Journal of Policy Research, 9(3), 69-84.
https://jprpk.com
https://doi.org/10.5281/zenodo.8361014

Using Interpretive Structural Modelling (ISM) to Impose Hierarchy on Critical Issues of Contractual Bargaining: A Study of Construction Industry of Pakistan

Muhammad Zeeshan Shaukat[1], Madiha Saleem[2], Muhammad Usman Ajmal Mirza[3], Abdul Basit[4], Abdul Aziz Khan Niazi[5]

Abstract

Purpose of conducting this research is to identify the critical factors of contractual bargaining in the context of construction industry of Pakistan. The design of current study comprises of the review of literature, data collection and analysis. Data collection involves systematic review of the literature, discussion with experts who are well versed with the domain of the study. ISM is applied to recognize, arrange and develop interrelationships among the critical factors of contractual bargaining. In order to validate the findings of ISM, MICMAC is used which verified the ISM findings. MICMAC groups variables in one of four categories; independent, dependent, linkage or autonomous. According to hierarchy imposed through ISM, factors 1, 4, 7, 8, 9 and 13 occupy *first level.* Factors 10, 11, 12, 17, 19 and 20 occupy *second level*. Factors 5, 14, 15 and 18 occupy *third level.* Factors 2 and 6 occupy *fourth level.* Factor 3 (political risk) and 16 (lack of management control) occupy *fifth* and *sixth level* respectively. MICMAC analysis revealed that factors of 2, 3, 6 and 18 are *independent variables*. Factors 5, 10, 11, 12, 14, 15, 16, 17, 19 and 20 are *linkage variables*. Factors 1, 4, 7, 8, 9 and 13 are *dependent variables* and no factor found to be *autonomous.* Factor 16 (lack of management control) is the most critical factor. The study deals with critical factors of contractual bargaining that are necessary to consider at the time of contract design & negotiation. It intends to create fruitful insights for a wide variety of audience including contractors, project owners, project managers, volunteers, donors, society and economy at large. It distinguishes itself, as there is no such work available in literature that addresses the need of identifying elements necessary to be considered during contracts' initial design, bargaining, execution, completion and enforcement. Further, it extends to build a structural model of identified factors and develops relationship in order to provide readers understanding about the cause-&-effect relationships among the factors. The results have implications for all the aforementioned stakeholders in construction projects and construction industry.

***Keywords*:** Contract, Critical Factors, Construction Industry, Interpretive Structural Modelling Technique, MICMAC

1. Introduction

Construction companies are continuously struggling to create and sustain competitive edge for the betterment of their own interests and for the well-being of all the stakeholders involved. In lieu of this, they adopt different strategies. Among the adopted strategies, the way the companies design, execute and enforce their contracts is commensurate for investigation. A contract is referred to a document that is used as a guarantee to assure an organization will work smoothly and in a well manner. It contains every stakeholder's rights, authorities, duties and obligations. A contract's design facilitates companies to specify suitable dimensions or clauses for effective functioning (Lumineau, 2017). Power structure is considered as the important element that most of the construction companies ignore at the design stage of contracts. The firms that have better contract designs are better able to save themselves from the opportunistic attitude of contractors than those who do not have (Lumineau, 2019).

There is a limited literature on how companies develop and sustain partnering competencies to make progress. The literature related to inter-firm alliances and contractual designs is also very limited. Since inter-firm contracts in the form of strategic alliances, joint ventures or any type of long-term partnerships have become a substantial strategy for the development and sustenance of competencies through interchange of the products, knowledge/expertise/skills and much more that is beneficial for companies and is not possible alone. Furthermore, current business environment is becoming more competitive, more complex, globally more intense, and more integrated. To deal with these environmental shifts, companies are struggling for their survival. In lieu of this, construction companies to survive in the complex and dynamic environment consider undergoing inter-firm alliances. Companies undergo Inter-firm contracts in the form of joint ventures, supplier's association, technology licensing or technology exchange agreements, R&D agreements, and direct investments etc. Various researches have associated the failure of abovementioned alliances or contracts to poor contract's design leading to early death of contractual relationships & litigation. Moreover, the legal officers do not have complete technical and procedural information due to which they are unable to draft contracts' specifications accurately which is problematic for companies.

While designing contracts, critical issues are ignored leading to early termination of contractual relationship and/or causes loss to either of the parties (Wang et al., 2019). Since, a little research is available that addresses the need of exploring critical factors of contractual bargaining that must be incorporated into contracts and negotiated by the parties at the time of initial bargaining. Therefore, finding out the critical/important factors involving contractual bargaining has become imperative. These factors need investigation to make the contract a success for the companies

[1] Hailey College of Commerce, University of the Punjab, Lahore, Pakistan, mzeeshan.shaukat@gmail.com
[2] Institute of Business & Management, University of Engineering and Technology, Lahore, Pakistan, smadiha01@gmail.com
[3] Institute of Business & Management, University of Engineering and Technology, Lahore, Pakistan, usman.3293634@talmeez.pk
[4] Lahore Institute of Science & Technology, Lahore, Pakistan, abasit_shahbaz@yahoo.com
[5] Department of Management Sciences, New Campus, University of Engineering and Technology, Lahore, Pakistan, azizniazi@uet.edu.pk

and the stakeholders. Essentially, researchers are busy in investigating how companies acquire and gain advantage to improve their alliance competencies and achieve success; they pay little attention to power structure among the partners as a possible influencing aspect of contract design. Therefore, current research aims to identify the critical issues of contractual bargaining. The research objectives are: i) to classify and arrange the critical factors in order of their importance, ii) to determine interaction among identified factors, iii) to classify the factors on driving-dependence diagram, iv) to discuss how the model is helpful to stakeholders and v) to underpin the theoretical and practical implications. In order to achieve research objectives, multitude of research methodologies have been considered viz: AHP, GRA, ANP, DEA, TOPSIS, VIKOR, DEMATAIL etc., but, ISM coupled with MICMAC is found to be most appropriate due to its advantages and wide applications to address such types of issues. Rest of the paper is arranged in the sequence of literature survey, research methodology, analysis results & discussion and conclusion.

2. Literature Survey

Review of literature is important to set out the very outset of the study. In this context, reasonable amount of literature has been surveyed and critically reviewed. Critical factors of contract bargaining were extracted from well-known research publications available on ScienceDirect (Elsevier), SpringerLink, Oxford Journals, Emerald, Wiley-Blackwell MDPI, Taylor & Francis etc. using keywords such as contract design, critical factors of contracts design, contractual bargaining, contract failure, construction industry failure etc. Initially, twenty-eight factors were obtained from literature (Annexure A). Later on, the factors were reduced to twenty through approval voting of experts and are explained following:

a. Contractual Complexity

The term ‘contract complexity’ describes the amount of detailed requirements in contracts/agreements (Alashwal et al., 2017).

b. Incompetence of other Stakeholders

Incompetence of a project partner is one of the reasons of the failure of inter-firm contracts. In developing countries like Pakistan, the identification of effective and qualified partner is essential. In construction projects, competencies are essential. One of the purposes of alliances and joint ventures is to enhance skills and knowledge and achieve success mutually. Competencies of a partner increase his bargaining power thereby increasing the success chances of construction contracts. The project managers need to focus on enhancing communication, coordination, problem solving and strong technical skills for successful execution of contracts and alliances (Alashwal et al., 2017).

c. Political Risk

The political uncertainty in the shape of leadership struggle, scattered political system, and poor public performance is a major risk for construction industry and creates problems for the contractors. It is not extraordinary that in emerging countries like Pakistan, firms remained overwhelmed with prevalent uncertainty in laws, acts, rules and regulations including change in the terms under which a business is functioning (Chang et al., 2018; Hwang et al., 2017).

d. Behavioural Uncertainty

In construction contract and joint ventures, behavioural uncertainty leads to several problems due to imbalance of information related to the tasks and processes. When behavioural uncertainty occurs, the party who has more information uses this information for its own benefits (You et al., 2018). There may be several reasons for uncertain behaviour of one party (Jagtap and Kamble, 2015). If a party predicts high relational risks in the on-going projects, then the other party might behave in an uncooperative way with the intention to destroy the relationship. For a healthy relationship, it is essential for both parties to behave cooperatively. If one party feels that its partner firm is behaving in an improper way, then ultimately it also behaves uncooperatively. Uncertain behaviour acts as a driving force leading towards tit-for-fat strategy. In contracts, there is an expectation from both sides and this expectation is considered as trust. However, at any stage one party perceives that the other party is behaving doubtfully then it causes the failure of the relationship between partners.

e. Un-acquaintance with Technology

In this era of advancement, technology is modifying the construction industry too. Like other industries, it is facilitating construction industry to gain competitive edge. Due to the human error or other risks involved in construction, construction project companies are shifting their processes on technology (Ghanbaripour et al., 2020). The infrastructure designs and building structures are becoming more complex.

f. Lack of Management Control

Management control is an important factor for construction projects to achieve desired results. Management control is defined as the process of ensuring that all the subunits are achieving their objectives and all the people are struggling for the same goals and policies. Management control refers to the master plan used by firms to make sure that the actions and behaviour of people are oriented towards the goals of the organization. Management’s control is necessary for inter-firm contracts. However, insufficient management control can restrict a partner to participate effectively in a project (Ghanbaripour et al., 2020).

