Explaining Model of Outsourcing Development Management of Physical Assets in Oil and Gas Industry: A Case Study of Iranian Gas Transmission Company

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ABSTRACT

Today, the strategy of outsourcing management, in economic enterprises and especially in governmental organizations, is one of the crucial issues in the field of procurement chain management and strategic alliance management. This issue in public organizations and institutions has its importance too. Because these organizations usually have a wide range of missions and supply chains, they need a comprehensive plan for outsourcing according to macro policies and strategies. Despite this importance, few studies have addressed the models of outsourcing development in firms. Using the content analysis method, this study aims to explain the model of outsourcing development management in oil and gas industry. Also, a deductive approach applied to the theoretical framework is developed in practice through case analysis in Iranian Gas Transmission Company. This company has the control of most of physical oil and gas assets in Iran. In addition to the researchers' observation and reviewing the related documents, the information required for the research was obtained through an interview with a significant number of senior managers and experts in Iran's oil and gas industry. Using the theme analysis method, this information was analyzed, and the expected situation of the outsourcing development management in the industry, as well as its impact and interactions, was described and explained.

1. Introduction

Nowadays, many large and successful companies in the world have experienced an outsourcing strategy in their growth process. Outsourcing in the study field (Ministry of Petroleum) is an agreement between each of the organizations of the Ministry of Petroleum (MOP) with the service providers; during the period of this agreement, service providers are replaced with one of the activities, jobs, professions/divisions, managements, or sometimes with subsidiary organizations and companies of the Ministry of Petroleum (MOP, 2012). Despite numerous upstream proclamations, there is still no comprehensive and reliable model of operationalizing

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these tasks, neither in the scientific literature nor in the industry (Damanpour et al., 2019; Taponen and Kauppi, 2020). Previously developed models focus more on the stages of outsourcing, and there is no model in line with outsourcing considerations about utilizing internal/local content/capabilities in a basket of alliances and matching the unique characteristics of oil and gas industry. The present study designs an explanation to study and analyze the outsourcing development management model in Iranian Gas Transmission Company with a descriptive approach and with the approach of developing internal capabilities. The main question of this research is "what is the development model of outsourcing the physical assets in (Iran's) oil and gas industry?". In other words, is it possible to develop an integrated outsourcing model with a portfolio management approach (Sharma and Loh, 2009; Ablo, 2015) to achieve the expected goals in oil and gas industry while paying attention to strategies for internal capacity development (Barden et al., 2003; Lacity and Hirscheim, 1993; Nelsonoly, 2010)?

In the next part of the article, the backgrounds and the theoretical foundations of the outsourcing are briefly reviewed, and the theoretical framework is then presented; the third part describes the research method, the selection process of the interviewees, and the design of the interview protocol. The fourth section explains the results of the interviews and the components of the model in detail. A summary of the research findings constitutes the final part.

2. Background and Theoretical Foundations

2.1. Quiddity of Outsourcing Management

Outsourcing is defined as a strategic decision to transfer organizational activities (delivery of services; administrative systems; and information systems) or sub-activities (delivery of parts of services; payroll; and data centers) to external suppliers (Damanpour et al., 2019). Governments do outsourcing to achieve economic efficiency, concentrate on their core competency, fulfill political ideology, or to ease managing units and processes (Damanpour et al., 2019; Young and Macinati, 2020). Relying on outsourcing as a strategy can have many benefits for organizations if it is properly designed and managed with competence and expertise. However, many organizations are ineffective in and unaware of the commitment and regulation required to obtain these benefits. Organizations are sometimes unable to understand the outsourcing impacts on employees, processes, methods, and tools. This crude and

unconscious attitude leads to the acceptance of some outsourcing methods that are often catastrophic, rather than rewarding. Finally, organizations may try to outsource their failed outsourcings to another contractor and repeat the same mistakes, or they may do U-turn outsourcing, that is, returning the outsourced work to the organization, and employ the internal resources of the organization to complete it.

Nationally and internationally, a limited number of models have been developed in the field of outsourcing (Taponen and Kauppi 2020; Hassanain and Al-Saadi, 2006; Saloneh, 2011). At the national level and in oil and gas industry, despite the strong emphasis on outsourcing, the share of asset outsourcing is still much lower than expected. Meanwhile, the outsourcing of physical assets of Iran's strategic oil and gas industry is more important due to its scope and its effects on all economic, social, and even security aspects of the country. Especially, because of national strategies and international constraints, outsourcing leads to the development of domestic capabilities in terms of simultaneously upgrading the capabilities of the current trustees and contractors in this field. Evidence shows that achieving superior results in economic, financial, commercial, organizational, human, systemic, and qualitative aspects depends on a systematic approach to outsourcing physical assets (Daneshi, 2008; Salone, 2011).

In the literature, in the fields of interactions and collaborations, various topics, including supply chain management, strategic partnerships development, strategic alliance management, and contracting have been addressed. However, few research works, including "outsourcing decision (taking) model" (Eshrafzadeh, 2005), "a practical framework for understanding the outsourcing process" (Chilenye, 2016), "designing a generic model of the outsourcing process in the public sector" (Rajabzadeh, 2008), "analysis framework for outsourcing outcomes" (Rajabzadeh, 2008), "a framework model of outsourcing asset management services" (Willcocks et al., 1995), and "information and technology outsourcing exchange cost model" (Poor Moallem, 2011) have been conducted in the field of outsourcing.

2.2. How to Formulate and Develop an Outsourcing Development Model

Despite research in the field of outsourcing, there are still several gaps in this area, including the need for additional research in the field of public services, the

study of long-term outcomes of outsourcing, the identification of long-term success factors in outsourcing, and warning signs in outsourcing contexts which have been addressed and emphasized in previous studies (Taponen and Kauppi, 2020). The need to develop an outsourcing process and deepening the studies on the implementation of mechanisms for selecting outsourcing governance scenarios have also been mentioned (Young and Macinati, 2012).

While the above discussion indicates that there is a growing stream of outsourcing literature, theory-focused literature is scant. However, the literature on questions such as what to outsource, what the determinants of outsourcing decisions are, and how to outsource, is still underdeveloped. The decision on what to outsource has been a point of great concern among researchers. In an attempt to answer the next key questions, scholars recommended that certain key factors and steps should be undertaken before deciding on outsourcing. Hence, in the current study, we argue that strategy and structure can be used to address the complexity associated with outsourcing decision-making.

This study presents the framework depicted in Figure 1 with the aim of a comprehensive conceptualization of outsourcing development management. As this figure shows, the initial codes were first extracted from the meaningful analysis units of the interviews. These codes were then aggregated into some secondary codes. Finally, the secondary codes were grouped at the heart of the principal theme of "outsourced development management".

