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Formation of Infrastructure Provision for Personnel Needs in Gas and Petrochemical Cluster: The Case of Iran

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Abstract: The problem of staffing the gas and petrochemical cluster is acutely raised in all oil-producing states. This article's purpose is to study program-targeted and problem-oriented approaches to forming infrastructure provision for personnel needs in Iran's gas and petrochemical cluster. Their peculiarity is that they belong to natural monopolies characterized by a high level of capital concentration. In this study, two approaches were identified to form infrastructure provision for the needs of personnel in the cluster. The first approach, program-targeted, relies on developing programs to overcome the lack of qualified specialists. The second approach, problem-oriented, considers the causes of the problem itself and the ways to prevent it. Based on the results of the study, several conclusions can be drawn. First, the traditional understanding of human resources infrastructure is insufficient to develop Iran's gas and petrochemical cluster (GPC). Secondly, for the successful development of social production, it is necessary to adequately develop infrastructure, the technical and economic justification of all processes, and to focus the entire industry on endogenous factors of scientific, technical, and socio-economic progress. Finally, the most critical issue in the system is the issue of staffing each stage with employees of mass professions, engineering, and scientific personnel, specialists in the field of economics, organization, and management, and executives of various levels.

Keywords: gas and petrochemical cluster; program-targeted; problem-oriented; personnel need

1. Introduction

There is a historical need in Iran's gas and petrochemical industry formation and development to solve many problems, their complication, and the development of implementation methods. One of the fundamental problems is the problem of staffing for the needs of the gas and petrochemical cluster (GPC), taking into account the continuous improvement of qualifications, the development of the terminology, professions, specialties, and specializations, workers of mass professions, engineering and scientific personnel, as well as managers of all levels of management. The solution to these problems requires the purposeful development of infrastructure and its main components—industrial, social, household, and institutional.

Infrastructure development is often subordinated to goal-setting, recreational, cultural and entertainment, housing, solving transport problems, etc. However, given the fundamental importance of socio-economic development needs of the formation and development of GPC, it escalates the need for programming of infrastructure development clearer and focusing on meeting the needs of current and upcoming areas of oil, gas, and chemical with the inevitable and profound qualitative changes in the development of the hydrocarbon complex and other related industries. The infrastructure complex must meet the needs of the GPC for the necessary production means that are required to support the production stages, starting from prospecting studies of hydrocarbon reservoirs (oil and gas fields) and ending with the final stages of consumption of hydrocarbon products or their export.

Infrastructure at the macro level is also subdivided into the industrial, social and household, and institutional:

- Industrial infrastructure is a set of industries directly serving the production of any product or service: informatics, energy, transport of all kinds, communications, etc.
- Social infrastructure is a set of general conditions associated with the reproduction of the labor force and the daily life of an individual: housing and communal services, education, health care, social security, etc.
- Institutional infrastructure is a set of institutions necessary to manage the economy and social life. These organizations and institutions of the legislative, judicial, and executive authorities provide sufficient conditions for economic management and daily life (Pykhov and Tatyana 2016).

Since the industrial-chemical infrastructure is a complex of general conditions for the function and development of social production, economic growth is possible only with its adequate progress (Dzhumanov and Mukhitdinova 2016). The most crucial industrial infrastructure sectors are the transport and energy sectors and the gas industry. Their peculiarity is that they belong to natural monopolies. Such monopolies are characterized by a high level of capital concentration, which allows large-scale vertical integration of the production process and the sale of goods and services, which leads to a significant reduction in transaction costs (Zolotov and Glushich 2007).

2. Theoretical Background

Social infrastructure has no specific definition. From a broader point of view, social infrastructure can be defined as a process whose task is to satisfy individuals and social needs and to fulfill the asocial interaction and the overall development of the individual and society (Grum and Grum 2020). Roelich et al. (2015) considered it as a derivative force for function of the society. Social infrastructure is one of the dominant factors guaranteeing the satisfaction of basic human needs, as well as the development of its comprehensiveness, and includes a complex and multi-layered set that combines the activities of institutions, organizations, and departments of a municipality to meet the basic needs and interests of the society (Frolova et al. 2016).

There are two conceptual approaches for defining the concept of social infrastructure as a sectoral activity. The essence of the sectoral approach means the economic development should be comprehensive, contribute to creating the necessary conditions for ensuring the effective functioning of production, and meet the needs of the society (Sumkov 2017). At the same time, attention should be drawn to the fact that the infrastructure is a set of general conditions and not individual elements and objects (Dubyna 2015).

