

## Contractual Challenges to Mehr Housing Project in Iran, and Presenting Appropriate Strategies: A Case Study of Pakdasht Project

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### ABSTRACT

Mehr housing project can be one of the largest housing projects which had been implemented in 9th and 10th governments of Iran. In this paper we try to study contractual challenges to this project in Pakdasht County, in Tehran, Iran, and give some appropriate solutions to meet these challenges. In this survey study, data collection tool was two questionnaires based on FIDIC contract guide, and UK Task Force guide. In our study, *financial risk management, pricing policies, quality management, time management, and transfer system* were introduced as construction contract challenges to Mehr housing project. Finally, to reduce challenges, some useful solutions as well as appropriate contract model were suggested.

**KEYWORDS:** Construction Contract, Challenges, Mehr Housing Project, Iran

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### INTRODUCTION

It is clear that housing has been one of the biggest challenges facing Iranian families, especially citizens of metropolises. Approximately one million marriages are registered in Iran annually. Undoubtedly, these families need a new house to start their marital lives. Skyrocketing housing prices in metropolises and even in cities is considered as a major obstacle to youth. Moreover, many Iranian married couples live in rented houses. For this reason, the government has decided to provide housing for people excluding the cost of land since 2005. Mehr housing project can be considered as one of the largest housing projects, which has been implemented in 9th and 10<sup>th</sup> governments of Iran. Although his project has had many achievements since now, and provided houses for many people in the cities of Iran, experts have offered serious criticisms against it. The supreme leader of Iran, Ayatollah Khamenei, denominated the year 2012 as the year of National Production, Support of Labor, and Iranian Capital, and according to him, national entrepreneurship should be supported. A large number of contractors and related technical, engineering, and constructive forces, who benefit from Mehr housing projects, have faced with several problems and challenges resulting in the cessation and extension of the contract period, and cancellation of economic justification of the project, and in some cases, collapse of entrepreneurship. The aim of this research is to identify the contractual challenges to Mehr housing project and portray the current status of this project, which is a result of the relative changes in time, cost, and quality of the project and has led to the beneficiaries' dissatisfaction. This research also aims to provide some solutions to meet the problems. To this end, a few numbers of projects should be investigated. Pakdasht project currently is one of the biggest Mehr housing projects of Housing Foundation of Tehran, Iran, which have encountered with many problems. Although the provision of contracts on Mehr housing project is set alike throughout Iran, this research examines the contract problems of Pakdasht Mehr housing project, and answers the following questions.

1. Has contractual provision led Mehr housing project to deviate from its original goals in build process?
2. Which provisions of the contract on Mehr housing project have made changes in time, cost, and quality of the contract on behalf of contractors and builders?

### MATERIALS AND METHODS

#### Construction industry:

We live in an age in which the complexity in all areas such as construction industry is increasing. There have been multiple complexities in recent decades such as oil embargo, environmental obligations, safety rules, limiting policies, the most critical one i.e., unusual litigations. In fact, construction industry has become challenging more and more. In confronting with such problems, the construction industry, which has been always in coordination with

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changes, has provided different solutions to meet the problems by extending the provisions of the contracts, and presenting various systems to implement the projects.

Construction industry had witnessed a remarkable evolution in terms of contract types and project implementation systems over the last 25 years due to the employer's growing needs, the importance of time, increasing demand for safety and quality, and the essential issue in construction industry namely cost reduction.[1]

In recent years, with the emergence of new challenges in the field of construction, construction industry, which has always been in consistence with changes, have adopted various solutions for overcoming such challenges and allocating them appropriately by extending and generalizing contract provisions, and presenting various systems for project implementation. In construction industry, the employer should make decision about the project requirements which can be met outside the organization, and cases which can be done within the organization. If the employer decides to use outside organizations to supply required goods, services, information, and products, different processes of procurement management and contract management can be used. Such decision-makings called project procurement strategy are considered as one of important decisions of the project. Project procurement strategy involves two following important issues: 1. determining organization type used for procurement (i.e. using outside resource or resources for different phases of the project especially for design and construction phases) 2. Determining contract type in terms of payment

Determining project procurement strategy is the first step which is taken towards the process of procurement management of projects. The basis of project procurement strategy is to allocate risks among different groups involved in the project. Therefore, it is closely associated with risk management process. By choosing the organization type for procurement strategy, the project procurement is defined based on different running systems including methods in which the organization uses its own sources for both project design and construction (e.g. consignment phase), methods in which single sources are used for both design and construction phases (e.g. conventional or design phase, bidding, and construction), and other methods which are based on the management. By using conventional methods more than consignment, the risks allocated to the contractor are increased. Also it should be considered that making decision on payment methods of the contracts leads to the development of two main types of contracts including fixed-price and pay-back contracts. Fixed-price contracts transfer greater risks to the contractor in comparison with pay-back contracts. Uncertainty may arise in many projects due to the nature of any project. Some projects have the potential to influence the project goals. In fact, these are the project goals and uncertainties that create the risk. The main point about the risk distribution and allocation in project environments is that risks should be allocated to a group which has the ability to manage and control in the best way.