2.3. Assessing the Validity and Reliability of Model

In this step, after compiling the model and to gain validity, an experts' panel was performed. A set of codes and quotes is taken before the two summarizing sessions, and the experts received the comments separately; in the panel, using qualitative analysis tools like Atlas-T software, decisions are summarized and reviewed.

3. Research Method

Today, especially in the current phenomena in the field of humanities and social sciences, efforts are made to pay serious attention to their characteristics, differences, and complexities in their specific context, due to the underlying effects (Daneshi, 2008;

Davarpanah, 2006; Shakeri, 2008; Shirani and Nabizadeh, 2008).

The case study of Yin (2010) is one of the methods for studying phenomena in their specific time, place, and conditions (Khaki, 2003; Markowitz, 1991). This method is used in cases where the researcher is faced with a complex subject, and it is not easy to formulate the characteristics of the phenomenon and its internal and external factors. Since the current study deals with "how and why" questions of the outsourcing phenomenon, the case study method has been used. Because of the following reasons, Iranian Gas Transmission Company in the field of oil and gas has been selected to investigate the outsourcing:

- Oil and gas industry is the largest, strategic, and propulsive industry of Iran that has vast physical assets, a value chain, and a high potential for promotion and development.
- Numerous upstream requirements and policies have made the industry inevitably move toward privatization and outsourcing.
- Iran's special conditions in terms of imposing strict sanctions and restrictions on the transfer of the network to the strategy of international companies more than ever require that in the outsourcing of this industry the focus should be on the national model and on domestic or local contents/capabilities.
- The majority of the physical assets of Iran's gas industry are in the possession of Iranian Gas Transmission Company.
- The activity scope of this company is the whole borders of the country within 10 operational districts, 86 pressure boosting facilities, more than 37500 kilometers of special pipelines in addition to 51 pipeline operation centers, and the telecommunication facilities in the whole gas transmission network. This company has strategic importance and is a governmental institution that cannot be privatized, so other methods such as outsourcing should be used in its field.
- Iranian Gas Transmission Company is carrying out various activities in the field of exploitation, technical and engineering, maintenance and repair, improvement and modernization, procurement and logistics, storage, and various support processes.
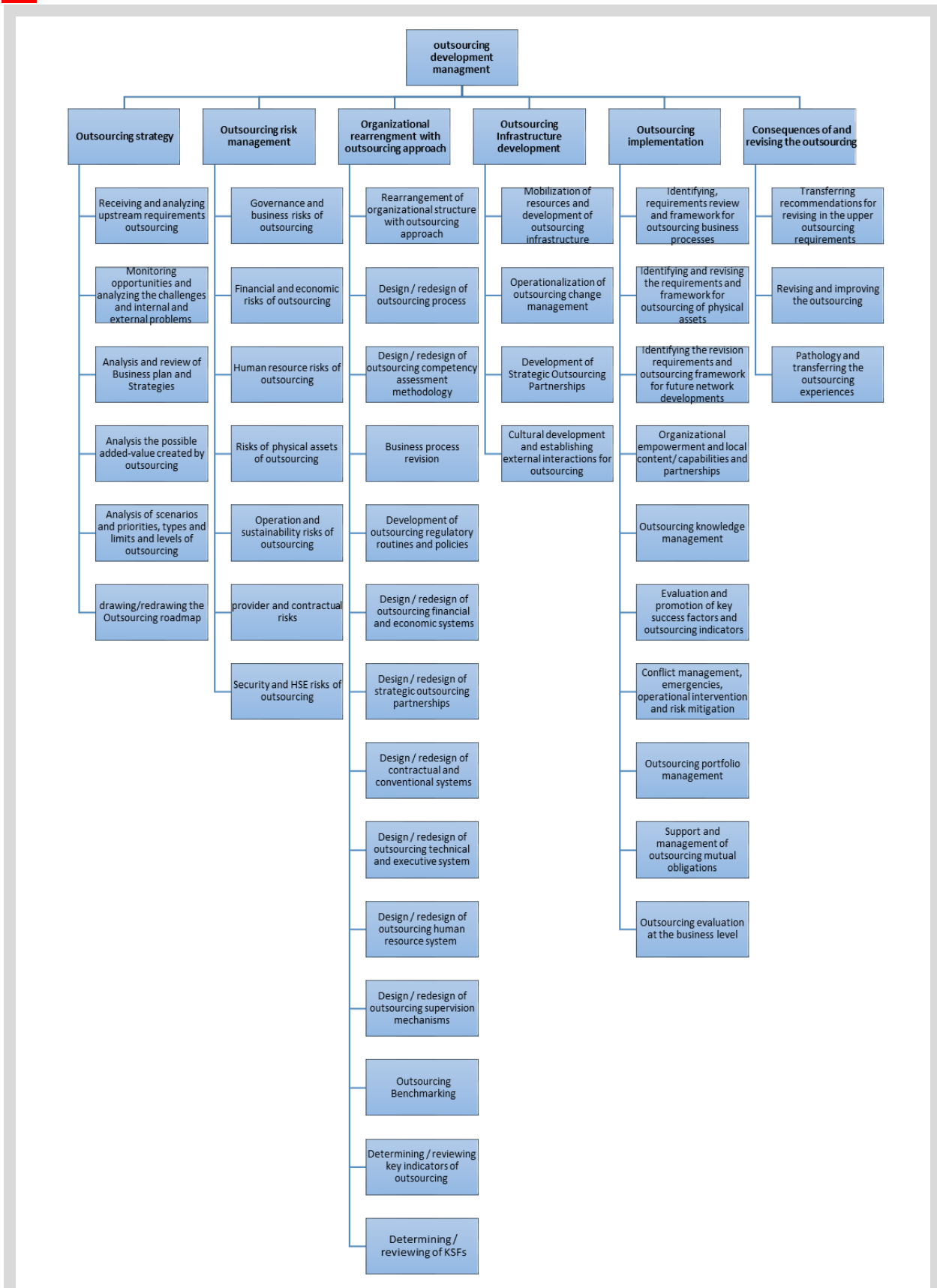
Figure 1. The hierarchical structure of the codes and the theme model.

The scope of outsourcing analysis in the research on Iranian Gas Transmission Company is in the types of outsourcing of physical assets such as pressure boosting facilities, pipelines, operation centers, and telecommunication facilities and in the outsourcing of the business processes.

Observation, interviewing, and reviewing the documents were the main methods for gathering information. In this study, the selection of the interviewees was performed with scrutiny, and the participants with high work and management experience, postgraduate education, and reliable information on and the seniority and relationship with the field of outsourcing policy-making and implementation were selected from the following groups; the interviews continued until theoretical saturation was achieved:

- The first group: the former and current deputy minister and the boards of directors of National Iranian Gas Company and Iran Gas Transmission Company;
- The second group: managers and senior executives of National Iranian Gas, Iran Gas Transmission Companies, and large companies with various businesses that have a history of responsibilities or participation in outsourcing;
- The third group: experts, scientists, and academic professors who have a history of cooperation or study activities in the field of outsourcing.