Each social infrastructure object has specific properties and characteristics (Yamshchikov and Likhter 2009). Therefore, a comprehensive analysis of every one of them is hardly possible, and it cannot help to scarcely identify the most general trends in their development (Volgin 2008).

The elements of the social infrastructure that ensure an individual's labor activity should be considered a set of tangible asset elements that create general conditions for the effective labor activity of each person, in the process of which their essential capabilities are manifested. The social infrastructure elements that provide labor activity include tangible assets, working conditions, transport, communications, power lines, gas and oil pipelines, spatial settlement shapes, vocational education, and advanced qualification (Nuhu et al. 2021; Miłek 2018). These elements can be federal, regional, and municipal. The practice of real-life makes us consider the aspects of social infrastructure in this aspect, which strongly affects their state of functioning. In emerging market relations, ignoring this aspect is unjustified and erroneous (Volgin 2008).

Companies face numerous challenges in managing team members' well-being, including discovering hidden problems (such as discrimination in the workplace), addressing systemic issues (such as the hiring process), engaging with vulnerable workers (such as migrants), and building a constructive dialogue with workers in an industry where this is not the case (ILO 2016). This has become the norm and ensures that standards are applied across all projects and often in complex subcontracting and supply chains.

Given the increased attention and numerous challenges, the Society of Petroleum Engineers held a special session on labor welfare standards and world best practices at its annual conference and exhibition in Abu Dhabi, where there are problems with the welfare of the workers. An essential initial step in a comprehensive review is to assess the risk of negative impacts on team member welfare by focusing on indicators that may indicate where these risks are higher. This may include consideration of the likely characteristics of project workers (e.g., lower-skilled migrants), the degree of subcontracting and the capabilities of these contractors, and the contextual risks associated with the project location (e.g., remote location or in a country with few legal entities), protection of employees, or where specific groups are widely discriminated against.

One of the critical risk clusters relates to how vulnerable migrant workers are treated in the recruitment and employment process (Baey and Yeoh 2018; Wahab 2020). Once risks or problems are identified, they should be addressed. There are good examples from oil and gas companies demonstrating good practice in this area. Some of the best practices may seem relatively straightforward, such as including workplace rights and grievance procedures as a standard component in motivating employees—but this is necessary for anyone to exercise their rights. Others require more attention and investment, such as developing labor cost models that the procurement team can use to determine contractor's bids during tenders that are too low for the ethical recruitment, hiring, and placement of employees.

The best practices for team member welfare extend beyond the workplace to employer-provided housing (Pogrebskyi 2016). In some projects, considerable attention is paid to the development of facilities that provide workers with a space where they can rest and relax comfortably and that are clean and sanitary. Improvements in team member placement can also be associated with increased productivity and retention of the workforce.

Certain conditions are the main issues of the local infrastructure factor such as information technology, local company needs, standards, social, educational, etc. (Barykin et al. 2021; Barykin et al. 2021). Social infrastructure includes public services such as education, health, maintenance, postal services, fire services, and other public services. If the social infrastructure is adequately developed and meets the needs of the users, a high quality of life is consequently achieved. Still, if not, social and economic issues can be raised that significantly affect the community's well-being (Vaznoniene and Pakeltienė 2017). Since the provision and maintenance of the necessary infrastructure contributes to a higher level of social security, the local procurement industry must be more competitive. IT infrastructure is certainly an important variable that significantly impacts local content development (Kazzazi and Nouri 2012). This is necessary for disseminating information, one of the critical policy principles promoting local content in the oil industry (Ghasabi 2018). The establishment of a public outreach office to (i) develop a national register of competent and qualified local suppliers, (ii) advise residents on joint venture opportunities and other mechanisms for cooperation with foreign companies, and (iii) support plans for local capacity-building, training, and R and D are recommended by (Klueh et al. 2007). For example, major oil companies have jointly introduced e-commerce portals such as Trade

Ranger, owned by 15 oil and petrochemical companies, including BP, Shell, Total FinaEIf, and Statoil. It currently has more than 1000 supplier members.

Cooperation between the host government and major players in the oil industry should focus on how to involve local companies in local labor. Attention should be paid to facilitating their participation in domestic oil activities without compromising quality, health, safety, and environmental standards (Heum et al. 2011). Utilities such as roads, railways and air transport, telecommunications, electricity, and water supply, as business development infrastructure, can create an environment that promotes business development and increases its productivity. The standard of this infrastructure will influence profitability considerations for 2170 investors (Heum et al. 2003). Social infrastructure is associated with social cohesion between social groups, which reduces the chances of social disorder. A stable environment attracts foreign investment and contributions to technology transfer (Heum et al. 2011).