#### **Construct contract types:**

Contract can be classified in several ways. Three common ways are:

- Classifying contract based on the awarding method
- Classifying contract based on the pricing method
- Classifying contract based on the project implantation system

**Contract types based on the awarding method:** The success of the civil projects is primarily due to the appropriate contractor selection. Therefore, contractor selection is mainly defined as the most challenging key decision-making in the field of outsourcing projects. Employers and investors of construction sector have always attempted to reduce the risks of bid and the costs of the project by preferring the lowest offered price rather than other advantages of contractors.

Quality control management and contractor selection are the main parts of construction process, because contractors are considered as one of the civil project pillars, and the main factor of turning sources into the final production. Considering that the main part of civil projects budgets is allocated to executive operations, implementation of every project requires an appropriate contractor who has the necessary abilities to carry out the project in terms of anticipated time and sources, and the considered quality.

Current method of contractor selection in civil projects is based on the lowest offered price, and different qualitative and quantitative indicators with various degrees of importance are discussed in the contractor's competency. Contract types based on the awarded method are:

- (a). Competitive bidding procedure
- (b). Negotiation procedure

**Competitive bidding procedure:** Bidding process and bidding arbitration are the main phases of the project procurement, which are considered as the critical activities and tasks of procurement sector. Usually the main purpose of bidding is to select the minimum price, while the original approach of bidding and bidding arbitration is to pay attention to select the chosen source and achieve minimum cost and maximum efficiency. Sometimes price is the determining factor of bidding arbitration and construction projects. It should be noted that in case of inability of the contractor to deliver the project on time, minimum price does not always mean minimum cost.

*Negotiation procedure:* In cases where holding bid is not possible based on the justification report of bid holder, the contract can be carried out in another way. Negotiation allows a broad range of criteria to be discussed. Therefore, it exists in most of the project implementation systems. In recent years, considering the potentials of negotiation procedure, the projects of government sector are noticeably awarded, while most of the contracts are concluded based on the negotiation rather than competitive bidding.

**Contract types based on the pricing:** Payment method reflects the amount of uncertainty in a project. So, it becomes clear that one of the fundamental differences among various contract types is the way of managing risks and their related payments, which can be included in a range from contracts based on the price and the contracts based on the cost. There are various types of payment methods in contracts for procuring goods and services, and carrying out different projects. They can be divided into two broad categories including lump-sum contract and pay-back contract. [2]

*Fixed-Price Contract (FPC):* In this type of contract, a fixed price is considered to provide the contract services, which is given to the service provider during the regular payment plan. This contract type can be used for services which have clear and precise dimensions, and if it is possible to change the contract services during the work, it will be tried to avoid using such type. It is obvious that in this type, all uncertainties, and consequently all risks are transferred to the contractor, and the employer will not take any financial risk.

*Unit Price Contract, No Escalation (UPC-E):* In UPC-E, some unit prices are considered for various works as fixed prices which are included in the contract. These unit prices are constant for the entire duration of the contract, and no escalation is made to them. This type of contract is mostly used for services with clear, detailed specifications and unknown workload, and the employer can arbitrarily change the workload at work, but making change in the specification is not possible without make a change in the price. The main point about such contracts is the precise control of the amount of works. Obviously, in such contract, the employer is responsible for all uncertainties and financial risks, and does not accept any risk. Also, as the costs increases, the contractor's profit will be more.

*Unit Price Contract, With Escalation (UPC-E):* In comparison to the aforementioned contract types, the unit prices of this contract type are moderated in contract duration during a specific period of time (e.g. every three months) considering the price inflation and specified parameters. It is clear that the employer is responsible for uncertainties resulting from financial inflation of the society, and the related risks, and the contractor is responsible for other risks.

*Cost Plus Fixed Fee Contract (CPFF):* In this contract, the contractor registers the actual costs of the works, and all the costs are paid by the employer. Clearly, in this contract type, the employer is responsible for all the uncertainties and financial risks, and the contractor does not accept any risk except that the contractor's benefit should not exceed a certain amount.

