



## Explaining the Public-Private Partnership Model for Financing National Iranian Gas Company Projects Based on Structural Model and Kohonen Neural Networks

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Submit: 27/03/2022 Accept: 09/01/2023

### ABSTRACT

The purpose of this article is to explain the pattern of public-private partnership (ppp) financing of contracts in the National Gas Company of the country. The research method is applied in terms of purpose - mixed type (qualitative - quantitative) and exploratory method. Participants in the quality stage, staff specialists and senior managers of the National Iranian Gas Company, which was selected based on a simple random sampling method and a researcher-made questionnaire was used to collect information. In order to analyze the statistical data, in addition to the theoretical saturation principle, K-S test was used for data normality, Hotelling t-test, AMOS software and for model analysis, the model of structural equations and Kohonen neural networks were used. To confirm the content and form validity of the questionnaires, in addition to using the opinions of professors and experts, convergent validity and average explained variance index (AVE) were calculated. In order to measure the reliability of the questionnaires and the internal consistency of each of the constructs, Cronbach's alpha and composite reliability (CR) indices were calculated. The results indicate that the public-private partnership model is based on important components such as efficiency and technical knowledge, support and value-creating commitment and attention to elites and investors, the quality of performance and continuous monitoring inspection, attention to specialization and correctness of work, merit selection and discipline in work and reduction of administrative automation have been formed. Predictability neural network model for public-private partnership in financing projects of National Gas Company Iran has shown significantly.

**Keywords:** Project financing, public-private partnership, communication dimensions, performance dimensions.

## 1. Introduction

Many economists emphasize the importance of the public section and private section relationship in economies, delaying the completion of infrastructure projects due to lack of investment and poor quality of public services in developing countries due to inappropriate policies or direct government intervention in design, construction, Know funding and support. Therefore, economists of international economic institutions such as the World Bank and the International Monetary Fund and many academic economists have abandoned the traditional theory of public management and proposed solutions to solve problems and increase the provision of services by developing infrastructure projects, including public-private partnerships. These are the solutions (Asnaashari & Etemadnia,2018) The reason for this can be attributed to the lack of basic laws and a proper legal basis for accessing various financing methods. Different projects have different risks and therefore different returns can be considered for them What is customary in the country is only to borrow from banks with difficult conditions. The government is not free from these problems, and the financing and implementation of the country's infrastructure projects also face various problems. Utilizing the public-private partnership model and using different financing tools according to the needs of companies as well as projects, can solve the problems caused by complex rules (Rezazadeh Gan , 2016). Partnerships with the private sector have characteristics such as effectiveness, skills, innovation, technical motivation, financing and risk sharing. Borrowing is done against the cash flow that will be generated by the plan. Therefore, one of the conditions for the success of any plan is access to sufficient and timely financial resources, proper management of financial resources and its optimal use. Sufficient and timely, the plan will not be implemented or will not achieve the set goals (Ahmadi & Mousavi ,2017).

Public-private partnerships have now evolved as a model for financing and implementing countries' infrastructure projects in various dimensions of financing, risk management and contracting. But the important point here is the lack of proper knowledge about the scientific foundations, infrastructure and proper information about public-private partnerships in developing countries. The Islamic Republic of Iran, like other countries in the world, is facing the need to

implement infrastructure projects and the lack of government funding to finance it. In line with the general policies of Article 44 of the Constitution, public-private partnership as a new system of financing and project implementation in the transfer of government infrastructure projects to the private sector, which with a vision and future research approach can be a good alternative for project financing (Rahnama Rudposhti , Hibati & Ahmadi, 2019). The National Iranian Gas Company, as an operating company under the Ministry of Oil, is responsible for the development and exploitation of oil and gas reserves. Iran, which has the second largest oil reserves in the world and has huge gas reserves, certainly does not need the investment of international oil companies to develop its activities in the gas sector. Cooperation and interaction of national gas companies with international companies to gain global experience is inevitable. What is important is the type and manner of cooperation between national and international trading companies. Internationally used gas contracts are not very diverse. In many countries of the world, different contracts of participation in production are used, although the general principles governing them are the same. In recent years, Iran's oil industry in various ways such as: domestic reciprocal sale, foreign reciprocal sale, foreign reciprocal sale with domestic partner, domestic reciprocal sale with foreign partner and a combination of methods (finance, bonds, foreign exchange reserve fund resources and internal resources), It has attracted the financial resources needed to develop its oil and gas fields and, as a result of each of these methods, has concluded and implemented a special contract. It should be noted that the implementation of each of these methods has left special results and effects (Golabchi & noorzaei, 2014). The idea of public-private partnership is very attractive in theory, but in practice, there are many problems for its implementation, especially in developing countries. Also, the implementation of infrastructure projects is associated with many risks for the government and the private sector, which none of them can accept alone. Therefore, it is very important to investigate the different aspects of public-private partnership and the factors affecting its successful implementation, especially in developing countries. Therefore, according to the economic situation of the developing countries, the need for the development of large infrastructure projects, as well as

the limitation of the government's budgetary resources, the implementation of public-private partnerships in economic development and the transfer of public services to the government seem necessary