The first way is associated with both the essence of existing problems and the emergence of new ones. These include, first, import dependence (both current and possibly to aggravate in the future), unpredictability in pricing, insufficient training of personnel, economic, organizational, regulatory, and legal restrictions, etc. The second way to solve this problem is to attract internal resources and opportunities to create the necessary production means required for each of the technological stages of the GPC.

However, the provision of technological and production needs requires a deep feasibility study of all processes, conditions, and their creation (Mohammadbeigi Khortabi et al. 2019), which should become the basis for the orientation of the entire industry towards endogenous factors of scientific, technical, and socio-economic progress. In this regard, it is of particular interest to use the concept of the life cycle of production means, which reveals the entire sequence of stages of their creation as the basis for providing such means and the production of all stages of the GPCs. This approach creates new opportunities for problem-oriented and program-targeted development of the infrastructure complex (Korshak 2016).

Therefore, in the most general form, if we want to get rid of the purchase of such means by importing, which in many cases creates significant technological, production, economic, political, and other problems, the production means must be made in the process of research, development, and creation of an industrial design and then by manufacturing the production means to meet the needs of the GPC.

3. Materials and Methods

This general approach requires a certain concretization and development in terms of scientific methods and principles of problem analysis. It is defined by the so-called concept of the life cycle of fundamental technical means and includes the following stages (CBI 2019): (1) fundamental research works (FRW), (2) applied research works (ARW), (3) experimental-structural development and design-technological development (ESD and DTD), (4) pilot production (PD), (5) industrial production (IP), (6) exploitation (E), and (7) recycling (R). A brief description of each stage is provided below.

Fundamental research works (FRW): There are different interpretations of actual research works and their role in forming a national technological initiative (Mokeeva 2017). By classifying the work, scientific research is divided into fundamental and applied research. Primary research aims to expand theoretical knowledge by obtaining new scientific data on processes, phenomena, laws in the field, scientific foundations, methods, and research principles (Mokeeva 2017; Daniali and Khortabi 2020). An example is an algorithm for the accurate modeling of oil and gas fields. Algorithms analyze seismic data and use it to predict the field's behavior when pumping hydrocarbons, but such simulators often make the earth's interior homogeneous. However, in reality, there may be large cracks.

Applied research works (ARW): Applied research works are a specification of the FRW about the needs of society and, in particular, to the formulation of principles for creating new classes of technical devices and technological processes to meet the growing variety of social needs (Mokeeva 2017). The analysis shows that in fundamental R and D, the following classes can be distinguished: hypothesis-free, experimental and theoretical, forming constitutional, and interconnected integrity. Hypothesis-free FRW is characterized by a free scientific search for potentially beneficial effects without a sufficiently strict definition of the activity vector.

Theoretical FRW is conducted mainly using logical and physical mathematical models and methods, concepts, theories, and hypotheses to pursue an ordered knowledge system. Experimental FRW is based on the search for evidence using scientific and technical means to identify the main and side factors, establish trends and patterns, classify and systematize experimental material, and observe phenomena. They are promising when studying multi-connected, multifunctional, and probabilistic systems, where the establishment of theoretical dependencies may be associated with several difficulties. Hence, they require a significant expenditure of resources. A classic example is an experimental work studying the conditions for obtaining controlled thermonuclear fusion or in the field of higher nervous activity. There are very close relationships between the considered classes of works. Thus, hypothesis-free research can acquire the features of directed search achievements and vice versa in search directions to formulate the principles of free scientific search.

Experimental-structural development and design-technological development (ESD and DTD): Developmental and technological works are aimed at implementing the used scientific principles, phenomena, processes, laws in certain geometric forms; a set of specialized techniques, solutions that determine the order and conditions of product manufacturing, and the use of tools and materials at this stage; the possibility of forming entirely local innovations related to the features of design forms, recipes, and technological parameters of processes are very high (Mokeeva 2017).

Pilot production (PD): Prototyping means the process of manufacturing one or more products commercially to realize the production feasibility of the physical principle; possibilities used constructively-technological solutions to meet the production capabilities of the manufacturer (material-technical base, qualification of personnel, and potential customer requirements) in the conditions of the adopted design and technological solutions, environmental friendliness, and production efficiency. It also serially determined the product's suitability, its compliance with capabilities of existing production equipment precision, quality products, raw materials, the organization of production, qualification of the production personnel, environmental protection, etc., and it identifies the necessary changes (Mokeeva 2017).

