Explaining the Model of Outsourcing Development Management of Physical Assets in the 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 government 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. Because these organizations usually have a wide range of missions and supply chains, and according to macro policies and strategies, they need a comprehensive plan for outsourcing. Despite this importance, few studies have addressed the models of outsourcing development in firms. Using the content analysis method, the purpose of this study is to explain the model of outsourcing development management in the oil and gas industry. Also, a deductive approach applied to the theoretical framework developed in practice through case analysis in the Iranian Gas Transmission Company. This company has control of the 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 the Iranian 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, and its impact and interactions, were 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 with the service providers and 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 for operationalizing

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these tasks, neither in the scientific literature nor in the industry (Damanpour, et al. 2019; Taponen & 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 the oil and gas industry. In the present study, the researchers have designed 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 the (Iran's) oil and gas industry?" In other words, in the oil and gas industry, is it possible, while paying attention to internal capacity development strategies (Barden et al., 2003; Lacity and Hirscheim, 1993; Nelsonoly, 2010) to develop an integrated outsourcing model with a portfolio management approach (Sharma and Loh, 2009; Ablo, 2015) to achieve the expected goals?

In the next part of the article, the backgrounds and the theoretical foundations of outsourcing will be briefly reviewed. Then the theoretical framework is presented, and in the third part is the research method, interviewees selection process and design of the interview protocol are described. The fourth section explains in detail the results of the interviews and the components of the model. A summary of the research findings will constitute 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; information systems) or sub-activities (delivery of parts of services; payroll; data center) to outside suppliers (Damanpour et al., 2019). Governments outsource 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 - if it is properly designed, and managed with competence and expertise - can have many benefits for organizations. However, many organizations are ineffective 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 (return outsourced work to the organization) and spend the organization's internal resources to complete it.

Nationally and internationally, a limited number of models have been developed in the field of outsourcing (Taponen, & Kauppi 2020; Hassanain et al.; Saloneh, 2011). At the national level and in the 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 the Iranian 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 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 have been addressed, including supply chain management, strategic partnerships development, Strategic Alliance Management, and contracting. However, more limited research has been conducted in the field of outsourcing, including the "outsourcing decision (taking) model" (Eshrafzadeh, 2005), the "A practical framework for understanding the outsourcing process" (Chilenye, 2016), and "Designing a generic model for outsourcing process in the public sector "(Rajabzadeh, 2008), "Analysis Framework for Outsourcing Outcomes" (Rajabzadeh, 2008), "A framework model for outsourcing asset management services " (Willcocks, et al., 1995), "Information & Technology Outsourcing Exchange Cost Model" (Poor Moallem, 2011).

2.2. How to Formulate and Develop an Outsourcing Development Model

Despite research in the field of outsourcing, there are still several study gaps in this area that have been

addressed in previous studies; 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 of outsourcing and warning signs in outsourcing contexts has been emphasized (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 surrounding questions like what to outsource? What are the determinants of outsourcing decisions? How to outsource? Are still underdeveloped. The decision of

"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 shown 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 are then aggregated into secondary code. Finally, the secondary codes are grouped at the heart of the principal theme of "outsourced development management".

Figure 1. The hierarchical structure of codes and themes model.

2.3. Assessing the Validity and Reliability of the Model

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

Case study (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 characteristics of the phenomenon and its internal and external factors. Since the current study deals with "How and Why" questions of 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:

- The oil and gas industry is the largest, strategic, and propulsive industry of the country that has vast physical assets, a value chain, and a high potential for promotion and development.
- Numerous upstream requirements and policies have made inevitable the industry move towards privatization and outsourcing.
- The special conditions of the country in terms of imposing tyrannical sanctions and restrictions on the transfer of the network to strategy of international companies, more than ever requires that in the outsourcing of this industry, focus be on the national model and based on domestic or local content/capabilities.
- Most of the physical assets of the country's gas industry are in the possession of the Iranian Gas Transmission Company.
- The activity scope of this company is the whole borders of the country and with 10 operational districts, 86 pressure boosting facilities, more

than 37500 kilometers of special pipelines in addition to 51 pipeline operation centers and also telecommunication facilities in the whole gas transmission network .This company has strategic importance and is a governmental institution that can't be privatized, so other methods such as outsourcing should be used in its field.

- 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.