After studying the literature, policies, and practices in the field of outsourcing, researchers developed an interview protocol containing interviewees' information, interview time and place, interview topics, tips for each of the outsourcing topics, a section related to open and additional cases that possibly raised by the interviewees, a section related to the additional information needed to be received, and the channels of future communications with the interviewees or their representatives, which was reviewed and finalized after a few stages before the start of the interviews and after the initial interviews. Based on the topics and tips of the interview guideline, more than 30 interviews were conducted as the main source of data collection. In this regard, studying the background of one of the researchers as the manager of the company effectively helped conduct in-depth interviews with senior government and private managers and improve the credibility and accuracy of the findings. Theme analysis was used to analyze the collected information. Theme analysis is a method that identifies, analyzes, and presents themes and categories derived from the information collected. Patterns and themes can be identified in two ways. Data-based, with a bottom-up empirical approach, and based on researchers' opinions with a top-down theoretical approach. To analyze the data using Atlas T qualitative analysis software, the steps of implementing and entering the text information of the interview protocols, becoming acquainted with the relevant information, creating an initial categorization, searching for themes in these categories, revising and reviewing themes, defining and naming categories, and compiling the report were taken.

4. Case Study of Iranian Gas Transmission Company

In this section, first, the mission dimensions of Iranian Gas Transmission Company are briefly described, and then, corresponding to the theoretical framework of the research, the research results are divided into three parts: the generalities and the graphic diagrams of the model; the description of the model dimension; the validation and completion of the model.

4.1. Brief Introduction of Iranian Gas Transmission Company

Iranian Gas Transmission Company, with the mission of clean, stable, safe, and productive transmission, in terms of the extent of pipelines and facilities under operation, is ranked first in Asia and fourth in the world after the United States, Russia, and Canada. 70% of the shares of the physical assets of National Iranian Gas Company are owned by Iranian Gas Transmission Company. A total of 37500 km of high-pressure gas transmission lines, 86 gas pressure boosting stations, 310 gas compressors located in stations, 9 stations for the export and import of natural gas, 51 pipeline operation centers, 1,360,000 hectares of gas transmission line area, 11500 employed manpower, 260 billion cubic meters of annual gas transmission capacity from domestic and imported sources to consumption bases, and 10 subsidiary gas transmission operation districts are the assets of Iranian Gas Transmission Company, which indicates the strategic importance of this huge complex in Iran's oil and gas industry.

4.2. Detailed Results

a. Generalities of related model

The proposed design model consists of six main themes:

1. Outsourcing strategy;
2. Outsourcing risk management;

3. Organizational rearrangement with an outsourcing approach;
4. Development of the outsourcing infrastructure;
5. Outsourcing implementation;
6. Consequences and revision of the outsourcing.

The first theme deals with the development of outsourcing on a macro and strategic basis to ensure that the outsourcing approach is in line with the company's macro strategies and clearly defines a long term path.

The second theme is explained to ensure the management of outsourcing risks in various areas and at strategic and operational levels, including risk assessment and adjustment.

The theme of rearrangement aims at systematizing and institutionalizing the development of outsourcing in the company. In this theme, the organization peels off for the development of outsourcing, and the key factors in outsourcing success are explained.

The theme of infrastructure development, in the company, mobilizes resources and prepares the conditions for achieving the planned goals and objectives.

The theme of implementation is the operational entry into such a submission. Based on the strategies, the rearrangement is done, and the infrastructure development and outsourcing implementation can be done. This theme not only is an outsourcing step but also includes other required integration measures such as outsourcing portfolio management.

The last theme deals with the consequences of outsourcing; this theme completes the evolution cycle of the model and provides reliable outputs to the upstream institutions and a fundamental revise of the developed model.
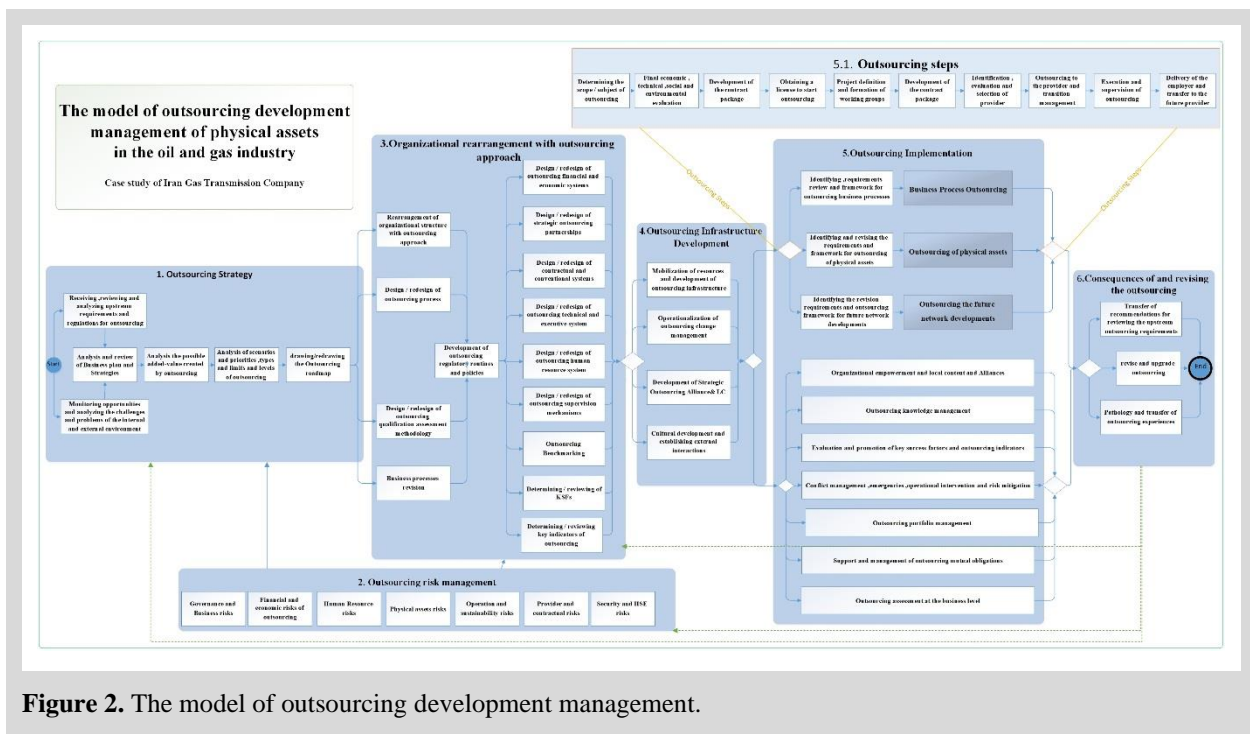

Figure 2. The model of outsourcing development management.