### **Literature review**

Public-private partnership contracts include various forms of long-term contracts between legal entities and public institutions. Their purpose is to finance, design, build, and, if necessary, exploit public sector projects and activities by the private sector, in other words, to transfer public or private project management to the private sector. The "public-private partnership" agreement should cover all the various economic and legal forms to enable private sector participation in public projects and activities. The long-term nature of the partnership agreement requires that the terms of the contract be adjusted so that, firstly, it has the necessary flexibility during the implementation period and, secondly, the necessary balance is established between the two parties to the contract. In such a way that the public sector ensures the receipt of services in accordance with the terms of the contract and the investor ensures the return of capital and profits (Bettignies & Ross, 2013). The idea of public-private partnerships is very appealing in theory, but in practice, there are many difficulties in implementing it, especially in developing countries. Also, the implementation of infrastructure projects is associated with many risks for the government and the private sector, none of which alone can not accept. Therefore, examining the various dimensions of public-private partnership and the factors affecting its successful implementation, especially in developing countries, is of great importance. Therefore, given the economic situation of developing countries, the need to develop large infrastructure projects as well as the limited budgetary resources of governments, the implementation of public-private partnerships in economic development and the transfer of public government services seems necessary (Hibati & Ahmadi, 2009). Contractual relations between the parties to the contract are regulated by the contract documents, which include different documents in different periods of the project. These documents may change during the authorized period for various reasons. The scope of these changes is wide depending

on the complexity of the subject of the contract, the high amount of the contract, the length of the contract as well as the change in the applicable laws. Changes in the provisions of the contract documents are made during the period allowed by the annex, and the contents of these annexes should normally give priority to the same subjects listed in the contract documents (Shingore, 2014).

In public-private partnership projects, the investor has no direct executive involvement in the implementation period and the commercial operation period, but in the implementation period (construction), is in the process of project development for planning and coordination, and in the commercial operation period (if he is the sole buyer of project services). As a recipient, project services must receive information. Despite the nature of public-private partnership projects where the control of the project is at the disposal of the investor until the end of the authorized period and the transfer of ownership to the investor, but due to the need to anticipate the conditions that can accelerate the transfer of the project from investor to investor, investor must have information. And be evidence so as not to be unaware of the conditions of the project (noee Aghdam, Hosseini & Emami, 2019). Many public-private partnership models, including joint venture (JV), strategic partnership for better use of public assets, design-construction-operation (DBO), design-construction-financing-operation (DBFO) There is. Some practical models of public-private partnership are shown in the table below:

Financing methods can be divided into internal and external in a general classification. Domestic financing methods include the government budget, obtaining bank loans, selling bonds, selling shares, and public-private partnerships, and foreign financing methods include foreign direct investment, credit lines, finance, and loans [6]. In this study, internal financing methods are considered.

**Table 1) Some public models of public-private partnership**

	<b>BOT</b>	<b>Concession</b>	<b>Lease Contract</b>	<b>Management Contracts</b>	<b>Service Contracts</b>
Investing and exploiting a major sector	Responsibility for all, operation and financing and making special investments	Responsibility for specific management, operation and renovation	Operations management or a major part of it	Various contracts for various types of support services	Scope of action
Public Private	Public Private	General	General	General	Asset ownership
Variable (Usually 25-30 years)	10-15 years	10-15 years	2-5 years	1-3 years	period of time
Private	Private	Private	Private	General	Responsibility for operation and maintenance
Private	Private	General	General	General	Investment
Private	Private	Common	General	General	Commercial risk
much	much	average	Average/low	low	The level of total risk borne by the private sector
Often fixed, variable in sections according to production parameters	All or part of the revenue	Proportion of income	Fixed payment, preferably motivated by efficiency	Price of services	How to compensate Private sector services

Source: Ghafari et al. (2019), urban infrastructure

**Table 2) Comparison of some public-private partnership agreements**

<b>Assignment</b>	<b>Use</b>	<b>Ownership</b>	<b>The main activity of a private company</b>	<b>contract type</b>
Operation of the project and free transfer	specified period of time	Government	Build	BOT
Project acquisition and free transfer	specified period of time	Private Company	Build	BOOT
Project acquisition	specified period of time	Private Company	Build	BOO
Project acquisition and transfer for a fee	specified period of time	Private Company	Build	BOOS
Assignment of interests	specified period of time	Government	Build	BLT
Free transfer of the project at the end	specified period of time	Private Company	Build	BOLT
Non-acquisition with free exploitation	specified period of time	Government	Build	BTO
Operation of the project and free transfer	specified period of time	Government	Rebuilding	ROT
Operation of the project and free transfer	specified period of time	Government	Civilization	MOT

Source: Golabchi et al. (2015), Transportation Engineering

Design-Construction-Financing-Operation Model (DBFO): This model is the most common form of public-private partnership involving four design-construction-financing-operation activities, providing a public-private partnership to finance the financing project. Private sector taxpayers, including banks or private investors, take steps to provide the facilities needed to provide services to the public sector. Next, the service provider builds, maintains, and operates to meet the needs of the public sector. The private sector receives its receipts on the basis of services provided and in accordance with specific performance standards during the contract. The components of the private sector financing model give them the flexibility to make their investments with the aim of maximizing returns (Mota & Moreira, 2019). Under BOT contracts, the private sector undertakes the process of "building" an infrastructure project and then obtains the "operating" and monetization privilege for a specified period of time to offset the cost of building the project. At the end of this period, the project will be automatically handed over to the public sector. For example, in the process of building a long-distance or intercity road under the BOT contract, a private company (or a consortium of several private companies) will take care of the road construction process and also finance the relevant costs. After the completion of the construction of the road, for a certain period of time (for example, 10 or 15 years), the private sector can collect tolls from passing vehicles within the framework of special regulations set out in the initial contract, and thus the principal and profit of its invested financial resources. Cover. At the end of this period, the ownership of the road is transferred to the public sector and the public sector decides whether to continue collecting tolls from passing vehicles. Naturally, similar contracts can be used to build subway lines, launch high-speed wireless networks in public places, and similar infrastructure projects within cities. Another important point in designing the details of BOT contracts is that if the time period set for the private sector in terms of concession of exploitation and revenue from the project starts exactly from the time the project is built, then the private sector is motivated to speed up The construction of the project will be maintained at the desired level. On the other hand, if the period starts

from the end of the project construction and coincides with the start of the operation process, the private sector will not have much incentive to accelerate the construction of the project. Or the private consortium finances and builds the infrastructure project or most of it (Rahmani & Mazhari, 2011).