*Cost Plus Percentage Fee Contract (CPPF):* This contract type is as same as the above-mentioned types, but it differs from them in terms of that a percent of cost related to works done by the contractor is paid to him or her as a fee. This contract type can be used for services which do not have exact and accurate dimensions, and the employer can change the contract terms and conditions readily. The major problem of this contract is that the contractor has no incentive to save, and is able to increase his or her wage by extra cost. As a result, an exact control should be exerted over the way according to which the contractor spends the budget, and financial statements. An incentive pay or penalty should be used to solve this problem. Obviously, the employer is responsible for all the uncertainties and financial risks, and contractor's benefit will not increase as the cost rises.

*Cost Plus Incentive Fee Contract (CPIF):* In this contract which is concluded to create incentive for reducing costs of the project, the contractor registers the actual cost of the contract and receives all of this cost from the employer. The contractor also receives a certain amount as a fee, and if possible, finishes the project at a lower cost than the original estimate, and gets an amount as a reward. It is clear that in such contracts uncertainties and financial risks are somehow reduced for the employer, and the contractor is not responsible for any risk but as the cost reduction decreases, the benefit will increase.

*Guaranteed Maximum and Shared Savings Contract (GMSS):* In GMSS, the contractor receives a final dividend, anticipates the project cost and considers it in the contract, and anticipates and guarantees a maximum limit for the total cost. If the total anticipated cost is less than maximum anticipated cost at the end of the project, the cost reduction or saving, which is anticipated in the contract, will be split between the employer and the contractor. In such contracts, uncertainties and the related financial risks are somehow reduced for the employer, and the contractor only accepts maximum cost which has guaranteed and demands more benefit [3].

The employer can choose the most appropriate one for the contract type considering all the above options. In fact, choosing the most appropriate contract type is one of the most important decisions which should be made in the project. Also, according to the final criteria defined for choosing a contract type, criteria should be weighted and prioritized.

**Mehr housing project in Iran:**

The main issue concerning demographic changes is that the growths in the numbers of households are increasing in comparison to that of population. This has a definite effect on housing. According to the population pyramid of Iran, demand for housing is at the top of the pyramid following acquiring elementary and higher education, entering the labor market, and entering into marriage. Statistics show that the reasons of increased price in Iran in recent years are due to the factors relating to the pressure of demand and structural problems of economics. According to governmental statistics, the numbers of households and the numbers of existing housing is seventeen and a half millions and sixteen millions respectively. This indicates a half million housing shortage in Iran. Factors relating to the pressure of demand for housing are due to the fact that a large population of Iran has reached the marriage and family formation age. This population is equal to eighty hundreds. Applicant concentration is due to the failure to meet the demands in recent years, which has covered a considerable level of the society. In Iran, One and a half million people, who do not have housing, are mainly consisted of youth who have just formed family. This is a frightening statistics. This circumstance makes 9<sup>th</sup> government of Ahmadinejad to meet the society needs by thinking about how to resolve this big problem. In 2007, Mehr housing project turned to the most project of Iran. The begging of executive operation of Mehr housing project was started in 9<sup>th</sup> government to be considered as an important measurement taken by the government for low-income people of Iran by the promise gave by Ahmadinejad to construct inexpensive houses. In that time, government claimed that one million and a half housing units can be constructed by implementing the project, and following goals will be pursued to provide housing for low-income people.[4]

Controlling housing market

1. Eliminating land price from the cost of housing construction
2. Increasing bank loans and decreasing interest rate of bank facilities
3. Applying discounts and exempting from customs, tariffs, and other side costs of housing construction
4. Paying attention to resistance housing construction
5. Creating incentives to use of industrial construction of housing

**Pakdasht Mehr Housing project:**

Pakdasht Mehr Housing project aims at the construction of 12,000 housing units. In these units, 3 educational spaces, 4 green spaces, and 2 therapeutic areas and a mosque are considered. The project is located in a land of 152 acres, which due to the existence of some opponents for a part of the land, a number of 4222 housing units have been assigned to contractors. Table 1 shows the ratio of this construction project in Pakdasht County. Duration of the contract, as stipulated in the most Mehr housing contracts, is 12 months.

**Table 1.**Ratio of construction of Mehr housing project in Pakdasht

	End of foundation (%)	End of beam (%)	End of frame (%)	End of Joinery (%)
Construction using new technologies and industrial production	15	35	30	20
Non-industrial construction method	15	30	30	25

The Mehr housing project buildings in Pakdasht combines traditional and industrial methods, but given the multiplicity of traditional method compared to industrial one, technological innovation of this project is lower middle. All buildings have concrete structure, ceiling joists; walls are non-load-bearing clay, with double-glazed windows on four floors without pilot, and without the installation of an elevator. Its specifications in accordance with other Mehr housing projects have met the minimum standards and regulations. Contracting parties are: Department of Housing and Urban Development, Mehr housing cooperatives, and contractors.

