International Research Journal of Innovations in Engineering and Technology (IRJIET)

ISSN (online): 2581-3048

Volume 5, Issue 3, pp 66-69, March-2021

https://doi.org/10.47001/IRJIET/2021.503013

Factor Hindering the Implementation of Industrialized Building System in Construction Industry of Sindh

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***Abstract* - The concept of construction industrialization and prefabrication is represented by the term Industrialized Building System (IBS). It was used to progress from conventional patterns of prefabrication. IBS as a new method of construction has number of benefits as it provides good quality reduces construction time, better management, optimum productivity, reduce wastage and safety and these benefits will ultimately lead us to customer satisfaction and better business environment. Though there are numerous benefits but still in Sindh, Pakistan the convention and labour intensive method of constructions are in use because stakeholders of construction industry are indifferent, this may be due to resistance towards change, cost and financial issues, poor skills and knowledge, legal and cultural issues etc.**

Thus, this paper identifies the factors hindering the implementation of IBS in construction industry of Sindh by reviewing literature. Next, the pilot study was carried out among the stakeholders of construction industry of Sindh to validate the factors identified from literature review and for that purpose 43 construction professionals having more than 5 years experience were selected. The top hindering factors identified from literature review and validated through pilot study are resistance in changing work environment, lack of code and standards, logistics and supply chain issues, cost and financial issues. Statistical analysis software V22 was used to analyze the data. At the end the paper put forward some recommendations to overcome the top factors hindering the implementation of IBS in construction industry of Sindh.

Keywords: Industrialized Building System, Factors, Construction Industry, Sindh.

I. INTRODUCTION

In construction industry, industrialized building system is not new but now in 21st century it has emerged again as a possible solution for improving construction performance and image. By implementing ISB industry will be able to save cost, improve quality by standardizing construction practices and reduction in labour intensity. In addition, IBS helps to reduce wastage, ensure neat and clean environment, lower total cost of construction and less site materials. The companies/firms in world who has successfully implemented IBS include Living Solution (United Kingdom), Sekisui Home (Japan), Wenswonen (Netherlands) and Open House (Sweden) [1].

However, the issue of using IBS as common construction practice is still not given proper attention in Sindh. This research aims to identify the top factors hindering the implementation of IBS in construction industry of Sindh and to put forward suitable recommendations to overcome the problem. Moreover, the results of the study will support decision makers and construction practitioners of Sindh with valuable suggestions for promoting IBS in construction industry of Sindh

II. LITERATURE REVIEW

Studied in past and observed that numerous factors hindering the implementation of IBS in construction industry [2], [3] and [4]. The study by Kamar and Alshawi identified the factors hindering the implementation of IBS projects in Malaysia which resulted following as the top hindering factors in implementation of IBS projects; lack of experience, the negative insight of IBS, poor IBS knowledge, be short of component testing facilities, extra cost and need of regulations [5]. Furthermore, the study in Malaysia by Din, Bahri, results that by using IBS in projects it balances the cost benefit of cheap labor, lack of motivation for IBS projects, partnering issues, supply chain management problem, low standardization of components and inadequacy of market size, are the significant factors hindering the implementation of IBS [6]. Whereas, limitations in implementing off-site construction manufacture was observed by Blismas, Pendlebury [7]. In Australia, hindrances in off-site production of construction components were studied by Blismas and Wakefield and the results of study found following factors at fault shortage of skills and lack of knowledge related IBS as top hindering factors [8]. The study of Musa, Muhammad [9] show that the factors like high cost of IBS components, poor IBS knowledge, poor management, no IBS research and development centre and poor implementation of IBS projects

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by government agencies are hindering the implementation of IBS in construction industry. Ismail, Yusuwan illustrated that involvement of team members during designing phase of project, an effective communication channel and a good working collaboration are the top factor influencing factors related to management of project and will lead us to successful implementation of IBS projects [10].

However, according to Luo, Mao a main quality risk and reduction in confidence among construction stakeholders regarding quality of IBS projects is created when there is lack of quality monitoring mechanism while component production process [2]. The quality of IBS projects is determined by market demand whereas market demand is one of the most hindering factors in implementation of IBS in construction industry. The study by Zhang, Skitmore also says that quality problem throughout the manufacturing process is a critical factor which hinders the implementation of IBS projects in construction industry [4].

