Petroleum
Business
Review

Designing an Environmental Pattern of Sustainable Development in the Iranian gas Industry

Mohammad Babaei[a], Assadolla Mehrara[b*], Mehrdad Matani[c], Mohammad Reza Bagherzadeh[d]

[a] *Ph.D Student in Public Administration, Islamic Azad University, Qaemshahr Branch, Qaemshahr, Iran, Email: mohammad.babaei2011@gmail.com*

[b] *Assistant Professor, Department of Public Administration, Islamic Azad University, Qaemshahr Branch, Qaemshahr, Iran, Emali: mehrara_a@yahoo.com*

[c] *Assistant Professor, Department of Public Administration, Islamic Azad University, Qaemshahr Branch, Qaemshahr, Iran. Email: matanimehrdad@yahoo.com*

[d] *Assistant Professor, Department of Public Administration, Islamic Azad University, Qaemshahr Branch, Qaemshahr, Iran, Email: thinks.paper@gmail.com*

ARTICLE INFO

Keywords:

Sustainable development

Environmental development

Iranian gas industry

Received: 1 January 2019
Revised: 10 February 2019
Accepted: 1 March 2019

ABSTRACT

Todays, the issue of environmental instability and destructive environmental behavior can leave many irreparable effects and damage on future ecosystems and the lives of future generations. Method: This study aimed to present an environmental Pattern of sustainable development in the Iranian gas industry. The present study used a qualitative with grounded theory method. In-depth interviews were conducted with 25 academic experts (professors of public administration and environmental engineering at universities in Mazandaran province) and the heads of the National Iranian Gas Company in five regions of Iran using the "rich information" sampling method. Results: The results indicated that the environmental Pattern of sustainable development in the Iranian gas industry had 15 dimensions in terms of causal conditions. 1. Services, 2. Safety and health requirements, 3. Social responsibility, (context condition) 4. Education and learning, 5. Acculturalization, 6. Managers' attitude and awareness (intervening conditions) 7. Contractors, 8. Technical facilities and equipment, 9. Technology and technical operations (Strategy) 10. Medium and long term policies of the Ministry of Energy, 11. Continuous monitoring and evaluation of project progress, 12. Consumption management programs, 13. Pollutants management programs and consequences 14. Improved environmental performance of the gas company and 15. Moving towards sustainable development. Conclusion: Since the gas industry is one of the most polluting industries and the lack of attention to environmental issues in this huge industry will lead the Iranian environment to very serious and perhaps irreparable crises, using the environmental Pattern of sustainable development in this industry seems highly important and necessary.

* Corresponding author

1. Introduction

Strengthening the productive power of the country and establishing a strong and dynamic economy which can satisfy the requirements of meeting the needs of the population, including creating jobs and income for the young generation and on the other hand it increases the potentials and possibilities of the country's influence in different commercial markets and realizes the inevitable necessity of cutting its dependence on oil in the field of sustainable exports, requires the expansion and deepening of the process of industrialization or economic growth, structural change, technological transformation, and sustainable development in all industries of the country (Mohebi et al., 2017). Todays, sustainable development is an inevitable necessity. On the contrary of the previous Patterns of development, the sustainable development approach emphasizes comprehensive development while social justice and environmental considerations are among its basic dimensions. During the recent decades, the environment has been considered from different economic and social aspects and its interaction with the energy sector, population, and economic growth has been the focus of many scientific discussions. The results of several studies indicated a strong relationship between the level of economic activity and energy consumption. Energy, as the driving force of most productive and service activities, has a special place in economic growth and development and consumption. Unlike the excessive energy, especially fossil fuels energy increases environmental pollution regardless of their consumption efficiency.

Currently, fossil fuels supply more than 77% of the world's total energy consumption (Barrett and Worden, 2014: 19). These fuels threaten the environment by producing greenhouse gases and other pollutants and destroying the ozone layer, resulting in global warming. Nevertheless, humans still depend on fossil fuels for energy production. Based on the Organization for Economic Co-operation and Development (OECD) in 2001, nearly all environmental factors, including soil, and climate were directly affected by human activities. in addition, population growth can exacerbate this crisis (Sadat Hashemi, Nasrollahi and Bameri, 2016). Identifying the forces which affect the environment is highly important and useful in adopting appropriate policies. Many researchers considered the inappropriate relationship between human and nature as one of the main reasons for the negative effects of the environment (Bargaoui et al., 2014). Due to the undeniable role of fossil energy use in increasing greenhouse gases, it is essential to regard the intensity and type of the effect of energy use and the factors affecting energy use on sustainable development. Furthermore, the rapid growth of the population during the past few decades unlike the decline in growth during the recent year have made many experts to regard the potential benefits and harms of this change (Sadat Hashemi, Nasrollahi and Bameri, 2016). More than one-fifth of global carbon dioxide emissions originates from transportation activities and more than one quarter of the world's electricity is consumed by households and such rates are rising in the housing sector in developed and developing countries. Although non-greenhouse gas compression technology is used in some countries for generating electricity, two-thirds of the generated electricity still comes from fossil fuels. Further, it should be noted that many alternatives to fossil fuels have adverse environmental effects. For instance, wind turbines have a negative effect on bird migration. The electricity generated by water power is generated by massive engineering construction projects which emit carbon dioxide and can result in unwanted changes in the migration of people, wildlife, and ecosystem. Nuclear energy has increased security concerns and its use in other areas, including military strikes. Ultimately, transportation and energy at the individual level are very widely consumed and are more severely affected by wealth and population compared to other environmental factors (Liddle, 2013). In terms of the significance of the present research, it should be noted that the results of the study can provide a suitable Pattern for the macro decision-makers due to the lack of such research in the gas industry by using the opinions of experts in the field of gas industry, environmental and academic experts. Thus, basic steps can be taken for the sustainable comprehensive development of the country, especially environmental sustainability. Due to the importance of this issue, the present study sought to develop an environmental Pattern of sustainable development in the Iranian gas industry because the Iranian gas industry as one of the most essential industries which strongly affected the economy of the country during the recent years will cause irreparable damage to the environment. Thus, the present study sought to answer the question: What is the environmental Pattern of sustainable development in the Iranian gas industry? What are its dimensions?

2. Materials and Method

Based on the objective of the present study, which was to design an environmental Pattern of sustainable development in the Iranian gas industry, the research

design was qualitative with grounded theory. The population of this study in the qualitative part included 25 subjects including academic experts (professors in the field of public administration and environmental engineering in universities of Mazandaran province) and the heads of the National Iranian Gas Company being selected in five regions of Iran. In-depth interviews were conducted. The interviews continued until the theoretical saturation was reached and then stopped. The characteristics required for individuals to be experts were mastery on the subject of sustainable development, mastery on environmental issues, and mastery on the subject of sustainable environmental development. Also, the technique used in this article is Delphi method.

3. Data Collection Method "Grounded Theory"

For the first time, Glaser and Strauss introduced the data theorizing strategy of the grounded theory to the scientific community (Haghgooyan et al., 2015). According to Strauss and Corbin, the grounded theory is what being inductively obtained from studying a phenomenon and representing that phenomenon. The grounded theory procedure is a qualitative research method using a series of systematic procedures to create inductive theories about a phenomenon (Strauss and Corbin, 2011). Grounded theory begins by creating theory in an inductive way and attempting to understand everyday events properly, trying to understand the world of the participants, as they have created, making relationships between concepts, events, and affairs which perhaps create abstract concepts that may be difficult to do with a little research. Grounded theory requires the individual to derive structures and rules directly from the direct data not from previous studies and theories (Gal et al., 2014). Thus, the researcher fails to start the project with a previous theory in mind, but he allows the emergence of a theory of information and data, a theory derived from data is more likely to be real than a theory obtained by putting together a series of concepts based on experiences or guesses. This study used the grounded theory as research method and a method for analysis because the researcher used it as a research method and then due to the use of semi-structured interviews based on grounded theory and due to the lack of a coherent theoretical framework for designing an environmental Pattern of sustainable development in the Iranian gas industry.