Industrial production (IP): Industrial production is the single, serial, large-scale, or mass production of products to meet personal or social needs (Büchi et al. 2020). In industrial production, continuous improvement of the production technology, management, and technology advancement is carried out.

Exploitation (E): This stage includes commissioning, repair, and maintenance. The location of operation (utilization, consumption) of manufactured products usually coincides in time with its production. The authors believe that the time difference between the production, sale, and use of technology products is insignificant. The stage of the operation is the final point of formation and realization of consumer properties of products (Mokeeva 2017).

Recycling (R): Retired equipment that has lost the specified consumer properties is used as raw materials to produce other products (Tse et al. 2016). Instead of decommissioned products, new products are developed and built with higher consumer qualities. Therefore, as a result of the interaction of the two approaches, the stages of the technological cycle in the system of GPC and the stages of the life cycle of production means necessary for the technical provision of each of the production steps can be presented as a formed matrix with their interactions (Figure 1).

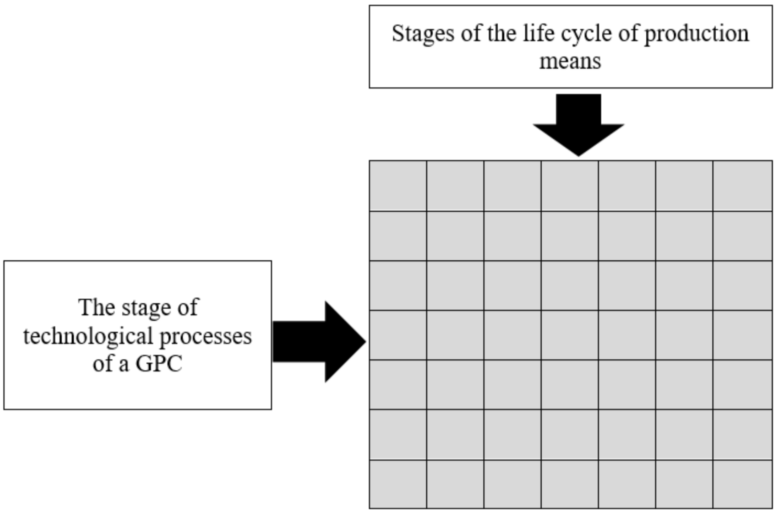

Figure 1. The field of interaction between the stages of the GPC and the life cycle of production instruments.

Therefore, the system of the integration field (interaction matrix) is formed by (a) the interaction of the stages of technological processes in the GPC, (b) the stages of the life cycle of production means. It can serve as a conceptual basis for the purposeful development of infrastructure formations, considering the desired and predictable consequences associated with the dynamic development of matrix fields.

4. Results

Figure 2 illustrates the possibility of forming a matrix that characterizes the interaction of two infrastructures that ensure the exchange of the stages of the GPC and the steps of the life cycle of the production means. The components of each of the infrastructures—production, social, and institutional—interact not only with each other but also within the framework of the two other infrastructures. In this case, the matrix structure of the interaction of fields is formed. A distinctive feature is the fact that any of the stages of the GPC, in principle, pass all the steps of the life cycle of the production means (horizontally), and any of the stages of the life cycle of the production means pass all the stages of the GPC vertically. In terms of the GPC, in the structure of production and economic activities of the oil and gas complex, there is a consistent transition from the stages of the life cycle of production means and operation of industrial production (operational character of the complex) to the steps of industrial and pilot production and to phases of development, design, and technological works. It should be noted that the infrastructures of both subsystems not only interact with each other but also contain common elements.

This matrix of fields can be provided by a wide variety of participants who have different departmental subordination and ownership rights and other territorial locations. The participation of the state and the implementation of specific fields can be very different and so can the involvement of various participants in joint actions.

By analogy, with the formation of the previous matrix, the matrix of personnel provision for the labor needs of the GPC can be configured, including employees of mass professions (specialists, engineering, and scientific personnel), managers at all levels of management, and executives (Figure 3).