**The main problems of Pakdasht Mehr housing project:** In general, Mehr Housing Project in Pakdasht involved in two types of problems : first type include Lack of superstructure services such as business and educational centers, and the distance to the main city, Tehran, which increases the risk of operation of these units. Second type of problem are Objections occur because of the poor performance of Mehr housing contractors during implementation and transfer, and the dissatisfaction of families who had been waiting for years hoping to get affordable housing. [5] Apparently, officials’ rush to open and prompt Transfer of Mehr housing units, has caused some of them to consider the quality as the last priority, and by ignoring the obvious technical principles of construction, increase the construction speed falsely. In fact, ignoring some rules to expedite the work as well as supervision weaknesses, and employing some inexperienced contractors has led not only to delay the implementation, but also Sometimes not adhere to the simplest principles of building and common and necessary standards. In addition to successive delayed Transfer of some projects, or relevant authorities’ deny of the houses Transfer, uncertain of how to provide ancillary

services such as water, electricity, gas, sewer, landscaping is another problem which concerns the applicants. All of these factors as well as the closure of many housing projects by contractors due to the increased cost of construction materials diverted Pakdasht Mehr housing project from its goals. [5]

**Related works:**

No specific research or activity has been done in terms of investigating the contractual challenges to beneficiaries in the process of Mehr housing construction projects. All the efforts which have been made are related to the challenges to Mehr housing projects. Mirzaei [4] presented the challenges to Mehr housing projects by raising the following questions.

- (1). When and by which types of financial resources are infrastructure networks, and public and social service provider centers created in new cities on the periphery of metropolises?
- (2). There is a considerable difference between resources predicted in 2011 and 2012, and necessary resources for supplying infrastructures and service centers. How are the financial resources provided?
- (3). In the absence of infrastructure, and public and social services, how will the status of registrants who will deliver their housing units this year be?

Nazari [6] proposed the following challenges and achievements of Mehr housing projects by posing the following questions.

- (a). How will the status of ownership, the system of exploitation and management of Mehr housing units be?
- (b). In case of lack of demand for tripartite units and financial concerns associated with it, what are the measures taken to prevent renting and selling these units to rural migrants and migrating to metropolises?

Mobin [7] writes that the problem of housing can be considered as one of the common issues in most cities of the world, and developing and planning of this problem is related to different economic, political, social and cultural contexts. Besides investigating the processes and factors which influence policy making in urban housing and land sectors, he explained and analyzed various outcomes of such policy-makings in housing supply sector for low-income people.

Ghasemi [8] investigated the impact of Mehr housing policy-making on the relationship between housing price and land price in six big cities of Iran. In this research, panel data related to two period times before and after Mehr housing project delivery were analyzed for an 11-year period time between the years 2000 and 2011 for six months. In recent years, many studies have been conducted in the field of Mehr housing projects, and aimed to investigate advantages and disadvantages of these projects. It has been tried to use these researches as possible.

**Research method:**

This study in terms of collecting data is descriptive, and in terms of goal is an applied study. Statistical population consists of 45 *Mehrza* contracting firms and consulting engineers who were designer of Mehr housing project in Pakdasht County. Among theses, 47 experts were selected as study sample by random sampling method. to collect data we used library and filed study method. Data collection tools were questionnaires of (1) efficient contract management, and (2) suitable solutions for contract amendment.

First questionnaire contains 27 questions where for measurement and identification of challenging provisions of Mehr housing contract, we used the most applied indexes based on Federation Internationale des Ingenieurs-Conseils (FIDIC) contract conditions. They are:

- Transfer system (questions 1-3)
- Pricing policies (questions 4-6)
- Financial Risk Management (questions 7-9)
- Time management (10-13)
- Quality management (questions 14-17)
- Supervision (questions 18-20)
- Payment Methods (questions 21-24)
- Remedies Management (questions 25-27)

This questionnaire was based on 5-choice Likert scale.

Our second inventory contains 12 questions where for providing suitable solutions for contract amendment in Mehr housing contract we used most applicable indexes based on UK Task Force's *Guide for Standard Forms Of Construction Contract*, which are: *risk areas, delay, quality failure, capacity for variations, design/management separation, Complexity, cost certainty, and clarity of remedies*. This tool also was based on 5-choice Likert scale.

For testing validity of questionnaires, after their designation, they were given to professors to be verified. Also reliability of the questionnaires we analyzed using Cronbach's alpha. The obtained value was 0.88. After gathering data, they were analyzed in SPSS software with related tests.

## RESULTS AND DISCUSSION

### Demographic characteristics:

In this section we provide descriptive data about frequency and demographic characteristics of study sample. Table 2 shows these results.