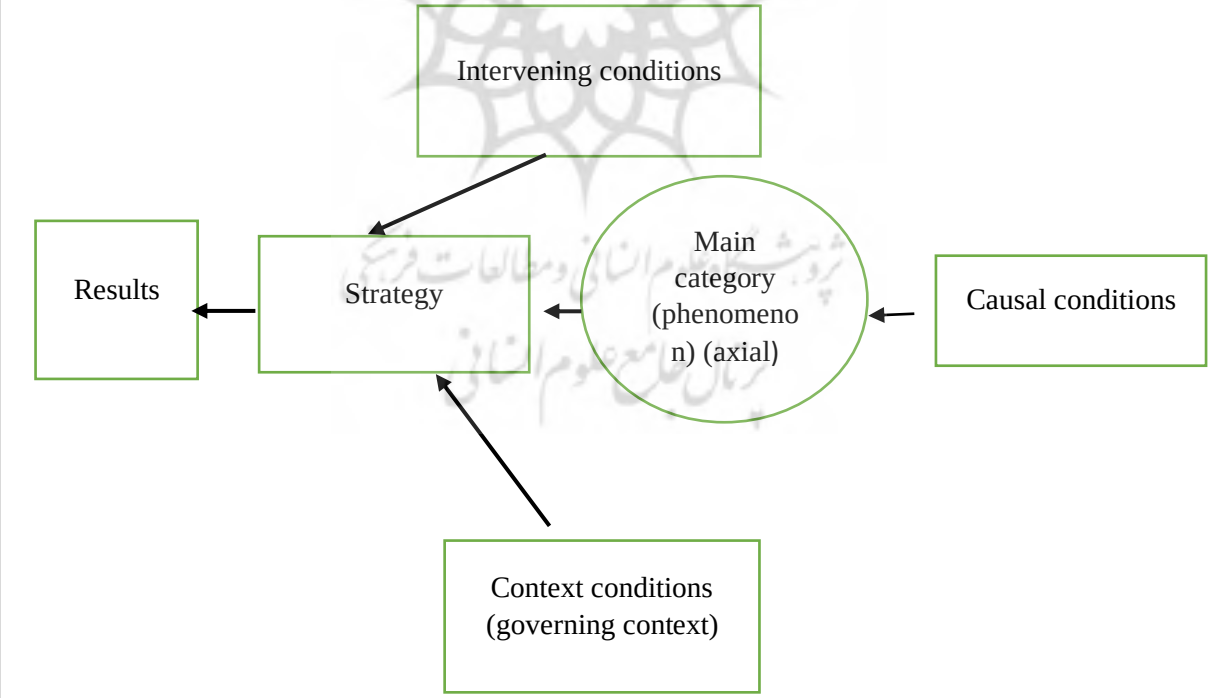

Figure 1. Paradigmatic pattern (Flick, 2018: 134).

Based on a systematic approach, the interviews were conducted using the content analysis technique during three coding steps (open coding, axial coding and selective coding). (Strauss and Corbin, 2011) to extract

the data needed for explaining the paradigmatic Pattern and achieving the final theory and then the basic codes and axes were identified. Based on the systematic approach of grounded theory, it should go through three coding stages and present a logical paradigm or an idea of an evolving theory in order to analyze the collected qualitative data and formulate a theory (Bazargan Harandi, 2018). The process of conducting the grounded theory in this study in form of paradigmatic Pattern dimensions is as follows:

- Phenomenon: This category (phenomenon) is the conceptual label being considered for the framework or design. Based on the paradigmatic Pattern, phenomenon is considered as an axial class in the research process and its relationship is considered with other classes. This relationship can be realized in the following five categories, as briefly explained below.
- Causal conditions: It refers to what causes the formation of an axial phenomenon or class. These conditions form a set of factors along with their characteristics.
- Context conditions: It refers to a set of concepts, classes, or variables which affect interactions. Context conditions are opposite to causal conditions which are a set of active variables. It is highly difficult to separate the context variables from the causal variables.
- Intervening conditions: It refers to structural conditions which facilitate or limit the intervention of other factors and affect actions and interactions.
- Strategies: It refers to all micro and macro measures which help to improve and strengthen the formation of the studied process under study.
- Consequences: Some variables indicate the results and consequences which result from the adoption of strategies (Strauss and Corbin, 2011).

4. Definitions of Concepts

Sustainable Development: Sustainable Development is the organizing principle for meeting human development goals while simultaneously sustaining the ability of natural systems to provide the natural resources and ecosystem services on which the economy and society depend. The desired result is a state of society where living conditions and resources are used to continue to meet human needs without undermining the integrity and stability of the natural system. Sustainable development can be defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs (Shaker, 2015: 35). Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: The concept of 'needs', in particular, the essential needs of the world's poor, to which overriding priority should be given; and The idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs (Hickel, 2019: 879). The United Nations Global Compact Cities Programme has defined sustainable political development in a way that broadens the usual definition beyond states and governance. The political is defined as the domain of practices and meanings associated with basic issues of social power as they pertain to the organisation, authorisation, legitimation and regulation of a social life held in common. This definition is in accord with the view that political change is important for responding to economic, ecological and cultural challenges. It also means that the politics of economic change can be addressed. They have listed seven subdomains of the domain of politics: Organization and governance, Law and justice, Communication and critique, Representation and negotiation, Security and accord, Dialogue and reconciliation and Ethics and accountability (James, 2015: 174-176).

Air pollution: Air pollution is the presence of substances in the atmosphere that are harmful to the health of humans and other living beings, or cause damage to the climate or to materials. There are different types of air pollutants, such as gases (such as ammonia, carbon monoxide, sulfur dioxide, nitrous oxides, methane and chlorofluorocarbons), particulates (both organic and inorganic), and biological molecules. Air pollution may cause diseases, allergies and even death to humans; it may also cause harm to other living organisms such as animals and food crops, and may damage the natural or built environment. Both human activity and natural processes can generate air pollution (Gonzalez, 2012: 66). Air pollution is a significant risk factor for a number of pollution-related diseases, including respiratory infections, heart disease, and COPD, stroke and lung cancer. The human health effects of poor air quality are far reaching, but principally affect the body's respiratory system and the cardiovascular system. Individual reactions to air pollutants depend on the type of pollutant a person is exposed to, the degree of exposure, and the individual's health status and genetics. Indoor air pollution and poor urban air quality are listed as two of the worlds worst toxic pollution problems in

the 2008 Blacksmith Institute World's Worst Polluted Places report. Outdoor air pollution alone causes 2.1 to 4.21 million deaths annually. Overall, air pollution causes the deaths of around 7 million people worldwide each year, and is the world's largest single environmental health risk. Productivity losses and degraded quality of life caused by air pollution are estimated to cost the world economy $5 trillion per year. Various pollution control technologies and strategies are available to reduce air pollution (Mosley, 2013: 118).

Fossil fuel: A fossil fuel is a fuel formed by natural processes, such as anaerobic decomposition of buried dead organisms, containing organic molecules originating in ancient photosynthesisthat release energy in combustion. Such organisms and their resulting fossil fuels typically have an age of millions of years, and sometimes more than 650 million years. Fossil fuels contain high percentages of carbon and include petroleum, coal, and natural gas (Liodakis, 2011: 94-95). Peat is also sometimes considered a fossil fuel. Commonly used derivatives of fossil fuels include kerosene and propane. Fossil fuels range from volatile materials with low carbon-to-hydrogen ratios (like methane), to liquids (like petroleum), to nonvolatile materials composed of almost pure carbon, like anthracite coal. Methane can be found in hydrocarbon fields alone, associated with oil, or in the form of methane clathrates. As of 2018, the world's main primary energy sources consisted of petroleum (34%), coal (27%), and natural gas (24%), amounting to an 85% share for fossil fuels in primary energy consumption in the world. Non-fossil sources included nuclear (4.4%), hydroelectric (6.8%), and other renewables (4.0%, including geothermal, solar, tidal, wind, wood, and waste) the share of renewables (including traditional biomass) in the world's total final energy consumption was 18% in 2018. Compared with 2017, world energy-consumption grew at a rate of 2.9%, almost double its 10-year average of 1.5% per year, and the fastest since 2010. Although fossil fuels are continually formed by natural processes, they are generally classified as non-renewable resources because they take millions of years to form and known viable reserves are being depleted much faster than new ones are generated. Most air pollution deaths are due to fossil fuel combustion products, it is estimated to cost over 3% of global GDP, and fossil fuel phase-out would save 3.6 million lives each year (Johnson, 2014: 56-58).

