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# **BARRIERS TO SUPPLY CHAIN MANAGEMENT IN THE CONSTRUCTION INDUSTRY OF PAKISTAN**

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**Abstract:** Construction in Pakistan is mostly project-based, requiring productive and systematic use of available resources. In the modern world, the SCM approach has become a central component in developmental initiatives in the construction industry which helps in enhancing the productivity and efficacy of construction projects. Since, the implementation of SCM requires a systematic management technique along with effective technological aid, it may discourage the contractor especially in developing countries like Pakistan. Consequently, this paper highlights the identification of constraints to SCM in the construction industry of Pakistan. For acquisition of data, a questionnaire survey was conducted. After an in-depth literature review, extensive research led to the recognizance of nineteen crucial barriers to the successful commencement of the SCM approach. These obstructions were sorted into four more extensive classifications, specifically, Strategic Barriers, Technical Barriers, Individual Barriers, Organizational Barriers and Cultural Barriers. These recognized barriers were incorporated into the questionnaire in the form of Likert Scale items with a range of five possible responses to rank their perceived significance of each barrier. Due to the ongoing pandemic, quantitative technique of data collection was used which included the circulation of questionnaire among various construction organizations. The collected data was analyzed statistically and using Factor Analysis, the results helped identify seven major factors. This study helps identify the deep-rooted hindrances faced by construction industry of Pakistan for the initiation of Supply Chain Management system and will help us better understand the challenges that may pave the way for the establishment of Supply Chain Management in the construction industry of Pakistan and similar developing countries in the years to come.

**Keywords-** supply chain management, barrier analysis, factor analysis, construction supply chain, Principal Components Analysis

## **1 Introduction**

Supply Chain Management (SCM) in the construction industry is a highly fragmented nexus of multiple levels of organizations from grass-root level to large scale enterprises comprising of stakeholders such as architects, suppliers, contractors, and indirect suppliers. SCM includes the movement of raw material, their storage, work in process inventory and consumed goods from starting point to consumption [1]. Construction industry plays a vital role in a country's economy, especially for developing countries like Pakistan. According to Pakistan Economic Survey, the country's construction industry accounts for 2.53% of Gross Domestic Product (GDP) and the sector employs 7.61% of the



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employed Pakistani labour force. The CPEC agreement between Pakistan and China has opened up a plethora of opportunities for the construction industry to thrive. The construction company in Pakistan is in developing stages and the competition within this industry has increased manifold in recent times. Therefore, the contractors have to work on strategies that increase the quality of their services while also decreasing the production unit costs, thus providing a competitive advantage to the construction firm. For this purpose, the successful implementation of Supply Chain Management focusing on the use of firm's suppliers, operations and technological capabilities is integral because the construction process includes a variety of parties which provide different services such as labour, materials, equipment and related information.

We conducted a quantitative content analysis of existing research and it is certain from this extensive Literature Review that a successful supply chain management eliminates cost and time overruns while increasing the process efficiency which provides a competitive advantage to the construction firm [2]. Even though there maybe a win-win approach for both the contractor and supplier but still there maybe many barriers in the successful implementation of Supply Chain Management. A variety of researchers, such as, Akintoye [3] and Dianty [4], have classified these barriers. Major barriers identified by Akintoye [3] are:

Insufficient understanding of Supply Chain Management concepts, Low commitment of senior management brass, Uncertainty of strategic benefits, Inadequate organizational hierarchy to support the system, Lack of commitment by partners and, Insufficient information technologies and related equipment.

The barriers identified by researches such as, [5], [6], [7], [8], [9], [10], [11], [12] and [13] are summarized and listed below:

Less availability of company information systems which enable sharing of information with the suppliers, insufficient consultants to guide the firms, negative impact on quality because of long-term working relation with the same supplier, supplier provided materials having inappropriate quality, inadequate informational technology infrastructure, contractor's inclination towards the clients' interests over the subcontractor and suppliers' needs, cost-oriented and short-term goals in the construction industry, suppliers lack interest in quality management, hindrance in implementation because of a large variety of suppliers involved in a project, project-based work in construction sector instead of mass production, issues regarding management and storage of stock, increased transportation cost and supplier distance, lack of trust due to hostile relations among stakeholders, inadequate understanding of Supply Chain Management by top management, supplier's lack of interest in long-term association, low trust in supplier's commitment, unsupported organizational structure for a cooperation with the suppliers, top management's hesitancy for adaptation to new management styles.