Global experience shows that if there are clear and accurate communication structures and forecasting and analysis of various economic, social and political risks as well as technical projects with a public-private partnership framework, such projects will be able to increase the injection of private sector investment into various projects. And thus increase the quantity and quality of investment in infrastructure projects. With these descriptions (Yuan, Miroslaw & Qiming, 2016).

It seems that Iranian cities, especially metropolitan areas, can use this method, due to its widespread use in developing and developed countries and the various experiences in carrying out various urban projects, especially in the transportation sector. And use public transportation, rehabilitation of worn-out structures, expansion of information technology infrastructures, creation of recreation areas, passages, urban highways and the like. But given the components of a successful public-private partnership, analyzing the consequences and creating the relevant legal and social contexts is crucial. Therefore, the problem in this article is based on three questions.

- What is the pattern of public-private partnership in financing the projects of National Gas Company of Iran?
- What are the factors affecting the public-private participation in the projects of National Gas Company of Iran?
- Is the quantitative model capable of predicting the financing structure of National Gas Company of Iran projects?

## Research background

Poorabrahimi, Daliri, Saghafi and Abdo Tabrizi (2020) in an article entitled The study of the effect of corporate and performance variables on the choice of financing method and the interaction of financing method on these variables on the impact of knowledge-based economy in increasing per capita

production, social welfare, reducing inequality in income distribution, increasing opportunities Jobs and improving the quality of the environment and improving the quality of products are pointed out as the characteristics of sustainable development. In this regard, in the statement of resistance economics, the Supreme Leader of the Knowledge-Based Economy has stated that one of the main policies in order to achieve the goals of resistance economics has been proposed. In order to achieve a knowledge-based economy, it is necessary and undeniable to pay attention and emphasize the role of companies active in this field.

In order to develop these companies and make their role in economic processes more colorful, it is necessary to identify the variables affecting these companies and conduct the necessary studies in order to make appropriate decisions. One of the key elements in the development of knowledge-based companies is the issue of financial resources of these companies. Existence of efficient financial system in knowledge-based companies can pave the way for the growth and development of these companies and advance their development plans with the least financial cost. In this study, using regression approach, the effect of corporate and performance variables on the choice of financing method is identified and also the interaction of financing method on these variables will be investigated. Faraji and Jalali, (2019) In an article entitled "Identification and Prioritization of Factors Affecting the Implementation of Public-Private Partnership in Mining Projects", Faraji et al. The use of public-private partnership (PPP) method is one of the effective strategies in financing with the participation and cooperation of the private sector. Proper implementation of PPP in mining projects requires identifying the effective factors of success by reviewing and studying the experiences of countries around the world, as well as using the opinions of experts and specialists. In this study, in order to identify and prioritize the factors affecting PPP success in mining projects by library studies and reviewing documents, the main factors of success were identified and questionnaires were developed and prioritized and provided to experts. The results of the questionnaire were ranked using Friedman test. The results show that the definition of a suitable project is the most important among the factors affecting the success of public-private partnership projects and the factors

regulating the payment mechanism, concluding a suitable contract, appropriate political and social environment and formulating and approving laws are in the next ranks. Noee aghdam, hoseynee, meamarnejad and emamee, (2017) in an article entitled "Effectiveness of financing through public-private participation in achieving development goals" to explain the difference between the impact of financing through public-private participation with other methods of financing on development goals in the Iranian economy. Research hypothesis The survey data of 1396 were tested by fuzzy Delphi method using one-way analysis of variance, Kruskal-Wallis and least significant differences. Findings show a significant difference between the impact of financing through public-private partnerships with financing methods through borrowing, selling bonds and selling stocks on IRA development goals. There is no significant difference between financing through public-private partnership and government budget in terms of impact on development goals. In order to achieve the development goals, it is necessary to increase the share of public-private financing method among other financing methods. Liberalization of government funding makes it possible to increase private sector participation. Keshtiban, (2009) The last few decades have seen an increase in the number of large-scale urban development projects in the field of public-private partnerships. Due to the problems of public-private partnership, serious attention is paid to the separation of public and private roles of departments and contracts outside the project. In a privately run urban development contract, development duties, risks and responsibilities are transferred to the private sector. An empirical case study of New Zealand, Korea, which is claimed to be the largest private sector development in the world, suggests that the benefits of public-private partnerships, other than the development opportunities offered to the private sector, pose less of a challenge to public sector projects. Danesh Jafari, (2012) Over the past two decades, international government contributions have become an important issue for improving public health in low- and middle-income countries. Governments have realized that the private sector can make a valuable contribution to overcoming major health challenges in financing, innovation, development and distribution projects. Private participation in health can bring many benefits, but it

may also raise some concerns. The first step in identifying the best way for public-private partnerships to maximize benefits and minimize risks is to identify potential benefits, challenges, and motivations. We define incentives as the reasons that private partners engage with public partners. The main finding of the article is that despite some significant and vital limitations, there are many benefits to public-private participation in the field of health.

Noorzaei, Makiabad and Afzali, (2013) Public and private partnerships to provide public infrastructure have costly contractual processes. Standard contracts are structural documents that provide standard requirements for this process; It is argued that they reduce transaction costs by restricting contract negotiations. This study, based on research and interviews, shows that the use of standard contracts in a wide range of sub-sectors, including artificial turf fields, gyms and multi-purpose sports centers, improves contract performance. Has been The failures are due to the conflict of interests of local governments, which is due to the prominent role and, of course, poor management of the public sector. Different levels of success are related to inefficient government responses in asset management. Rahnama Rudposhti, Hibati, Nikoram and Ahmadi, (2007) The development of infrastructure projects and the provision of more efficient and quality services are among the important and vital factors in the economic growth and development of countries. Meanwhile, the study of the literature on the subject indicates the relationship between economic freedom and the use of public-private participation. The present article examines the relationship between economic freedom and the extent to which participation in public-private partnerships is enhanced in 29 developing countries during the period 1999-2008. In the case of Iran, only the property rights index has a direct and statistically significant relationship, and the indicators of trade freedom, investment freedom, and financial freedom are inversely and statistically significant inversely related to public-private participation. However, the findings of this paper indicate that the relationship between business freedom, financial freedom, government size, monetary freedom, freedom from corruption, and the extent to which public-private partnerships are used is insignificant.