Natural environment: The natural environment encompasses all living and non-living things occurring naturally, meaning in this case not artificial. The term is most often applied to the Earth or some parts of Earth. This environment encompasses the interaction of all living species, climate, weather and natural resources that affect human survival and economic activity (Oldroyd, 2006: 74). The concept of the natural environment can be distinguished as components:

- Complete ecological units that function as natural systems without massive civilized human intervention, including all vegetation, microorganisms, soil, rocks, atmosphere, and natural phenomena that occur within their boundaries and their nature.
- Universal natural resources and physical phenomena that lack clear-cut boundaries, such as air, water, and climate, as well as energy, radiation, electric charge, and magnetism, not originating from civilized human actions (Adams, 2006: 29).

5. Background Research

Ali PourAli et.all in article" The Study of Human Development Dimensions (Education, Health, and Welfare) Effects on Environmental Performance Index" believe that Many governments have realized that they could not isolate environmental performance apart from other measures of development. Hence, the necessity of HDI improvement with the environmental dimensions was a theme of discussion during the most recent Rio+20-United Nation Conference on Sustainable Development (2012), as part of Millennium Development Goals. Since the Human Development Index can describe social development and economic development simultaneously, the main goal of this study is to examine the impact of the dimensions of human development index, especially education, on the Environmental Performance Index. The results based on the panel data fixed effects model using GLS in the 101 selected countries during 2005-2015 show that the three dimensions of the Human Development Index, namely health, education, and welfare, have a positive and significant effect on the environmental performance.

Mojtaba Azizi and Adeleh Moghaddam in article "Provide a model for managing technology development projects in the Iranian gas industry" believe that the main challenge in this regard is not paying enough attention to the life cycle of technology development projects and not considering sufficient flexibility in planning and managing these projects. In other words, these projects are a plan consisting of several projects that are carried out in several stages, and some of these stages also consist of several sub-projects that require

communication and interaction between them at a higher level than separate individual management. These projects should be guided and led. Although it is better to identify and analyze hazards by downsizing a complex technology to smaller units or stages, if the coordination and interaction between these stages is not managed on a macro level and with a strategic view, the macro view of the entire life cycle from the beginning An acceptable result will not be achieved until the end of the project is maintained.

Simon W. Tai and Jung Wan Lee in an article entitled:"Environmental Management and Sustainable Development in the Oil and Gas Industry" belive that the important part of the sustainable growth is environmental management. Eco-efficiency states the necessity of success in both economic and environmental performance. It means turning over the capital stock and introducing new cleaner production processes and new products that would be environmentally friendly instead of the older polluting factories. It also means reducing waste, implementing recycling and reuse, using fewer and less toxic materials, and using energy and water more efficiently. A special program depending on formulated monitoring problems and tasks should be developed for each project in the oil and gas industry. Overall, in order to achieve sustainable development, environmental sustainability should constitute an integral part of the growth process and cannot be considered in isolation from it. A good balance between economic development and environmental sustainability is one of the main tasks of contemporary management in the oil and gas industry. Much has already been achieved, but the industry recognizes that even more can be accomplished. A company which aspires to be sustainable in the market has to follow the principles of a learning business. We live in a world that is increasingly shaped by sustainable development issues, such as energy security, climate change, water availability, the degradation of ecosystems. These challenges are becoming central to business competitiveness and long-term success. Likewise, the need for cooperation between government, industry and civil society to foster a more sustainable future is becoming ever more urgent.

Erik E Cordes in an article entitled "Environmental Impacts of the Deep-Water Oil and Gas Industry: A Review to Guide Management Strategies" belive that the industrialization of the deep sea is expanding worldwide. Expanding oil and gas exploration activities in the absence of sufficient baseline data in these ecosystems has made environmental management challenging. Here, we review the types of activities that are associated with global offshore oil and gas development in water depths over 200 m, the typical impacts of these activities, some of the more extreme impacts of accidental oil and gas releases, and the current state of management in the major regions of offshore industrial activity including 18 exclusive economic zones. Direct impacts of infrastructure installation, including sediment resuspension and burial by seafloor anchors and pipelines, are typically restricted to a radius of approximately 100 m on from the installation on the seafloor. Discharges of water-based and low-toxicity oil-based drilling muds and produced water can extend over 2 km, while the ecological impacts at the population and community levels on the seafloor are most commonly on the order of 200-300 m from their source. These impacts may persist in the deep sea for many years and likely longer for its more fragile ecosystems, such as cold-water corals. This synthesis of information provides the basis for a series of recommendations for the management of offshore oil and gas development. An effective management strategy, aimed at minimizing risk of significant environmental harm, will typically encompass regulations of the activity itself (e.g. discharge practices, materials used), combined with spatial (e.g. avoidance rules and marine protected areas) and temporal measures (e.g. restricted activities during peak reproductive periods).

6. Findings

In the qualitative part of the research, the main focus of the study was related to the exploration of the factors affecting dimensions, components, and indicators related to the design of the environmental Pattern of sustainable development in the Iranian gas industry regarded as the main concept. In order to achieve this, first the main categories and sub-components were presented based on open and axial coding of data from in-depth and exploratory interviews with key experts and refinement of conceptual codes. Accordingly, the data were examined at the sentence and phrase level for each of the interviews and conceptual codes were extracted from the transcripts of the interviews to perform open and axial coding in the first stage. Then, these components were organized in form of sub-categories and named by continuous review by performing refinement and reduction operation. The transcript of interviews was reviewed to ensure that each of the concepts and categories was organized properly. Logical saturation was performed for the main categories and subcategories by reviewing the categories.

Open and axial coding stopped when a significant classification was achieved after several reviews of interview transcripts. In general, 329initial conceptual codes were obtained from the analysis of qualitative research data in the coding stage. After reviewing and matching these codes and eliminating the repeated codes, the common codes were achieved and indicated the coding of conducted in in-depth and individual interviews being elicited from the transcript of the interviews.

7. Data Description Based on Open Coding

The findings of the qualitative part were in form of findings obtained from the coding results with the content analysis approach and concepts from data. The most basic work at this step is open coding. Accordingly, common concepts of recording units were counted and common codes were counted. Table 1 shows the frequency of the percentage of experts in interviews to the most significant categories resulting from open coding.

Table 1. Results of open coding and code number of the interviewee to each factor according to experts.

Examples	Code number	Main categories
Basically, gas supply to various parts of the country, including mountainous areas, is the protection of forests and the environment because if the gas company can limit a family from using wood and forest for home heating and instead make them use gas energy, it means protecting the environment. Negative - sometimes the destruction of the environment in implementing the gas supply projects. Positive - Establishment of HSE unit for improving the processes of the company in environmental protection and continuous monitoring of contractors' performance in the effective implementation of gas supply projects.	1	Gas supply to various parts of the country, including forest and mountainous areas Limiting the use of wood for home heating by replacing gas Creating a unit for health, safety and environment unit to protect the environment Continuous monitoring of contractors' performance in the effective implementation of gas supply projects
Continuous monitoring of contractors' performance, explaining the environmental strategy, commitment of senior managers to social responsibility, use of new environmental technologies, monitoring and controlling the proper drilling, protecting forests and pastures in the implementation of projects to improve environmental activities are effective in the gas industry Iran.	1	Continuous monitoring of contractors' performance Explaining the environmental strategy Commitment of senior managers to social responsibility use of new environmental technologies monitoring and controlling the proper drilling, protecting forests and pastures in the implementation of projects
Fuel supply is a social responsibility. In addition, responding to negative effects on the environment. Protecting the forest and the environment is one of the missions of the National Gas Company in the line with social responsibility and preservation of forests and the environment. When the development of gas to mountainous areas is a priority in the plans of the National Gas Company, it means not cutting down trees for the home heating system.	2	Responding to negative environmental effects Preserving the forests and the environment No cutting of trees and wood for home heating system