Founded relationships show the relations between the categories. For example, the risk management theme influences the outsourcing strategy and organizational rearrangement with an outsourcing approach, or the theme of the consequences and revision of the outsourcing provides the necessary information and feedback on the first, the second, and the third categories.

b. Description of categories and model dimensions

In the forthcomings, the images formed based on the theoretical framework, the collected information, and especially the analysis of the interviews are described respectively in the chapters of interview management, outsourcing risk management, organizational rearrangement with outsourcing approach, development of outsourcing infrastructure, implementing outsourcing, and consequences and revision of the outsourcing. Due to the existence of multiple codes for the steps of implementing outsourcing, this subcategory is also described independently.

b.1. Outsourcing strategy

The nature of outsourcing strategy (Osborne and Gaebler, 1991; Rahanandeh Purlengrodi, 2013; Arasti et al., 2008; Tjemkes et al., p.15–36, 2017; DiRomualdo and Gurbaxani, 1998, Håkansson, 1990) and the related decisions have been considered in limited studies. The complexity of outsourcing is that it should pay attention to designing a comprehensive model of managing outsourcing development. This task should be done in the form of a portfolio (Barthe´lemy and Geyer, 2005) of a variety of outsourcings. These, and the reasonable maintenance of the governance activities in the company, require that the strategy for the outsourcing should be performed systematically in the following measures.

Receiving, reviewing, and analyzing upstream requirements and regulations for outsourcing: Considering the development of this model for governmental settings and the existence of the laws, regulations, and upstream policies that affect any outsourcing action in the company, the initial steps in this area are identifying this collection and the analysis of how to cover and adapt all the elements of outsourcing with them.

Monitoring opportunities and analyzing the challenges and problems of the internal and external environment (Barthe´lemy and Geyer, 2005): Realizing the long-term benefits of outsourcing requires the organization to identify and review all of the opportunities, threats, strengths, and weaknesses associated with outsourcing outside and inside the organization with a long-term approach.

Analysis and review of business plan and strategy: Based on the upstream requirements and regulations of outsourcing, as well as the analysis of identified opportunities, challenges, and problems, the set of strategies of the organization, including the directional pillars, strategic plans, and indicators, as well as the company's business plan, are reviewed, and necessary changes are applied with an outsourcing approach where appropriate.

Analysis of the possible added value created by outsourcing: cost-benefit analysis and the feasible added value that can be achieved to fulfill the mission of the organization in the areas of business, operation, human resources, finance, and partnerships, especially in the medium and long term.

Analysis of scenarios and priorities, types, limits, and levels of outsourcing (Kianmehr, 2001): Active management of outsourcing portfolio approach (Sharma and Loh, 2009; Ablo, 2015) can create more advantages for the company if outsourcing portfolio design is performed in line with outsourcing strategies and is supported by outsourcing portfolio management.

There are different scenarios for outsourcing. The transfer of an entire geographical area such as provinces or operational areas to a contractor (outsourcer) and the transfer of a similar set of assets such as telecommunications facilities to an outsourcer are some scenarios in this area. This step can be performed with an analysis of its various aspects, including cost-benefit analysis, local capacity acceptance analysis, and manpower outflow rate analysis.

Drawing/redrawing the outsourcing roadmap: The company adopts the approach of outsourcing roadmap as a powerful and efficient tool to support the management and planning of outsourcing development the vision of which is outlined in the outsourcing strategies. In a coherent framework, strategic diverse elements must be converted in the form of a single document to achieve the goals of outsourcing. This long-term-plan document (in our case study, a ten-year plan) illustrates the failure of outsourcing goals. In the field of outsourcing, the time and duration of all the outsourcing should be recorded, the resources and infrastructure required and the research and systems that need to be done should be listed, and the verification and approval steps should be performed (Taponen and Kauppi, 2020).

b.2. Outsourcing risk management

The organization manages outsourcing risks (Abzai and Karimi, 2010; Barthe´lemy and Geyer, 2005) by identifying them, analyzing them, and then assessing whether the risks should be adjusted by being dealt with so as to meet the risk criteria. Based on the information gathered, outsourcing risks are classified into the following seven groups:

Governance and business risks: Because oil and gas industry is predominantly governmental, governance risks, including restrictions rooted from or changes in laws and regulations, policies, programs, risk of attitude and the attitude of regulatory agencies, and how resources are allocated to the company should be assessed and managed. It is also necessary to manage the risks of the business, including the characteristics, changes, and weaknesses of the business model.

Financial and economic risks of outsourcing: Financial and economic risks from macro and micro dimensions such as the risk of inflation and currency

devaluation, the risk of incorrect economic estimates, the risk of not having a suitable economic model of outsourcing, the risk of limited funding of outsourced payments by the employer, the risk of the benefit-cost of outsourcing, and the risk of corruption in the outsourcing contract are assessed and adjusted or accepted.

Risks of human resources: The risks of human resources include restrictions on manpower adjustment, job security risk of former human resources of outsourcing, manpower relocation risk, manpower empowerment, training risk, manpower recruitment risk, manpower retirement risk, not fulfilling manpower requirements risk, and lack of adequate information required for management.

Risks of physical assets: The risk of the improper maintenance and repair of physical assets, the risk of the removal, collection, transference, and disposal of physical assets, the risk of the replacement and development of physical assets, the risk of the supply of outsourced items and spare parts, the risk of hardware and software infrastructures, the risk of the uniqueness of the physical assets of the gas transmission network, the risk of the defects in the technical documents of physical assets, the risk of the outwear of physical assets, the risk of the uncertainty of physical assets quality at the time of delivery and obtaining at the beginning and at the end of outsourcing, and the risks that should be managed.

Operation and sustainability risks: The risk of maintaining the stability of service delivery and the risk of nonoperation, interruption in operation, or operation with a low quality are very important from social, political, and technical aspects due to the sensitivity of oil and gas industry and need attention and adjustment.

Provider and contractual risks: The risk of not selecting eligible outsiders, the risk of inability and sufficient expertise to be outsourced in fulfilling obligations, the risk of not fully defining the description of outsourcing services, the risk of outsourcing work to the third parties, the risk of not predicting the special cases and situations in the outsourcing contract, the risk of insufficient flexibility of the outsourcing contract, the risk of the unilateral outsourcing contract, the risk of insufficient experience in concluding outsourcing contracts in Iran, the risk of the duration of the outsourcing contracts, the risk of the defect in abolition and termination of the outsourcing, and the risk of the insufficient attention to the justice and improving the internal capabilities in the outsourcing need to be measured and adjusted.