Ezzatabadipour and Taherpour, (2014) The purpose of this study is to identify the variables that affect the

success of public-private partnerships. In this study, after a lot of research among experts and ten tundra workers familiar with this field, twenty-five experts in the field of service infrastructure of the country were identified and tested. These individuals were asked to answer the questionnaire questions in two ways; In one dimension, they were asked to indicate how important in their view, the variables identified in the research, and in another dimension, using their experience, to determine how much these variables are present in public-private partnership projects in Iran. The textbook is based on theoretical foundations and articles related to the research topic. Also, using Cronbach's alpha coefficient, the validity of the present letter has been declared 0.934. In this study, to measure the importance and amount of identified variables, the entropy technique is used to analyze the content and as a result, it is stated that "the level of trust between the parties" is of the highest importance and "the inability of the public sector to restructure in proportion to the partnership. Public-private is of the least importance (from the point of view of passers-by)

In the research of Mohammadi, Mehdi [14], it is stated that with public-private partnership, the public sector will provide efficient and effective services, in addition to optimal utilization of the expertise, resources and innovation of the private sector. Although public-private partnerships are attractive in theory, there are many problems to implement them in practice. The purpose of this research is the obstacles of public sector financing for construction projects in Isfahan province with a multi-criteria approach. The statistical community of this research includes all managers, experts and experts who have expertise, experience and knowledge in the field of public sector financing. Due to the uncertainty of the exact size of this community, taking into account the theoretical saturation, the sample size is 40 people, and by quota sampling, 40 questionnaires were collected among 20 organizations from all the organizations in charge of construction projects in the province. was distributed The measurement tool is a researcher-made questionnaire, which experts confirmed its formal and content validity. To analyze the data using the TOPSIS method, the answers to the questions of this research were examined and finally 66 obstacles were identified and classified into five categories; In addition, the research findings show that public-private partnership contracts include service, rental, management,

construction and operation, transfer, concession and joint investment contracts in the order of the least obstacles.

**Method**

The research method of the present research is applied in terms of purpose and exploratory in terms of method and mixed method is used. The present study is developmental in terms of its purpose and is among qualitative studies considering the type of data and the style of analysis and documentation. Data analysis was done using neural networks, correlation, confirmatory factor analysis and structural modeling with Amos software in the qualitative part of the method. Interview-based coding will be used. Qualitative data is obtained from the results of interviews with experts, and quantitative data is also extracted using a questionnaire, and in terms of implementation, part of it is descriptive and survey, and the other part is a correlation-causal method, which uses structural equation modeling of the amount and type of effects (direct and indirect) a number of independent variables will be studied. Sampling in qualitative research is usually done purposefully using non-probability methods and continues until theory saturation. Most of the qualitative research is done using interview tools and from the perspective of experts. The number of samples is usually very limited and the criterion for the end of sampling is theoretical saturation

In the present research, in the qualitative part, 8 members of the faculty related to the subject who have more than 15 years of teaching experience and have related publications and researches in the field of financial and organizational management, as well as 7 members of elite financial managers and experts who work in the gas company They are responsible for the financial department and are responsible for the contracts and have more than 12 years of experience. They are selected by snowball sampling method. And in the quantitative part, 380 experts and employees of National Gas Company of Iran were selected based on Morgan's table by simple random sampling method, and to collect information after conducting interviews and determining the dimensions and model of the financing model, a questionnaire is prepared, which has 110 items are arranged with a 5-point Likert scale.

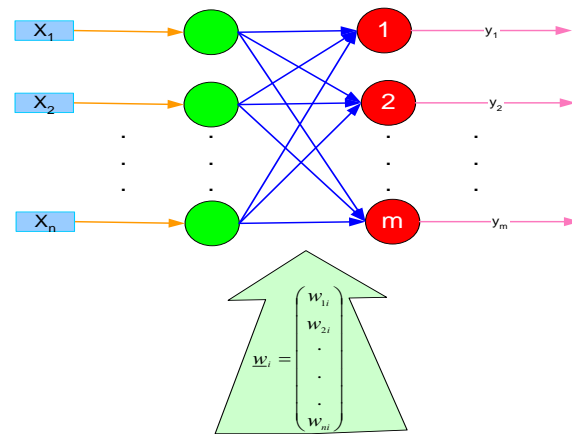
To analyze the data in the qualitative section after conducting a semi-structured interview, which was done by asking the following questions: (a) What are

the components of financing? (b) What should be the state of formation of optimal contracts in government public partnership? (c) What factors affect the formation of valid contracts in the field of gas company contracts? Then the necessary data were collected based on "theoretical saturation".

**Table 3) Statistical sample table**

Number	Statistical population in the qualitative sector	Row
6	Experienced managers of the gas company University professors in the field of financial management	1
4		2
3	Financial experts of gas company	3
2	University professors in the field of public administration	4
15	Total	

On the other hand, in the quantitative part of the SOM algorithm, it is a type of neural network model that is used in the implementation and projection of nonlinear characteristics from multidimensional space to one-dimensional space (Kohonen quoted by Sefidari and others, 2013).



**Figure 1) Structural model of one-dimensional Kohonen network (Amiri et al., 2018)**

In order to prioritize the impact of organizational dimensions on financing, the self-organizing neural network model is used, and the output tables are analyzed using the neural network section of SPS software version 24.