Examples	Code number	Main categories
Changing the priority of the gas company from the perspective of production to environmentally friendly The commitment of senior management to accountability to people, and providing the required environmental funding in the annual budgets are effective factors on improving the environmental measures and activities of the Iranian gas industry.	2	Changing the priority of the gas company from the perspective of production to environmentally friendly The commitment of senior management to accountability to people Providing the required environmental funding in the annual budgets
Since the environmental organization in the country is regarded as an upstream reference, the rules communicated by it should be enforced in companies. The National Gas Company, as one of the companies, is obliged to observe them. However, this is a very general question that can be referred to the areas such as carbon management, waste management, and wastewater management. The measures taken by the National Gas Company have been highly effective in some cases, so that it is a superior Pattern for other organizations. On the other hand, it is considered as an environmental pollutant due to some operational limitations.	3	Implementing the requirements of different standards in the field of health, safety and environment Carbon management Waste Management Wastewater management
Patterning the projects conducted in other countries, providing the necessary funds, acculturalization on the importance of environmental measures, using the potential of universities in implementing operational projects, changing from speech to action on environmental issues, and enforcing environmental rules for all people and organizations are strictly considered as effective and practical measures for facilitating the process of environmental activities in the Iranian gas industry.	3	Patterning the projects conducted in other countries Providing the necessary funds Acculturalization on the importance of environmental measures Using the potential of universities in implementing operational projects Changing from speech to action on environmental issues Enforcing environmental rules for all people and organizations
Managers' commitment to environmental actions, planning and controlling by the environmental unit of the gas organization, acculturalization among employees, and increasing the reforms of local communities and the community in case of environmental measures and activities are considered as effective factors for improving the environmental measures and activities in the Iranian gas industry.	4	Managers' commitment to environmental actions Planning and controlling by the environmental unit of the gas organization Acculturalization among employees Increasing the reforms of local communities and the community in case of environmental measures and activities
Protecting the environment and promoting the health and safety of stakeholders are among the	4	Protecting the environment,

Examples	Code number	Main categories
environmental strategies of Iran Gas Company which should be considered for protecting the environment.		Promoting the health and safety of stakeholders
Reducing the liquid fuel consumption and converting resources to natural gas consumption, reducing the noise of urban pressure reducing stations, and gas consumption optimization of C.G.S pressure reducing stations C.N.G gas supply to stations are among the positive measures and activities in the National Iranian Gas Company.	5	Reducing the liquid fuel consumption and converting resources to natural gas consumption Reducing the noise of urban pressure reducing stations Gas consumption optimization of C.G.S pressure reducing stations C.N.G gas supply to stations
Training the contractors Training the gas company staff, preparing educational books and pamphlets and presenting them at schools, and broadcasting training teasers on radio and television are the effective and practical measures for facilitating the process of environmental activities in the Iranian gas industry.	5	Training the contractors Training the gas company staff Preparing educational books and pamphlets and presenting them at schools Broadcasting training teasers on radio and television
The main major of a gas company is supplying natural gas as a clean fuel or energy. Considering the results such as replacing liquid fuel in industries, using C.N.G in cars is an essential step in preserving the environment and reducing air pollution. At the meantime, Mazandaran Gas has planted trees in the gas storages of the province or cooperated with natural resources and the environment.	6	Replacing liquid fuel in industries Using CNG in cars Planting trees in the gas storage of the province and cooperating with natural resources
Planting seedlings for the cut trees in gas supply projects, treying to increase the green space of stations and facilities, the indigenous economy boom and reduction of migration from villages to cities, and the industrial and special waste management are considered as effective factors in improving the environmental measures and activities in the Iranian gas industry.	6	Planting seedlings for the cut trees in gas supply projects Trying to increase the green space of stations and facilities The indigenous economy boom and reduction of migration from villages to cities Industrial and special waste management
In some cases, (projects) it protects the environment and optimizes consumption. Nevertheless, in some projects, it causes damage to natural resources and the environment. The works in the gas company in terms of environmental issues are very good in the short and medium term, but that other works will be expected in future issues. For instance: improving the heating and cooling efficiency at homes, increasing the	7	Optimizing the consumption Improving the heating and cooling efficiency at homes Increasing the efficiency and survival of gas equipment supplies

Examples	Code number	Main categories
efficiency and survival of gas equipment, and improving vision in relation to new energies such as hydropower and wind.		
The relationship between the licensing organizations of the Gas Company and the environment, formulating a sustainable energy supply strategy and reviewing the environmental issues are the effective factors in improving the environmental measures and activities in the Iranian gas industry.	7	Developing a sustainable energy supply strategy Reviewing environmental tips as required
Monitoring the activities of the company in form of the environment through the relevant ISO standard is one of the positive attitudes of the National Iranian Gas Company towards the environment. The estimate of the gas actions in the company in protecting the environment is positive, especially by supplying gas to villages with more than 20 households, it prevents the destruction of forests and the environment.	8	Monitoring the activities of the company through ISO Avoiding the use of forest wood to heat homes by replacing gas
In the term of the format and extends described in the related ISO standard, there is a relationship between the environmental measures of the Iranian gas industry and the concept of social responsibility. Creating welfare for the community is one of the benefits of the gas company, which gets rid of the problems of liquid fuel supply and holds their costs and environmental damage by providing gas to citizens and villagers, being in line with the social responsibilities of the gas company.	8	Policy-making in the form and limits of the related ISO standard Welfare due to gas supply
The measures and activities of the National Iranian Gas Company to the environment were excellent because it prevented the cutting of forest trees, and also kept the villagers in their places of residence, and reduced migration to the city. Gas supply in two parts of the plain and impractical and mountainous regions is on the agenda of the National Gas Company. There is no special problem for the plain. For impractical and mountainous regions, some environmental studies should be conducted by the Gas Company (ELQ) and the risks should be identified. Negative factors are possible for the cases where there is the speed at work.	9	Reducing the cutting of trees Reducing the migration from village to city Gas supply to impractical and mountainous areas Need to identify risks for supply gas to impractical areas

Examples	Code number	Main categories
Before implementing the projects, first environmental studies should be conducted to obtain the necessary licenses from natural resources and the environment. Appropriate transportation of thiol and not sitting in the open air , removal of thiol networks and collecting it in a special place, correct replacement of trans and dirty oil and not draining and spilling it on soil, correct replacement and removal of the filters related to pressure reducing stations and failure to use herbicides for eliminating the station grass are among the issues which should be considered for improving the environmental measures and activities in Iranian gas company.	9	Environmental studies and getting the required licenses before implementing the project Appropriate transportation of thiol and not sitting in the open air Appropriate replacement of trans and dirty oils and not draining and spilling it on soil Correct replacement and removal of the filters related to pressure reducing stations
Since we live in a country which is based on oil and gas and such industries cause lots of environmental pollution, thus the environmental pattern can be highly significant. The National Iranian Gas Company is one of the leading companies in the area of HSE and attempts to preserve the environment by implementing the requirements of different standards in this regard. HSE affairs can play a more effective role through allocating enough budget and monitoring projects.	10	Implementing the requirements of different standards in the field of health, safety and environment Allocating enough budget to health and safety affairs and the environment
Finding solution for flaring, gas supply to power plants and refineries, and gas supply to major industries are considered as measures for facilitating the process of environmental Pattern of sustainable development in the Iranian gas industry.	10	Finding solution for flaring Gas supply to power plants and refineries Gas supply to major industries
In order to improve the environmental measures and activities of the gas company, we should force the contractors to preserve the environment in the context of executive contracts and the official personnel should have excellent supervision on the good observance of environmental issues by the contractors.	11	Forcing contractors to preserve the environment in the context of executive contracts Continuous controlling of contractors' performance to ensure their compliance with environmental issues
Constructing of recycling site for thiol waste in barrels, supplying clean energy (gas) and gas supply to forest villages and preventing forest degradation and non-use of wood for fuel, eliminating gas bills (paper bills) and sending SMS invoices and using joint connections in the installation of regulator meters for subscribers to prevent gas leakage and environmental pollution are considered as effective and practical measures for facilitating the process of environmental activities in the Iranian gas industry.	11	Constructing a recycling site for thiol waste in barrels Gas supply to forest villages Not cutting of trees and wood for home heating system Upgrading the gas equipment of major and minor subscribers