Security and HSE risks: The risk of selecting the incompetent acceptor, the risk of leaking the classified information of the company from a provider channel, the risk of theft and destruction or sabotage, the risk of fire and safety problems, the risk of injury to the employees of the providers within the outsourcing area, the environmental damage, and the risk of improper disposal of sewage and normal/industrial wastewater in the outsourcing should be managed.

b.3. Organizational rearrangement with outsourcing approach

The incompatibility of the company's architecture with the outsourcing approach increases the probability of failure in the development of outsourcing in the company, and it is necessary to systematically rearrange the organization in various dimensions so as to institutionalize and ensure the success of outsourcing in the company (Deepa et al., 2018).

Rearrangement of organizational structure with outsourcing approach (Deepa et al., 2018): The effect of outsourcing approach on roles, power, authority, responsibilities, hierarchy, and the way of transferring information between company levels and the need for changes in organizational positions, for the variation and relocation of employees, for the establishment of monitoring, and for the support mechanism of outsourcing make it necessary to review the organizational structure of the company with a strategic approach to outsourcing. This review takes place in the structure of the line and staff of the company and is applied at two levels; in the outsourced area in which executive responsibilities are eliminated and supervisory responsibilities are created; and in the whole company that covers outsourcing portfolio management. In addition to applying changes in the organizational structure, due to the changes in some jobs, apart from changing the organizational chart, job descriptions and conditions for obtaining some jobs are reviewed; also, for the new jobs, including outsourcing supervisors, an appropriate job certificate is prepared.

Design/redesign of outsourcing process (Seyed Javadin and Hassangholipor, 2011; Kiel, 2006; Mclaver, 2005; Taponen and Kauppi, 2020): To institutionalize outsourcing in the company and clarify the activities required to be performed separately by organizational units and positions, the sequence and priority of activities, the relationship of the outsourcing process with others organizational processes, and outsourcing principles and purposes should be determined, and the company should formulate, review, and approve its

outsourcing process in the form of its process management system.

Design/redesign of Outsourcing Qualification Assessment (Young and Macinati, 2012): To ensure the design, development, and implementation of outsourcing in the company in all areas and dimensions of outsourcing, in the fields of method, manpower, process competency assessment methodology in various phases of outsourcing, manager systematically evaluates the extent to which the defined criteria are satisfied separately for the relevant components. This methodology, in addition to project control, informs managers and policymakers of the achievement of goals and effective management of project risks. All the outsourcing projects are evaluated according to this methodology. Based on the results of evaluations, if the requirements are not fulfilled, additional and corrective measures are defined and implemented.

Business process management revision (Taponen and Kauppi, 2020): The operational difference before and after outsourcing in the company is created by updating all the processes of the organization (Abzari and Karimi, 2010). Many of the organization processes in the post-outsourcing period can no longer be implemented in the same way as before and need to be reviewed following the new approach while defining the roles of acceptors (providers) and outsourcing management devices.

Development of outsourcing regulatory routines and policies (Young and Macinati, 2012): This step is one of the most complex systemic steps in outsourcing, in which bylaws, instructions, executive routines, protocols, procedures, checklists, forms, and guidelines are compiled. These clarify all the administrative aspects of outsourcing. Regulatory documents are drafted within the framework of national laws and regulations, and all outsourcing contract documents are written based on them. After that, the provider and the supervision system of the company provide services based on these documents. Some models have been derived from the other inputs of compiling of these documents.

Along with the development of outsourcing in the company, based on experience and knowledge, regulatory documents are developed.

Design/redesign of outsourcing financial and economic systems: One of the necessities of outsourcing is the existence of a financial and economic system that covers its requirements. During and after the period of each outsourcing, the existence of measurement and quantification mechanism and the real estimations of the value of the domain in the process of outsourcing are required at the beginning. It is necessary to calculate the costs of the employer company before outsourcing and accurately estimate future costs if it is still at the disposal of the company or if it is outsourced.

Design/redesign of strategic outsourcing alliances (Asharafzadeh, 2004; Lonsdale and Cox, 2000): The company aims to gain access to valuable and complementary resources such as capital, technology, knowledge, and specialized staff which were previously unavailable, to expand geographically, the volume of services, and cost-effectiveness, to reduce strategic and operational risks, to increase the internal growth, and to form their strategic alliances, which include outsourcing. The various policies and styles of the alliance affect the outsourcing agreements.

Design/redesign of contractual and conventional systems: At this stage, to cover the outsourcing requirements (as a compliment and along with the outsourcing systems), the set of contractual, temporary-to-permanent, and legal mechanisms of the company are designed, and the existing cases are reviewed. The design of the contract package framework and procedures for identifying, evaluating, and selecting contractor/provider are among the items considered in this step.

Design/redesign of outsourcing technical and executive system: Existing technical and executive systems cover most projects and developments, and at the time of this study, there is a lack of outsourcing technical and executive system, which is compiled in the theme of organizational rearrangement. The routines and regulatory documents are set based on this system.

Design/redesign of outsourcing human resources system (Arasti et al., 2008, Abzari and Karimi, 2010; Deepa et al., 2018): Unlike in the past, the human resources system of the company covers two new areas: human resources that can be outsourced and employees of the company that are related to the outsourcing. Although, at the first glance, outsourced human resources are independent of the employer in an organization; nevertheless, given the direct impact of their performance and behavior on the mission of the organization, they should be considered. This attention should cover everything from the qualification stage to empowerment and training, to quantitative and qualitative adequacy, and to possible administrative violations. Also, in the case of employer staff, there are issues such as assigning former staff to the outsourced areas, relocating current staff to the new jobs of the

outsourcing, and hiring of new employees in a revised system for human resources.

Design/redesign of outsourcing supervision mechanisms: Employer supervisory responsibility, especially after the contract, is one of the most important responsibilities of the company and plays a key role in achieving sustainable and long-term outsourcing success. Outsourcing oversight, while not interfering in its executive activities and maintaining the independence of the provider, along with creating the ground for innovation development and productivity enhancement, requires determining methods, criteria, programs, identifying resources and capabilities, and abilities required for it.

Outsourcing Benchmarking: Defining, identifying, and adapting to outstanding actions and processes at the national and international levels to increase the outsourcing performance of the company [based on APQC definition] are effective issues in designing the outsourcing development benchmark due to the institutionalization of this comparative evaluation and covering some shortcomings. By using knowledge and experience, and eliminating existing ambiguities within the benchmark, a sub-theme has been assigned to it. This benchmarking includes various areas such as modeling outsourcing of typical contractual and conventional documents.

Determining/reviewing the key success factors in outsourcing: The company, based on its strategies and outsourcing strategies, identifies and reviews periodically the key factors in industry success, including strategic, environmental, and temporary factors (Rahnavard, 2008; Greaver, 1999) to focus and increase accuracy in implementing activities and programs.

Determining/reviewing key indicators of outsourcing (Kianmehr, 2001; Mahmodi Meymand et al., 2010; Greaver, 1999): Defining measurable variables that show how successful the organization has been in achieving its key goals (performance and outcome) in outsourcing, in line with strategic goals, and integrating and compiling these indicators along with strategic, process, productivity, and operational indicators of the company, is done in the organizational rearrangement.