In order to be able to use neural networks to achieve the appropriate prediction of the components in the form of a model, it is necessary to classify the variable of financial levels into two levels of low grades and high grades. By using the components and the structure of the hyperbolic basis function (mathematical function), it reaches the neural network estimation stage. The table below shows the classified levels of actual funding scores and predicted levels using neural networks

320 people have been used as the training part and 60 people have been used as the test part in the neural network training part of spss software, which is sufficient. The hyperbolic basis function has been used as a basis function for predicting neural networks.

**Table 4: Variable classification table of financing levels in two groups of education and test**

Predicted values			Observed	sample
Correct percentage	High level	Low level		
88.1	10	112	Low level	Education
97.4	188	0	High level	
90	1	22	Low level	Test
97.2	36	1	High level	
100	93%	90.7 %	Percent total	

In the classification of the qualitative variable of financing, two levels of poor financing and good financing are divided, which are considered based on the central indicators of the quantitative variable of financing. In neural networks, there are two evaluation groups: at the learning level, it designs rules from the data set, and in the test section, it tests the predicted values based on real data to show the correctness of the model in prediction. In the above table, it is shown that the financing variable based on 25 organizational components in the learning and training group is low in 112 cases and using the learning and training rule of

neural networks, the level of contamination of the desired model of low neural networks is introduced and in 15 cases The responsiveness of the financing variable is low, but the predicted values using the learning and training functions of neural networks are introduced as the second code, ie the high level of responsiveness, which is 88.1% in the training section for code 1, which indicates the low level of responsiveness. Is more than 85%. Therefore, the prediction classification that is desirable and significant for the low response level based on the financing components, which indicates the appropriate learning rules based on the defined performance function. In the high response level section, neural networks function well and in 97% of cases Has done. In the test section, which shows the test phase of the rules of learning and training of neural networks that have been examined at a low level of response, in 22 cases, which include 0.95% of cases, the low level of response is introduced as low and 100% for a high level of response. Cases have been predicted.

Therefore, according to the above table, in 97% of cases, the correct percentage is related to the neural network test to predict the high type of response variable.

Table 4-3 shows the estimation of the parameters related to the predictive function of neural networks, depending on the type of response level based on financing indicators.

What are the factors affecting the public-private participation in the projects of National Gas Company of Iran?

Is the quantitative model capable of predicting the financing structure of National Gas Company of Iran project

The final model is written based on the coded variables of the financing components:

**Table 5: Parameter estimation table**

Output Layer	Output Layer				Predictive variables
		H1	H2	H3	
		1.288	.338	.863	Technical efficiency
		.652	.720	1.054	Technical knowledge
		1.752	.105	.775	Minimize costs
		.274	.400	.773	Commitment Support
		.610	.771	.277	Commitment to values
		.747	.143	.775	Efficiency

Output Layer	Output Layer				Predictive variables
		.233	.018	.863	Observance of moral norms
		.652	.779	.047	Experimental effectiveness
		.752	.092	.473	Performance quality
		1.007	.461	.863	Reduce office automation
		.626	.739	.110	Responsible accountability
		1.74	.114	.269	Consulting and cooperation
		1.204	.409	.772	Qualified consultants
		.652	.860	.116	Inspection and supervision
		.700	.136	.775	Identify capabilities
		.369	.007	.863	work discipline
		.629	.049	.464	Align with the goals of the organization
		.446	.140	.775	Specialization
		1.200	.427	.863	Accuracy at work
		.609	.030	1.113	Competence
		.736	.224	.775	Systematic thinking
		.209	.314	.863	Technical self-efficacy
		.338	.798	.454	Support the technical elite
		.747	.207	.637	Time evaluation
.324	.676				H1
.240	.960				H2
.145	.382				H3

In Table 4, the amount of predictive coefficients based on two hidden functions of hyperbolic effects related to learning and training of neural networks are obtained, which shows the presence of variables in the neural network model in function (1) H to H(3). and in two functions (1) H and (2) HH (3) it is 0.676 and 0.382.960, respectively. In the second layer, the concentration variable coefficient in the functions H(1), H(2), H(3) is 0.324 and 0.24, respectively, 0.145. Regression coefficients of neural networks in the second layer form the neural network model for predicting the financial variable.

Is the quantitative model capable of predicting the financing structure of National Gas Company of Iran projects?

On the other hand, the structural equation model is a method for investigating the relationships between hidden variables, which also considers observable variables at the same time. Hidden variables are the main factors that are shown in a pattern or conceptual model. Observable variables are the same items or questions related to measuring the main factors. In fact, structural equation model is the Persian translation of Structural Equation Model, which is also called SEM for short.

This method is a special causal structure between a set of latent variables and observable variables. Using the structural equation modeling method, the relationships between hidden variables can be investigated, as well as the measurement items of each hidden variable with the relevant variable. Emos software is used to perform the calculations of this method.

To evaluate the validity of measurement models, the first criterion is convergent validity (AVE). This narrative means that the set of references explains the main structure. Fornell and Locker Davari & Rezazadeh, (2014) have proposed the use of the extracted mean variance (AVE) as a measure of convergent validity. A minimum AVE of 0.5 indicates sufficient convergence validity, meaning that a latent variable can, on average, explain more than half of the scatter of its representations.

The second criterion is differential validity, which is given in the PLS path modeling as the Fornell and Larker criteria. The Farnell Larker criterion claims that a variable should have a greater dispersion among its variables than the representations of other latent variables. Statistically, the AVE root for each latent variable should be greater than the correlation of that variable with other latent variables in the model. The

results of the reliability and validity of the measurement model are given in the following tables (Momeni ,2013).

The diagram below shows the validity of the components through confirmatory factor analysis related to the financing components along with the questions of the questionnaire, which shows the factor load weights greater than 0.4. Also, factor load covariance relationships are greater than 0.4.