Examples	Code number	Main categories
Since the standards and procedures in the oil and gas industry were adapted from international standards, observing such requirements at the company level, especially during the last decade, is certainly significant and valuable measures in this area, such as the environmental evaluation of projects before designing and implementing, along with monitoring and measuring the environmental aspects of the equipment in operation, waste management, flaring reduction, etc. can be considered as the strengths of the National Gas Company. Positive: Discussing the environmental evaluation of projects and crossing paths to supply gas which have less environmental damage. Negative: Regarding the management of paper waste, it seems that the gas company should pay more attention and recycle any paper in the basic offices.	12	Environmental evaluation of projects before designing and implementing Monitoring and measuring the environmental aspects of equipment in operation Waste management flaring reduction
All of the activities in the company are directly related to social responsibility, including waste management, reducing air pollution by supplying natural gas to power plants on time, providing sustainable energy for villagers adjacent to forest to preserve natural resources and prevent deforestation, investing in energy, management and establishing of new systems to preserve the gas resources in the country for the future, reducing and controlling methane emissions in facilities to prevent greenhouse gas emissions, etc. Since reducing environmental damage reduces air pollution and Earth is warming rapidly, environmental requirements play an essential role in preventing climate change and global warming.	12	Waste management Reducing air pollution by delivering and supplying natural gas to power plants on time Preventing the deforestation by villagers adjacent to forests Investing in energy management Managing the control of greenhouse gases and air pollutants
Considering the principles of environment and its preservation, as well as the organizational duties of gas company in the province regarding the social responsibilities of green space preservation, and the debate on the reduction of the amount of production waste and its management have been considered.	13	Preserving the green space Reducing the amount of production waste and its management
Environmental protection and optimal use of energy are among the most significant indicators of developing the social responsibilities and interaction with stakeholders, which is part of value-added processes.	13	Environmental protection Optimal use of energy
The measures of the National Iranian Gas Company in the short and medium term to the environment seem appropriate and excellent, extra-organizational and national measures are required but due to long-term challenges such as	14	Increasing the energy efficiency in residential buildings Increasing the efficiency and life of gas industry equipment

Examples	Code number	Main categories
global warming, climate change, the end of fossil fuels, etc., such as: increasing productivity energy in residential buildings, increasing the efficiency and life of gas industry equipment, changing attitudes and support on renewable fuels (solar - wind, etc.).		
Gas supply development strategy in mountainous and forest regions to replace natural gas with other fossil fuels, preventing deforestation, as well as measuring and monitoring the environmental pollutants, and controlling and reducing it continuously based on global agreements in form of carbon and energy management roadmap of bio-strategies are among the environmental; strategies in the Iranian Gas Company.	14	Developing the gas supply in mountainous and forest regions Avoidance of cutting down trees by replacing natural gas Identifying and planning for environmental pollution control in line with global agreements Creating a carbon management unit
Based on the main mission of the National Gas Company in providing clean energy, it seems that an effective step has been taken for reducing air pollution by replacing liquid fuel in industries and CNG fuel in transportation. Positive: Gas supply to liquid fuel power plants is one of the measures which can cause less environmental pollution, being conducted in the gas company. Negative: Gas supply to mountainous environments is one of the negative points which can be performed through replacing gas with electricity. Therefore, gas fuel is used for generating electricity to the power plant and deliver electricity to customers in the mountains.	15	Replacing liquid fuel in industries Gas supply to CNG stations
Replacing gas fuel with liquid fuel is one of the social responsibilities for facilitating the lives of consumers and is one of the social responsibilities. Mazandaran Gas Company shows adherence to the concept of social responsibility in the environmental dimension (establishment of ISI14001 and HSEMS) by taking measures such as waste management and material life cycle management (LCA), planting seedlings for cutting trees along gas supply projects, evaluating the risk of environmental consequences of projects and the local economy boom to reduce migration from cities to villages.	15	Facilitating life for consumers Waste management Material life cycle management Planting seedlings for the cut trees along gas supply projects Evaluating risk of environmental consequences of projects Economy boom for reducing migration from villages to cities
The gas company is a supporter of the environment since natural gas is defined as a clean fuel. Mazandaran Gas Company regarding environmental activities which have obtained ISO standards in the project attempted to correctly collect the harmful environmental waste which has remained from the project, but unfortunately it is	16	Getting the ISO environmental standards and licenses Optimal monitoring on the implementation of standards in projects

Examples	Code number	Main categories
sometimes observed that these standards are not properly conducted in the project. Due to the sensitivity of gas supply in terms of the speed of gasification in cities and villages, such defects are natural and their implementation is not possible for 100%.		
Changing the thoughts and attitudes of senior managers at the level of the whole ministry and the oil industry, since we are in the industrial transition phase, we have no choice but to use environmental activities in such a way to preserve our current environment for the future. Providing a special budget for this work and executive power to the HSE unit or the executive deterrent factor by the HSE unit is one of the efficient and practical measures for facilitating the process of environmental activities in the Iranian gas industry.	16	Changing the thoughts and attitudes of senior managers Providing special budget for the health, safety, and environment unit Implementing the requirements for different standards in the fields of health, safety and environment
Preventing the development of gas supply to the areas where human presence is low and causes environmental degradation, preventing gas leakage through updating gas supply technologies, creating the technology which indicate the detection of leaks with the highest speed and receiving a tax called green tax from all of the oil and gas fields are among the effective factors in improving the environmental measures of the Iranian gas industry in terms of spending it on protection and reconstruction of the damaged environment.	17	Preventing gas leakage through upgrading gas supply technologies Creating technologies for detecting all kinds of leak with the highest speed
Changing the fundamental attitudes in the opinion of senior managers of the Ministry and the National Iranian Gas Company is one of the effective measures for facilitating the process of environmental activities in the Iranian gas industry, which is impossible since we are in a developing country because in all developing countries like us, the environment cannot be the first priority. The last but not eh least, it is by far the last priority since the speed of development in policy is a priority.	17	A fundamental change in the attitude of senior managers
In order to protect the environment, the National Iranian Gas Company has supplied gas to all areas of the country and large and small industries, including power plants, steel, etc., as well as gas supply to cities and villages. It replaces clean gas with other fossil fuels such as diesel, kerosene and fuel oil, polluting the environment, while supplying gas to remote and sometimes mountainous and forest villages is not only not economical, but also causes less fuel gas with other	18	Large and small industries, including power plants Gas supply to cities and villages Replacing clean gas fuel with other fossil fuels

Examples	Code number	Main categories
fuels. Fossils cannot be replaced and there will be no clear prospect for developing small and large industries in such villages, while it destroys the forest and texture of the region as well as the soil and value of the land.		
Since natural gas is colorless and odorless, it is scented with thiol to inform the citizens in case of gas leakage and take action for eliminating the leakage, which is necessary for ensuring the safety and protection of gas applicants. However, since thiol deodorant is a complicated chemical compound and highly harmful to the environment, the gas company has started a project for recycling empty thiol barrels which could pollute water and soil.	18	Eliminating the smell in empty thiol barrels
Todays, the issue of environmental protection is outside the scope of social responsibilities in the National Iranian Gas Company and has become a technical and standard requirement due to the significance of the environment and the establishment of strong government mechanisms and rules in this field. In afforestation and payment of forest route costs for planting trees, a relationship is established between the environmental measures of the Iranian gas industry and the concept of social responsibility.	19	Afforestation and paying the forest route lines for planting trees
Education, standardization, Patterning, continuous measurement, gas supply to mountainous routes, reducing fuel consumption, and not cutting down trees for home heating are effective and practical measures for facilitating the process of environmental activities in the Iranian gas industry.	19	Education Standardization Patterning Continuous measurement Gas supply to mountainous routes Reducing fuel consumption Not cutting down trees for home heating
Protecting the environment is one of the social responsibilities. National Iranian Gas Company always operates in line with the current standards regarding the environment. In addition, gas companies operate in line with the current standards regarding social responsibility.	20	Measures in line with the current standards
Developing the research and behavioral Patterning, developing the participation of management systems and health promotion, and developing the information systems and process	20	Developing the research and behavioral Patterning Developing the participation of management systems and health promotion