g. Limited Finance

Lack of funds, poor financial condition of the contractor, contract alterations, modifications in drawings and designs, recruitment issues, lack of equipment, poor control, construction errors, poor on-site management and procurement issues, labour clashes and strikes result in delayed production, time-overruns and cost overruns. Contractors can improve their financial condition through various approaches such as joint venture, which is helpful in minimizing the risk and provide support in resources (Ghanbaripour et al., 2020).

h. Opportunistic Behaviour

The term 'opportunistic behaviour' describes the process of capturing the benefits of having superior information that restrict a partner to accomplish requirements and encourage to take advantage of ambiguities for the sake of generating maximum profits. Opportunistic behaviour might be in different forms i.e. hiding meaningful information from the other partner, deviating from their words, forefend casual commitments, and misusing contract loopholes for personal benefits (Yan et al., 2018). After entering into a contract, a firm always looks forward for its own advantage & interest and exhibit opportunistic behaviour. The other party, also refuses to provide their useful resources & information and adopt a vigilant behaviour towards their partner firm resulting in an early termination of the contract. Research states that, companies adopt different procedures and defensive techniques against such behaviour of their partner firm. When one company uses protective measures, other company also applies the same method and due to this, there is lack of communication, disputes and deadlocks between parties. All these lead towards early death of the contract.

i. High degree of Interdependence

Joint venture partners interact with each other and the way of interaction affect the output of their alliance. While interacting with each other, they use to be dependent on each other's resources and this interdependence very much affects the behaviour of firms and resulting in various disputes. While working on the achievement of common goals, partners have to trust on each other and put their efforts for continuous improvement. Productivity oriented partners put their efforts to complete the assigned tasks and use each other resources, but over-dependence on each other's resources leads to conflicts resulting in termination of contracts (Yan et al., 2018).

j. Lack of Trust/Commitment/Mutual Loyalty

Cooperation and trust are very important factors for successful execution of contracts. When companies are committed towards their mutual goals and shared valued in a cooperative way, then the element of trust arises (Dorn et al., 2016). In construction projects or inter-organization contracts, there is an exchange of information and resources to solve problems and achieve coordination. The exchange of information refers to the readiness to share valuable information with the partner firm. Sharing of resource for problem solving describes the level of readiness of the partners to own the responsibility and find the solutions of a problem, however, maintaining their connection throughout the project. Coordination reflects that parties are ready to bend their behaviours according to the requirements of the project and their partner firm.

k. Poor Negotiation Skills

Construction contracts' success is very much based on the skills of the project team. A competent team facilitates a project through its kills to complete a project successfully, so problem-solving and negotiation skills are key elements for the success of construction contracts. There are various parties that are involved in a project. Companies have their own targets and goals, while in partnership or joint ventures there is a mutual goal or target. Beside the common goals, companies have their own goals, aim and targets and it is not compulsory that they always agree on a specific issue of point. Lack of interest and conflicts are common in construction projects. These conflicts/clashes are considered as a critical factor that creates hindrance in the way of success of a project. To cope up with these clashes/conflicts, negotiation skills perform a critical role. However, poor/lack of negotiation skills in construction contracts are creating problems that result in early breakup (Rajeh et al., 2015).

l. Poor Project Management Skills

Project managers need to obtain required skills, managerial proficiency and other capabilities required to play their role for successful execution of contracts. In order to manage the things effectively and efficiently, hard project management skills are very important. In face of globalization and economy instability, project managers are facing more challenges and complex issues. Bringing internal and external partners onto the same line is more critical to a project's success than how much the venture is technically implemented. To achieve mutual understanding, project managers need to understand the significance of resolving conflicts among various stakeholders (Zuo et al., 2018). Therefore, there is a need for project managers to increase not only technical expertise but also the proficiencies for managing challenges.

m. Poor Research & Development

Construction industry is lacking in innovation as compare to other industries (Lenderink et al., 2020). The revolution in construction projects is adversely affected because of the way innovation is unadventurously measured through research & development expenditures and the elimination of numerous novelties established at the venture level in such dimensions. Research & development is helpful in problem solving. Poor Research & development results in cost-overruns and time-overruns which is not good for the goodwill of contract parties.

n. Lack of Supportive infrastructure

Infrastructure refers to all the supporting material e-g, transport, power, and other necessary items that are required to start and run a construction site. Supportive infrastructure is not very much critical in nature but it affects the

application of project. Sometimes, companies fail to provide the promised supportive infrastructure because the contractors commit on many things that they do not fulfil due to lack of resources. Lack of supportive infrastructure may result in the project suspension and early termination (Lenderink et al., 2020).

o. Incompetent Human Capital

Human Capital is a source of competitive advantage and a competent human capital leads towards better performance and create a batter position. On the other hand, inefficient/incompetent human resource can create many problems. In construction projects, human capital plays a vital role; companies with inefficient skills, high turnover rate, mangers' inefficiency in site management, lack of understanding of instructions, communication and absenteeism problems are destined to delayed & poor performance (Macy, 2018).

p. Useless Social Capital

'Personal or social relations' is an important intangible resource that a company has. The strong relationship in the society and with the stakeholders represents the competitiveness of a firm. Social capital, different from other resources, is defined as the relationship in and outside the organization that is beneficial in many ways and that enhances the competitiveness of a firm (Macy, 2018).

q. Lack of information

Companies need information for decision making to fight against the challenges and to solve their problems. Superior information improves their position; companies with superior information have better bargaining power. Element of risk is inherent in construction projects; however, through superior knowledge and information, companies can manage or minimize the risk (Macy, 2018). On the other hand, lack of information and poor knowledge about procedures and design management can cause delays in projects that lead to higher costs due to increased work periods, high material costs, high labour wages, which puts a partner on back foot and lowers its position in the contractual relationship and the overall project environment.

r. Lack of Partner's Experience

Experience with multinational as well as local companies represents that a company is able to manage inter-firm contracts. The experience creates confidence and competency to manage a project and bring better performance. Poor background and less experience creates difficulties and uncertainties. Enough contextual experience helps partners to cope up with divergent cultures, policies and market environments. Competences of a partner contribute to the success of inter-firm contract and increase its own bargaining power. On the other hand, lack of experience creates problems, issues, conflicts & uncertainties and influences the bargaining power of partners (Macy, 2018).

s. Shortage of Critical Resources

When a partner has more critical resources in comparison to another partner, that partner would have a strong position in contractual bargaining related to the management of joint ventures & alliances. In simple words, possession of critical resources leads to stronger bargaining power (Macy, 2018).

t. Imbalance of Power Symmetry

If partners are equal in power, they happily contribute their thoughts, resources, techniques and strategies, thereby helping in the development of a healthy relationship as well as in the completion of the contracts. However, if there is any imbalance or injustice in power symmetry, the party who has less power hesitates to contribute their strategies creating a hindrance in the way of successful completion of the contracts (Lenderink et al., 2020).

In nutshell, from above representation of review of literature, we were able to find twenty-eight factors in total that have been placed before the panel of experts for their vote (Cai et al., 2018; Dhochak & Sharma, 2016; Abdullah & Siraj, 2014; and Li et al., 2019; Sushil, 2012) to include/exclude, delete, modify or merge on the basis of relevance, importance or vitality to the issue under study. As a result of this process, we reached to the twenty factors aforementioned and detail of remaining factors has been skipped for brevity. However, the voting sheet is included in this study as an Annexure A.

3. Research Methodology

The methodology section contains information on nature of research, procedure of research, research tools, sampling method, size of sample, criteria for recruitment of experts on panel, method of data collection and technique of analysis. Philosophy of the research is interpretivism. The design of current study comprises of the review of literature, data collection and analysis. Data collection involves systematic review of the literature, discussion with experts who are well versed with the domain of the study. ISM is applied to recognize, arrange and develop interrelationships among the critical factors of contractual bargaining. In order to validate the findings of ISM, MICMAC is used which verified the ISM findings. MICMAC groups variables in one of four categories; independent, dependent, linkage or autonomous. It is a theory-building research that does not require priory theory. It begins with the specific observations, methods, proposal to identify the patterns and regularities/irregularities, develop preliminary hypotheses to be investigated and at the end formulating a theory (Saunders et al., 2015).

3.1. Panel of Experts

The expert is a person who has a comprehensive knowledge related to an issue and can provide information and instructions for understanding of a particular problem (Kloker et al., 2018, Stavraki, 2018). The individuals having ten years of minimum experience/knowledge of construction industry are called experts in this case (Silva, 2017). For

composition of the panel of experts, 15-30 experts are enough to generate reliable results in case of homogenous group (Raut et al., 2019) whereas only 5 to 10 experts are needed to produce good results in case of heterogeneous group (Kloker et al., 2018). However, in this research, sixteen heterogeneous experts (i.e. four academic experts, two lawyers and the rest ten belong to construction industry) are recruited to compose the panel (Clayton, 1997; Khan & khan, 2013). The panel consists of the researchers/professors (who teach contract law), the lawyers, the contractors and the senior management of construction companies i.e. general managers.