**Table 6) Confirmatory factor analysis of standard estimation mode**

Component	A number of meanings		
	questions	(sig)	Result
Technical efficiency	question 1	•/۷۹	•/•••
	question 2	•/۹۰	•/•••
	question 3	•/۶•	•/•••
	question 4	•/۹۰	•/•••
	question 5	•/۶۸	•/•••
	question 6	•/۸۶	•/•••
	question 7	•/۸•	•/•••
Technical knowledge	question 8	•/۹۰	•/•••
	question 9	•/۹۶	•/•••
	question 10	•/۸۱	•/•••
	question 11	•/۷۸	•/•••
	question 12	•/۷۱	•/•••
Minimize costs	question 13	•/۸۷	•/•••
	question 14	•/۸۳	•/•••
	question 15	•/۸۱	•/•••
	question 16	•/۶۹	•/•••
Commitment Support	question 17	•/۸۹	•/•••
	question 18	•/۸۹	•/•••
	question 19	•/۹۰	•/•••
	question 20	•/۹۰	•/•••
	question 21	•/۸۱	•/•••
Respect the parties	question 22	•/۹۶	•/•••
	question 23	•/۸•	•/•••
	question 24	•/۹۶	•/•••
Responsible accountability	question 25	•/۸۴	•/•••
	question 26	•/۷۲	•/•••
	question 51	•/۸۴	•/•••
Consulting and cooperation	question 52	•/۸۸	•/•••
	question 53	•/۹•	•/•••
	question 54	•/۸۸	•/•••
	question 55	•/۹•	•/•••
	question 56	•/۷۸	•/•••

Component	A number of meanings		
	questions	(sig)	Result
	question 57	•/۹۶	•/•••
	question 58	•/۹۶	•/•••
	question 59	•/۹۶	•/•••
	question 60	•/۸•	•/•••
Qualified consultants	question 61	•/۹۶	•/•••
	question 62	•/۸۷	•/•••
	question 63	•/۸۷	•/•••
Inspection and supervision	question 64	•/۶۹	•/•••
	question 65	•/۸۹	•/•••
	question 66	•/۶۲	•/•••
Identify capabilities	question 67	•/۸۹	•/•••
	question 68	•/۸۷	•/•••
	question 69	•/۸۷	•/•••
	question 70	•/۸۹	•/•••
Work and contract discipline	question 71	•/۸۷	•/•••
	question 72	•/۸۹	•/•••
	question 73	•/۸۷	•/•••
	question 74	•/۹۴	•/•••
Alignment with organizational goals	question 75	•/۰۰	•/•••
	question 76	•/۰۲	•/•••
	question 77	•/۹۴	•/•••
	question 78	•/۰۲	•/•••
	question 79	•/۹۴	•/•••
	question 80	•/۷۶	•/•••
Respect the parties	question 81	•/۹•	•/•••
	question 27	•/۹۰	•/•••
	question 28	•/۷۲	•/•••
	question 29	•/۹۰	•/•••
Commitment to continuous efficiency increase	question 30	•/۶•	•/•••
	question 31	•/۸۳	•/•••
	question 32	•/۹•	•/•••
Observance of moral norms	question 33	•/۷۲	•/•••
	question 34	•/۷۹	•/•••
	question 35	•/۹۰	•/•••
Experimental effectiveness	question 36	•/۶۶	•/•••
	question 37	•/۹۰	•/•••
	question 38	•/۹۰	•/•••
	question 39	•/۷۸	•/•••
Performance quality	question 40	•/۹۰	•/•••
	question 41	•/۶•	•/•••
	question 42	•/۸۸	•/•••
Reduce office automation	question 43	•/۹•	•/•••
	question 44	•/۹۳	•/•••
	question 45	•/۸۴	•/•••
	question 46	•/۹۳	•/•••
	question 47	•/۹۳	•/•••

Component	A number of meanings		
	questions	(sig)	Result
	question 48	./٨٤	./٠٠٠
	question 49	./٩٣	./٠٠٠
	question 50	./٠١	./٠٠٠
Responsible accountability	question 51	./٨٤	./٠٠٠
	question 52	./٨٨	./٠٠٠
Specialization	question 82	./٨٤	./٠٠٠
	question 83	./٧٩	./٠٠٠
	question 84	./٩٠	./٠٠٠
	question 85	./٦٠	./٠٠٠
	question 86	./٩٠	./٠٠٠
Accuracy at work Competenc	question 87	./٦٨	./٠٠٠
Accuracy at work Competenc	question 88	./٨٦	./٠٠٠
	question 89	./٨٠	./٠٠٠
	question 90	./٩٠	./٠٠٠
	question 91	./٩٦	./٠٠٠
Systematic thinking	question 92	./٨١	./٠٠٠
	question 93	./٧٨	./٠٠٠

Component	A number of meanings		
	questions	(sig)	Result
	question 94	./٧١	./٠٠٠
	question 95	./٨٧	./٠٠٠
	question 96	./٨٣	./٠٠٠
Technical self-efficacy	question 97	./٨١	./٠٠٠
	question 98	./٦٩	./٠٠٠
	question 99	./٨٩	./٠٠٠
	question 100	./٨٩	./٠٠٠
	question 101	./٩٠	./٠٠٠
	question 102	./٩٠	./٠٠٠
Support the technical elite	question 103	./٨١	./٠٠٠
	question 104	./٩٦	./٠٠٠
	question 105	./٨٠	./٠٠٠
	question 106	./٩٠	./٠٠٠
evaluation Time	question 107	./٨٤	./٠٠٠
	question 108	./٧٢	./٠٠٠
	question 109	./٩٠	./٠٠٠