Examples	Code number	Main categories
mechanization are among the environmental strategies of the Iranian Gas Company.		Developing the information systems and process mechanization
Developing the standards and criteria for energy consumption is one of the effective measures of reducing energy consumption. Using new renewable energy sources can be effective in the long term. Due to the long-term or short-term effects on the environment, organizations are forced to analyze their cost-benefit at various stages of the production and fuel consumption cycle and be aware of potential risk management. Since economy is required for societies, the production, transfer and optimal use of energy will be necessary for the survival, comfort, development, and progress of human societies.	20	Developing the standards and criteria of energy consumption Awareness of potential risk management Survival, comfort, development, and progress of human societies through the optimal use of energy
Respecting the environment is one of the branches of social responsibility in companies, thus there should be a strong relationship between the social responsibilities of companies such as gas and the environment, so that the countries which respect the environment encourage the service companies to plant trees and take measures on environmental development behaviors.	21	Planting trees and environmental development behaviors
With the current implementation process, utility companies such as gas should be certainly encouraged to plant alternative trees for destroying any part of the forest, and reducing polluting gases and. I think redesigning the high-efficiency gas appliances, can intervene even in production because the extracted gas should burn in a gas-burning device, and as the efficiency of this device is higher, the pollution for the environment will be lower.	21	Reconstructing and replacing the destroyed trees Redesigning the gas-burning devices with high efficiency
In terms of social responsibilities and environmental protection, Mazandaran Gas Company has presented perfect support for not cutting down trees or reducing the environmental pollution through transferring subscriptions to forest, urban, and even rural areas. All of the activities in the gas company, as a service organization, are at the micro level of service and satisfactory, and it is excellent if the environment is observed based on its requirements in crossing the forests and natural areas.	22	Gas supply to forest, cities, and villages Not cutting down the trees
Increasing the budget of the National Iranian Gas Company, supporting the goals of the National Gas Company and using the latest technology in the world are considered as the effective measures	22	Increasing budget in the National Iranian Gas Company

Examples	Code number	Main categories
used for facilitating the process of environmental activities in the Iranian gas industry.		Using the up-to-date technology in the world
With the development of gas supply in cities and even remote regions as well as the use of clean fuel instead of fossil fuels, it plays a significant role in protecting the environment. Developing the CNG stations is one of the measures taken by the company to reduce air pollution. Using poor quality fossil fuels with high sulfur levels has caused a lot of environmental pollution. Using natural gas (methane) as a fossil fuel with good calorific value and less pollution compared to other fuels (coal, fuel oil, diesel, etc.) can play a critical role in reducing the amount of NO and SO caused by the combustion of these fuels.	23	Developing gas supply to cities and even remote areas Using clean fuel instead of fossil fuels Developing CNG stations for reducing air pollution
Since the oil and gas and petrochemical industries have created jobs for many people, thus the socio-economic status of communities plays a major role, many processes which use chemicals can have detrimental effects on the environment and health.	23	Job creation
Using new technologies, strategic and long-term vision, using appropriate information technology and software for integrating environmental information and improving the public transportation system in big cities of the province are among the effective measures for facilitating the environmental activities of the Iranian gas industry.	23	Using new technologies Improving the public transportation system in the big cities of the province
The environmental measures of the Iranian gas industry are precisely related to the issue of social responsibility. Gas supply to the most remote villages even with low populations is one of such measures. Although it is active in other areas, such as environmental jihadist activities, any positive measure taken by the gas industry (or any other organization) will benefit the whole society and affect the whole society due to the direct relationship between the environment and society as a whole.	24	Welfare and social benefit from supplying the gas fuel
Improving the business environment, making industries and gas burning, and gas piping even on the most impractical routes are among the the environmental strategies of Iran Gas Company.	24	Improving business Gas burning industries Gas supply even to the most impractical routes
The environment is a highly essential issue at the national and international levels, and the contribution of the National Iranian Gas Company, and especially the Gas Company of Mazandaran Province, is almost obvious. The measures which	25	Defining waste management projects Controlling the projects environmentally Gas supply to remote villages

Examples	Code number	Main categories
were adopted to prevent the release of pollutants into the environment in form of defining waste management projects with the LCA method and controlling projects from an environmental perspective, etc. are among the measures used by this organization. Increasing gas supply to the remote villages which are far from the city and located in the middle of forests and mountains, causes no damage to forests and trees in the forest, but prevents greenhouse gases and environmental pollution.		
Preserving the national capital and the environment is one of the priorities in the National Gas Company and all people are required to observe it. Our goal is eliminating all of the accidents which have adverse effects on people and the environment. We move towards sustainable development, to increase productivity and improve the quality of human resources by modern standards. Evaluating the environmental sustainability is one of the most significant tools in the process of sustainable development planning.	25	Eliminating all adverse effects on people and the environment Increasing productivity Evaluating the environmental sustainability
Active presence of HSE representatives in all fields and operations, allocation of budget and separate resources for environmental protection, formulation of rules related to environmental effects as well as teaching culture to managers and employees to protect the environment are regarded as the effective measures and facilitate the process of environmental activities of the Iranian gas industry.	25	Allocating environmental budget Developing environmental regulations Training managers and employees Acculturalization among managers and employees

Table 2. Components and indicators of the pattern.

Indicator (open coding)	Component (Axial Coding)
Need to identify risks for supplying gas in impracticable areas	Services
Reduction of noise in urban pressure reducing stations	
Gas supply to industries, power plants and refineries	
Gas supply to CNG stations	
Gas supply to various parts of the country, including forest and mountainous regions	
Planning and controlling by the environmental unit of the gas organization	Safety and health requirements
Improving the level of safety and health	
Implementing the requirements of different standards in the field of health, safety and environment	

Indicator (open coding)	Component (Axial Coding)
Allocating adequate funds to health, safety and the environment	
Establishing health, safety and environment units for protecting the environment	
Strengthening social, legal and environmental responsibilities	social responsibility
Boom of local economy to reduce migration from villages to cities	
Reverse migration from city to village	
Compensating the destruction of natural resources after implementing projects by planting alternative seedlings	
No cutting of trees and wood for home heating system	
Responding to negative environmental effects	
Compiling the environmental educational headlines	Teaching and learning
Using the potential of universities in implementing operational projects	
providing educational books and pamphlets and presenting them at schools	
Broadcasting the educational teasers on radio and television	
Training the gas company personnel	
Training programs for managers and personnel	
Acculturalization about the environmental dimensions at the level of employees and other stakeholders	Acculturalization
Implementing incentive / punitive plans for personnel and contractors	
Acculturalization on the significance of environmental measures	
Encouraging drivers to make their cars bi-fuel	
Awareness of potential risk management	Maaaeers' atttteee add awareness
Belief and commitment of senior management to accountability for people	
A faaaa mett al caaeee is seii rr maaagers' atttteee	
Using consultants with up-to-date knowledge	
Change from speech to behavior about environmental issues	
Reduction of environmental slogans without action	
Environmental studies and getting the necessary licenses before implementing the project	Sustainable environmental development
Providing the required environmental funding in the annual budgets	
More studies on solutions to reduce environmental harms	
Developing the management systems participation and health improvement	

Indicator (open coding)	Component (Axial Coding)
Developing the information systems and process mechanization	
Developing the successful research and behavioral Patterning	
Training the contractors	contractors
Forcing the contractors to protect the environment in executive contracts	
Continuous monitoring of contractors' performance in the effective implementation of gas supply projects	
Developing the CNG stations to reduce air pollution	Technical facilities and equipment
Upgrading the gas equipment of major and minor subscribers	
Using new environmental technologies	
Creating leak detection technologies with the highest speed	
Increasing the efficiency and survival of gas equipment supplies	Technology and technical operations
Protecting the pipelines against corrosion	
Correcting replacement and removal of filters related to pressure reducing stations	
Appropriate replacement of trans and dirty oils and not draining and spilling it on the soil	
In the format and extent described in the relevant ISO standard	Medium- and long-term policies of the Ministry of Energy
The real priority of environmental issues in five-year programs	
Effective communication and Patterning of projects conducted in other countries	
Developing and explaining environmental regulations and instructions	
Developing the standards and criteria for energy consumption	
Developing a sustainable energy supply strategy	
Covering villages and regions with 20 households	
Macro policy making	
Converting the country into a regional power up to 1404	
Monitoring and measuring the environmental aspects of equipment in operation	Continuous supervision and evaluation of the project process
Environmental evaluation of projects before design and implementation	
Reviewing environmental tips as required	
Appropriate feasibility of projects	
Controlling the activities of the company through ISO	
Supervising and controlling the proper drilling	
Improving the heating and cooling efficiency at homes	