3.2. Data Collection

Face-to-face discussion interviews were conducted to collect comprehensive information using close-ended, knowledge-based, matrix-type questionnaire adapted from Hasan et al. (2019); Alawamleh and Popplewell (2011); and Trigunarsyah and Parami Dewi (2015).

3.2.1. Selection of Research Technique

Two parallel techniques, interpretive structural modelling (ISM) and Cross Impact Matrix Multiplication Applied to Classification (MICMAC), were used to conduct analysis. (ISM) technique was used to impose hierarchy and identify the most critical factors of contractual bargaining. The details of both is given following.

3.2.2. About ISM

Warfield first proposed interpretive Structural Modeling in 1973. This technique is commonly used e.g. Rajan, et al. (2021): Majumdar, Garg, & Jain, (2021); Zeinalnezhad et al., (2021); He, & Chen, (2021); Menon & Ravi (2021) James et al., (2020) and Niazi et al., (2019) to deal with complex issues through combination of modelling language of words, diagraphs and the discrete mathematics. It is used in a wide range of areas (Sushil, 2017; Warfield, 1973; Warfield, 1974). ISM converts undistinguishable & very poorly developed models into a crystal-clear and well-defined model useful to many stakeholders (Ali et al., 2009, Sushil, 2012). The steps involved in Interpretive Structural Modelling (ISM) (Attri et al., 2013; Thakkar et al., 2008; Warfield, 1973) are explained in data analysis section.

3.2.3. About MICMAC Analysis

MICMAC analysis divides variables into four sections; (i) *t*he *autonomous variables* (variables having weak driving and weak dependence power), (ii) the *dependent variables* (variables having weak driving power but strong dependence power, (iii) the *linkage variables* (variables having strong driving and strong dependence power and (iv) the *independent variables* (variables having strong driving but weak dependence power).

3.2.4. Time Horizon

The research is a cross-sectional based on data collected at one point in time (Saunders et al., 2015).

4. Analysis & Results

The data was processed through ISM and MICMAC. The former one was used to identify and rank factors according to their importance and the latter one was used to verify the results of the former and club factors into four groups. The detailed procedures of both are presented following:

4.1. ISM Modeling

Determination of Factors: In order to extract initial information regarding critical factors, the most recent relevant literature had been reviewed. After that, the factors were discussed with experts to refine and include most related factors in the analysis.

Establishing Contextual Relationship among Factors: A panel of experts comprising of sixteen people, from academia and construction industry of Pakistan with at least ten years' relevant work experience, was recruited to obtain comprehensive information regarding the importance and relevance of factors. The panel members' profile is given in Table 1. An initial list of twenty-eight factors reduced to twenty factors, along with their ISM and MICMAC results, is given in Table 6.

Table 1: Experts' Profile

Sr. #	Designation	Education	Experience
1	Assistant Professor	PhD	17
2	Assistant Professor	PhD	18
3	Sr. Lecturer	M. Phil	15
4	Sr. Lecturer	M. Phil	15
5	Lawyer	LLB	15
6	Lawyer	LLB	20
7	Resident Engineer	M. Phil	20
8	Resident Engineer	M. Phil	20
9	Asst. Resident Engineer	M. Phil	14
10	Project Manager	M. Phil	15
11	Asst. Manager project	M. Phil	13
12	Contractor	DAE	20
13	Contractor	DAE	20
14	Contractor	B.Sc	20
15	Contractor	DAE	20
16	Contractor	DAE	20

Building Structural Self-Interaction Matrix (SSIM): The experts' opinion was obtained on the direction of relationship between the pairs of factors (Table 2). During this process the experts were asked to mention the relationship in the form of VAXO code where

V: for the rows affecting the columns
A: for the columns affecting the rows
O: for no relationship between the rows and the columns and
X: for the two-way relationship between the rows and the columns

Table 2: SSIM

Sr. No	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1		A	A	A	O	O	A	O	O	A	A	A	O	O	O	O	O	O	O	X
2			A	O	V	O	O	O	O	O	O	O	O	O	O	O	V	O	O	O
3				V	V	O	V	O	V	O	V	O	O	O	A	A	O	O	O	O
4					A	A	X	V	V	O	O	O	O	V	A	A	A	A	A	A
5						O	O	V	O	O	X	O	V	X	O	A	A	O	O	O
6							V	V	V	V	V	O	O	V	A	O	V	V	O	V
7								X	X	O	O	O	O	O	O	A	A	A	A	A
8									A	O	A	O	X	O	A	A	A	A	A	A
9										X	O	O	O	O	O	O	O	O	O	A
10											X	O	O	O	O	X	O	A	A	A
11												V	V	X	V	A	A	A	A	X
12													O	A	A	A	A	A	A	X
13														A	A	A	A	A	A	X
14															V	A	X	V	V	V
15																A	A	V	V	V
16																	X	V	V	V
17																		A	A	A
18																			O	O
19																				A
20																				

Building Initial Reachability Matrix (IRM): Then from Table 2, an initial reachability matrix (IRM) was prepared by following rules given below:

Rule One:	V: $i \rightarrow j$	A: $i \leftarrow j$	X: $i \leftrightarrow j$	O: $i \not\leftrightarrow j$
	1	0	1	0
Rule Two:	V: $j \rightarrow i$	A: $j \leftarrow i$	X: $j \leftrightarrow i$	O: $j \not\leftrightarrow i$
	0	1	1	0

Final Reachability Matrix (FRM): The IRM not placed here due to limited space, its transitivity was checked and replaced zeros with 1* and hence, final reachability matrix (Table 3) was constructed following rules of transitivity.

Table 3: Final Reachability Matrix (FRM)

Sr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	DP
1	1	0	0	*1**	0	0	*1**	*1**	*1**	*1**	*1**	*1**	*1**	0	0	0	*1**	0	*1**	1	12
2	1	1	0	1*	1	0	1*	1*	0	0	1*	1*	1*	1*	1*	1*	1	0	0	1*	14
3	1	1	1	1	1	0	1	*1**	1	*1**	1	*1**	*1**	*1**	*1**	0	*1**	0	0	*1**	*16*
4	1	0	0	*1**	0	0	*1**	*1**	*1**	*1**	*1**	1	*1**	0	0	0	*1**	0	*1**	1	12
5	*1**	0	0	1	1	0	*1**	1	*1**	*1**	1	*1**	1	1	*1**	0	*1**	*1**	*1**	*1**	*16*
6	*1**	0	0	1	*1**	1	1	1	1	1	1	*1**	*1**	1	*1**	*1**	1	1	*1**	1	18
7	1	0	0	1	0	0	1	1	1	*1**	0	0	*1**	*1**	0	0	0	0	0	*1**	*9*
8	*1**	0	0	*1**	0	0	1	1	*1**	0	0	0	1	0	0	0	0	0	0	*1**	*7*
9	*1**	0	0	*1**	0	0	1	1	1	1	*1**	0	*1**	0	0	*1**	0	0	0	0	9
10	1	0	*1**	*1**	*1**	0	*1**	*1**	1	1	1	*1**	*1**	*1**	*1**	1	*1**	*1**	*1**	*1**	*18*
11	1	0	*1**	*1**	1	*1**	*1**	1	*1**	1	1	1	1	1	1	*1**	*1**	*1**	*1**	1	19
12	1	0	0	1	*1**	0	1	1	1	*1**	*1**	*1**	*1**	1	*1**	0	*1**	*1**	*1**	*1**	*16*
13	*1**	0	0	*1**	0	0	*1**	1	*1**	*1**	*1**	*1**	1	0	0	0	*1**	0	*1**	1	12
14	*1**	0	*1**	*1**	1	*1**	*1**	*1**	*1**	*1**	1	1	1	1	1	*1**	1	1	1	1	19
15	*1**	*1**	1	1	*1**	1	*1**	1	*1**	*1**	*1**	1	1	*1**	1	0	*1**	1	1	1	19
16	*1**	0	0	1	*1**	0	1	1	*1**	1	1	1	1	*1**	*1**	*1**	1	1	0	*1**	*16*
17	*1**	0	*1**	1	1	*1**	1	1	*1**	*1**	1	1	1	1	1	1	1	*1**	*1**	*1**	*19*
18	*1**	*1**	1	1	1	*1**	1	1	*1**	1	1	1	1	1	1	1	1	1	1	1	20
19	*1**	0	0	1	*1**	0	1	1	*1**	1	1	1	1	*1**	*1**	*1**	1	0	1	*1**	*16*
20	1	0	0	1	*1**	0	1	1	1	1	1	1	1	*1**	*1**	*1**	1	0	1	1	16

Level Partitioning (LP): The FRM was partitioned using iteration method (Table 4) devised by Warfield (1973).