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

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

- The first group: the former and current Deputy Minister and the Boards of Directors of the National Iranian Gas Company and the Iran Gas Transmission Company
- The second group: Managers and senior executives of the National Iranian Gas and 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 including interviewee information, interview time and place data, interview topics, tips for each of the outsourcing topics, a section related to open and additional cases that possibly raised by the interviewee as well as a section related to additional information need to be received and channels of future

communications with the interviewee or his representatives, and after a few staged before the start of the interviews and after the initial interviews, reviewed and finalized. Based on the topics and tips of the interview guideline, more than 30 interviews, as the main source of data collection, were conducted. In this regard, the background of one of the researchers as the manager of the company studied effectively helped to provide conducting in-depth interviews with senior government and private managers and to 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 and 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, getting 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 was done.

4. Case Study of Iranian Gas Transmission Company

In this section, first, the mission dimensions of the 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 first part, generalities, and graphic diagrams of the model. Second, the description of the model dimension. Third, the way to validate and complete the model is presented.

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, ranks first in Asia and fourth in the world (after the United States, Russia, and Canada). 70% of shares of the physical assets of the National Iranian Gas Company are owned by the Gas Transmission Company. 37500 km of high-pressure gas transmission lines, 86 gas pressure boosting stations, 310 gas compressors located in stations, 9 stations for export and import of natural gas, 51 pipeline operation centers, 1.360.000 hectares of gas transmission line area, 11500 employed manpower, the 260 billion cubic meters of annual gas transmission capacity from domestic and imported sources to consumption bases, ten subsidiary gas transmission operation districts. These indicate the strategic importance of this huge complex in the country's oil and gas industry.

4.2. Detailed Results

a. Generalities of the related model

The given design model consists of six main themes:

1. Outsourcing strategy,
2. Outsourcing risk management,
3. Organizational rearrangement with outsourcing approach,
4. Outsourcing infrastructure development,
5. Outsourcing implementation,
6. Consequences of and revising 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 outsourcing risks management in various areas and at strategic and operational levels, including risk assessment and adjustment.

The theme of rearrangement is aimed 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 of 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, rearrangement is done and infrastructure development, outsourcing implementation can be done. This theme is not just an outsourcing step but is an outsourcing step. It 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.
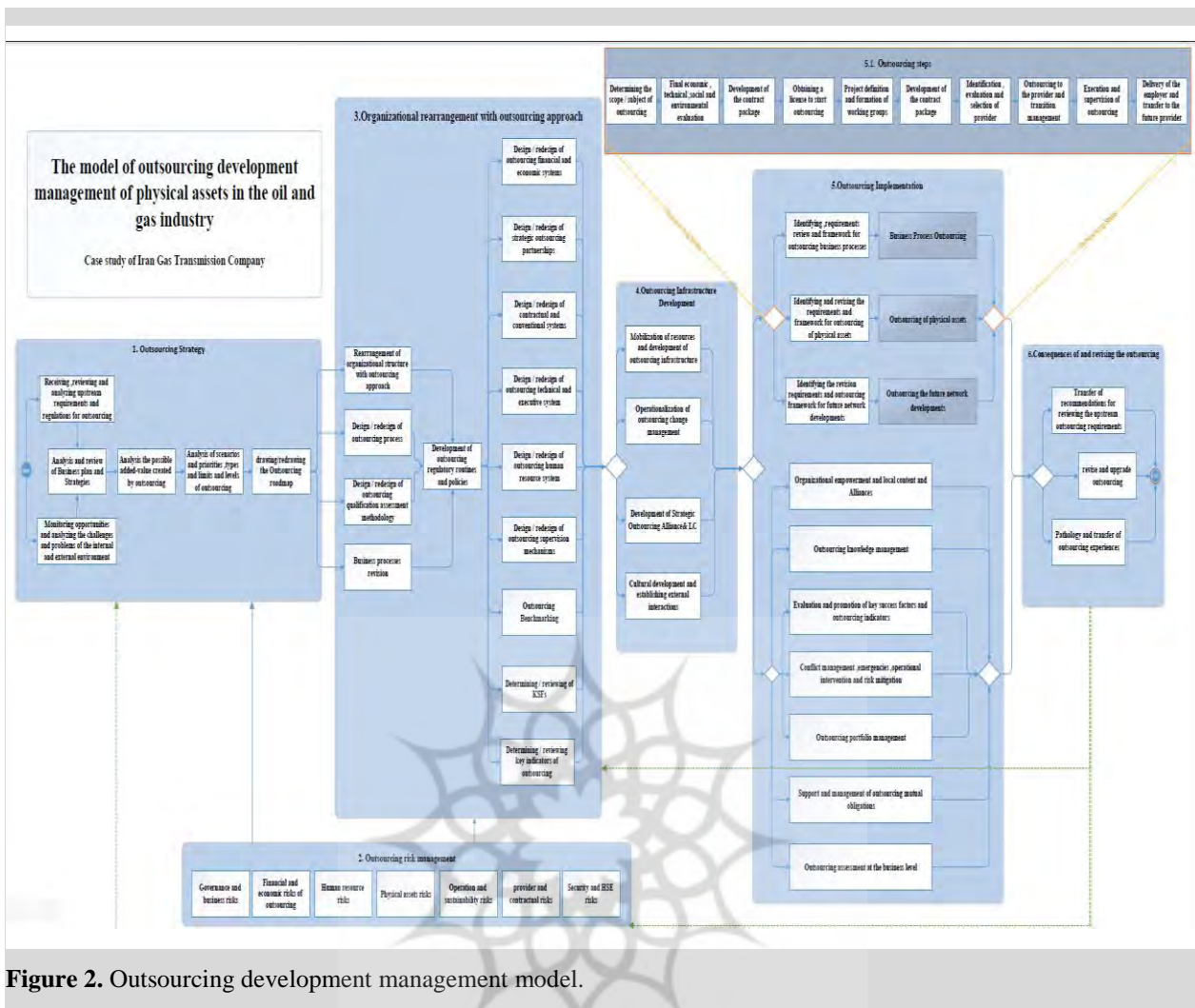
Figure 2. Outsourcing development management model.