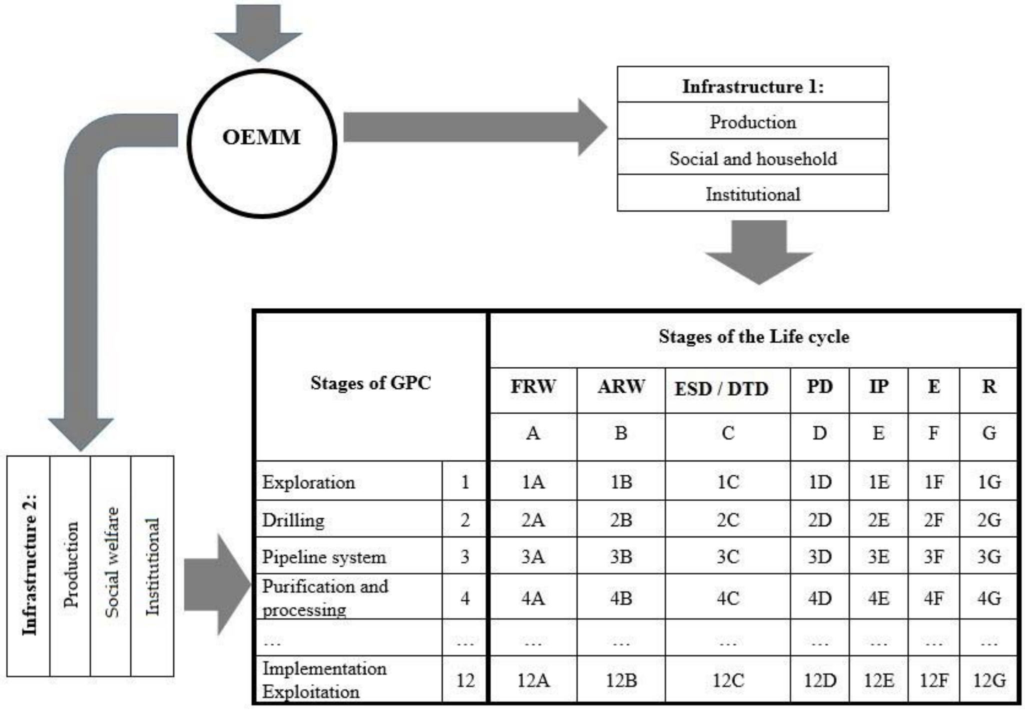

Figure 2. Matrix of the relationship between the stages of GPC and the life cycle of production means and their maintenance. OEMM = organizational and economic management mechanism.

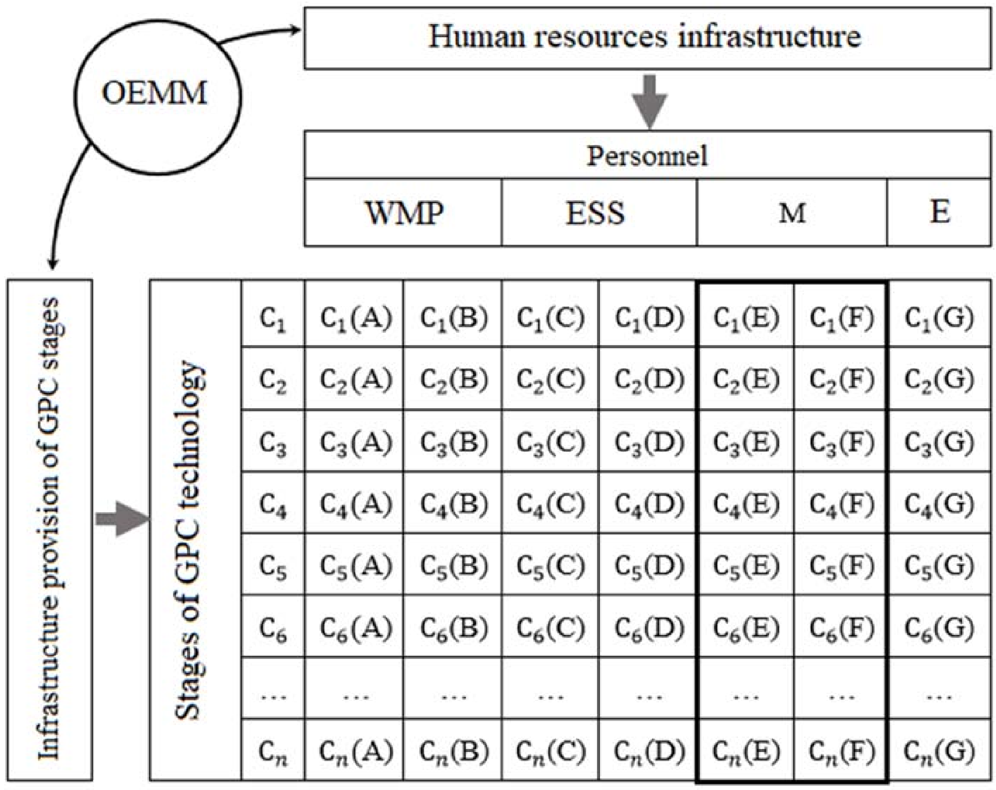

Figure 3. Integral field of staffing. WMP: workers of mass professions; ESS: engineers, scientific personnel, specialists; M: managers; E: executives.