The quality of projects generally refers to satisfaction of customer need and completion of project within the schedule time frame and cost. In that case it is essential to indentify the factors hindering the implementation of IBS in construction industry of Sindh and get recommendation to overcome the hindering factors. This will lead us to effective implementation of IBS in construction industry of Sindh and better business environment.

III. RESEARCH METHODOLOGY

The data of this study is justified on the basis of adopting methods as reviewing literature and pilot study questionnaire survey. Identification of factors hindering the implementation of IBS in construction industry of Sindh was done through literature review. Moreover, to identify the top hindering factors in implementation of IBS in construction industry of Sindh a questionnaire survey was carried out among 43 construction professionals and stakeholders of construction industry of Sindh. The questionnaire survey comprises of two parts; the first part includes introduction and experience of company/individual whereas the second part include the hindering factors which are to marked from 1 to 5 as very low to very high according to their severity. The analysis and interpretation of the data is done by using statistical tools.

IV. CHARACTERSTICS OF RESPONDENTS

The questionnaire was distributed among 100 construction professionals and stakeholders of construction industry working on building projects of Sindh Province. However, as a response fourth three (57) were received back so the response rate of the study was fifty seven percent (57%). This is an acceptable value as normal response rate of questionnaire survey is about twenty to thirty percent [11]. Moreover fourteen responses were received back were incomplete thence remaining forty three valid responses were considered for further analysis.

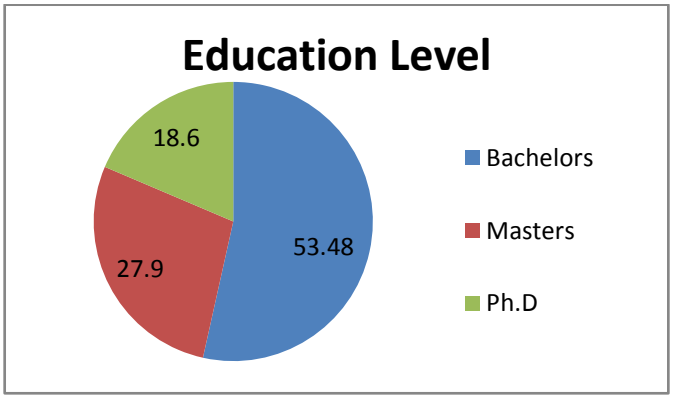

Figure 1: education level of the construction professional participated in the questionnaire survey

The education level of the construction professional participated in the questionnaire survey is represented in. figure 1. All the respondents were highly qualified and the majority of the survey respondents about 53.48 percent (23 out of 43) had bachelor's degree, however 27.9 percent (12 out of 43) of the respondents had Master's degree whereas, 18.6 percent (8 out of 43) of the respondents had Ph.D degree.

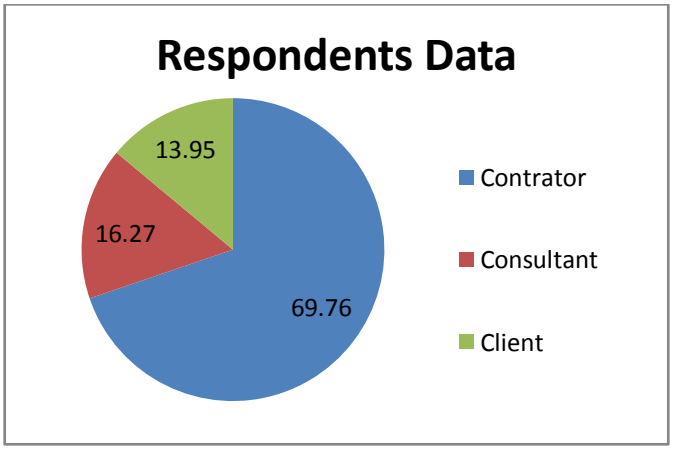

Figure 2: Three different fields of stakeholders

Figure 2 shows the three different fields of stakeholders which they belong to i.e. client, consultant and contractor. The stakeholders participated in this survey mostly belong to contractors which were about 69.76 percent (30 out of 43). Secondly most of the respondents belong to consultants which were 16.27 percent (7 out of 43). While only 13.95% (6 out of 43) of the survey respondents were from the client.