Founded relationships show the relationships between categories. For example, the "risk management" theme influences the "outsourcing strategy" and "organizational rearrangement with an outsourcing approach", or the theme of "Consequences of and revising the outsourcing" provides the necessary information and feedback for the first, second, and third categories.

b. Description of categories and model dimensions

In the forthcomings, the image formed based on the theoretical framework and after collecting information and especially the analysis of 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 of and revising 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

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 related decisions have been considered in limited studies. The complexity of outsourcing is that it should attention to designing a comprehensive model for 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 governance activities in the company, requires that strategy for the outsourcing 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 laws and regulations and upstream policies that affect any outsourcing action in the company, the initial steps in this area are identifying this collection and 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 (Barthélemy 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 where is appropriate necessary changes are applied with an outsourcing approach.

Analysis of the possible added-value created by outsourcing: cost-benefit analysis and feasible added-value that can be achieved to fulfill the mission of the organization in the areas including business, operational, human resources, financial, 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", performed in line with "outsourcing strategies" and be 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), 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 and backing the management and planning of outsourcing

development whose vision is outlined in outsourcing strategies. In a coherent framework, strategic diverse elements, which 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, ten-years plan) illustrates the failure of outsourcing goals; In the field of outsourcing, records the time and duration of all outsourcing; Lists the resources and infrastructure required and the research and systems that need to be done and go through the verification and approval steps (Taponen and Kauppi, 2020).

b.2. Outsourcing risk management

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

Governance and business risks: because the oil and gas industry are predominantly governmental, governance risks, including restrictions rooted from or changes in laws and regulations, policies, programs, risk of attitude and attitude of regulatory agencies, and how resources are allocated to the company be assessed and managed. It is also necessary to manage the risks of the business, including the characteristics and 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 for outsourcing, the risk of limited funding of outsourced payments by the employer, risk of the benefit-cost of outsourcing, the risk of corruption in the outsourcing contract are assessed and adjusted or accepted.

Human resource risks: Human resource risks, including restrictions on manpower adjustment, job security risk of former human resources of outsourcing, manpower relocation risk, manpower empowerment, and 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: Risk of improper maintenance and repair of physical assets, Risk of removal and collection and transference and disposal of physical assets, Risk of replacement and development of

physical assets, Risk of supply of outsourced items and spare parts, Risk of hardware and software infrastructures, Risk of the uniqueness of physical assets of the gas transmission network, risk of defects in technical documents of physical assets, risk of outwear of physical assets, risk of uncertainty of physical assets quality at the time of delivery and obtaining at the beginning and end of outsourcing, risks that should be managed.