The implementation of this matrix can be used to develop problem-oriented and program-targeted approaches to forming interacting infrastructures and developing appropriate organizational and economic management mechanisms.

The most critical issue in the system of staffing for needs of GPC remains the issue of staffing each stage with employees of mass professions, engineering, and scientific personnel, specialists in the field of economics, organization, and management, managers of various levels, and executives of middle and senior management. Of particular interest, there is the structure of highly qualified specialists' knowledge, skills, and abilities of highly skilled specialists. In this regard, there is a specific interest in the history of the establishment and the development of the training of personnel and specialists for the GPC of Iran.

Understanding the capabilities of existing technologies in the oil sector and the importance of the fundamental knowledge underlying these technologies will enable technology transfer and development managers and planners to determine the necessary technologies for the country's oil industry. Unfortunately, historical evidence shows that no serious action has been taken to strengthen universities and research centers to develop fundamental knowledge in oil technologies in the extractive sector for almost a century.

Technology transfer is in all oil contracts signed later, but they never gave satisfactory results. Training and technical skill development are within the country's scientific development system and applied skills. It, therefore, has the endogenous factors development system mechanism of design and management of oil contracts. Moreover, the main task of international oil companies is not to train personnel for oil-rich countries, since they do not logically have the necessary incentives to perform this task (Asiago 2017). Teaching and promoting scientific and technical skills in the oil industry has always been the focus of the country's oil officials, and this has not been entirely exclusive to oil contracts. Immediately after the nationalization of the oil industry, on 30 April 1951, the law "on the implementation of the principle of nationalization of the oil industry throughout the country" was passed. A mixed committee of the National Assembly, the Parliament, and the Minister of Finance was created to remove the Anglo-Iranian oil company from ownership immediately. In the same law, the training required by the oil industry is of particular concern to the legislature since the implementation of previous contracts with oil companies clearly shows that there is little hope for training in the form of oil contracts. Therefore, article 6 of this law provides that " ... for the gradual transformation of foreign specialists into Iranian experts, the mixed committee is obliged to annually send several students abroad for examinations to acquire various fields of knowledge and experience related to the oil industry in foreign countries, and after the approval of the Ministry—this must be carried out by the Ministry of Culture on time. Tuition fees and student expenses will be paid from oil revenues."

5. Discussion

The first step in the development of the industry for the production of equipment necessary for the oil industry is the establishment, by the Ministry of oil, of an organization or institute in cooperation with relevant institutions to measure the quality and standardization of these products, create a database of foreign purchases of the National Iranian Oil Company, and identify equipment that can be produced now or in the foreseeable future; in terms of compliance with technical standards and competitive price, the possibility of their production is provided with financial support and cooperation with universities and engineering research centers. Creating synergy between companies and institutions that independently carry out foreign purchases in the oil industry is a prerequisite for the success of domestic production policy and saving the necessary investments to transfer and develop advanced technologies.

The involvement of domestic manufacturers in the production of equipment and components necessary for the oil industry can be an excellent way to achieve the development goals, as it provides appropriate conditions for the interaction of experts, specialists, and managers with advanced foreign companies. The success of this solution requires the ability to absorb fundamental knowledge and appropriate opportunities to acquire professional technical skills so that it can embark on the path of creativity and technological innovation for the domestic production of equipment needed by the oil industry.

The Ministry of Science, Research, and Technology's roles are essential in integrating a technology development roadmap involving universities and research centers, particularly inadequately planning and monitoring institutions relevant to the domestic production process and compliance with global standards. Otherwise, the bitter experience of the country's auto industry will be repeated. Despite billions of dollars of heavy investment in the industry over decades, there is still a deep gap with the technological boundaries in the industry (Saberi 2017).

The transfer of technology related to knowledge, skills, and, in general, activities and operations related to oil exploration and development, as opposed to trading in tools and mechanisms, is not an easy task since the nature of the technology used in them makes it difficult to transfer it. This is because oil exploration and development is an industry based on science and technology and requires geological surveys, geophysical and seismic surveys, logging, drilling, injection of wells, reservoir design, pipeline fittings, and computer software services. These activities and services require equipment, tools, skilled machinery, and technical knowledge. For a country to be self-reliant, it must plan and implement long-and short-term training and R and D programs to have the necessary technical and industrial structure to obtain and acquire the technology.