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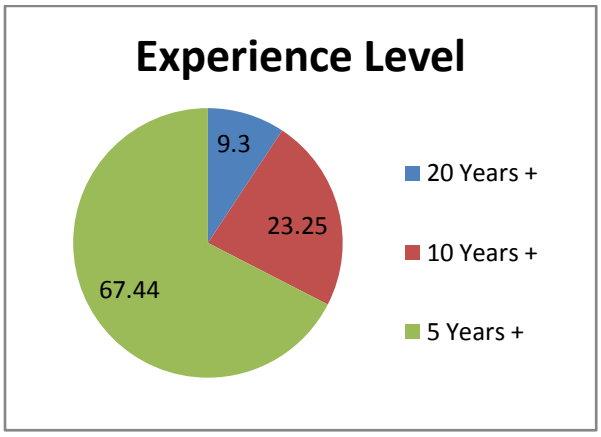

Figure 3: Experience level

The aspect considered as very important in quantitative research is professional experience of survey respondents. The participants of survey were having good years of experienced in construction industry of Sindh. Figure 3 summarize their experience level. It can be observed that 9.3 percent (4 out of 43) of respondents had experience more than 20 years whereas 23.25 percent (10 out of 43) of the survey respondents had experience more than 10 years and 67.44 percent (29 out of 43) had experience more than 5 years in construction industry of Sindh.

V. DATA ANALYSIS AND RESULTS

Cronbach's alpha was used to establish that the obtained data from respondents in a survey is reliable. It measures the consistency of data set and it is also commonly considered to evaluate suitability of data for factor analysis [12]. The value of Cronbach's alpha was determined by using SPSS V22. The table 1 below represents the results of reliability test. The data collected in questionnaire survey was reliable to proceed further analysis as Cronbach's alpha value was 0.821 as the acceptable reliable value is 0.70 or above [13].

Table 1: Reliability statics

Cronbach's Alpha	No of items
0.821	25

SPSS V22 was used to determine relative Importance Index (RII) for Factors hindering the Implementation of IBS in construction industry of Sindh. The table 2 below represents the rankings of factors as per RII

Table 2: Top Factors Hindering the Implementation of IBS in construction industry of Sindh

Factors	Overall RII	Overall Rank
Cost and financial issues	0.818	01
Resistance In Changing Work Environment	0.809	02
Logistic and supply chain issues	0.798	03
Lack of government, incentive directive and promotion	0.774	04
Resistance from customers and professionals	0.762	05
Lack of code and standard	0.753	06
Lack of resource R&D and IBS centre	0.747	07
Lack of assessment, certification, training and education	0.739	08
Constructability issue	0.730	09
Negative perception	0.722	10
Lack of equipment and machinery	0.707	11
High initial cost	0.691	12
Lack of Scientific Information	0.679	13
Cost and Return Investment	0.668	14
Lack of knowledgeable manpower	0.652	15
Legal and cultural issues	0.633	16
Lack of communication & integration in design stage	0.606	17
Lack of technology and readiness issues	0.588	18
Misunderstand of building regulation	0.572	19
Manufacturing capability & involvement issues	0.544	20
Planning and Implementation	0.521	21
Effective communication channel	0.501	22
Good working collaboration	0.483	23
Wastage of material	0.467	24
Low quality	0.447	25

This ranking enabled to identify the major factors hindering the implementation of IBS in construction industry of Sindh. As per ranking of professional it was established that cost and financial issue, resistance in changing work environment and logistic and supply chain issues are the top

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three hindering factors respectively in implementation of IBS in construction industry of Sindh.

VI. CONCLUSION

This study presents the top factors hindering the implementation of industrialized building system in construction industry of Sindh. The top three factors identified from the study are cost and financial issue, resistance in changing work environment and logistic and supply chain issues respectively. The hindering factor can be overcome by allocating sufficient financial resources, arranging training for employees and designing proper mechanism for supply chain management.

The results of the study may help government departments as well as construction professionals of construction industry of Sindh in understanding that wherein the implementation of ISB is suffered and what action shall taken to ensure implementation of IBS in construction industry of Sindh. Moreover, adoption of these measures can assure quality products, effective construction process and better business environment of construction industry of Sindh.

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Citation of this Article:

Muhammad Nawaz, Nafees Ahmed Memon, Samiullah Sohu, "Factor Hindering the Implementation of Industrialized Building System in Construction Industry of Sindh" Published in *International Research Journal of Innovations in Engineering and Technology - IRJIET*, Volume 5, Issue 3, pp 66-69, March 2021. Article DOI https://doi.org/10.47001/IRJIET/2021.503013

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