.1, No. 4. (Taylor & Francis, Oct-Dec 2006).
- Fars news agency (2021). Deciphering the impact of the Ukraine war on the restoration of gas relations between Iran and Turkmenistan. An interview with the head of the International Energy Studies Institute.
- GIIGNL. (2019). *The LNG Industry GIIGNL Annual Report 2019*. The International Group of Liquefied Natural Gas Importers: Neuilly-sur-Seine, France. [Google Scholar]
- Goel, V.; Furman, K.C.; Song, J.H.; El-Bakry, A.S (2012). Large neighborhood search for LNG inventory routing. *J. Heuristics*, 18, 821-848. [Google Scholar]
- Haji-Hosseini Baghdadabadi, Tahira; Ghasemi, Abdul Rasul; Mohammadi, Timur (2022). The future study of natural gas consumption in Iran in the horizon of 2030; A scenario-building approach based on the censored regression model. *Quarterly Journal of Energy Economics Studies*, 18 (73): 1-23.
- Hajian, Mohammad Mehdi; Mousavi, Mitra (2015). A comparative study of the legal status of the condition of obligation to receive in gas sales and transmission contracts. *Private Law Research Quarterly*, Year 5, Number: 16.
- Health Effects Institute (2017). *State of Global Air 2017*. URL<https://www.stateofglobalair.org/sites/default/files/SoGA2017_report.pdf>.
- Hosseinzadeh Kashan, Ali; Akbari, Ali Akbar (2016). Natural gas transmission network optimization model - study.
- International Energy Agency (IEA). (2021). The role of LNG in the global energy market. Retrieved from <https://www.iea.org>.
- International Energy Agency (IEA). (2022). The role of natural gas in global energy transitions. Retrieved from <https://www.iea.org>.
- International Energy Agency (IEA). (2023). *Global energy outlook 2023*. Retrieved from <https://www.iea.org>.

- International Gas Union (IGU). (2021). Wholesale gas price formation. Retrieved from <https://www.igu.org>.
- Jazayeri, Ahmed (2015). Gas diplomacy: Europe and turning weaknesses into strengths in the energy crisis. Tehran: Yazda Publications.
- Koza, D.F., Ropke, S., Molas, A.B. (2017). The liquefied natural gas infrastructure and tanker fleet sizing problem. *Transport. Res. Part E: Logist. Transport. Rev.* 99, 96-114 doi:10.1016%2Fj.tre.2017.01.003.
- Li, Mingyu, and Peter Schütz (2020). Planning Annual LNG Deliveries with Transshipment. *Energies* 13, no. 6: 1490. <https://doi.org/10.3390/en13061490>.
- Marcel, Valerie & Mitchell, John V. (2006). *Oil Titans: National Oil Companies in the Middle East*. Washington D.C: CHATHAM HOUSE and London BROOKINGS INSTITUTION PRESS.
- Matthiesen, Henning (2006). To What Extent Do Take-or-Pay Contracts Facilitate the Development of Infant Gas Markets and What Challenges Do They Pose at the Time of Liberalization? CEPMLP Annual Review. (www.dundee.ac.uk/cepmlp 2006).
- Mitchell, John & Marcel, Valérie & Mitchell, Beth (2012). *What Next for the Oil and Gas Industry?* London, CHATHAM HOUSE, the Royal Institute of International Affairs.
- Mohammadi, Teymur; Ghanimi Fard, Hojjat Elah; duty, affection; Javan, Afshin (2015). Simulating the FOB cash price for Iran's natural gas export from the hypothetical northwest hub using the Schwartz-Smith method. *Iranian Applied Economic Studies Quarterly*, No. 20.
- Momeni, Mansour; Qayoumi, Ali (2016). *Analyzing statistical data using SPSS*. Tehran: Kitab Nou Publications.
- Morishima, H. (2006). *Natural Gas Bridging to the Future Energy*. (<http://cat.inist.fr>).
- Msakni, Mohamed Kais & Haouari, Mohamed (2018). Short-term planning of liquefied natural gas deliveries. *Transportation Research Part C: Emerging Technologies*, Volume 90, May 2018, Pages 393-410.
- Nabi Faizi Checkap, Ghulam; Mousavi, Mitra (2020). The risk transfer point of contractual responsibility in international contracts for the sale and transportation of natural gas from the point of view of the Convention on the International Sale of Goods. *Scientific Quarterly of Judicial Law Perspectives*, No. (95).
- NaturalGas.org (2013). *Natural Gas and the Environment*. URL<<http://naturalgas.org/environment/naturalgas/>>.
- Nik-Bakhsh-Sharfshadeh, Ali (2013). *Review of natural gas sales and transfer contracts*. Master's thesis, University of Tehran, Faculty of Law and Political Sciences.
- Pustišek, Andrej & Karasz, Michael (2017). *Natural Gas: A Commercial Perspective*. Berlin: Springer International Publishing.
- Qanawati Nasab, Ali (2020). Investigating hydrate technology and various methods of natural gas transmission. *Scientific monthly oil and gas exploration and production*. Number (199).
- Rahimi, Gholam Ali (2008). Investigating natural gas pricing mechanisms in different regions. *Energy Economy Studies*, Volume: 4, Number 13.
- Rahimi, Gholam Ali, Dehghani, Toraj (2017). LNG import marine terminals; Opportunities and challenges. *Scientific monthly oil and gas exploration and production*. Number (156).
- Rai, Hassan; Nazari, Javad; Sarzahi, Morteza; Maleki, Abbas (2021). The blessing or curse of natural gas in Iran: a prospective study of natural gas exports until 2050. *Public Policy Quarterly*.
- Rakke, J.G.; Stålhane, M.; Moe, C.R.; Christiansen, M.; Andersson, H.; Fagerholt, K.; Norstad, I