The construction industry of Pakistan lacks any substantial research for the incorporation of SCM thus the identification of the barriers paves the way for future research for the integration, implementation and improvement of the supply chain process.

## **2 Research Methodology**

### **2.1 Development of Research Framework**

The selection of study population was first narrowed down based on extensive literature review and expert opinion to the following: Construction Firms, Design Consultancy Firms, Clients' Firms, Subcontractors' Firms, Suppliers' Firms, Others (Engineers, Architects, PhD Students).

This barriers were categorized into areas of concern, namely:

<b>S/no.</b>	<b>Areas of Concern</b>
1	Strategic
2	Individual
3	Organizational
4	Cultural
5	Technological



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**2.2 Development of Measurement Tool**

The measurement tool is in the form of an online questionnaire, keeping in mind the current pandemic. The barrier categories in Table 1 have been kept in mind for the development of the questionnaire. Likert Rating Scale has been used for the questionnaire.

**Table 2**

<b>Barrier Categories</b>	<b>Supply-chain management barriers</b>
Strategic barrier	Political instability
	Lack of creation of supply chain alliances
	Short-term decision-making perspectives
	Unchecked transportation costs
	Preference to project-based production over mass production
Cultural barrier	Lack of top management commitment and support
	Prioritization of client over supplier and subcontractor's needs.
	Mistrust among employees and supply-chain partners
	Excessive hiring of a single subcontractor and impacts on quality
Technological barrier	Subcontractors and suppliers are not allowed to participate in the early stages of the project
	Lack of information technology use by suppliers
	Poor ICT structure (information system and electronic trade systems) of companies to share information with suppliers
Individual barrier	Lack of education to employee and supplier employee
	Resistance to change of management system by suppliers
	Lack of motivation of suppliers to invest in quality management
	Lack of necessary tools, management skills and knowledge
Organizational barrier	Hindrances in stock storage and management for suppliers
	Low information quality, insufficient information exchange and, less transparency along with limited communication
	Serious problems with payments between customers, main contractors, sub-contractors and suppliers
	Lack the framework and measurement system

**2.3 Data Collection**

A total of 109 responses were obtained, out of which 2 were disregarded, leaving us with a sample size of 107.

**Table 3**

Contractor firms	37.6%
Client firms	21.1%
Supplier firms	3.7%



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Subcontractor firms 2.8%

**Note:** Some respondents were part of multidimensional firms, thus involved in multiple categories.

## 2.4 Data Analysis

### 2.4.1 Formation of Data Set

In this approach, we checked the Likert Type Items, extracted ordinal data for analysis, categorized factors using Mean of Likert Items (Strategic, Cultural, Individual, Technical, Organizational) and subsequently, inserted value labels (1:Strongly Disagree, 2:Disagree, 3:Undecided, 4:Agree, 5: Strongly Agree)

### 2.4.2 Normality Check

Since our sample size is 107 (>100), we consider Kolmogorov-Smirnov Normality Test. Significance for all variables is <0.05, thus being statistically significant and subsequently, Not Normally Distributed. For further confirmation, we took Log Base 10 of the variables, and data was still proven to be Not Normally Distributed.

**Table 4**

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
S	.127	107	.000	.959	107	.002
C	.094	107	.022	.978	107	.077
T	.185	107	.000	.868	107	.000
I	.108	107	.004	.957	107	.002
O	.107	107	.004	.968	107	.012

a Lilliefors Significance Correction

### 2.4.3 Factor Analysis

We conducted Principal Components Analysis. Eigen values greater than 1 were set to be retained in extraction. We then conducted Bartlett's Test of Sphericity: A significance p value of <0.01 is less than 0.05, it implied that data is statistically significant, thus variables are significantly correlated. Number of components retained by SPSS are 07 during Factor Reduction. These 7 components sufficiently explain the relation between initially selected 19 barriers. The cumulative percentage of Variance of 62.38% is the percentage of variance accounted for by these 7 components. (which lies in the range of 40-60% in which most solutions typically exist.)