Outsourcing metrics may cover the excellent performance of single outsourcing, but outsourcing portfolio indicators indicate poor portfolio management

performance, which needs to cover both macro and micro dimensions of outsourcing.

b.4. Outsourcing infrastructure development

Mobilization of resources and development of outsourcing infrastructure: Based on the rearrangement, the resources needed for its implementation, including financial resources; human capital; equipment, machinery, and facilities; communication and IT hardware and software infrastructures; information, and knowledge resources are provided. In existing cases, depending on the need, changes are made in these factors.

Operationalization of outsourcing change management: Extensive organizational and environmental developments and the tangible effects of outsourcing on all the elements of the organization require activating the change management mechanism in the organization. Applying each part of the organizational rearrangements and developing the outsourcing infrastructure require identifying and determining the prerequisites, as well as their effects and consequences, and managing the changes before, during, and after the outsourcing. These changes include human, systemic and process, network and physical, financial, cultural, and even political and behavioral assets dimensions in the organization.

Development of strategic outsourcing alliances and local content (LC) (Lonsdale and Cox, 2000): Along with alliance management, developing mechanisms for negotiation, design, management, evaluation, and termination of partnerships, according to the planning done in the theme of organizational rearrangement, with the approach of developing internal and local content, leads to the development of an appropriate network of collaborations for implementation and support of outsourcing by the company. With these measures, the risk of failure of cooperation is reduced, and conflicts are managed with a long-term approach.

Cultural development and establishing external interactions: Organizational culture—as a set of values, guiding beliefs, understandings, and ways of thinking, which are common among the members of the company and are recognized by new members as the correct ways of doing things and thinking—should support outsourcing. The cultural distance of partners is an important issue in the success or failure of outsourcing, which is managed by the company policymakers.

Also to develop the company outsourcing network, interactions with a network consisting of all units of the company; outsiders; contractors; company value chain in oil and gas industry; upstream institutions; and society based on the requirements of outsourcing strategies and goals and their needs and expectations, appropriate two-way or network interactions are formed in the context of communication and information technology infrastructure and the active role of managers, employees, and representatives of the company according to the company outsourcing process map.

b.5. Outsourcing implementation

Using the prepared infrastructure and in the framework of organizational rearrangement, the envisaged areas are outsourced in the outsourcing road map. Based on the upstream documents and interview findings, three areas of (a) business processes (Abzari and Karimi, 2010); (b) physical assets (in this study, pressure boosting facilities, pipelines, operation centers, and telecommunication facilities); and (c) network and developmental facilities that are gradually added to the existing network are outsourced. Therefore, network developments are placed in an independent group the outsourcing of which has fewer considerations and limitations than the existing assets and can be outsourced from the outset of the operation.

Identification, requirement review, and framework of outsourcing business processes: To outsource the management, operational, and logistic processes of the company that are selected based on the road map for outsourcing, a set of initial measures should be performed, and all of the following measures should be implemented based on organizational rearrangement (3rd category of the model); including reviews required for the totality and structure of process failures; determining how to apply changes to inputs and outputs; and the intersections between processes determining how to revise the process monitoring indicators, determining the way of policymaking for overall outsourcing process, outsourcing part of the process, or outsourcing part or all of the process in company or geographical levels to the provider determine how to monitor outsourced processes; determine the flow of the external information of the company, including upstream and regulatory bodies; determine how to submit reports and process monitoring; determine how to change the outsourced processes; and determine how to eliminate non-compliance processes. Determining how to manage and allocate process infrastructure should be based on

organizational rearrangements (the third theme of the model).

Business process outsourcing: Based on the selected processes of outsourcing, in the framework of the requirements, outsourcing is performed according to the general steps specified in categories 1–5.

Identifying and revising the requirements and framework of outsourcing physical assets: At this stage, requirements for the outsourcing of pressure boosting facilities, storage facilities, pipelines, operation centers, and telecommunication facilities, including how to deliver and transform assets; how to improve, renovate, utilize, maintain, repair, dismiss, scrap, and replace property, procurement method of consumables, and spare items during outsourcing; how to communicate between the bases and destinations of receiving and delivering gas or data; the communication method of provider with other upstream institutions and stakeholders (including National Iranian Gas Dispatching Director); and the procedures for operational interventions and emergency management are counted and managed.

Outsourcing of physical assets: Based on the assets selected for outsourcing, and in the framework of calculating the requirements, outsourcing is done according to the general steps specified in categories 1–5. This activity includes a set of actions from the time of decision-making process of the outsourcing to the delivery of assets from the provider by the employer.

Identifying the revision requirements and outsourcing framework for future network developments: Regarding outsourcing the current or future developments of the gas and data transmission network (as products and services), because these assets can be directly outsourced from the project (in this case by Iran Gas Engineering and Development company), it is necessary to calculate (and apply) the special requirements of this style of outsourcing. In outsourcing the projects, an identification strategy and decision-making process is needed for the following considerations: requirements such as how and when the outsourcing takes place; the obligations between the company and the provider and the contract due; responsibilities for setting-up and ramp-up to reach the capacity of the network and fix the punch lists of problems; responsibilities for using the guarantee and asset guarantee services, the way to determine and allocate the monitoring device; how to enable externalization and monitoring device.

Outsourcing future network developments: Based on the ongoing developments, to enter the company service delivery network within the framework of the requirements calculation, outsourcing is carried out following the general steps specified in categories 1–5. This activity includes a set of actions from the completion of the project and the ready operation of the facility to the delivery of the assets outsourced by the employer (with or without the role of service developer project).

Organizational empowerment and local content and collaboration (Burden, 2003; Lacity and Hirschheim, 1993; Lonsdale and Cox, 2000; Nelsonoly, 2010): In parallel with the outsourcing process, training, skills development, and qualification were performed in two aspects of the organizational empowerment and individual empowerment (staff). This empowerment includes five target groups. The first group is the employer organization in all the related lines and staff units (monitoring office, employer representatives, monitoring and evaluation managers, and outsourcing support managers). The second group is the providers, who, within the framework of the expected competencies and the contractual framework, are empowered by the employer, by themselves, or by the third empowerment organization. The third group is the company contractors and companies related to the employer value chain, which are then somehow related to outsourcing. The fourth group is the providers of other types of outsourcing related to this outsourcing. The fifth groups are local and indigenous potentials and capabilities that can be developed to provide more added value for the company (employer) and the community in terms of social responsibilities and good management of some risks such as some security risks and financial risks.