Currently, there is a vast network of faculties and universities in Iran that are engaged in training personnel, bachelors, masters, doctors, and officials, for the needs of the GPC. In the authors' opinion, the formation of a system of training engineering and scientific personnel and specialists require the development of an integrated approach that should take into account:

- The status of various areas in a GPC and the perspectives and forecasts of their development across the stages.
- Training requirements for different professions, specialties, and specializations.
- Development of the theory of training and advanced personnel training problems, considering the best international and national experience, generalizing scientific developments and the best practices based on established scientific and engineering centers and schools.

In general, the problem of personnel training should be considered not as a problem of transfer and assimilation of knowledge, skills, and abilities, but as a problem of the formation of personnel's intellectual potential, which includes:

- Knowledge, skills, and attainments.
- Mental abilities (the ability to analyze and synthesize, induction and deduction, and system analysis and synthesis).
- Creative abilities (the ability to create the new and eliminate the old).
- Intuition (the ability to predict events and results without first proving them).
- Prognostic (the ability to foresee the future based on science and social practice).

Unfortunately, modern higher education is mainly limited to the first point of forming the intellectual potential of the future specialist, which largely determines the predominantly reproductive style of professional thinking. To a certain extent, the structure of professional knowledge of a specialist (engineer, researcher) who creates production means for each technological stage of the GPC is not one. Still, several groups of specialties (specializations), i.e., the distribution of the share of professional knowledge of specialists, requires it (Figure 4).

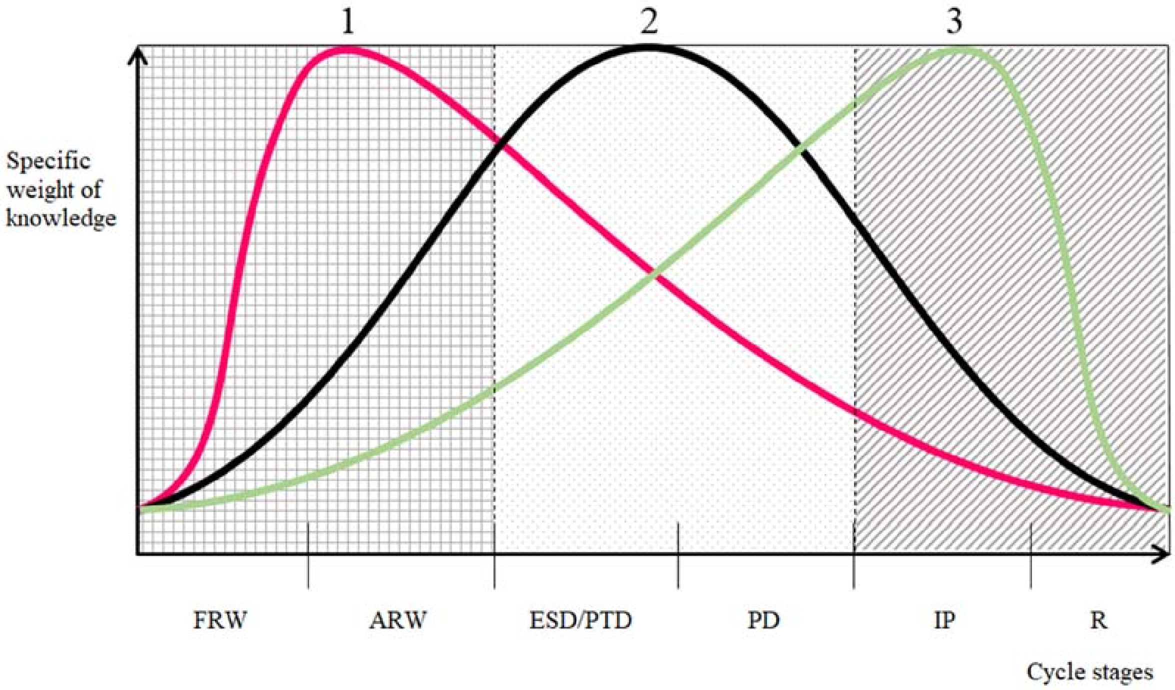

Figure 4. Distribution of the specific weight of professional knowledge for the technological stages of the GPC.

The first group of specialists has predominant knowledge in fundamental and applied research, with a decrease in the amount of knowledge in the subsequent life cycle stages. This is a characteristic feature of the academic specialties of universities. The second group of things has shifted maximum in experimental-structural development, design-technological development, and pilot production. The third group of specialties are professionally trained specialists mainly in industrial production and created technical production means.