**Table 5**

Component	Total	Initial Eigenvalues		Extraction Sums of Squared Loadings		
		% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.659	19.257	19.257	3.659	19.257	19.257
2	2.002	10.535	29.792	2.002	10.535	29.792
3	1.498	7.882	37.674	1.498	7.882	37.674
4	1.460	7.686	45.360	1.460	7.686	45.360
5	1.141	6.006	51.366	1.141	6.006	51.366
6	1.076	5.666	57.031	1.076	5.666	57.031
7	1.017	5.351	<b>62.382</b>	1.017	5.351	62.382
8	.957	5.036	67.418			
9	.907	4.773	72.191			
10	.783	4.119	76.310			
11	.756	3.980	80.290			



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12	.692	3.642	83.933		
13	.675	3.553	87.485		
14	.571	3.007	90.492		
15	.463	2.435	92.927		
16	.418	2.200	95.127		
17	.367	1.933	97.060		
18	.321	1.690	98.750		
19	.238	1.250	100.000		

### 3 Results

In light of the results, the paper clearly exhibits the significant role of some of the factors that prevent the implementation of supply chain management. The responses from the concerned parties of the construction sector show how important and fruitful it will be for the construction industry of Pakistan to have a pervasive awareness of the barriers so that it would pave way for the better supply chain management. After a series of tests and analyses, the results showed that 7 factors identified were enough to sufficiently explain the relation between initially selected 19 barriers.

Research focuses mainly on the challenges to supply chain management adoption faced by stakeholders specializing in the construction industry of Pakistan. According to the results of the questionnaire survey, there are primarily seven factors that characterize the problem. The survey data revealed a commonality of viewpoints on important topics relevant to the five theme areas of concern. Although the percentage of replies may change between groups (and for some types of analysis, these variances must be considered).

This paper expands the scope of current literature review of the subject specifically for Pakistan by highlighting some of the most critical factors that needs to be addressed more often. The paper would also prove to be helpful for any future researchers who would like to explore the subject further.

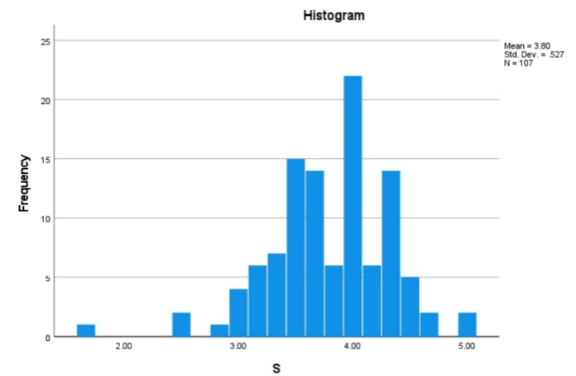


Figure 1: Statistical Deviation in Strategic Barriers

**Table 6**

**Prime Factors**

- Political instability and infrastructural hindrances
- Project Based Production Tendencies over Mass Initiatives
- Lack of Mutual Trust among Stakeholders
- Lack of early involvement by grass root level stakeholders
- Lack of understanding of the concept and unawareness of need
- Lack of information system infrastructure and electronic trade systems
- Less transparency with limited communication between suppliers and construction firms

### 4 Conclusion

It can be concluded from the paper that having a stable political environment, and developing an understanding of SCM will potentially help in the adoption of SCM. However, contractors who mainly focus on cutting costs and maximizing profit may hesitate to invest in consultancy. There it is recommended for the consultants to prioritize employer-contractor relationships in order to motivate the contractors. It can also be concluded that consultants and contractors are regularly inclined towards joint endeavors that will open them to professional management approaches and new advances while clients are less excited about executing such adjustments.



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*Recommendations:*

- Establishment of an independent ombudsman organization to adjudicate and monitor procurement and administrative concerns, which might save significant time spent on conflict settlement.
- The adoption of an impartial contractor/consultant rating system will vastly enhance procurement procedures.
- The establishment of a specialized financial institution, which would serve towards the requests of the development business.
- Training is the most effective approach for resolving HR concerns inside the industry. To train the personnel, the company should utilize already established technical and vocational establishments.

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