ASSESSMENT OF FACTOR THAT AFFECTING TO IMPLEMENTING IBS IN INDIAN CONSTRUCTION INDUSTRY

Rinkesh Patel
M.E. Student, Civil Engineering Department
SNPIT &RC, Umrakh (GTU), Bardoli, Gujarat, India

Abstract: **Industrialized Building System (IBS) is a term used for a technique of construction where by components is manufactured in a controlled environment, either at site/off site, placed and assembled into construction works. In this paper studied about Implementing Industrialized building system in construction. The knowledge base study of the factors affecting implementation. By examining its advantages, IBS can easily be considered as the most appropriate way to serve sustainable building projects. The crucial factor affecting to implement IBS in construction to be concludes. The decision support matrix made by the statistical tools. Which will help to take decision of sequential manner to improve factors affect to IBS?**

Keywords: Industrialized building system (IBS), sustainability, Factor affecting

1. INTRODUCTION

Industrialized Building System (IBS) is a term used in Malaysia for a technique of construction where by components are manufactured in a controlled environment, either at site or off site, placed and assembled into construction works. Worldwide, IBS is also known as Pre-fabricated/Pre-fab Construction, Modern Method of Construction (MMC) and Off-site Construction. CIDB Malaysia, through IBS Centre is promoting the usage of IBS to increase productivity and quality at construction sites through various promotion programs, training and incentives. The content of IBS (IBS Score) is determined based on the Construction Industry Standard; either manually, web application or fully automated CAD-based IBS Score calculator.

The fundamental idea of Industrialized Building System (IBS) is to move some effort away from construction site to manufacturing floor. In IBS construction, building components are pre-fabricated at factory and transport to site for installation. The government of Malaysia has agreed to expand the method of IBS in construction sector and endorsed the content of IBS Roadmap 2003- 2010 to guide the mission.

IBS can be seen as an alternative option to maintain sustainability in construction. It can generate more controlled human resources and cost, shorten the construction period and increase the quality of buildings. Simultaneously, it can also enhance occupational health and safety. In addition, the most advantageous solutions to reduce construction waste are based on IBS. By examining these advantages, IBS can easily be considered as the most appropriate way to serve sustainable building projects.

The importance of sustainability issues has increased among the global community and it is necessary for all parties involved – local authorities, contractors, governments, consultants and architects – to respond quickly to these changes and constraints. Several studies have been carried out regarding the sustainability of construction and building, and from these studies the importance of sustainability has been highlighted. Inappropriate selection of the IBS used will affect the performance of the buildings. Without a well-defined decision making tool the potential for IBS will not be optimized. The value of IBS is also limited since their performance is not fully utilized. The value should include not only financial but also social and environmental benefits. This is supported by other researchers who argued that less attention is given to soft issues (e.g., health and safety, waste management, occupant comfort) and the efforts to integrate these issues in decision making are still at an early stage.

IBS is also known as Pre-fabricated/Pre-fab Construction, Modern Method of Construction (MMC) and Off-site Construction. CIDB Malaysia, through IBS Centre is promoting the usage of IBS to increase productivity and quality at construction sites through various promotion programs, training and incentives.

2. PROBLEM STATEMENT

Indian Construction industry is not so much familiar with Industrialized Building System (IBS). So, Implement of Industrialized Building System in Construction can be helpful for Cost reduction, Waste reduction, ecofriendly construction and by this concept, we can implement sustainable construction. For that, study of prefabrication and Industrialized Building System can be helpful to future Indian construction scenario.

3. SCOPE

- The scope of this research will be limited to the construction industry, which involves the IBS as the main components in their projects.
- Data collection for analysis the critical factor which has been collected from manufacturer, project manager, consultant and contractor

- Decision matrix will be generated with help of statistical tools.
  Research area is limited up to Surat, Navsari & Valsad district of south Gujarat region

4. MANUFACTURING / CASTING

Precast concrete is a construction product produced by casting concrete in a reusable mold or "form" which is then cured in a controlled environment, transported to the construction site and lifted into place. In contrast, standard concrete is poured into site-specific forms and cured on site. Precast stone is distinguished from precast concrete by using a fine aggregate in the mixture, so the final product approaches the appearance of naturally occurring rock or stone.