**Table 2.** Demographic characteristics of study sample

Measure	N	%
<b>Sex group</b>		
Male	44	93.6
Female	3	6.4
Total	47	100
<b>Age group</b>		
20-30	15	32
31-40	18	38
41-50	12	25.5
More than 50	2	4.5
Total	47	100
<b>Academic degree</b>		
Diploma	4	8.5
Associate Degree	10	21.2
Bachelor degree	26	55.3
Master and higher	7	15
Total	47	100
<b>Work experience (year)</b>		
Less than 5	15	32
5-10	15	32
20-11	12	25.5
More than 20	5	10.5
Total	47	100

### Efficiency of construction contract in Pakdasht Mehr housing project:

**Transfer system:** According to participants, the status of Transfer system of Mehr housing contract in Pakdasht was investigated. Its results are presented in table 4. Table 3 shows the frequency of items about Transfer system.

**Table 3.** Frequency of items related to the status of the Transfer system of Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
In selecting a contractor, to what extent the appropriate quality assessment procedures has been used?	N	11	15	19	2	-	47
	%	23.4	32	40.4	4.2	-	100
To what extent selected contractors are enable for the project?	N	1	6	13	17	10	47
	%	2.1	12.8	27.6	36.2	21.3	100
To what extent the method of transfer corresponded to Pakdasht Mehr housing project goals?	N	8	18	17	4	-	47
	%	17	38.3	36.2	8.5	-	100

**Table 4.** statistics of Transfer system

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	13	3	10	3.56	1.89	9	8	8.23

According to table 4, the obtained mean value is 8.23. Since the average of 3 and 15 is 9, then the result is lower than average which indicates that according to the respondents, Transfer system of contract is at lower level.

**Pricing policies:** According to participants, the pricing policies of Mehr housing contract in Pakdasht were investigated. Its results are presented in table 6. Table 5 shows the frequency of items about pricing policies.

**Table 5.** Frequency of items related to pricing policies of Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
Contract initial amount to what extent is corresponded to the actual cost at the beginning of the project?	N	2	8	11	11	15	47
	%	4.2	17	23.4	23.4	32	100
to what extent fixed pricing is useful for the project?	N	22	15	8	2	-	47
	%	46.8	32	17	4.2	-	100
The lack of adjustment in pricing policies to the extent is appropriate for the project?	N	20	18	7	2	-	47
	%	42.5	38.3	15	4.2	-	100

**Table 6.**statistics of pricing policies

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	13	3	10	4	2	7	8	7.21

According to table 6, the obtained mean value is 7.21. Since the average of 3 and 15 is 9, then the result is lower than average which indicates that according to the respondents, pricing policies of the contract is at lower level.

**Financial Risk Management:** According to participants, the Financial Risk of Mehr housing contract in Pakdasht were investigated. Its results are presented in table 8. Table 7 shows the frequency of items about this risk.

**Table 7.** Frequency of items related to financial risk management of Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
to what extent employer can respond to sudden changes in the price of materials, fuel and labor?	N	23	15	8	1	-	47
	%	48.9	32	17	2.1	-	100
Imposing any financial risk to the contractor how much is fair?	N	28	17	2	-	-	47
	%	59.6	36.2	4.2	-	-	100
How inappropriate sharing of financial risks (between employer and contractor) is appropriate to the goals of the project?	N	20	17	7	3	-	47
	%	42.5	36.2	15	6.3	-	100

**Table 8.**statistics of Financial Risk Management

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	11	3	8	2.5	1.58	3	5	5.02

According to table 8, the obtained mean value is 5.02. Since the average of 3 and 15 is 9, then the result is lower than average which indicates that according to the respondents, financial Risk Management of the contract is at lower level.

**Time management:** According to participants, the Time management of Mehr housing contract in Pakdasht were investigated. Its results are presented in table 10. Table 9 shows the frequency of items about Time management.

**Table 9.** Frequency of items related to time management of Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
The initial time of contract to what extent is corresponded the actual duration of the project?	N	8	10	15	10	4	47
	%	17	21.2	32	21.3	8.5	100
Fines for delays caused by the contractor's negligence, how much is fair?	N	15	9	10	8	5	47
	%	32	19.1	21.3	17	10.6	100
Officials insist on early completion of the project to what extent is for the benefit of the project?	N	18	15	8	6	-	47
	%	38.3	32	17	12.7	-	100
To what extent do you think your project will be completed in accordance with the initial time?	N	7	13	20	5	2	47
	%	15	27.7	42.5	10.6	4.2	100

**Table 10.**statistics of time management

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	19	4	15	10.12	3.18	8	10	10.04

According to table 10, the obtained mean value is 10.04. Since the average of 4 and 20 is 12, then the result is lower than average which indicates that according to the respondents, time management of the contract is at lower level.