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

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

Security and HSE risks: Risk of selecting the incompetent acceptor, risk of leaking company classified information from provider channel, risk of theft and destruction or sabotage, risk of fire and safety problems, risk of injury to providers employees within the outsourcing area, Environmental damage, risk of improper disposal of sewage and normal and industrial wastewater are in outsourcing and requires management.

b.3. Organizational rearrangement with the 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 to institutionalize and ensure the success of outsourcing in the company, it is necessary to systematically rearrange the organization in various dimensions (Deepa et al., 2018).

Rearrangement of organizational structure with outsourcing approach (Deepa et al., 2018): The effect of outsourcing approach on roles, power, authority and responsibilities, hierarchy and the way of information transfer between company levels, and the need for changes in organizational positions and change and relocation of employees and the establishment of monitoring and support mechanism for Outsourcing, it is necessary to review the organizational structure of the company with a strategic approach to outsourcing. This review takes place in the structure of the company's Line and staff and is applied at two levels, first in the area that has been outsourced, in which executive responsibilities are eliminated and supervisory responsibilities are created, and second in the whole company that supports Covers outsourcing portfolio management. In addition to applying changes in the organizational structure, due to changes in some jobs, in addition to changing the organizational chart, job descriptions and conditions for obtaining some jobs are reviewed and for new jobs, including outsourcing supervisors, the 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 perform separately by organizational units and positions, determine the sequence and priority of activities, determine the relationship of outsourcing process with others Organizational processes and outsourcing principles and purposes, the company formulates / reviews and approves its outsourcing process in the form of the company's 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, systematically evaluates the extent to which the defined criteria are met separately for the relevant components. This methodology, in addition to project control, informs managers and policymakers about the achievement of goals and effective management of project risks. All outsourcing projects are evaluated according to this methodology. Based on the results of evaluations, if the requirements are not met, 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's 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. And in that set of bylaws, instructions, executive routines, protocols, procedures, checklists, forms, and guidelines are compiled. These clarify all 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 company's supervision system provide services based on these documents. Some models have drawn from other inputs of the 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 real estimations of the value of the domain in the process of outsourcing is 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 and also 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, and knowledge, and specialized staff, which were previously unavailable, to expand geographically and in services volume, cost-effectiveness, reduction of strategic and operational risks, increase of speed and internal growth, form their strategic alliances, which include outsourcing. The various policies and styles of the alliance affect outsourcing agreements.

Design/redesign of contractual and con conventional systems: At this stage, to cover the requirements, requirements, 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 is based on this system.

Design/redesign of outsourcing human resource system (Arasti et al., 2008, Abzari and Karimi, 2010; Deepa et al., 2018): Unlike in the past, the company's human resource system covers two new areas, human resources that can be outsourced and employees of the company that are related to outsourcing. Although, at first glance, outsourced human resources are in an organization independent of the employer, 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, quantitative and qualitative adequacy, and possible administrative violations. Also, in the case of employer staff, issues such as assigning former staff to outsourced areas, relocating current staff to new jobs of outsourcing, the hiring of new employees in a revised HR system.

Design/redesign of outsourcing supervision mechanisms: Employer supervisory responsibilities, 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] is an effective issue in designing the outsourcing development benchmark, which due to the

institutionalization of this comparative evaluation and covering some shortcomings. Knowledge and experience and the elimination of existing ambiguities, within the benchmark, a sub-theme has been assigned to it. This Benchmarking includes various areas, such as modeling the outsourcing of typical contractual and conventional documents.

Determining/reviewing the key success factors of outsourcing: The company, based on its strategies and outsourcing strategies, identifies and reviews periodically the key factors of industry success, strategic, environmental, and temporary (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 compilation these indicators, along with strategic, process, productivity and operational indicators of the company, are 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 are provided, including financial resources, human capital, equipment and machinery and facilities, communication and IT hardware and software infrastructures, information and knowledge resources. 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 elements of the organization, requires activating the change management mechanism in the organization. Applying each part of the organizational rearrangements and developing the outsourcing infrastructure requires identifying and determining the prerequisites as well as their effects and consequences and managing the changes before, during, and after. 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 LC (Lonsdale and Cox, 2000): 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, along with alliance management 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's policymakers.