By producing precast concrete in a controlled environment (typically referred to as a precast plant), the precast concrete is afforded the opportunity to properly cure and be closely monitored by plant employees. Utilizing a Precast Concrete system offers many potential advantages over site casting of concrete. The production process for Precast Concrete is performed on ground level, which helps with safety throughout a project. There is a greater control of the quality of materials and workmanship in a precast plant rather than on a construction site. Financially, the forms used in a precast plant may be reused hundreds to thousands of times before they have to be replaced, which allow cost of formwork per unit to be lower than for site-cast production.

5. METHODOLOGY

The Relative Importance Index (RII) will be used to rank (R) the different causes. These rankings make it possible to cross-compare the relative importance of the factors as perceived by the respondents. Each individuals causes RII perceived by all respondents will be used to assess the general and overall rankings in order to give an overall picture of the affecting factor in implementation of IBS in Indian construction industry. This RII technique is used by many researcher.

The formula to calculate RII given below: where,

$$RII = \Sigma W \div (A \times N)$$

W = Weighting given to each factor by the respondents (ranging from 1 to 4), A = Highest weight (i.e. 4 in this case), N = Total Number of respondents.

6. Data Collection

Sr. No.	Respondent	Questionnaires Distributed	Responses Returned	Responses percentage
1	Site engineer	78	38	48.71%
2	Contractors	82	48	58.53%
3	Consultant	60	30	50%
4	Project Manager	48	20	41.66%
5	Supplier	30	16	53.33%
Total		298	152	
Responses percentage			51.0067%	

7. DATA ANALYSIS

ALL RESPONDENT			
SR.NO.	**F.NO.**	**FACTOR AFFECTING IBS**	**ΣR/(152*5)**
1	F 29	Safety, Health & living standards	0.936842105
2	F 12	Standardization & quality	0.919736842
3	F 40	Ecofriendly construction	0.896052632
4	F 1	Design cost	0.864473684
5	F 4	Construction & operation cost	0.864473684
6	F 34	Environment friendly	0.852631579
7	F 16	Skill labour	0.85
8	F 14	Structural design	0.839473684

9	F 23	Regulations and standards	0.838157895
10	F 3	Transportation cost	0.835526316
11	F 52	Research & development center	0.817105263
12	F 36	Site condition	0.810526316
13	F 51	Different size, shape available	0.806578947
14	F 2	Profitability	0.801315789
15	F 10	Labour cost	0.798684211

8. DECISION SUPPORT MATRIX

Feasible trial test to sequential of improve the factor affecting IBS on basis of statistical analysis.

FEASIBILE TRIAL					
Sr.no	TRIAL NO.	FINAL LIMIT	FINAL SCORE	DIFFRENCE	RANK
1	2	47.5	47.3	0.2	1
2	7	47.5	46.8	0.7	8
3	12	47.5	46.7	0.8	9
4	13	47.5	47.3	0.2	2
5	16	47.5	46.6	0.9	11
6	21	47.5	47.2	0.3	5
7	22	47.5	46.6	0.9	12
8	23	47.5	46.9	0.6	7
9	24	47.5	47.3	0.2	3
10	25	47.5	47.3	0.2	4
11	27	47.5	46.7	0.8	10
12	30	47.5	47	0.5	6

9. CONCLUSION

The construction industry in Malaysia has been changed due to the current technology which increases the level of quality and safety of the building. It is a construction process which is using the technique, product, and component or construction system involving the installation of construction component on construction site. The implementation of IBS has been identified as a solution to promote sustainable construction. This is possible by identifying the potential sustainable performance indicators starting from the early stage. The study will identify and integrate the different understandings to the critical issues that impact on the gap between sustainable development and IBS implementation. The decision support matrix made with the help of statistical tools. The final conclusion of the paper is to proper improve factor in sequence to shown in matrix will be helpful to implement IBS in construction industry. Top 10 factor should be improve in sequence.