**Quality management:** According to participants, the quality management of Mehr housing contract in Pakdasht were investigated. Its results are presented in table 12. Table 11 shows the frequency of items about this management.

**Table 11.** Frequency of items related to quality management of Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
Defined area and quality expected from Mehr housing project to what extent is corresponded to the amount and duration of the contract?	N	20	10	12	4	1	47
	%	42.5	21.2	25.5	8.5	2.1	100
Employer's (government) insist to deliver projects faster, to what extent affected the quality of the project?	N	2	5	13	15	12	47
	%	4.2	10.6	27.7	32	25.5	100
Due to the sudden change in the price of materials, fuel, labor, and lack of adjustment of the contract, the contractor, to what extent can secure the desirable qualities of the project?	N	24	10	10	3	-	47
	%	51	21.2	21.2	6.4	-	100
To what extent contractor can deliver the project to the employer in accordance with the desired quality of the contract?	N	12	13	15	6	1	47
	%	25.5	27.7	32	12.7	2.1	100



**Table 12.** statistics of quality management

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	19	4	15	8.3	2.88	9	9	9.9

According to table 12, the obtained mean value is 9.9. Since the average of 20 and 4 is 12, then the result is lower than average which indicates that according to the respondents, quality management of the contract is at lower level.

**Supervision:** According to participants, the supervision in Mehr housing contract in Pakdasht were investigated. Its results are presented in table 14. Table 13 shows the frequency of items about supervision.

**Table 13.** Frequency of items related to supervision in Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
To what extent the supervision of the project by engineers of engineering organization is desirable?	N	10	8	17	3	9	47
	%	21.3	17	36.2	6.4	19.1	100
Housing organization, as an higher supervisor, to what extent is committed to playing its role?	N	11	15	14	6	1	47
	%	23.4	32	29.8	12.7	2.1	100
Due to setting how to supervise in the contract, to the extent it is appropriate to the goals of the project?	N	4	3	18	11	11	47
	%	8.5	6.4	38.3	23.4	23.4	100

**Table 14.** statistics of supervision

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	15	3	12	6.04	2.45	8	8	8.7

According to table 14, the obtained mean value is 8.7. Since the average of 3 and 15 is 9, then the result is lower than average which indicates that according to the respondents, supervision in the contract is a little at lower level.

**Payment:** According to participants, the payment methods in Mehr housing contract in Pakdasht were investigated. Its results are presented in table 16. Table 15 shows the frequency of items about payment methods.

**Table 15.** Frequency of items related to payment methods in Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
Lack of advance payment in Mehr housing contract, how much influence the physical progress of the project?	N	7	15	16	6	3	47
	%	15	32	34	12.7	6.3	100
The ratio of payments to the extent consistent with the cost of construction?	N	1	3	10	16	17	47
	%	2.1	6.4	21.3	34	36.2	100
To what extent the statements related to banking facilities are paid on time?	N	2	4	10	16	15	47
	%	4.2	8.5	21.3	34	32	100
To what extent the statements related to members are paid on time?	N	7	14	19	5	2	47
	%	15	29.8	40.4	10.6	4.2	100

**Table 16.** statistics of payment methods

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	20	4	16	8.17	2.85	15	14	13

According to table 16, the obtained mean value is 13. Since the average of 20 and 4 is 12, then the result is higher than average which indicates that according to the respondents, payment methods in the contract is at higher level.

**Remedies management:** According to participants, the remedies management in Mehr housing contract in Pakdasht were investigated. Its results are presented in table 18. Table 17 shows the frequency of items about remedies management.

**Table 17.** Frequency of items related to remedies management in Mehr housing contract in Pakdasht

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
To what extent there are solutions for resolving disputes in the contract?	N	10	8	15	6	8	47
	%	21.3	17	32	12.7	17	100
To what extent some procedures are included in the contract to raise the remedies of the parties?	N	3	6	18	11	9	47
	%	6.4	12.8	38.3	23.4	19.1	100
How much staff dispute resolution board specified in the contract is approved by the parties?	N	1	2	11	23	10	47
	%	2.1	4.2	23.4	49	21.3	100



**Table 18.**statistics of remedies management

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	15	3	12	5.35	2.31	10	10	10.06

According to table 18, the obtained mean value is 10.06. Since the average of 15 and 3 is 9, then the result is higher than average which indicates that according to the respondents, remedies management in the contract is at higher level.