Also to develop the company's outsourcing network, interactions with a network consisting of all units of the company, outsiders, contractors, company value chain in the 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, according to the company's outsourcing process map, are formed in the context of communication and information technology infrastructure and the active role of managers, employees, and representatives of the company.

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 are: (a) business processes (Abzari and Karimi, 2010), (b) physical assets (in this study, pressure boosting facilities, pipelines, operation centers, and telecommunication facilities); (c) and network and developmental facilities that are gradually added to the existing network are outsourced. Therefore, network developments are placed in an independent group whose outsourcing has fewer considerations and limitations

than existing assets and can be outsourced from the outset of the operation.

Identifying, requirements review and framework for outsourcing business processes: To outsource the management, operational and support processes of the company that are selected based on the roadmap for outsourcing, a set of initial measures should be determined and implemented, including required reviews needed for the totality and structure of process failures, determining how to apply changes to inputs and outputs, and intersections between processes, determining how to revise the process monitoring indicators, determining the way of policymaking for overall outsourcing process, outsourcing a part of the process, or outsourcing part or all of the process Corporate or geographical to the provider, determine how to monitor outsourced processes, determine the flow of 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, 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 for 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 for the outsourcing of physical assets: At this stage, requirements for the outsourcing of pressure boosting facilities, storage facilities, pipelines and operation centers, telecommunication facilities, including how to deliver and transform assets, how to improve, renovate, utilization, maintain, repair, dismissal, scrapping and replacement of 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, communicate method of provider with other upstream institutions and stakeholders (including the National Iranian Gas Dispatching Director), the procedure of 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 for outsourcing to the delivery of assets from the provider by the employer.

Identifying the revision requirements and outsourcing framework for future network developments: Regarding the 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. Requirements such as how and when and delivery and transformation responsibilities between the development project trustees, the employer company and the provider (including Temporary and permanent delivery), how and responsibilities in setting up and ramp-up to reach the capacity of the network and fix the punch lists of problems, how and responsibilities in using the guarantee and asset guarantee services, how to determine and allocate the monitoring device, how to enable externalization and monitoring device, in particular, these outsourcing requires accounting and determination.

Outsourcing the future network developments: Based on the ongoing developments to enter the company's 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 assets from the 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, performed in two aspects of organizational empowerment and individual empowerment (staff). This empowerment includes five target groups. The first group is the employer organization in all related lines and staff units (monitoring office, employer representatives, monitoring and evaluation managers, 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 or by themselves or the third empowerment organization. The third group is the company's contractors and companies related to the employer value

chain, which are then somehow related to outsourcing. The fourth group is the providers of other outsourcings 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 levels and related components in the company, between the company headquarters and ten operational areas, as well as connecting 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 and along with a comparison with predefined goals, upstream requirements and superior models, improvement actions and action plans are determined and continuously planned, implemented, controlled and improved.

Conflict management, emergencies, operational intervention, and risk mitigation: Outsourcing in their cycle face a variety of disturbances in the desired balance and stability, including conflicts between the company's line and staff units and the provider supervising body, society and government institutions. With the provider, the company's employees, the providers with each other and with the contractors, between the internal units and the provider employees and managers; that some 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, the possibility of better and more appropriate communication, and increase energy in the company and outsourcing problem, solving the inert and covert problems, creation of 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 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, 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's outsourcing roadmap, also increases management complexity, coordination costs, and conflict risk. In addition to conflict management, proper emergency management in the 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, at this stage, the relevant risks are adjusted, 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 model categories 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 company's employer can be summarized into two groups. The first

group is the compensation of services provider, which has mainly financial and credit dimensions, and 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 the 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, company outsourcing, in the initial stages and implementation, which this code deals with. Assessment of the competency includes manpower, facilities, and machinery, methods and procedures, materials and 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 of the outsourcing is located 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 each outsourcing and other outsourcing, the following steps can be jointly defined for outsourcing and customized to suit each outsourcing.

Determining the 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 could lead to a revision of the roadmap. Factors such as outsourcing portfolio management, risk management, potential and actual outsourced capabilities, manpower characteristics and limitations, and corporate and environmental assets, policies, and considerations affect this activity.