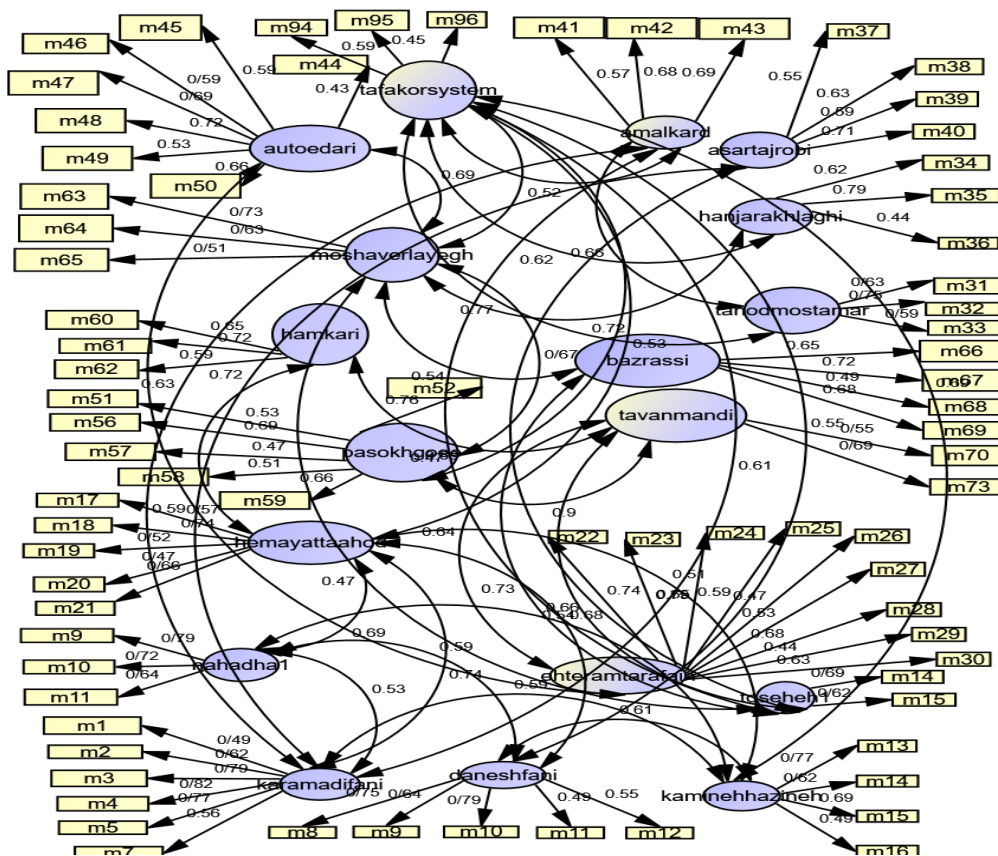


Figure ۲) Validity of financing components using confirmatory factor analysis

Factor load is a numerical value that determines the intensity of the relationship between a hidden variable and the corresponding manifest variable during the process of path analysis. The higher the factor load in the structural model of an index in relation to a specific structure, the greater the contribution of that index to the explanation of that structure. Therefore, the contribution of each of the items and components is obtained with factor load weights in the above table and they show values greater than 0.4. The diagram below is the structural model of financing components, whose factor loadings indicate significant effective weights in the model.

The composite reliability criterion and Cronbach's alpha are used for the reliability of structures, and the superiority of composite reliability over Cronbach's alpha is that in calculating Cronbach's alpha for each structure, all indicators are included in the calculations with equal importance, while for the calculation of CR Indicators with higher factor load are more important. The optimal value of this criterion is greater than or equal to 0.7. In order to fit the structural model of the research, a number of goodness of fit indices have been used. Since most of the goodness of fit indices are accepted in the range, the model has a good fit as shown in the table below.