**Suitable solutions to reduce challenges of Mehr housing contract in Pakdasht:**

As mentioned before, to provide suitable solutions to amend the provisions of Mehr housing contract, we used *Guide for Standard Forms Of Construction Contract*. The used indexes are: risk areas, delay, quality failure, capacity for variations, design/management separation, Complexity, cost certainty, and clarity of remedies. In this section we present frequency of obtained data for each index.

**Risk area:** In this section we studied risk areas in contract. The question was: “In order to achieve the objectives of the Contract, how much risk can be transferred to the contractor?” Results of analyzing data is shown in table 19

**Table 19.**statistics of Risk area

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	5	1	3	0.73	0.85	3	3	3.33

According to table 19, the mean value is 3.33. Since the average of 5 and 1 is 3, we can see that the obtained mean is higher than the average value, so it shows that according to participants in this study, risk area will be transferred more to the contractor.

**Delay:** To study the risk of delay, our question was: “to what extent the contractor must respond to the risk of delays occurring in the project?” Analysis results are presented in table 20.

**Table 20.**statistics of Risk of delay

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	5	1	3	0.59	0.76	3	3	3.04

According to table 20, the mean value is 3.04. Since the average of 5 and 1 is 3, we can see that the obtained mean is almost equal to the average value, so it shows that according to participants in this study, risk of delay should be divided equally between employer and contractor.

**Quality risk:** The question was: “to what extent the contractor must respond to the risk of quality in the project?” table 21 shows the analysis results.

**Table 21.**statistics of quality Risk

N	Max	Min	Variation	Variance	SD	Mode	Median	Mean
47	5	1	3	1.02	1	3	3	3.62

According to table 21, the mean value is 3.62. Since the average of 5 and 1 is 3, we can see that the obtained mean is higher than the average value, so it shows that according to participants in this study, risk of quality will be transferred more to the contractor.

**Selection criteria:** In order to study selection criteria including: Capacity for variations, design/management separation, speed, complexity, cost certainty, and clarity of remedies in Pakdasht Mehr housing contract, participants were asked to answer some questions which are presented in table 22.

**Table 22.** Statistics of selection criteria

Items	statistic	Very low	Low	Somewhat	High	Very high	Total
Due to the nature of Pakdasht Mehr housing Project, employer’s involvement in the project, how much should be?	N	15	17	8	3	2	45
	%	33.3	37.8	17.8	6.6	4.5	100
To what extent the management can be separated from design?	N	21	13	9	-	2	45
	%	46.6	28.9	20	-	4.5	100
To what extent can we manage the variations?	N	1	-	11	22	11	45
	%	2.2	-	31.1	33.3	26.7	6.7
Mehr housing project complexity is to what extent?	N	1	14	15	12	3	45
	%	2.2	31.1	33.3	26.7	6.7	100
To what extent the speed in the implementation of the project is important?	N	-	8	16	20	1	45
	%	-	17.8	35.6	44.4	2.2	100
How much cost certainty there will be in the project?	N	-	10	27	8	-	45
	%	-	22.2	60	17.8	-	100
The degree of clarity of remedies to what extent should be?	N	5	9	19	11	1	45
	%	11.1	20	42.2	24.5	2.2	100

## CONCLUSION

The purpose of this study was to identify the challenges facing the Mehr housing project contract and providing suitable solutions to meet these challenges in the project in Pakdasht County in Tehran, Iran. In this survey study, studied components of contract management were: transfer system, pricing policies, financial risk management, time management, quality management, supervision, payment methods, and remedies management. Among these, all components except payment methods and remedies Management whose mean values were higher than average value can be considered as challenges for Mehr housing project in Pakdasht.

According to our findings, *financial risk management* had the highest effect on project management. Financial risk management in the project refers to the optimal distribution of financial risks between contracting parties. In fact, the aim of the project's financial risk management, is financial risk transfer to the side that has the ability to afford it. Based on the evaluation results of the questionnaire, more transfer of financial risks to the contractor was beyond the contractor's ability, and certainly one of the reasons for the suspension or adverse changes to the project management by contractors can be unacceptable financial risk of the project.; therefore, It can be concluded that financial risk management of the project is the most challenging indicator in Pakdasht Mehr Housing project which has not been taken into account.

Another effective indicator was *pricing policies* which have not been considered favourably and efficiently in the project. According to participants in this study, lack of adjustment in the contract due to the dramatic increase in prices of materials, fuel and labor as well as using fixed pricing are one of the challenges facing the implementation of Mehr housing project, and wrong Pricing policies are the reasons for undesirable changes in the project by contractors.

*Quality management* is another component to be considered. According to participants, Mehr housing project beneficiaries's expected quality did not match the amount and duration of the contract, and contractors despite the insistence of the employer (government) to deliver projects faster and sudden changes in the price of materials, fuel, labor, and Lack of contractual adjustments, can not protect the quality of the project, and can not deliver the project in accordance with the quality expected by beneficiaries.