Table 4: Level Partitions

F	Reachability Set	Antecedent Set	Intersection Set	Level
1	1,4,7,8,9,10,11,12,13,19,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,4,7,8,9,10,11,12,13,17,19,20	
4	1,4,5,7,8,9,10,11,12,13,14,15,17,18,19,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,4,5,7,8,9,10,11,12,13,14,15,17,18,19,20	
7	1,4,7,8,9,10,13,14,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,4,7,8,9,10,13,14,20	
8	1,4,7,8,9,13,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,4,7,8,9,13,20	
9	1,4,7,8,9,10,11,13,16	1,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,4,7,8,9,10,11,13,16	
13	1,4,7,8,9,10,11,12,13,17,19,20	1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20	1,4,7,8,9,10,11,12,13,17,19,20	1
10	3,5,10,11,12,14,15,16,17,18,19,20	3,5,6,10,11,12,14,15,16,17,18,19,20	3,5,10,11,12,14,15,16,17,18,19,20	
11	3,5,6,10,11,12,14,15,16,17,18,19,20	2,3,5,6,10,11,12,14,15,16,17,18,19,20	3,5,6,10,11,12,14,15,16,17,18,19,20	
12	10,11,12,17,19,20	2,3,5,6,10,11,12,14,15,16,17,18,19,20	10,11,12,17,19,20	
17	3,5,6,10,11,12,14,15,16,17,18,19,20	2,3,5,6,10,11,12,14,15,16,17,18,19,20	3,5,6,10,11,12,14,15,16,17,18,19,20	
19	5,10,11,12,14,15,16,17,19,20	5,6,10,11,12,14,15,16,17,19,20	5,10,11,12,14,15,16,17,19,20	
20	5,10,11,12,14,15,16,17,19,20	2,3,5,6,10,11,12,14,15,16,17,19,20	5,10,11,12,14,15,16,17,19,20	
				2
5	5,14,15,18	2,3,5,6,14,15,16,18	5,14,15,18	
14	3,5,6,14,15,16,18	2,3,5,6,14,15,16,18	3,5,6,14,15,16,18	
15	2,3,5,6,14,15,18	2,3,5,6,14,15,16,18	2,3,5,6,14,15,18	3
18	5,14,15,16,18	5,6,14,15,16,18	5,14,15,16,18	
2	1,16	2,3,16	1,16	4
6	1,16	6,16	6,16	
3	3	3,16,	3	5
16	16	16	16	6

Conical Matrix (CM): After partitioning, the conical matrix (Table 5) was constructed by rearranging factors in their respective levels (Ali et al., 2018).

Table 5: Conical Matrix

Sr.	1	4	7	8	9	13	10	11	12	17	19	20	5	14	15	18	2	6	3	16
1	1	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	1	0	0	0	0	0	0	0	0
4	1	*1*	*1*	*1*	*1*	*1*	*1*	*1*	1	*1*	*1*	1	0	0	0	0	0	0	0	0
7	1	1	1	1	1	*1*	*1*	0	0	0	0	*1*	0	*1*	0	0	0	0	0	0
8	*1*	*1*	1	1	*1*	1	0	0	0	0	0	*1*	0	0	0	0	0	0	0	0
9	*1*	*1*	1	1	1	*1*	1	*1*	0	0	0	0	0	0	0	0	0	0	0	*1*
13	*1*	*1*	*1*	1	*1*	1	*1*	*1*	*1*	*1*	*1*	1	0	0	0	0	0	0	0	0
10	1	*1*	*1*	*1*	1	*1*	1	1	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	0	0	*1*	1
11	1	*1*	*1*	1	*1*	1	1	1	1	*1*	*1*	1	1	1	1	*1*	0	*1*	*1*	*1*
12	1	1	1	1	1	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	1	*1*	*1*	0	0	0	0
17	*1*	1	1	1	*1*	1	*1*	1	1	1	*1*	*1*	1	1	1	*1*	0	*1*	*1*	1
19	*1*	1	1	1	*1*	1	1	1	1	1	1	*1*	*1*	*1*	*1*	0	0	0	0	*1*
20	1	1	1	1	1	1	1	1	1	1	1	1	*1*	*1*	*1*	0	0	0	0	*1*
5	*1*	1	*1*	1	*1*	1	*1*	1	*1*	*1*	*1*	*1*	1	1	*1*	*1*	0	0	0	0
14	*1*	*1*	*1*	*1*	*1*	1	*1*	1	1	1	1	1	1	1	1	1	0	*1*	*1*	*1*
15	*1*	1	*1*	1	*1*	1	*1*	*1*	1	*1*	1	1	*1*	*1*	1	1	*1*	1	1	0
18	*1*	1	1	1	*1*	1	1	1	1	1	1	1	1	1	1	1	*1*	*1*	1	1
2	1	*1*	*1*	*1*	0	*1*	0	*1*	*1*	1	0	*1*	1	*1*	*1*	0	1	0	0	*1*
6	*1*	1	1	1	1	*1*	1	1	*1*	1	*1*	1	*1*	1	*1*	1	0	1	0	*1*
3	1	1	1	*1*	1	*1*	*1*	1	*1*	*1*	0	*1*	1	*1*	*1*	0	1	0	1	0
16	*1*	1	1	1	*1*	1	1	1	1	1	0	*1*	*1*	*1*	*1*	1	0	0	0	*1*

4.2. Drawing Digraph

The digraph (Warfield, 1973), developed for the sake of understanding the structural relationship amongst the factors, is presented in the form of Figure 1.

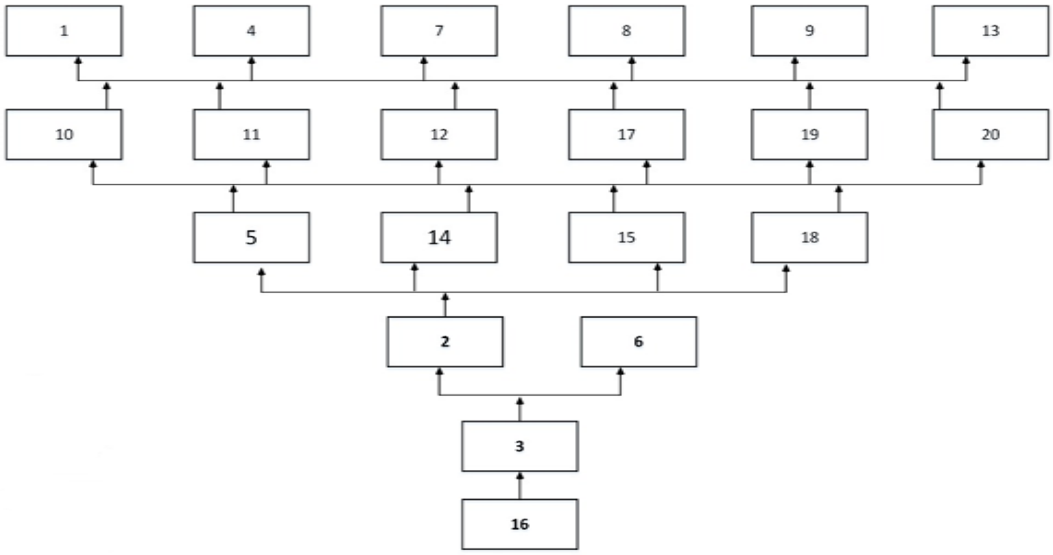

Figure 1: Diagraph

Building ISM Model: The directions of relationships among the factors can be observed on conical matrix and diagraph too, but for the sake of easy and quick understanding, an ISM model is presented in Figure 2 in which the nodes represent the factors and respective codes.

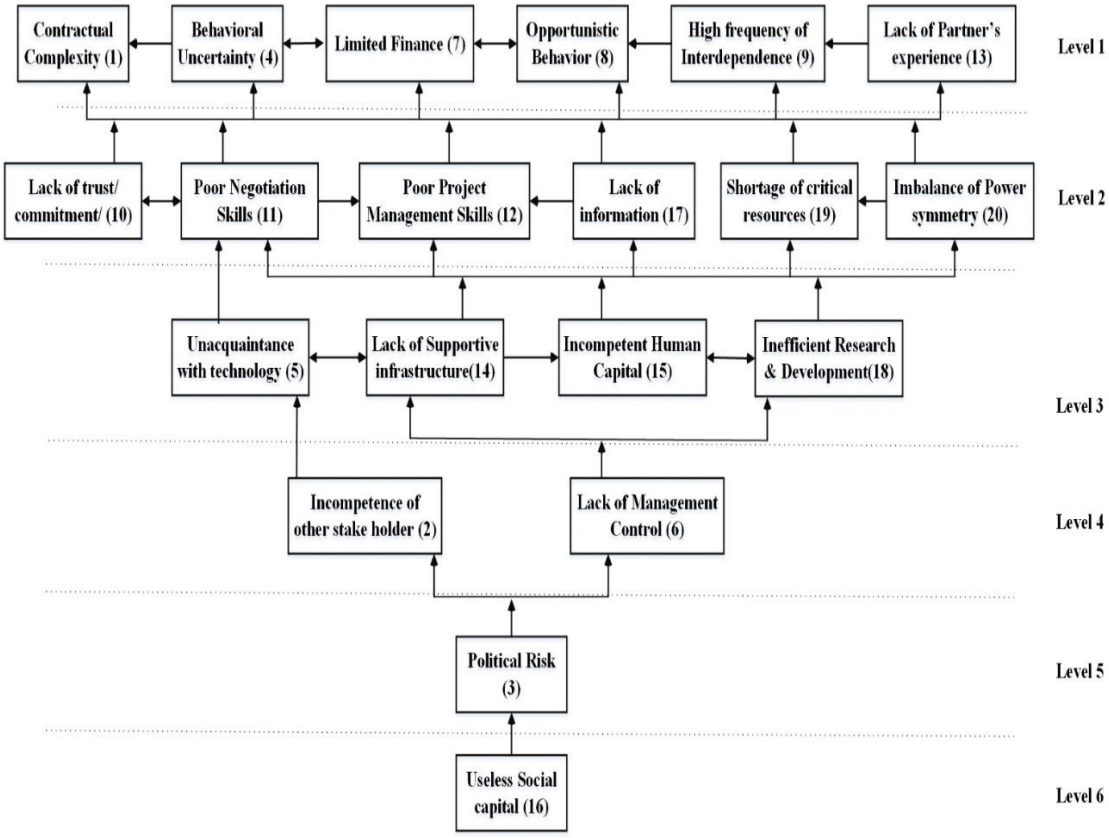

Figure 2: ISM Model

It can be viewed that (1), (4), (7), (8), (9) and (13) reside on *Level-I*, factors (10), (11), (12), (17), (19) and (20) reside on *Level-II*, factors (5), (14), (15) and (18) reside on *Level-III*, factors (2) and (6) reside on *Level-IV* and factors (3) and (16) reside on *Level-5* and *Leve-6* respectively.