پژوهشگاه علوم انسانی و مطالعات فرهنگی
پرتال جامع علوم انسانی

Indicator (open coding)	Component (Axial Coding)
Limiting the use of forest wood for home heating by replacing gas	Subscribers consumption management programs
Using the clean fuel instead of fossil fuels (energy efficiency)	
Optimizing the gas consumption of CGS pressure reducing stations	
Recycling and recovery	
Reducing the resource and energy consumption (energy efficiency)	
Redesigning the gas-burning devices with high efficiency	
Implementing the waste collection programs in the environment	Pollutant management programs
Recovering the Thiol residue from barrels	
Preventing Thiol from falling to the ground during evacuation	
Identifying and planning the environmental pollution control based on notifications	
Flaring reduction	
Wastewater management	
Establishing a comprehensive waste management system	
Establishing the management system and evaluating the material life cycle	
Creating a carbon management unit	
Managing the control of greenhouse gases and air pollutants	
Developing the clean fuel subscribers	Promoting the environmental performance of the gas company
Protecting the forests and environment in the implementation of projects	
Environmental crises management	
Increasing energy efficiency	
Eliminating all adverse effects on people and the environment	
Changing the gas company priority from the perspective of production to environmentally friendly	
Job creation	Moving towards sustainable development
Business boom	
Developing knowledge management	
Reducing the fuel costs	
Evaluating the environmental sustainability	
Investing in the field of energy management	
Convenience due to providing comfortable, cheap, and relatively clean fuel	
Creating an open communication space inside and outside the organization for achieving the goals	

Indicator (open coding)	Component (Axial Coding)
Improving the public transportation system in the big cities of the province	

The final Pattern obtained from the qualitative analysis is displayed as follows:

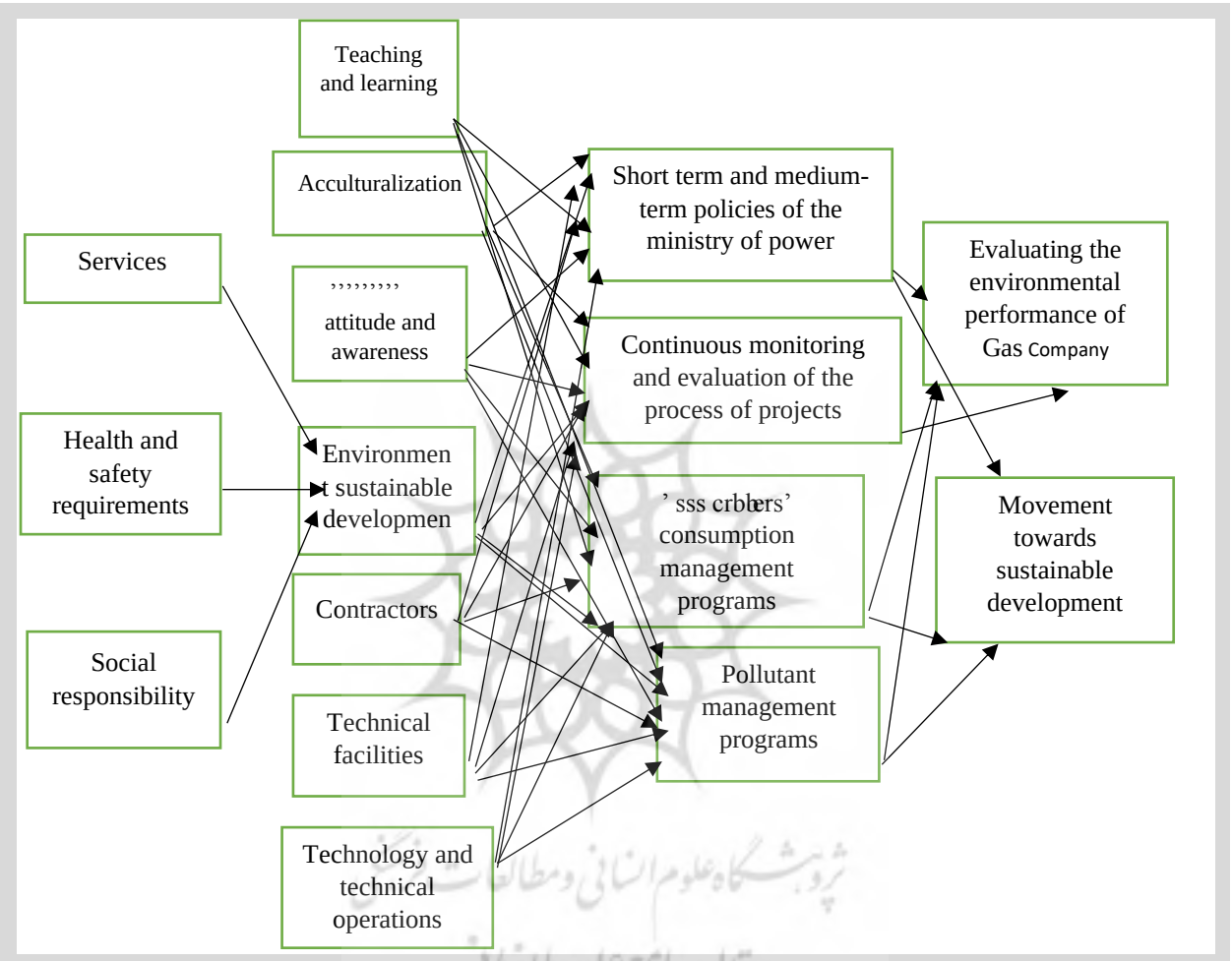

Figure 2. Paradigmatic pattern obtained from experts (Findings from the interview).

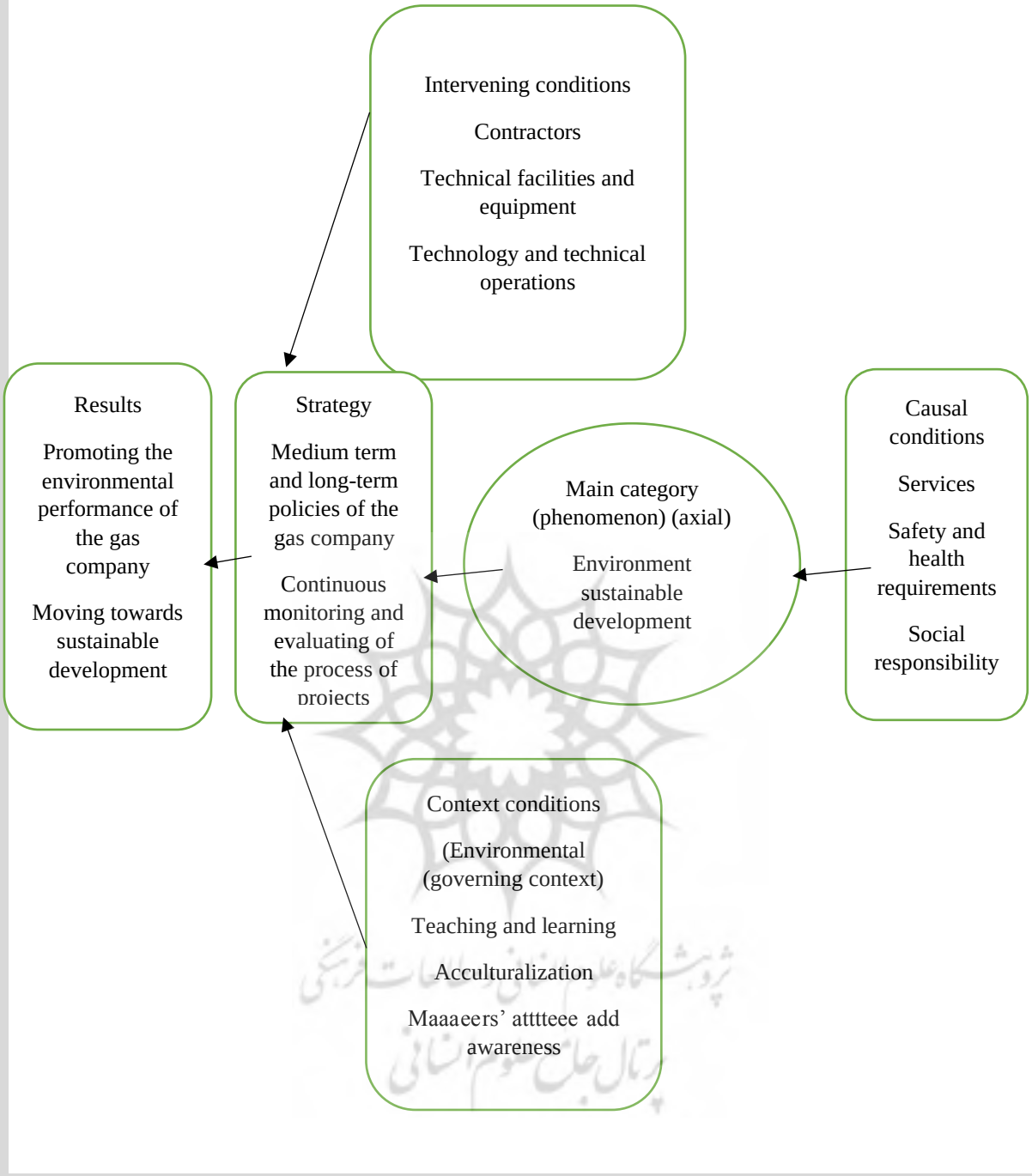

Figure 3. Final research pattern.