According to the results, the initial time of the contract did not match with real time, and duration of the project will be beyond the initial time mentioned in the contract. Even with the insistence of the employer (government) to deliver projects faster, the project can not be completed in the time specified in the contract. In fact, the lack of *time management* will be another challenge in Mehr housing project.

*Transfer system* of the contract is also not considered efficiently in Mehr housing project. Contractor selection method, and lack of quality assessment process for the contractors are challenges for this project. moreover, supervision is the factor not considered efficiently, but due to the proximity of the estimated average of respondent to moderate level, The supervision set in the contract is somewhat appropriate to the goals of the project.

In this study we also provided suitable solutions to meet these challenges. According to obtained data, 75% the respondents believe that for the success of the project, it is better that more *risk areas* be borne by the contractor, and only 13.3 % stated that to reach the goals, that more risk should be transferred to the employer. 56% said that it is better to divide *delay risks* equally between the contractor, and employer, and 66 % argued that for the success of the project, most risks related to *quality* should be transferred to the contractor. Figure 1 presents the output of our contract model.

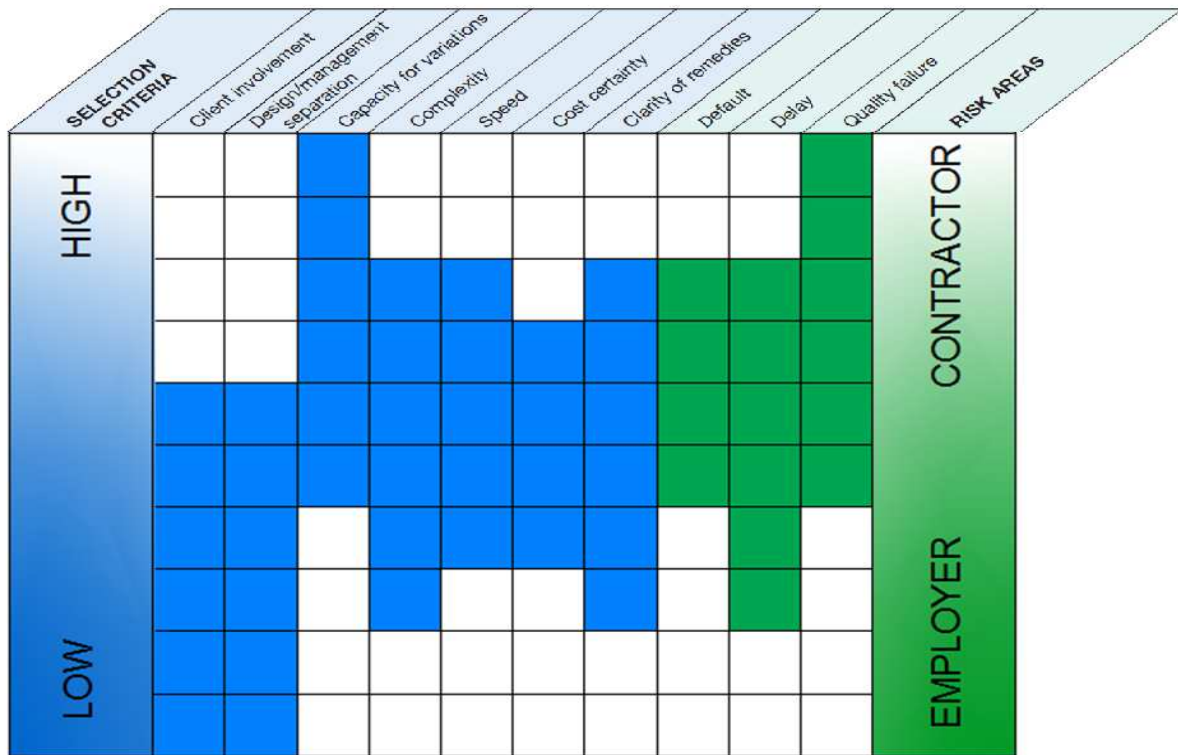


Figure 1. Contract model of the study

After review and compliance between the ideal contract according to the respondents for Pakdasht Mehr housing project, and UK Task Force's *Guide for Standard Forms Of Construction Contract*, to reduce challenges following contractual models can be suggested:

- JCT 98 : STANDARD FORM BUILDING CONTRACT
- CONDITIONS OF CONTRACT FOR CONSTRUCTION (RED BOOK)
- CONTRACT FOR BUILDING AND CIVIL ENGINEERING MAJOR WORK

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