Final economic, technical, social and environmental evaluation & FS: due to the time difference between determining the cases of outsourcing in the roadmap, with the time of starting outsourcing, the need to provide sufficient reasons to higher authorities, reviewing outsourcing from financial, economic, social, political and environmental dimensions. To ensure that the definition of the scope of outsourcing still has the anticipated justifications.

Development of the 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", and organizational restructuring and 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's 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 the license(s) to start outsourcing: In this step, a set of necessary licenses and approvals are obtained from within-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, and if the outsourcing is approved, conditional to changes in the plan before the outsourcing the dictated revisions 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 the oil and gas industry, nevertheless, 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 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's 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 also 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, replaced it another provider.

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

Outsourcing to the 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 for the provider, accession of the provider (staff and properties) to the outsourcing area, coordinating with stakeholders, transferring responsibility from 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; Pilot and experimental assigning the work to the provider, forming and activating the communication channels between committees and joint working groups, preparation of documents (technical and legal), delivery and transformation, formation and activation of the employer's monitoring office, fulfillment of the employer's initial obligations, including any financial payment, ensuring the ability and provider in accepting the responsibility of fulfilling the obligations and finally leaving the company forces out of the scope of outsourcing and determining their tasks takes place in this phase.

The responsibility devolution, depending on the type of outsourcing, is done in a one time or gradually manner, 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, provides action and products, services, and defined reports. Simultaneously and in parallel, the employer's supervisory actions are carried out, including supervisions, controls, monitoring, evaluations, and audits (per case or periodical, planned or unplanned). Complementary and corrective actions are taken based on the results of the monitoring and provider requests. This step includes a set of stakeholder conflict management measures and an agreement to make possible changes to the initial defined framework.

This stage includes the joint performance of responsibilities by the parties, including the compensation of the employer's stage services.

Delivery of the employer and transfer to the next provider: Before the end of the contract or in any way the termination of the contract during the contract (including provider bankruptcy or non-eligibility), the employer take decisions on the management of the outsourcing area, in the form of insourcing or extending the current contract with a provider or the surrendering the field to the new provider. In case of a decision to extend the contract, the necessary agreements and legal actions will be taken.

In 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, based on the specific checklists, are reviewed and recapture from the provider. At this stage, it is possible to claim any compensation from the provider for damage and unconventional depreciation of assets.

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

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

b.6. Consequences of and revising the 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 learning transfer to upstream institutions, 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 being an emergent phenomenon has caused the existing laws and regulations do not cover all aspects of this area, which of course 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 outsourcing in the country and the removal of legal barriers to outsourcing. And a continuation of the outsourcing development path in the company would be possible. The company's 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 to promote the company's brand (as one of the strategic axes recommended by higher institutions).

Pathology and transfer of outsourcing experiences: Although in the theme of outsourcing risk management, outsourcing risks have been identified and measured, nevertheless, during the outsourcing process, it brings valuable lessons to the company that this knowledge is formed from Successful experiences and failures of the company can help other ranks of the oil and gas industry (and of course other industries of the country and the international arena) to 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 reverse transfer of knowledge from other institutions of the 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 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, however, the active codes in the model, including "Evaluation and promotion of key indicators and factors of outsourcing success", "Evaluation of outsourcing at business level", "Outsourcing benchmarking", "Outsourcing risk assessments", "Outsourcing change management", "Implementation of regulatory mechanisms", as well as lessons learned. The results of the model provided sufficient information to revise the management of 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, revising the resource mobilization and

infrastructure development, revising 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 outsourced development management model with the following characteristics was extracted and explained:

- In this model, outsourcing management is 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 interviews, in this model, 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.

Similar to any research, the results of the following research have some limitations. Considering that this research has been carried out in the oil and gas industry setting 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, especially statistical generalization is impossible. For example, the specific sensitivities of the 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 in the future that the dimensions of outsourcing are especially explained more than now, has not this degree of importance in other enterprises. Also 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 that in other firms, may exist in the same way or in a deferent way. And this can be explored through similar studies in other businesses in the 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 with other approaches, including the international approach. Also, comparing and examining the relationship and differences between outsourcing with other categories of value chain relationship and strategic alliance (Lonsdale and Cox, 2000), including

contracting and privatization, is still one of the interesting and needed topics for future studies in this field of knowledge.

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