8. Discussion and Conclusions

The present study was an attempt to design an environmental model of sustainable development in the Iranian gas industry. The research falls within the category of qualitative studies built on grounded theory. The results showed that the environmental model of sustainable development in the Iranian gas industry consists of 15 dimensions namely 1. Service-delivery mission, 2. Safety and health requirements, 3. Social responsibility, underlying conditions 4. Training and Learning, 5. Culture building, 6. Attitudes and knowledge of executives, intervention conditions 7. Contractors, 8. Technical facilities and equipment, 9. Technology and technical operations, Strategy 10. Mid-term and long-term policies of the Ministry of Energy, 11 Continuous monitoring and evaluation of the

projects, 12. Consumption management programs, 13. Pollutant management programs and their ceeeeeeecces ... aaaa ccemett ff Gas Cmmaa''' s environmental performance 15. Taking measures for sustainable development.

The findings of the present study are consistent with the findings of a study conducted by Pour-Ali et al. In fact, emphasis on health, education and welfare indices has a significant positive correlation with environmental performance. Moreover, according to Fathabadi, expert force training, development of the necessary structures and laws, using successful experiences in this field as well as the expert opinions can significantly contribute to promotion of environmental, social and cultural assessments. The findings of this article also showed that human resource management in general, and expert managers in particular, can be very helpful in this regard.

According to the findings of a study conducted by Azizi & Moghaddam's; lack of adequate attention to the life cycle of technology development projects and failure to consider adequate flexibility in project planning and management, the findings of the present study also showed that intervening conditions such as contractors, technical equipment and facilities, as well as technology and technical operations can play an effective role in this regard. Contrary to the findings of Azizi & Moghaddam, however, the itt ereeii gg ciiii tisss '''' t really fall witii n the category of crucial condition.

On the other hand, Simon Tai & Li-Jung Wang showed that the interaction and cooperation of governments in the international arena can effectively contribute to mitigation of oil and gas pollutants. In fact, attempts made to solve the problem of pollutants in the oil and gas industry are doomed to failure as long as governments refuse to make measure to a achieve constructive interaction in the international arena. This point is actually trivial in comparison to the findings of the present study. In other words, the authors of the present study emphasize that sustainable development in the Iranian gas industry should be achieved through a multifaceted policy, and mere reliance on interaction with governments in the international areaa ca'' t ee eelff ll it t ii r reaar..

References

Adams, Simon. (2006). Earth Science: An illustrated Guide to Science, New York NY: Chelsea House.

Bargaoui, S., Liouane, N and Nouri, N. (2014). Environmental Impact determinants: An Empirical Analysis Based on the STIRPAT Pattern, Journal of Procedia - Social and Behavioral Sciences, (109), pp 449–458.

Barrett, Ross and Worden, Daniel. (2014), Oil Culture. Minneapolis: University of Minnesota Press.

Bazargan Harandi, Abas. (2018). Introduction to Qualitative and Mixed Methods: Common approaches in Behavioral Sciences, Tehran: Didar Publications.

Corsatea Teodora, Diana and Giaccaria, Sergio. (2018). Market Regulation and environmental Productivity Changes in the Electricity and Gas Sector of 13 Observed EU Countries, Journal of Energy, (164), pp 1286–1297.

Danaei Fard, Hasan and Eslami, Azar. (2011). Making the theory of Organizational Indifference: Using the Research Strategy of Grounded theory in Practice, Tehran: Imam Sadegh University Press.

Danaeifard, Hasan, Emami Seyed Mojtaba. (2007). Qualitative Research Strategies: A feflection on Grounded theorizing, Journal of Management thought, 1 (2), pp 69–97.

Firoozi, Mohammad Ali; Mohammadi Dehcheshmeh, Mostafa and Saeedi, Jafar. (2017). Evaluation of Environmental Sustainability Indicators with Emphasis on Air Pollution and Industrial Pollutants, Case Study: Ahvaz Metropolis, Quarterly Journal of Urban Ecology Research, 8(15), pp 13–28.

Flick, Oveh (2018). An introduction to Qualitative Research, Translator: Hadi Jalili, Tehran: Ney Publications.

Gal, Meredith; Burke, Walter and Gal, Joyce. (2014). Quantitative and Qualitative Methods in Educational Sciences and Psychology, (translated by Ahmad Reza Nasr et al.), Tehran: Samt Publications.

Gonzalez, George. (2012). The Politics of air Pollution: Urban Growth, Ecological Modernization, and Symbolic Iinclusion, NewYork: Suny Press.

Haqgooyan Zolfa, Zarei; Matin Hasan, Jandaghi Gholamreza and Rahmati, Mohammad Hussein. (1394). Understanding the Process of Happiness Formation Using Grounded theory, Quarterly Journal of Organizational Behavior Studies, 4(13), pp 119–141.

Hickel, Jason. (2019). The contradiction of the Sustainable Development Goals: Growth Versus Ecology on a Finite Planet, Journal of Sustainable Development, 27 (5), pp 873–884.

James, Paul. (2015). Urban Sustainability in Theory and Practice: Circles of Sustainability, London: Routledge.

Johnson, Bob. (2014). Carbon Nation: Fossil Fuels in the Making of American Culture. Lawrence, KS: University Press of Kansas.

Liddle, B. (2013). Population, Affluence, and Environmental Impact Across Development: Evidence from Panel Cointegration Patterning, International Journal of Environmental Patternling & Software, (40), pp 255–266.

Liodakis, E. (2011). The Nuclear Alternative". Energy Production Within Ulaanbaatar, Mongolia. AIP Conference Proceedings, 8 (1), pp 81–96.

Mohammadi Hamidi, Somayeh and Sobhani, Nobakht. (2018). Sustainable Development in the Middle East with Emphasis on Iran, Quarterly Journal of Spatial Planning, 28(8), pp 99–114.

Mohebi, Nematollah; Azizi, Majid; Ziaei, Mohsen and Husseinzadeh, Omid. (2017). Presenting a Pattern for Achieving Sustainable Development in the Iranian Wooden Furniture Industry, Quarterly Journal of Wood and Forest Science and Technology Research, 24(1), pp 117–136.

Mosley, Stephen. (2013). The Chimney of the World: a History of Smoke Pollution in Victorian and Edwardian Manchester, London: Routledge.

Oldroyd, David. (2006). Earth Cycles: A historical Perspective, Westport, Connicticut: Greenwood Press.

Orazalin, Nurlan and Monowar, Mahmood. (2018). Economic, Environmental, and Social Performance Indicators of Sustainability Reporting: Evidence from the Russian Oil and Gas Industry, Journal of Energy Policy, (121), pp 70–79.

Sadat Hashemi, Mohadeseh; Nasrollahi, Zahra and Bameri, Saeed. (2016). the Factors Affecting the Environment and Sustainable Development in the group of MENA and OECD Countries Based on the STIRPAT Pattern, Journal of Comparative Economics, 3(2), pp 127–138.

Shaker, Richard. (2015). The Spatial Distribution of Development in Europe and its Underlying Sustainability Correlations, International Journal of Applied Geography, (63). pp 31–48.

Shen, Jianming; Xiaohong, Zhang; Lv, Yanfeng; Yang, Xiangdong; Wu, Jun; Lin, Lili; and Yanzong, Zhang. (2019). An Improved Emergy Evaluation of the Environmental Sustainability of Chnma's Steel Production from 2005 to 2015, International Journal of Ecological Indicators, (103), pp 55–69.

Strauss, Anselm and Corbin, Juliet. (2011). Principles of Qualitative Research Methodology: Grounded theory, Procedures and Methods, Translated by Biyuk Mohammadi, Tehran: Institute of Humanities and Cultural Studies.