MICMAC Analysis: MICMAC groups variables, based on their driving and dependence power, into independent/dependent/linkage or autonomous variables(Jain et al., 2016). It verifies the finding obtained through ISM which is true in this study. MICMAC diagram for illustrating division of factors is presented in Figure 3.

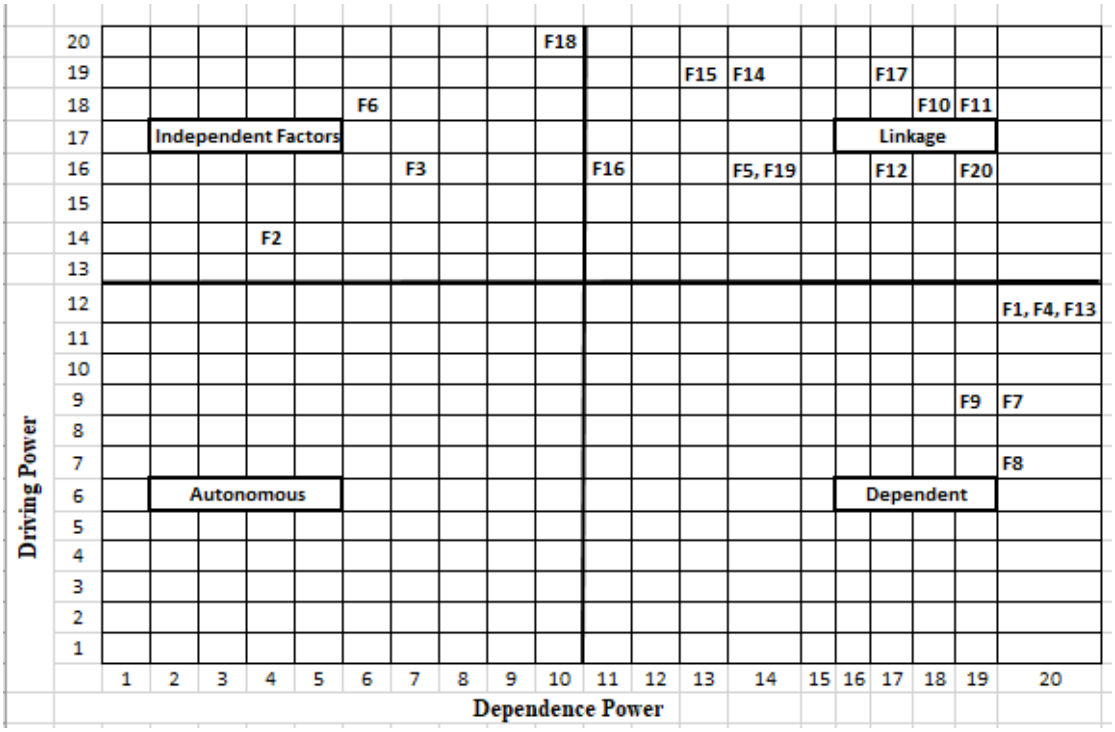

Figure 3: MICMAC Diagram

It is noted that factors F2, F3, F6 and F18 are categorized as independent variables. Factors F1, F4, F7, F8, F9 and F13 are categorized as dependent variables. Factors F5, F10, F11, F12, F14, F15, F16, F17, F19 and F20 are categorized as linkage variables and no factor is in autonomous section.

5. Results

The Critical factors identified through this research must not be ignored at time when contracts are in design phase. The logic behind using our precious time for this research is to uncover the most critical factors that if ignored can cause contract immature death harming trust relationship between contract parties. The research design is based on review of literature, expert opinion, data processing & analysis, discussion and recommendations. Two parallel techniques (ISM and MICMAC) have been applied to meet the objectives of the study. ISM prioritizes factors on the basis of importance into different levels. According to ISM analysis, Factor F16 is placed at the bottom of the model at sixth level and is a driving variable. Factor F3 is placed on fifth level. Factors F2 and F6 are placed at fourth level. Factors F5, F14, F15 and F18 are placed at third level. Factors F10, F11, F12, F17, F19, and F20 are placed at second level. Factors F1, F4, F7, F8, F9 and F13 are placed at first level and are dependent variables.

MICMAC categorized F2, F3, F6 and F18 as independent that are placed at the *third* (F18), *fourth* (F2 and F6) and *fifth* (F3) levels of the ISM model. They drive other factors of the system. Factors F1, F4, F7, F8, F9 and F13 are the dependent factors and occupy the *first* level of the ISM model. The summary of findings obtained through both techniques (ISM and MICMAC) is shown in Table 6. The key factors of contractual bargaining are highlighted as bold in Table 6.

5.1. Discussion

ISM is commonly used for determining interrelationship among factors by creating hierarchal model (Ali et al., 2018). This study is conducted in the context of exploring critical factors of contracts bargaining to address issues of failure in construction industry of Pakistan.

While designing the contracts, critical issues are ignored, which results in various issues of critical nature and majority of contracts reach to early death and termination. In emerging countries like Pakistan majority of business deals, especially in construction sector, occur in the form of contracts, which are destined to failure due to unavailability of information critical to successful execution, completion and enforcement. The failure of contracts results in loss to either of parties as well as to economy of the country. In order to save the economy as well as the stakeholders of construction sector, it is the need of the time to discover critical elements of contractual bargaining that may benefit companies for successful execution and completion of contracts.

The current research applies (ISM) to explore and rank the critical factors of contractual bargaining. For this purpose, an initial list of twenty-eight (*28)* factors was produced through systematic comprehensive review of available literature of renowned publishers. The list was refined and reduced to twenty factors through approval voting of a panel of sixteen experts.

Discussion about Results: Factor F16 is at sixth level and F3 at fifth level respectively. It presented factors 2 and 6 at fourth level, factors F5, F14, F15 and F18 at third level. Further, it presented factors F10, F11, F12, F17, F19 and F20 at second level. Lastly, it placed factors F1, F4, F7, F8, F9 and F13 at the first level. In case of MICMAC, factors F2, F3, F6 and F18 are independent variables. Factors F1, F4, F7, F8, F9 and F13 are dependent variables. Factors F5, F10, F11, F12, F14, F15, F16, F17, F19 and F20 are linkage variables. Note: no factor is autonomous.
Overall, factors F2, F3, F6 and F18 found to be the most critical factors; 2, 3, are 6 placed at *independent* and 18 is placed at *linkage quadrants* of MICMAC. These factors need attention while designing, executing and enforcing the contracts. If considered, they might lead to successful completion of contracts.

Table 6: Final list of Factors & Summary of Results

No	Factors	Code	Driving	Dependence	Cluster	Level	Reference
1	Contractual Complexity	F1	12	20	Dependent	First	Wang et al., (2018)
2	Incompetence of other Stakeholders	F2	14	4	Independent	Fourth	Ghanbaripour et al., (2020)
3	Political Risk	F3	16	7	Independent	Fifth	Chang et al., (2018)
4	Behavioural Uncertainty	F4	12	20	Dependent	First	You et al., (2018)
5	Unacquaintance with Technology	F5	16	14	Linkage	Third	Lenderink et al., (2020)
6	Lack of Management Control	F6	18	6	Independent	Fourth	Mba & Agumba, 92018)
7	Limited Finance	F7	9	20	Dependent	First	Tripathi & Jha, (2018)
8	Opportunistic Behaviour	F8	7	20	Dependent	First	You et al., (2018)
9	High degree of Interdependence	F9	9	19	Dependent	First	Wong et al., (2017)
10	Lack of Trust / Mutual Commitment	F10	18	18	Linkage	Second	Ghanbaripour et al., (2020)
11	Poor Negotiation Skills	F11	19	18	Linkage	Second	Zuo et al., (2018)
12	Poor Project Management Skills	F12	16	17	Linkage	Second	Zuo et al., (2018)
13	Lack of Partner's Experience	F13	12	20	Dependent	First	Mba & Agumba, (2018)
14	Lack of Supportive infrastructure	F14	19	15	Linkage	Third	Song et al., (2018)
15	Incompetent Human Capital	F15	19	14	Linkage	Third	Ghanbaripour et al., (2020)
16	Useless Social Capital	F16	16	11	Linkage	Sixth	Moore et al., (2018)
17	Lack of Information	F17	19	17	Linkage	Second	Macy, (2018)
18	Poor Research and Development	F18	20	10	Independent	Third	Lenderink et al., (2020)
19	Shortage of Critical Resources	F19	16	14	Linkage	Second	Song et al., (2018)
20	Imbalance of Power Symmetry	F20	16	19	Linkage	Second	Bamel et al., (2019)