6. Conclusions

Iran is one of the states that have high potential for the development of the economy and the social sphere based on natural factors, including the largest reserves of hydrocarbon raw materials, oil and gas, and has every opportunity to enter the top five world states in terms of production and sale in the oil and gas complex. However, at present, a number of problems are observed in the country's economy, created under the influence of factors of endogenous and exogenous nature that mutually influence each other. Due to the influence of these factors, there is a tendency to reduce investment in the oil and gas complex, an insufficient level of organizational and technological basis for production, a lack of highly qualified personnel in many professions and specializations, and an insufficient level of development of the organizational and economic management body (Rodionov and Daniali 2020a). The level of integration ties is insufficient both in the system of the oil and gas complex, in integration and gas sectors in particular, and due to the fact that the gas complex has become involved in the system of major economic interests recently. Moreover, the organizational and economic ties of the oil and gas complex with the chemical industries and energy are insufficient.

So, has this study managed to open up basic discussions of where we want to go? At present, in our opinion, more attention is required to the system of the most important factors that determine the efficiency of the oil and gas complex. Moreover, among the leading factors, attracting investments, optimizing resource management, developing the potential of the oil and gas complex, effective gas monetization, and improving exports are most often indicated. It has been established that the overwhelming share in solving these problems belongs to the improvement of professional training and advanced training of personnel in the GPC system (Rodionov et al. 2020).

In this article, the topic of program-targeted and problem-oriented approaches to forming infrastructure support for personnel needs for the gas and petrochemical cluster (GPC) of Iran was considered. The formation and development of the GPC of Iran entail an undeniable need to solve the related problems that appear during this period. One of these problems is the problem of staffing the needs of the gas and petrochemical clusters. In the study, it was determined that the existence of these problems is due to the following factors: continuous professional development, development of terminology, professions, specialties and specializations, employees of mass engineering and scientific personnel, specialists, as well as managers at all levels. It was also revealed that the solution to these problems is the purposeful development of infrastructure and its three components: industrial, social, and institutional (Rodionov and Daniali 2020b), which is in alliance with (Nuhu et al. 2021; Miłek 2018).

After analyzing the scientific literature on the given topic, two complex approaches to forming infrastructure support for Iran's gas and petrochemical cluster personnel were identified. The first, program-targeted, is based on developing programs to solve this field's lack of qualified specialists. The second approach, problem-oriented, explores the problem's various causes and methods to prevent it. Based on the results of the study, several conclusions can be drawn. First, the traditional understanding of human resources infrastructure is not enough for the successful development of the GPC of Iran. This requires a new level of knowledge of end infrastructure development.

Secondly, for the successful development of social production, it is necessary to adequately develop infrastructure, the technical and economic justification of all processes to focus the entire industry on endogenous factors of scientific, technical, and socio-economic progress. The detailed approach creates new opportunities for problem-oriented and program-targeted development of the infrastructure complex. Both approaches were recognized as rational and effective in solving the problem of building infrastructure to meet personnel needs.

Finally, the most important issue in the system of staffing the needs of GPC remains the issue of staffing each stage with employees of mass professions; engineering and scientific personnel; specialists in the field of economics, organization, and management; managers of various levels, and managers of middle and senior management. Of particular interest, there is the structure of highly qualified specialists' knowledge, skills, and abilities. In this regard, there is a specific interest in the history of the establishment and development of training of personnel and specialists for the GPC of Iran.

After the study, it was concluded that modern higher education is mainly limited to providing knowledge, skills, and abilities, which largely determines the predominantly reproductive style of professional thinking.

Limitation and Future Direction

The authors could discuss that research is known to significantly expand the ability of companies, industries, and even countries to acquire and apply existing knowledge. For this reason, investing in research is called an indirect approach to increasing acquisition potential. However, it should be noted that the indirect increase in acquisition potential through investment in research is very timely and depends on the route. Therefore, the experience of most domestic industry experts is diverse from the expertise of technology holders. Research centers can play the role of an observer, can monitor the environment, and can transmit technical information understandable to the industry. Of course, there is no need for the intermediary role of research centers in routine and specific less-complicated activities.

The research will lead to positive changes in technology transfer, including the precise selection of technology, the elimination of concerns of the transferring party regarding the correct application of technology, and its adaptation to environmental requirements, so as not to hit the company's credibility or full technology transfer. Technology dissemination leads to technological innovation to find new opportunities. The participation of research personnel at all stages of transfer increases the probability and possibility of mastering the technology and its recreation; combining indigenous technology with imported technology reduces costs and keeps up with technological developments.

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