Outsourcing knowledge management: Outsourcing knowledge management is the continuous process of using existing knowledge and creating new knowledge to achieve the goals of the outsourcing portfolio and contribute to organizational learning (Rahnavard and Khavand Kar, 2008). Outsourcing managers must be able to acquire knowledge appropriately at each stage of the outsourcing cycle and share it throughout the outsourcing life cycle so that the company, the outsourcing portfolio, and the outsourcing benefit from it. Outsourcing knowledge management goes beyond outsourcing documentation and the use of outsourcing knowledge in its termination. Outsourcing knowledge network provides an organizational platform for managing different types of knowledge in different areas and at various levels and the related components in the company, between the company headquarters and 10 operational areas; it connects the company to the knowledge network of outsiders (providers) and external stakeholders and includes the creating, acquiring, classifying, modification, sharing, and dissemination of outsourcing knowledge.

Evaluation and promotion of key success factors and outsourcing indicators: Based on the key success factors and determining indicators (Salone, 2011; Greaver, 1999; Deepa et al., 2018) in the organizational rearrangement phase and defined goals and parallel with the implementation of outsourcing in the company, the realization of factors and indicators are monitored; also, along with a comparison with predefined goals, upstream requirements, and superior models, improvement actions and action plans are determined, and they are continuously planned, implemented, controlled, and improved.

Conflict management, emergencies, operational intervention, and risk mitigation: Outsourcing in its cycle faces a variety of disturbances in the desired balance and stability, including conflicts between the company line and staff units, the provider supervising body, society, and governmental institutions; conflicts with the provider; conflicts with the company employees; conflicts of the providers with each other and with the contractors; and conflicts between the internal units and the provider employees and managers; some conflicts are destructive and some are constructive. In these cases, the company adopts an appropriate approach to conflict management to achieve positive consequences such as making changes; fostering creativity and innovation; clarifying issues, goals, views, and opinions; making communication better and more appropriate; increasing energy in the company and outsourcing problem; solving the inert and covert problems; and creating better and more constructive views and opinions.

Outsourcing portfolio management: The company creates more opportunities to increase its competitive advantage by expanding its cooperation from one outsourcing to a set of outsourcings. How the portfolio of alliances is created, configured, and developed influences the management of the outsourced development. The performance of the company depends not only on the success of each outsourcing contract but also on the set of alliances. To gain synergy from the portfolio of outsourcings (and, of course, the existing subcontracting), the company actively designs and manages the interconnected and interdependent

relationships between its partners in the alliances. This portfolio of outsourcing, envisioned in the company outsourcing roadmap, also increases management complexity, coordination costs, and conflict risk. In addition to conflict management, proper emergency management in oil and gas industry is of particular importance because maintaining stability and safety in this industry has far-reaching social consequences. Limited experience and capacity of providers in emergency responders are required, and the employer must actively have the forecasts, networks, and appropriate crisis management mechanisms.

Also, according to the description in the theme of risk management, following the assessments and approaches to accepting or reducing risk, the relevant risks are adjusted at this stage, and adjustments are made in individual outsourcing, in the outsourcing portfolio, and at the company level.

Knowledge management and internal coordination are two factors influencing the management of the alliance portfolio.

Support and management of outsourcing mutual obligations: Most of the outsourcing models define the framework and receive appropriate services and products from the provider. This does not lead to the desired result without considering the responsibilities of the employer. The responsibilities of the employer of the company can be summarized into two groups. The first group is the compensation for the service provider, which has mainly financial and credit dimensions; the second group is the actions and support responsibilities without which the provider will not be able to fulfill its responsibilities. Items such as obtaining permits and approvals (corporate and external) and providing common infrastructure fall into this theme.

Outsourcing evaluation at business level: It is necessary to continuously evaluate the competency in terms of competency based on the developed methodology mentioned in the theme of organizational rearrangement and company outsourcing in the initial stages and implementation, with which this code deals. The assessment of the competency includes manpower, facilities, machinery, methods, procedures, materials, items required, and the preparation and maintenance of environmental conditions.

b.5.1. Outsourcing steps

If we consider the whole management of outsourcing as a super-project, each outsourcing is considered as a subset of this super-project and has its developmental steps and activities. Although different steps may be defined for them due to the nature of the outsourcing field and the difference between the outsourcings, the following steps can be jointly defined for outsourcing and customized to suit each outsourcing.

Determining scope/subject of outsourcing: Based on the outsourcing approved in the outsourcing roadmap, in this step, the field and scope of outsourcing are precisely defined and unanimously agreed upon. Any change in this choice can lead to a revision of the roadmap. Factors such as outsourcing portfolio management, risk management, potential and actual outsourced capabilities, manpower characteristics and limitations, corporate and environmental assets, policies, and considerations affect this activity.

Final economic, technical, social and environmental evaluation and feasibility study: Due to the difference between the time determining the cases of outsourcing in the roadmap and the time of starting outsourcing, providing sufficient reasons to higher authorities and reviewing outsourcing from financial, economic, social, political, and environmental dimensions are required so as to ensure that the definition of the scope of outsourcing still has the anticipated justifications.

Development of contract package: In this step, a set of contract documents, including general and specific documents of outsourcing is compiled. Typical documents of each outsourcing field (which have already been prepared) are used by default and customized for the specific outsourcings. These documents are compiled with an eye on the output of risk management, organizational restructuring, and the development of outsourcing infrastructure.

Project definition and formation of working groups: Outsourcing operational steps, based on the license, begin with the definition of the project (Hassanain Mohammad and Al-Saadi, 2006; PMI, 2017) in the frame of the company project charter, determining the responsibility of units, as well as organizing outsourcing working groups. Organizational and individual empowerment within the company is implemented after this stage.

Obtaining license(s) to start outsourcing: In this step, a set of necessary licenses and approvals are obtained from the inside of the company and external organizations. At this stage, the outsourcing plan is presented to the authorities and evaluated along with the evaluation and feasibility study prepared in the previous step. If the outsourcing is not approved, in addition to

removing the outsourcing from the agenda, it is necessary to review the roadmap; also, if the outsourcing is approved conditional to changes in the plan before the outsourcing, the dictated revisions are passed and the relevant changes are managed.

Identification, evaluation, and selection of provider: In the framework of national laws and regulations, to find the best options for reliable outsourcing, the company begins the identification of providers. Although this identification is laid on the framework of authorized lists of Iran's oil and gas industry, the company is developing its partnerships, focusing on the use of internal capabilities. Given the definitive timing of outsourcing on the roadmap, monitoring potential providers and empowering them before the evaluation and selection stage can form stronger business partners for the company. The identified options are evaluated under the minimum requirements of the existing laws and regulations and adding the assessment of the long-term potential of cooperation with the provider. Selection is based on the results of evaluations and considerations of the company outsourcing portfolio in each field.

The selection phase is important in three time periods: at the beginning of the outsourcing, before the end of the outsourcing to consider the alternatives, and continuously during the outsourcing period so that whenever, and for any reason, it is no longer possible to continue working with the previous provider, without interrupting the provision of services, it can be replaced with another provider.