- (2011). A rolling horizon heuristic for creating a liquefied natural gas annual delivery program. *Transp. Res. Part Emerg. Technol*, 19, 896-911. [Google Scholar].
- Roberts, Peter (2014). *Gas and LNG Sales and Transportation Agreements, Principles and Practice*, Fourth Edition. SWEET & MAXWELL, THOMSON REUTERS Professional, UK Ltd.
- Robinson, J.; Holland, Bill (2021). *Natural gas in transition: Upstream faces pressure to cut emissions, go green*. S&P Global Platts.
- Sakaran, Uma (2016). *Research methods in management*. Translation: Mohammad Saebi and Mahmoud Shirazi, Tehran: Publications of the Higher Institute of Management and Planning Education and Research, fifth edition.
- Samadi, Ali Hossein; You give an imam, Mahdi (2014). *Investigating the impact of the expansion of unconventional gas resources on Iran's natural gas production: a system dynamics approach*. Iranian energy economy research journal.
- Sarmad, Venus; Bazargan, Abbas; Hijazi, Elaha (2009). *Research methods in behavioral sciences*. Tehran: Aghaz Publishing House, 16th edition.
- Syedhashmi Tolon, Mohammad Reza (2019). *Compiling the optimal model of company management in the direction of the internationalization of National Iranian Oil Company*. Doctoral thesis, Allameh Tabatabai University, Faculty of Law and Political Sciences.
- Shiravi, Abdul Hossein (2012). *Oil and gas law*. First edition, Tehran: Mizan publication.
- Shiryaevskaya, Anna; Stapczynski, Stephan; Koh, Ann (2021). *Natural gas prices surge as energy transition-driven demand outstrips supply*. World Oil, Houston, Texas.
- Stålhane, M.; Rakke, J.G.; Moe, C.R.; Andersson, H.; Christiansen, M.; Fagerholt, K. (2012). A construction and improvement heuristic for a liquefied natural gas inventory routing problem. *Comput. Ind. Eng.* 2012, 62, 245-255. [Google Scholar]
- Stevens, Paul (2015). *Prospects for Iran's Oil and Gas Sector*. Research paper, Middle East and North Africa Program & Environment. London: Energy and Resources Department, Chatham House, the Royal Institute of International Affairs.
- Stevens, Paul (2016). *International Oil Companies: The death of the old business Model*. Research paper. London: Chatham House, the Royal Institute of International Affairs.
- Uzezi Aziano, Ef (2012). *Natural Gas Contracts: Do Take or Pay Clauses Fall Foul of The Rule Against Penalties?* *Journal of Energy and Natural Resources Law*, p.8.
- Wood, D. (2018). *LNG: A nontechnical guide*. PennWell Books.
- Yazdi Olomi, Hamidreza (2010). *The concept of submission and its relationship with the transfer of ownership and risk (including exchange) in the contract of sale*. *Journal of Law and Policy Research*, No. 315.