6. Conclusion

The study identified/explored the important factors that need to be known and considered for contract designing to avoid the issues of early termination or failure of contracts. The study began with the systematic assessment of the literature and generation of a rough list of factors. Then some experts fulfilling the inclusion criteria were recruited to take their opinion on the initial list of factors. The experts were approached for three times; first for the verification of factors identified through literature review, second for approval voting and third for obtaining information about factors' interrelationships (Vasanthakumar et al., 2016; Raeesi et al., 2013). After generating a refined list of factors, ISM and MICMAC were applied to construct hierarchal model, arrange them in levels and divide them into MICMAC groups. The list of approved and not approved factors is given in Annexure.
ISM placed F16 at sixth level, F3 at fifth level, 2 and 6 at fourth level, F5, F14, F15 and F18 at third level, F10, F11, F12, F17, F19 and F20 at second level, F1, F4, F7, F8, F9 and F13 at the first level of the ISM model.
In case of MICMAC, F2, F3, F6 and F18 are independent variables; they drive other factors. Factors F1, F4, F7, F8, F9 and F13 are dependent; Changes in independent variables lead to changes in these variables. Factors F5, F10, F11, F12, F14, F15, F16, F17, F19 and F20 are linkage variables; they are mediators that influence dependent variables indirectly. (Note: No factor is autonomous in these variables. All the variables affect and affected by other variables of the system).

6.1. Implications of Study

The Study identifies the critical factors that companies need to consider and handle with care prior to entering into a deal or contract or during the implementation of the contract. This research highlights the factors that are critical to construction contracts for their successful execution and completion. This research facilitates the construction companies or other companies where contract is an essential part of operations. The research model will help avoid early termination of the contracts. The hierarchy of factors developed in this research with the help of ISM

methodology provides a guide to policy makers of the construction and/or other contract industries and contractors about the importance of the factors that need to be kept in mind while designing contracts.

6.2. Practical Implications

The research will be helpful to reduce the chances of the failure of contracts. It intends to be fruitful for the design, execution and enforcement of contracts in the construction industry of Pakistan. As per expert's opinion, 'useless social capital' (F16), 'contractual complexity' (F1), 'behavioural uncertainty' (F4), 'limited finance' (F7), 'opportunistic behaviour' (F8), 'high degree of interdependence' (F9) and 'lack of Partner's experience' (F13) are creating problems in the way of successful completion and enforcement of contracts. The ISM structural model and MICMAC classification is beneficial for the policy makers, legal officers and other stakeholders who actively participate in the process of designing contracts. The list of critical factors and their interrelationship produced through this research is fruitful in understanding their significance for the design of contracts, and failure to do so might cause failure of the contracts' completion and enforcement. This research is capable of providing a guide to construction contractors to develop a comprehensive structure and by following the same may reduce the risk. The ISM-based model presented in this research proposed contractors and policy makers a comprehensive solution that would be beneficial to solve the practical problems in construction as well as other industries where the work through contracts is a routine.

6.3. Theoretical Implications

This research adds to existing literature by providing a detailed understanding of issues inherent in and necessary to consider in contractual bargaining. Use of experts' opinion in identifying the factors and their relevance to the phenomenon under study is a distinguishing feature contributed by this research. A model established through interpretive structural modelling (ISM) and classification scheme produced through MICMAC analysis are significant additions to the literature. Confirmation of finding of the ISM model through MICMAC is a new thing to add to literature. To conclude, this study offers a foundation for future researches in the context of contractual bargaining.

6.4. Limitations of Study

Current research has many useful implications, however, not without limitations that are essential to describe. This section presents limitations of the research.

- First, this study considers only *twenty (20)* critical factors of contractual bargaining, there might be the factors that the researchers have skipped overlooked. Furthermore, not all the factors might be of equal importance for construction companies.
- Second, this research is qualitative in nature, which gives information on the relevant critical factors of contractual bargaining and does not give information on the strength of relationship among variables; results are not validated using secondary data techniques.
- Third, in this research, experts who belong directly or indirectly to contract organizations or academic institutions (for more than 10) were approached for their valuable opinion. The study employed only 16 experts to acquire information and opinion regarding factors' relevance and importance, hence, raising question on the reliability of findings.
- Last, the scope of application is limited to construction industry of Pakistan only; it explores factors necessary for consideration in the bargaining stage of contracts within the context of Pakistan.

6.5. Recommendations

To overcome the limitations of the study, we suggest the following tips to potential readers and researchers.

- First, future researchers might explore more literature concerning contractual bargaining by exploring other journals and publishers not covered in this study.
- Second, the interrelationship among factors and mediating or moderating effect of factors needs to be tested through secondary data techniques e-g, PLS-SEM, GRA etc.
- Third, in future researches, the size/diversification of experts may be increased by incorporating social stakeholders to further make the research more reliable. Further, this study use experts' opinion to sort out and identify important factors; the same can be accomplished using more professional techniques like PCS, EFA etc.
- Last, since the study is applicable to Pakistani construction sector only, the potential researchers may try to replicate this research in other regions/industries/sectors/countries. Further, the researchers may replicate the research process to explore factors that are important to international inter-firm contracts.

References

Abdullah, M. R. T. L., & Siraj, S. (2014). Interpretive Structural Modeling of MLearning Curriculum Implementation Model of English Language Communication Skills for Undergraduates. *Turkish Online Journal of Educational Technology-TOJET*, 13(1), 151-161.

Adnan, H., Rosman, M. R., Rashid, Z. A., Yusuwan, N. M., & Bakhary, N. A. (2018, February). Application of Delphi expert panel in joint venture projects. In IOP Conference Series: Earth and Environmental Science (Vol. 117, No. 1, p. 012048). IOP Publishing.

Ado, A., Su, Z., & Wanjiru, R. (2017). Learning and knowledge transfer in Africa-China JVs: Interplay between informalities, culture, and social capital. *Journal of International Management*, 23(2), 166-179.

Alashwal, A. M., Fareed, N. F., & Al-Obaidi, K. M. (2017). Determining success criteria and success factors for international construction projects for Malaysian contractors. *Construction Economics and Building*, 17(2), 62-80.

Alawamleh, M., & Popplewell, K. (2011). Interpretive structural modelling of risk sources in a virtual organisation. *International Journal of Production Research*, 49(20), 6041-6063.

Ali, S. M., Arafin, A., Moktadir, M. A., Rahman, T., & Zahan, N. (2018). Barriers to reverse logistics in the computer supply chain using interpretive structural model. *Global journal of flexible systems management*, 19(1), 53-68.

Amarkhil, Q., & Elwakil, E. (2019). Construction organization success strategy in post-conflict environment. *International Journal of Construction Management*, 1-10.

Attri, R., Dev, N., & Sharma, V. (2013). Interpretive structural modelling (ISM) approach: an overview. *Research Journal of Management Sciences*, 2319, 1171.

Bamel, N., Dhir, S., & Sushil, S. (2019). Inter-partner dynamics and joint venture competitiveness: a fuzzy TISM approach. *Benchmarking: An International Journal.*

Benítez-Ávila, C., Hartmann, A., Dewulf, G., & Henseler, J. (2018). Interplay of relational and contractual governance in public-private partnerships: The mediating role of relational norms, trust and partners' contribution. *International journal of project management*, 36(3), 429-443.

Bustinza, O. F., Gomes, E., Vendrell-Herrero, F., & Baines, T. (2019). Product– service innovation and performance: the role of collaborative partnerships and R&D intensity. *R&D Management*, 49(1), 33-45.

Cai, Y., & Xia, C. (2018). Interpretive Structural Analysis of Interrelationships among the Elements of Characteristic Agriculture Development in Chinese Rural Poverty Alleviation. *Sustainability*, 10(3), 786.

Chang, T., Deng, X., Hwang, B. G., & Zhao, X. (2018). Political risk paths in international construction projects: case study from Chinese construction enterprises. *Advances in Civil Engineering*, 2018.

Chang, T., Hwang, B. G., Deng, X., & Zhao, X. (2018). Identifying political risk management strategies in international construction projects. Advances in Civil Engineering, 2018.

Chen, W. T., Merrett, H. C., Lu, S. T., & Mortis, L. (2019). Analysis of Key Failure Factors in Construction Partnering—A Case Study of Taiwan. *Sustainability*, 11(14), 3994.

Clayton, M. J. (1997). Delphi: a technique to harness expert opinion for critical decision-making tasks in education. *Educational Psychology*, 17(4), 373-386.

Dhir, S. (2017). Flexibility in modification and termination of cross-border joint ventures. *Global Journal of Flexible Systems Management*, 18(2), 139-151.