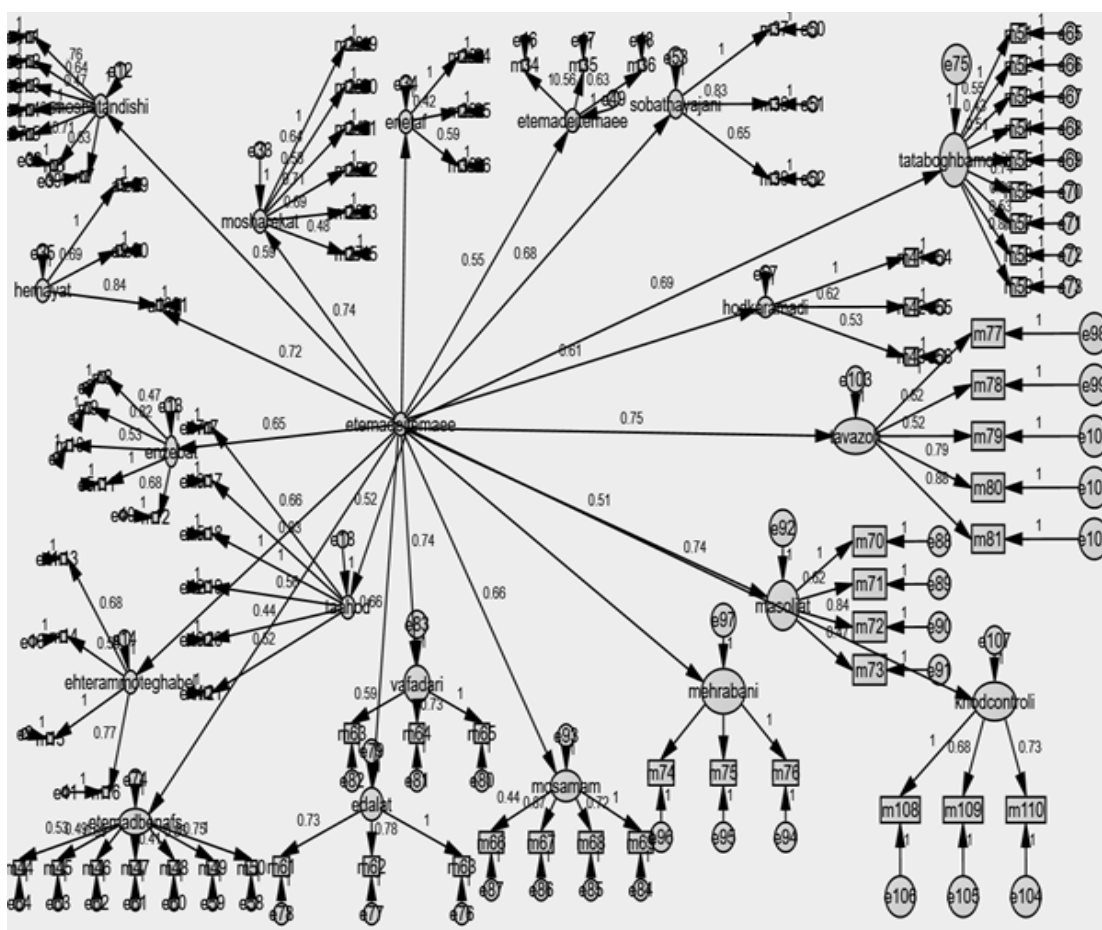


Figure ۳) The tested model of the components of financing dime

**Table V )Investigation of one-dimensionality of references (Cronbach's alpha and hybrid)**

Cronbach's alpha	Composite reliability cp	Variable
•/۷۲	•/۷۰	Technical efficiency
•/۷۰	•/۷۹	Technical knowledge
•/۷۰	•/۸۳	Minimize costs
•/۷۷	•/۸۴	Commitment Support
•/۷۹	•/۸۴	Respect the parties
•/۷۷	•/۷۸	Commitment to continuous performance enhancement
•/۷۸	•/۷۹	Observance of moral norm
•/۷۹	•/۸۰	Experimental effectiveness
•/۹۳	•/۹۴	Performance quality
•/۸۷	•/۸۹	Reduce office automation
•/۸۱	•/۸۰	Administrative Accountability
•/۷۲	•/۷۰	Consulting and cooperation
•/۷۰	•/۷۹	Qualified consultants
•/۷۰	•/۸۳	Inspection and supervision
•/۷۷	•/۸۴	Educational and time evaluation
•/۷۹	•/۸۴	Identify capabilities
•/۷۷	•/۷۸	Specialization
•/۷۸	•/۷۹	Alignment with goals
•/۷۹	•/۸۰	Elite support
•/۹۳	•/۹۴	Organizational discipline
•/۸۷	•/۸۹	Competence
•/۸۱	•/۸۰	Systematic thinking
•/۷۹	•/۸۴	Office self-efficacy

Several indices are used to evaluate the suitability of the structural equation model. An index used is the chi-square index (X2), which is considered an index of the absolute suitability of the model, and the higher it is, the lower the suitability of the model. When the sample size is equal to 75 to 200, the chi-square value (X2) is a reasonable measure of Since the chi-square is very sensitive to the sample size, many researchers measure the chi-square relative to its degree of freedom, that is, the relative chi-square (X2/df). The ratio of this index minimizes the effect of sample size on chi square model. If this index is less than 2, it indicates excellent fit, and if it is between 2 and 5, it is good fit, and if it is greater than 5, it indicates poor and unacceptable fit of the model. goodness of fit. But for models with larger N, the chi-square (X2) is almost always statistically significant, and this makes the chi-square statistic ( X2) almost always rejects the model. One of the desired indexes in the structural equation model is the Goodness of Fit Index (GFI), whose values vary between zero and one, and the closer to one, the better the fit. Also, the adjusted goodness of fit index (AGFI) is an overall measure of goodness of fit and takes into account the number of degrees of freedom. When this index is equal to 0.80 or more, the fit of the model is acceptable, and values close to 0.95 indicate a good fit. The fitting of the structural model of the main hypothesis has been done, which shows that they have significant values in confirming the model

**Table ^ ) of the final research model (main question)**

The amount obtained in the present study	Recommended amount	index name
77/1	Between 1 and 5	Chi-square ratio of degrees of freedom (X2/df)
032/0	Less than 0.05	Root Mean Square Error of Approximation (RMSEA)
93/0	More than 0.9	Softened Fit Index (NFI)
91/0	More than 0.9	Comparative Fit Index (CFI)
92/0	More than 0.9	Pentler-Pont Indicator (NFI)
66/0	More than 0.5	Parsimonious fit indices (PNFI)
95/0	More than 0.9	incremental fit index (IFI)
95/0	More than 0.^	Adjusted goodness of fit index (AGFI)

## Discussion and conclusion

As the results of research show, the formation of financing in public-private partnerships leads to the registration of regular and complete contracts. In order to provide a suitable model for the optimal financing model, the applied model has been used. In the technical dimensions related to financing management, the positive and semantic impact of the technical dimension components has been confirmed. In the section of technical dimensions, the most influential component is the technical knowledge of the contracting party. The second priority in the technical dimension is the technical efficiency of contractors in contract registration, which can improve the management of financing in positive contracts. The third priority in the technical dimension is related to specialization, which can be effective in managing financing and positive contracts. In the structural model section, the effect of financial dimension components on financing management based on weights has been prioritized. The first influential component in the financial dimension is financial commitment support, which can play an important role in financing management. The second priority is related to the financial dimension component of cost minimization, which is effective in optimizing the financing management. To explore the dimensions of the financing optimization model, interviews with elites were conducted. Training, the necessary competence to improve the quality of contracts and agreements and pay attention to efficient acceptance in the implementation of monitoring programs and specialized reforms in the implementation of financing and understanding the conscientiousness and responsibility of contractors and having a vision for development-oriented programs, full knowledge of information and professional resources in contracts and agreements. Having technical literacy and having a suitable roadmap for implementing technical guidelines and rules of communication with colleagues with regard to processing and transfer of information and specialized technical knowledge in contracts, systematic control and leadership and appropriate assessment in evaluating creativity in questioning and courage in meeting technical experts in financing management needs is.

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