شناسایی و رتبه‌بندی عوامل مؤثر بر تعیین نقطه تحویل در قراردادهای بین‌المللی فروش گاز طبیعی (مورد مطالعه: قراردادهای فروش گاز طبیعی با روش ال ان جی)

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چکیده

تحلیل محیط جهانی صنعت انرژی و تحولات آن نشان می‌دهد که گاز طبیعی شکل دهنده آینده انرژی جهان است. آینده ایران به‌عنوان صاحب اولین منابع گازی جهان، انکارناپذیر با مقوله‌ای به نام «گاز طبیعی» گره خورده است. تحولات جدید از جمله شرایط محیطی جهان، پیامدهای جنگ روسیه و اوکراین، تنش‌های منطقه خاورمیانه و پیش‌بینی افزایش قیمت جهانی نفت خام در آینده نزدیک نیز بر نقش و اهمیت گاز طبیعی افزوده است. بر اساس تحلیل بریتیش پترولیوم (BP) و آژانس بین‌المللی انرژی (IEA)، روند مصرف گاز طبیعی تا سال ۲۰۳۰ با سرعت بیشتری ادامه خواهد داشت؛ بنابراین برای حفظ موقعیت برتر ایران در بازارهای جهانی و استفاده به‌موقع از مزیت ذخایر گاز کشور به‌منظور تبدیل این ذخایر به سرمایه با ارزش افزوده بیشتر، نیازمند توسعه بیشتر زیرساخت‌های فنی، سیاسی، بازاریابی، حقوقی، زیرساختی و غیره کشور هستیم. روش و تکنیک‌های اساسی در آن یکی از مهم‌ترین گلوگاه‌های قراردادهای بین‌المللی فروش گاز طبیعی، طراحی و تعیین «نقطه تحویل» است که با توجه به نحوه واگذاری و عوامل احتمالی هر قرارداد، می‌تواند در قراردادهای مختلف متفاوت باشد. در این تحقیق به‌منظور شناسایی عوامل مؤثر بر تعیین «نقطه تحویل» در قراردادهای بین‌المللی فروش گاز طبیعی به‌صورت LNG، ادبیات تحقیق بررسی و با کارشناسان مصاحبه صورت گرفت و مدل مفهومی تحقیق و شاخص‌های اندازه‌گیری آن‌ها طراحی شد. شاخص‌های جمع‌آوری شده در قالب پرسشنامه محقق ساخته بین اعضای جامعه آماری توزیع و نظرات آن‌ها جمع‌آوری شد. با توجه به یافته‌های این تحقیق، نتایج آزمون T حاکی از آن است که پنج عامل اصلی تعریف شده برای این تحقیق، به گفته اعضای جامعه آماری پژوهش، در تعیین نقطه تحویل در قراردادهای بین‌المللی فروش گاز طبیعی با تأکید بر روش LNG مؤثر است. از طرفی برای رتبه‌بندی این عوامل از نظر میزان اهمیت از آزمون رتبه‌بندی فریدمن استفاده شد. بر اساس نتایج آزمون، عامل قراردادی بالاترین میانگین رتبه و در نتیجه بیشترین اهمیت را داشت. عوامل سیاسی، جغرافیایی، فنی و اقتصادی به ترتیب از نظر اهمیت دنبال شدند.

واژگان کلیدی: گاز طبیعی، گاز طبیعی مایع (LNG)، قرارداد فروش و انتقال گاز طبیعی، نقطه تحویل، عوامل قراردادی، عوامل اقتضایی