Dhochak, M., & Sharma, A. K. (2016). Using interpretive structural modeling in venture capitalists' decision-making process. *Decision*, 43(1), 53-65.

Fałkowski, J., Malak-Rawlikowska, A., &Milczarek-Andrzejewska, D. (2017). Farmers' self-reported bargaining power and price heterogeneity: Evidence from the dairy supply chain. *British Food Journal*, 119(8), 1672-1686.

Famiyeh, S., Amoatey, C. T., Adaku, E., & Agbenohevi, C. S. (2017). Major causes of construction time and cost overruns. *Journal of engineering, design and technology*.

Gardas, B. B., Raut, R. D., & Narkhede, B. (2019). Determinants of sustainable supply chain management: A case study from the oil and gas supply chain. *Sustainable Production and Consumption*, 17, 241-253.

Ghanbaripour, A. N., Sher, W., & Yousefi, A. (2020). Critical success factors for subway construction projects–main contractors' perspectives. *International Journal of Construction Management*, 20(3), 177-195.

Greer, C. R., Lusch, R. F., & Hitt, M. A. (2017). A service perspective for human capital resources: A critical base for strategy implementation. *Academy of Management Perspectives*, 31(2), 137-158.

He, Z., & Chen, H. (2021). Critical factors for practicing sustainable construction projects in environmentally fragile regions based on interpretive structural modeling and cross-impact matrix multiplication applied to classification: A case study in China. *Sustainable Cities and Society*, 74, 103238.

Heiskanen, A. (2017). The technology of trust: How the Internet of Things and blockchain could usher in a new era of construction productivity. *Construction Research and Innovation*, 8(2), 66-70.

Howard, M., Roehrich, J. K., Lewis, M. A., & Squire, B. (2019). Converging and Diverging Governance Mechanisms: The Role of (Dys) Function in Long-term Inter-organizational Relationships. *British Journal of Management*, 30(3), 624-644.

Hwang, B. G., Zhao, X., & Chin, E. W. Y. (2017). International construction joint ventures between Singapore and developing countries. *Engineering, Construction and Architectural Management*.

Jain, V. K., Kumar, P., Dube, P., & Rawat, M. P. (2020). Decision-Making Framework using Interpretive Structural Modeling (Ism) and Analytic Hierarchy Process (Ahp) Methods: Millennials & Sustainable Consumption.

James, A. T., Kumar, G., Bhalla, M., Amar, M., & Jain, P. (2020). Analysis of challenges for automobile service garages in India: a structural modeling approach. *Journal of Advances in Management Research*., 18(3), 392-413.

Karabag, S. F. (2019). Factors impacting firm failure and technological development: A study of three emerging-economy firms. *Journal of Business Research*, 98, 462-474.

Keung, C., & Shen, L. (2017). Network strategy for contractors' business competitiveness. *Construction Management and Economics*, 35(8-9), 482-497.

Khan, S., & Khan, M. S. A. (2013). Conceptualized Model of Green It Purchasing Enablers–An Application of Delphi Technique and Interpretive Structural Modeling. *Business Sciences International Research Journal*, 1(1), 24-37.

Kitamura, H., Matsushima, N., & Sato, M. (2017). Exclusive contracts and bargaining power. *Economics Letters*, 151, 1-3.

Kloker, S., Klatt, F., Höffer, J., & Weinhardt, C. (2018). Analyzing prediction market trading behaviour to select Delphi-experts. *Foresight*, 20(4), 364-374

Kumar, S., & Thakkar, J. J. (2017). Schedule and cost overrun analysis for R&D projects using ANP and system dynamics. *International Journal of Quality & Reliability Management*.

Kuwaiti, E. A., Ajmal, M. M., & Hussain, M. (2018). Determining success factors in Abu Dhabi health care construction projects: customer and contractor perspectives. *International Journal of Construction Management*, 18(5), 430-445.

Latusek, D., & Vlaar, P. W. (2018). Uncertainty in interorganizational collaboration and the dynamics of trust: A qualitative study. *European Management Journal*, 36(1), 12-27.

Lenderink, B., Halman, J. I., Boes, H., & Voordijk, H. (2020). A method to encourage and assess innovations in public tenders for infrastructure and construction projects. *Construction innovation*.

Li, G., Huang, D., Sun, C., & Li, Y. (2019). Developing interpretive structural modeling based on factor analysis for the water-energy-food nexus conundrum. *Science of The Total Environment*, 651, 309-322.

Lu, C., Yu, Z., Wang, X., & Hong, Y. (2020). Empirical Study on the Obstacles to the Success of Joint Ventures in Construction Projects. *Advances in Civil Engineering*, 2020.

Lumineau, F. (2017). How contracts influence trust and distrust. *Journal of management*, 43(5), 1553-1577.

Majumdar, A., Garg, H., & Jain, R. (2021). Managing the barriers of Industry 4.0 adoption and implementation in textile and clothing industry: Interpretive structural model and triple helix framework. *Computers in Industry*, 125, 103372.

Manley, K., & Chen, L. (2017). Collaborative learning to improve the governance and performance of infrastructure projects in the construction sector. *Journal of Management in Engineering*, 33(5), 04017030.

Mba, M. B., & Agumba, N. J. (2018). Critical Success Factors of Joint Ventures in the Construction Industry: Literature Review. In Proceedings of the 21st International Symposium on Advancement of Construction Management and Real Estate (pp. 597-605). Springer, Singapore.

Menon, R. R., & Ravi, V. (2021). Analysis of barriers of sustainable supply chain management in electronics industry: An interpretive structural modelling approach. *Cleaner and Responsible Consumption*, 100026.

Moore, C. B., Payne, G. T., Autry, C. W., & Griffis, S. E. (2018). Project complexity and bonding social capital in network organizations. *Group & Organization Management*, 43(6), 936-970.

Niazi, A. A. K., Qazi, T. F. and Sandhu, K. Y. (2019). Uncovering the Myths of TQM in Readymade Garment Sector of Pakistan: An Interpretive Structural Modeling Approach. *Review of Economics and Development Studies*, 5 (3), 531-540.

Niazi, A.A.K., Qazi, T.F., Basit, A. and Khan, K.S., (2019). Curing Expensive Mistakes: Applying Ism on Employee's Emotional Behaviors in Environment of Mergers. *Review of Economics and Development Studies*, 5(1), 79-94.

Oliveira, N., &Lumineau, F. (2019). The dark side of interorganizational relationships: An integrative review and research agenda. *Journal of Management*, 45(1), 231-261.

Parameswar, N., &Dhir, S. (2018). Post termination interaction in international joint ventures (IJV). foresight.

Qing, Q., Deng, T., & Wang, H. (2017). Capacity allocation under downstream competition and bargaining. *European Journal of Operational Research*, 261(1), 97-107.

Raeesi, R., Dastrang, M., Mohammadi, S., & Rasouli, E. (2013). Understanding the interactions among the barriers to entrepreneurship using interpretive structural modeling. *International Journal of Business and Management*, 8(13), 56.

Rajan, R., Rana, N. P., Parameswar, N., Dhir, S., & Dwivedi, Y. K. (2021). Developing a modified total interpretive structural model (M-TISM) for organizational strategic cybersecurity management. *Technological Forecasting and Social Change*, 170, 120872.

Raut, R., Gardas, B. B., & Narkhede, B. (2019). Ranking the barriers of sustainable textile and apparel supply chains: An interpretive structural modelling methodology. *Benchmarking: An International Journal*.

Razzaq, A., Thaheem, M. J., Maqsoom, A., & Gabriel, H. F. (2018). Critical external risks in international joint ventures for construction industry in Pakistan. *International Journal of Civil Engineering*, 16(2), 189-205.

Samanta, P. K., & Singla, H. K. (2019). Factors Affecting the Success of Joint Ventures in Indian Construction Firms. *IUP Journal of Management Research*, 18(3).

Saunders, M. N., Lewis, P., Thornhill, A., & Bristow, A. (2015). Understanding research philosophy and approaches to theory development.

Shen, L., & Cheung, S. O. (2018). How forming joint ventures may affect market concentration in construction industry?. *International Journal of Construction Management*, 18(2), 151-162.

Shen, W., Tang, W., Siripanan, A., Lei, Z., Duffield, C. F., Wilson, D., ... & Wei, Y. (2017). Critical success factors in thailand′ s green building industry. *Journal of Asian Architecture and Building Engineering*, 16(2), 317-324.

Shi, C., Chen, Y., You, J., & Yao, H. (2018). Asset specificity and contractors' opportunistic behavior: moderating roles of contract and trust. *Journal of management in engineering*, 34(5), 04018026.

Silva, T., & Ma, J. (2017). Expert profiling for collaborative innovation: big data perspective. *Information Discovery and Delivery*, 45(4), 169-180.

Singh, S., & Gupta, A. (2020). An ISM modeling for factors affecting the purchase of green products. *Journal of Modelling in Management*, 16(1), 103-123.

Song, H., Zhu, F., Klakegg, O. J., & Wang, P. (2018). Relationship between contractual flexibility and contractor's cooperative behavior: The mediating effect of justice perception. *International Journal of Managing Projects in Business*, 11(2), 382-405.