At the end of each contract, three options, namely extending the contract with the previous provider, continuing the work by the company, or outsourcing to another provider, affect the identification and selection processes.

Outsourcing to provider and transition management: One of the important measures in any outsourcing is the transition from insourcing to outsourcing, determining the current status and parameters of the area and assets being outsourced; defining and creating the necessary access of the provider (staff and properties) to the outsourcing area; coordinating with stakeholders; transferring responsibility from the company employees to the provider; ensuring the adequacy and qualification of resources and provider employees; observing and learning work by provider; doing shoulder-to-shoulder work by the employer and provider; experimentally assigning the work to the provider on a pilot scale;

forming and activating the communication channels between committees and joint working groups; preparing, delivering, and transforming the documents (technical and legal); forming and activating the employer's monitoring office; fulfilling the employer's initial obligations, including any financial payment; ensuring the ability of the provider to accept the responsibility of fulfilling the obligations; and finally leaving the company forces out of the scope of outsourcing and determining their tasks in this phase.

The responsibility devolution, depending on the type of outsourcing, is done in a one-time manner or gradually within the framework of the contract and in a specific schedule.

Execution and supervision of outsourcing: This action covers the entire period of each outsourcing contract, after the transfer of responsibility to the provider. During this period, the provider performs the assigned responsibilities and provides action, products, services, and defined reports. Simultaneously and in parallel, the employer's supervisory actions, including supervisions, controls, monitoring, evaluations, and audits (per case or periodical and planned or unplanned) are carried out. Complementary and corrective actions are taken based on the results of the monitoring and the provider requests. This step includes a set of stakeholder conflict management measures and an agreement to make changes to the initial defined framework possible. This stage includes the joint performance of responsibilities by the parties, including the compensation for the employer's stage services.

Delivery of employer and transfer to the next provider: Before the end of the contract or due to the termination of the contract because of for instance the provider bankruptcy or ineligibility, the employer takes decisions on the management of the outsourcing area, in the form of insourcing, extending the current contract with a provider, or surrendering the field to a new provider. In case of a decision to extend the contract, the necessary agreements and legal actions will be taken.

In the case of a decision not to cooperate with the current provider, the reverse of the initial delivery process to the provider is performed. At this stage, based on the delivery documents, the set of areas and assets delivered to the provider are reviewed and recaptured from the provider based on the specific checklists. At this stage, it is possible to claim any compensation for damage and unconventional depreciation of the assets from the provider.

Outsourcing knowledge management: at this stage, it is important to transfer and share the knowledge from the previous provider to the employer and then to the next provider in the desired way.

At this stage, the employer's expert forces either enter the outsourcing area and take responsibility or, at the same time, transfer the responsibility to the next provider.

b.6. Consequences and revision of outsourcing

Any system without a feedback and improvement mechanism is imperfect and doomed to poor quality or failure in the long run. The present theme deals with the three aspects of training the upstream institutions in the transfer process, transferring knowledge to other oil and gas systems and organizations, and finally promoting the effectiveness of outsourcing.

Transfer of recommendations for reviewing the upstream outsourcing requirements: Outsourcing has a short history in Iran and, due to being an emergent phenomenon, it has caused the existing laws and regulations to not cover all the aspects of this area, which of course has created problems and obstacles in the management of outsourcing development. If our research subject can provide comprehensive and practical proposals for upgrading laws and regulations for the higher institutions on its own scale (and of course at the request of the upstream institutions), it will help both the development of the outsourcing in the country and the removal of legal barriers to outsourcing. Moreover, a continuation of the outsourcing development path in the company will be possible. The company position in the development of standards in this area can strengthen the role of the company in the development of practical knowledge of outsourcing, which will help promote the company brand (as one of the strategic axes recommended by the upstream institutions).

Pathology and transfer of outsourcing experiences: Although in the theme of outsourcing risk management, outsourcing risks have been identified and measured, during the outsourcing process, it brings valuable lessons to the company; this knowledge is formed from successful experiences and failures of the company and can help other ranks of oil and gas industry (and of course other industries in Iran and in the international arena) go through the process of outsourcing development by utilizing more efficient resources. This knowledge transfer can lead to the growth of outsourcing development management in the company by the reverse transfer of knowledge from other institutions of oil and gas industry along with modeling the theme of organizational rearrangement.

On the other hand, if this model is well developed, successful experiences (and even learning from its failure) can be used in other management, technical, legal, and organizational systems of the company and can act as effective drivers in the sustainable development path of the company.

Revise and upgrade outsourcing: Although by anticipating all the appropriate management considerations of outsourcing development in the designed model, an attempt has been made to reduce the likelihood of failure or rework and unwanted costs, the active codes in the model include the evaluation and promotion of the key indicators of and factors in outsourcing success; the evaluation of outsourcing at a business level; outsourcing benchmarking; outsourcing risk assessments; outsourcing change management; the implementation of regulatory mechanisms; and the lessons learned. The results of the model provided sufficient information on revising the management of the outsourced development. The information gathered provides a valuable source of knowledge for identifying and evaluating outsourcing risks, the theme of outsourcing risk management.

This revising can be an organizational reorganization, upgrading the resource mobilization and infrastructure development, and modifying the implementation and outsourcing.

5. Conclusions

In this study, the management of outsourcing development was examined and analyzed, and using the opinions of senior managers and experts of the Ministry of Petroleum, the management model of the outsourced development with the following characteristics was extracted and explained:

- In this model, outsourcing management was examined and analyzed as a leadership issue and not one of the organization activities.
- Due to the importance and necessity of explaining the outsourcing process, based on the results of the interviews, in addition to the main categories in this area, outsourcing steps, as one of the subcategories of outsourcing implementation are differentiated and covered in detail in this model.

Similar to any research, the results of the current work have some limitations too since it has been carried out in oil and gas industry settings, and especially in Iran

Gas Transmission Company with special time and place conditions. It should be considered that the results of this case study cannot be generalized, and especially statistical generalization is impossible. For example, the specific sensitivities of oil and gas industry in terms of safety and social consequences of maintaining the sustainability of services in this area have led to risk management as an independent theme in the model. It is possible that the dimensions of outsourcing will especially be explained further in other enterprises in the future. Furthermore, in this model, in the context of the study environment, three groups of outsourcing of physical assets, outsourcing of business processes, and outsourcing of new network developments are identified and explained; they may exist in a similar or different way in other firms. This can be explored through similar studies in other businesses in oil and gas industry and more broadly in other organizations. From another perspective, the present study focuses on a model with the approach of utilizing domestic capabilities; other studies can address the differences in the development of outsourcing using other approaches, including the international approach. Moreover, comparing and examining the relationship and differences between outsourcing and other categories of value chain and strategic alliance (Lonsdale and Cox, 2000), including contracting and privatization, are still one of the interesting and required topics of future studies in this field of knowledge.

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