SEQUENCIAL ADOPTION OF MATRIX:

In this sequence we have to improve factor for better implementation.

TRIAL 2		
Sr. no	FACROR IN SEQUENCE	CODE
1	Transportation cost	10
2	Safety, Health & living standards	1
3	Standardization & quality	2
4	Ecofriendly construction	3
5	Design cost	4
6	Construction & operation cost	5
7	Environment friendly	6
8	Skill labour	7

9	Structural design	8
10	Regulations and standards	9

TRIAL 13		
Sr. no	FACROR IN SEQUENCE	CODE
1	Transportation cost	10
2	Safety, Health & living standards	1
3	Standardization & quality	2
4	Ecofriendly construction	3
5	Design cost	4
6	Construction & operation cost	5
7	Environment friendly	6
8	Regulations and standards	9
9	Structural design	8
10	Skill labour	7

TRIAL 24		
Sr. no	FACROR IN SEQUENCE	CODE
1	Safety, Health & living standards	1
2	Transportation cost	10
3	Standardization & quality	2
4	Regulations and standards	9
5	Ecofriendly construction	3
6	Structural design	8
7	Design cost	4
8	Skill labour	7
9	Environment friendly	5
10	Construction & operation cost	6

REFERENCES

[1] Krish R. Villaitramani, Dhruv P. Hirani, "PREFABRICATED CONSTRUCTION FOR MASS HOUSING IN MUMBAI" international Journal of Innovative Research in Advanced Engineering (IJIRAE) Volume 1 Issue 9 (October 2014), ISSN: 2349-2163

[2] N.Dineshkumar, P.Kathirvel "Comparative Study on Prefabrication Construction with Cast In-Situ Construction of Residential Buildings" IJISET - International Journal of Innovative Science, Engineering & Technology, Vol. 2 Issue 4, April 2015.

[3] Nor Azmi Ahmad Bari, Rosnah Yusuff, Napsiah Ismail, Aini Jaapar & Norizan Ahmad, "Factors Influencing the Construction Cost of Industrialized Building System (IBS) Projects" Asia Pacific International Conference on Environment- 2011

[4] R. Taherkhani, A.L. Saleh, Mohammad Ali Nekooie, Shaiful Amri Mansur, "EXTERNAL FACTORS INFLUENCING ON INDUSTRIAL BUILDING SYSTEM (IBS) IN MALAYSIA" International Journal of Sustainable Development & World Policy

[5] Riduan Yunus, Jay Yang "Sustainability Criteria for Industrialized Building Systems(IBS) in Malaysia", The Twelfth East Asia-Pacific Conference on Structural Engineering and Construction, 2011

[6] Ryan E. Smith, Shilpa Narayanamurthy**,** "Prefabrication in Developing Countries: a case study of India" without a hitch: new directions in prefabricated architecture.

[7] Siva Jaganathan, Lenin Jawahar Nesan, Rahinah Ibrahim, Abdul Hakim Mohammad, “Integrated design approach for improving architectural forms in industrialized building systems” A Frontiers of architectural Research Article -2013

WEBOLOGY:

[1] Boston Consulting Group Reports on Globalization and India. http://www.bcg.com
[2] http://abdulkarimibrahim.blogspot.in/2011/02/definition-of-industrialised-building.html
[3] http://www.ukessays.com/essays/construction/the-definition-of-industrialised-building-system-construction-essay.php, https://www.sciencedirect.com/
[4] Minaean Habitat India Ltd. Official Website http://www.minaeanindia.com
[5] Reddy, Alan C. A Macro Perspective on Technology Transfer. Quorum Books 1996.
[6] United States State Department 2006 Labor Re- port. http://www.usinfo.state.gov