Song, J., Hu, Y., & Feng, Z. (2018). Factors influencing early termination of PPP projects in China. *Journal of management in engineering*, 34(1), 05017008.

Song, S. (2017). Host market uncertainty, subsidiary characteristics, and growth option exercise. *Long Range Planning*, 50(1), 63-73.

Stavraki, G., Plakoyiannaki, E., & Clarke, J. (2018). The Appropriation Cycle: Novice and Expert Consumers. *European Journal of Marketing*, 52, 1886-1908.

Sun, C., Jiang, S., Skibniewski, M. J., Man, Q., & Shen, L. (2017). A literature review of the factors limiting the application of BIM in the construction industry. *Technological and Economic Development of Economy*, 23(5), 764- 779.

Sushil, A. (2017). Modified ISM/TISM Process with Simultaneous Transitivity Checks for Reduced Direct Pair Comparisons. *Global Journal of Flexible Systems Management*, 18(4), 331-351.

Sushil, S. (2012). Interpreting the interpretive structural model. *Global Journal of Flexible Systems Management*, 13(2), 87-106.

Thakkar, J., Kanda, A. and Deshmukh, S.G. (2008). Interpretive structural modeling (ISM) of IT- enablers for Indian manufacturing SMEs. *Information Management & Computer Security*, 16 (2), 113-136.

Trigunarsyah, B., & Parami Dewi, A. A. D. (2015, May). Using a design–build system: an interpretive structural model. In Proceedings of the Institution of Civil Engineers-Municipal Engineer (Vol. 169, No. 1, pp. 3-12). Thomas Telford Ltd.

Tripathi, K. K., & Jha, K. N. (2018). Determining success factors for a construction organization: A structural equation modeling approach. *Journal of management in engineering*, 34(1), 04017050.

Um, K. H., & Kim, S. M. (2019). The effects of supply chain collaboration on performance and transaction cost advantage: The moderation and nonlinear effects of governance mechanisms. *International Journal of Production Economics*, 217, 97-111.

Vasanthakumar, C., Vinodh, S., & Ramesh, K. (2016). Application of interpretive structural modelling for analysis of factors influencing lean remanufacturing practices. *International Journal of Production Research*, 54(24), 7439-7452.

Viswanathan, S. K., & Jha, K. N. (2020). Critical risk factors in international construction projects. *Engineering, Construction and Architectural Management*.

Wang, C., & Giouvris, E. (2020). Firm Survival between Manufacturing and Non- Manufacturing Industries: Cultural Distance, Country Risk, Entry Mode, Market Size, Firm Age and Location. *The Chinese Economy*, 1-20.

Wang, W., Chen, Y., Zhang, S., & Wang, Y. (2018). Contractual complexity in construction projects: Conceptualization, operationalization, and validation. *Project Management Journal*, 49(3), 46-61.

Wang, Y., Chen, Y., Fu, Y., & Zhang, W. (2017). Do prior interactions breed cooperation in construction projects? The mediating role of contracts. *International journal of project management*, 35(4), 633-646.

Wang, Y., Chen, Y., Fu, Y., & Zhang, W. (2017). Do prior interactions breed cooperation in construction projects? The mediating role of contracts. *International journal of project management*, 35(4), 633-646.

Warfield, J. N. (1973). Binary matrices in system modeling. *IEEE Transactions on Systems, Man, and Cybernetics*, (5), 441-449.

Warfield, J. N. (1974). Toward interpretation of complex structural models. *IEEE Transactions on Systems, Man, and Cybernetics*, (5), 405-417.

Williams, S. (2017). Venture Capital Contract Design: An Empirical Analysis of the Connection Between Bargaining Power and Venture Financing Contract Terms. *Fordham J. Corp. & Fin. L.*, 23, 105.

Wong, A., Wei, L., Yang, J., & Tjosvold, D. (2017). Productivity and participation values for cooperative goals to limit free riding and promote performance in international joint ventures. *Journal of World Business*, 52(6), 819-830.

Wu, A., Wang, Z., & Chen, S. (2017). Impact of specific investments, governance mechanisms and behaviors on the performance of cooperative innovation projects. *International Journal of Project Management*, 35(3), 504-515.

Xue, J., Lu, S., Shi, B., & Zheng, H. (2018). Trust, guanxi, and cooperation: A study on partner opportunism in Chinese joint-venture manufacturing. *Journal of Business & Industrial Marketing*.

Yap, J. B. H., & Cheah, S. Y. (2019). Key challenges faced by Chinese contractors in Malaysian construction industry. *Journal of Engineering, Design and Technology*.

Yeniyurt, S., &Carnovale, S. (2017). Global supply network embeddedness and power: An analysis of international joint venture formations. *International Business Review*, 26(2), 203-213

You, J., Chen, Y., Wang, W., & Shi, C. (2018). Uncertainty, opportunistic behavior, and governance in construction projects: The efficacy of contracts. *International Journal of Project Management*, 36(5), 795-807.

Zahariadis, N. (2017). Bargaining power and negotiation strategy: Examining the Greek bailouts, 2010–2015. *Journal of European Public Policy*, 24(5), 675- 694.

Zeinalnezhad, M., Chofreh, A. G., Goni, F. A., Hashemi, L. S., & Klemeš, J. J. (2021). A hybrid risk analysis model for wind farms using Coloured Petri Nets and interpretive structural modelling. *Energy*, 229, 120696.

Zhang, L., & Qian, Q. (2017). How mediated power affects opportunism in owner– contractor relationships: The role of risk perceptions. *International Journal of Project Management*, 35(3), 516-529.

Zhang, N., Deng, X., Zhao, X., & Chang, T. (2019). Exploring the sources of contractors' competitive advantage on international HSR construction projects. International Journal of Civil Engineering, 17(7), 1115-1129.

Zhao, Z. Y., Tang, C., Zhang, X., & Skitmore, M. (2017). Agglomeration and competitive position of contractors in the international construction sector. *Journal of construction engineering and management*, 143(6), 04017004.

Zuo, J., Zhao, X., Nguyen, Q. B. M., Ma, T., & Gao, S. (2018). Soft skills of construction project management professionals and project success factors. *Engineering, Construction and Architectural Management.*

Annexure A: Approval voting on contractual bargaining factors

Sr. #	Factors	E1	E2	E3	E4	E5	E6	E7	E8	E9	E10	E11	E12	E13	E14	E15	E16	Status
1	Contractual Complexity	√	√	x	√	x	√	x	√	x	√	√	√	√	√	√	√	Approved
2	Incompetence of other stake holder	√	√	√	√	x	√	√	√	x	√	√	√	X	√	√	√	Approved
3	Political Risk	√	√	x	x	x	√	√	√	x	x	√	√	√	x	√	√	Approved
4	Behavioural Uncertainty	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Approved
5	Unacquaintance with technology	X	x	√	√	√	x	x	√	√	x	x	x	X	x	√	√	Approved
6	Lack of Management Control	X	√	x	x	√	x	√	x	√	x	x	x	X	x	x	x	Approved
7	Limited Finance	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Approved
8	Opportunistic Behaviour	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	x	Approved
9	High degree of Interdependence	X	√	√	√	√	√	√	x	√	x	x	x	√	x	√	x	Approved
10	Lack of Trust /commitment / mutual loyalty	X	√	√	√	√	√	√	√	√	x	x	√	√	x	x	x	Approved
11	Poor Negotiation Skills	√	√	√	√	√	√	√	√	√	√	√	√	X	√	√	√	Approved
12	Poor Project Management Skills	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Approved
13	Poor Research and Development	√	√	√	√	√	√	√	x	x	x	x	√	√	√	√	x	Approved
14	Lack of Supportive infrastructure	√	x	√	√	√	√	√	√	√	√	√	√	√	√	√	x	Approved
15	Incompetent Human Capital	√	√	√	√	√	√	x	√	√	√	√	√	X	√	√	x	Approved
16	Use less Social capital	X	√	x	√	√	x	x	√	√	x	x	√	√	√	x	x	Approved
17	Lack of information	X	x	√	√	√	√	x	√	√	x	x	√	X	√	√	√	Approved
18	Lack of Partner's Experience	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Approved
19	Shortage of Critical Resources	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Approved
20	Imbalance of Power Symmetry	X	√	√	√	x	√	x	√	x	√	√	√	√	√	√	√	Approved
21	Market Uncertainty	X	√	√	x	x	√	√	√	x	x	x	x	X	x	√	√	Not Approved
22	Contractor Competitive Position	√	√	√	√	√	√	x	√	√	√	√	√	√	√	√	√	Not Approved
23	Uncompetitive Procurement	√	x	√	x	x	x	√	x	x	x	x	√	√	x	x	x	Not Approved
24	Inefficient Supply Chain Management	X	x	x	x	√	√	x	x	x	x	x	√	X	x	x	√	Not Approved
25	Substitutability	X	√	x	x	x	√	√	√	x	x	x	√	√	√	x	x	Not Approved
26	Governance Mechanism	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	Not Approved
27	Inefficient Quality Control	√	x	x	x	x	x	x	√	x	x	x	√	X	x	√	x	Not Approved
28	Economic Risk	x	√	√	x	x	√	√	x	x	x	x	x	√	x	x	√	Not Approved