

CHALLENGES OF MODULAR HOUSING TECHNIQUE IN SURAT CITY

¹Ronak I. Khurana, ²Dr. Neeraj D. Sharma, ³Rushabh A. Shah

¹Student of Masters of Construction Engineering and Management, ²Professor, ³Assistant Professor

¹Department of Civil Engineering,

¹SNPIT & RC, Umrakh, Bardoli, Gujarat, India

Abstract—This paper analyzes about the current scenario of modular housing technique as well challenges to utilize this technique in future period. Different factors are selected from literature work to obtain questionnaire sample. The questionnaire survey gives you top main challenges factors which prohibited the utilization of this method in Surat City with the help of various stakeholders' like Architect, Site Engineers and Contractors respectively.

Index Terms—Modular housing, Prefabrication

I. INTRODUCTION

Due to growth of population, it has been found that many nations will encounter an urgent need for new housing for living purpose in the coming decades. In different countries like UK and Europe increased demand is more a product of demographic change than population increase. This modular housing might lead to advantage in terms of cost, value and quality, in meeting this increased demand.

If the potential advantage of innovative mass housing is to be realised, there is a clear need to overcome people's resistance to old ideas of modular and standardisation. During the sixties and seventies in many parts of the world, programmes of bad quality and badly designed "system building" gave rise to a notion that the process of prefabrication itself, rather than particular products, was at fault. There are many potential attitudinal constraints to standardisation and modular housing, some of which are historical and may not now be based on any real concern with modern methods.

II. LITERATURE REVIEW

The main aim of Tomas U. Ganiron Jr and Mohammed Almarwae^[1] was to give information about modular housing and it is one of the affordable housing for living because it is much cheaper than conventional housing.

Addey Sham Baharin, Mohammad Fadhil Mohammad, Muhamad Faiz Musa and Mohammad Reeza Yusof^[2], explains that Industrialized Building System (IBS) Modular System (MS) is a building construction method where around 70 % of construction material where manufactured in plant controlled environment and at the last assembled of parts in field for construction. These techniques help to adsorb quality of tenants.

Elena M. Generalovaa, Viktor P. Generalova and Anna A. Kuznetsovaa^[3] explain that, the construction of modular housing is analyzed from overseas nation. The utilization of modular housing is cost efficient, safe and ecofriendly. Modular Housing in Russia based on 3D Reinforced concrete module block which helps to achieve quality of building life.

Jeffrey Molavi and Drew L Barral^[4], suggested that modular housing guaranties more control over safety and quality of materials. However, some other problems such as design involvement and coordination of the factory and Plant activities may be easily erode if an appropriate procurement technique is not selected. During precast concrete construction for that period of time it required high skilled labour, complex design and complex method. Because this factors helps to improve modular design in many way. To include this managerial task in a modular construction's equation, this research suggests a construction procurement method based on project type to achieve sustainable modular construction.

Diana Lopeza and Thomas M Froesea^[5], the authors addressed the research question, concluding that modular housing method is little bit more cost effective than the panelized construction method for these particular case studies and under the given circumstances. It also provides a workflow chart of the implications of both construction methods and a discussion of the compromise things when choosing the modular housing method over the panelled method.

Jinyue Zhanga, Yating Longa, Siqian Lva and Yunchao Xianga^[6], tells that the worldwide growth of BIM has been improved from several years now it is utilized in technical field. Current trend in China have demonstrated that innovation in BIM-enabled modular design and the utilization of 3D laser scanning technology to ensure accurate geometric information of MEP systems. The utilization of BIM in the Chinese construction industry in the near future will provide more advantage to modular and industrialized construction, such as shorter construction period, safety work, material conservation and controlled environment.

Mohammad Kamali and Kasun Hewage^[7], aimed to assess the factors associated with modular housing performance throughout its life and also to find out the comparison of advantage and constraints from conventional construction techniques. Consequently, such a workflow can help the owner to choose best methods for the construction without environment effect and also to achieve the objective with suitable time period.

III. CONCEPT OF MODULAR TECHNIQUE

Globally, modular construction has a long history. The Mongolian Yurt is a building technology that is thousands of years old and prefabricated to be easy to transport. In North America, housing kits were brought to the east-coast in the seventeenth century, and entire homes began to be transported in the late nineteenth century by a Nova Scotia company which shipped prefabricated wood-frame homes within North America and also to the Caribbean. In modern times there are several nations where modular construction is commonly used for housing. In Sofia, Bulgaria, it is estimated to be over 65% of the population living in modular buildings. In 2009, the United Nations spent \$73 million on modular buildings. A 2011 Globe and Mail article reported that while "in Scandinavia up to 70 percent of housing is

prefab, and modular housing of this type is common in Germany and other parts of Europe, there's relatively little multi-family prefab housing in North America.”

IV. RESEARCH METHODOLOGY

- The research works analyse the challenges of using Modular Housing Technique in Surat City.
- First of all, literature works regarding Modular construction are analyzed to know the current status of technique.
- Different factors are selected from research paper to obtain questionnaire sample.
- 1. The project owners do not allow using Modular construction techniques.
- 2. General contractors do not have expertise of assembling prefabricated building components onsite.
- 3. The local zoning ordinance restricts the use of Modular construction techniques.
- 4. The local building regulation restricts the use of Modular construction techniques.
- 5. The financial institution restricts the use of Modular construction techniques.
- 6. Designing Modular construction components requires special computer software.
- 7. Scarcity of skilled craft works locally.
- 8. Using Modular construction techniques will increase the design cost.
- 9. Using Modular construction techniques will increase the construction cost.
- 10. Transportation restraints
- 11. Limited design options of using Modular construction techniques.
- 12. Inability to make changes in the field by using Modular construction techniques.
- 13. Any other reasons

Self-structured questionnaire sample are prepared to find the challenges factors.

RII method has been selected to analyse the factors.

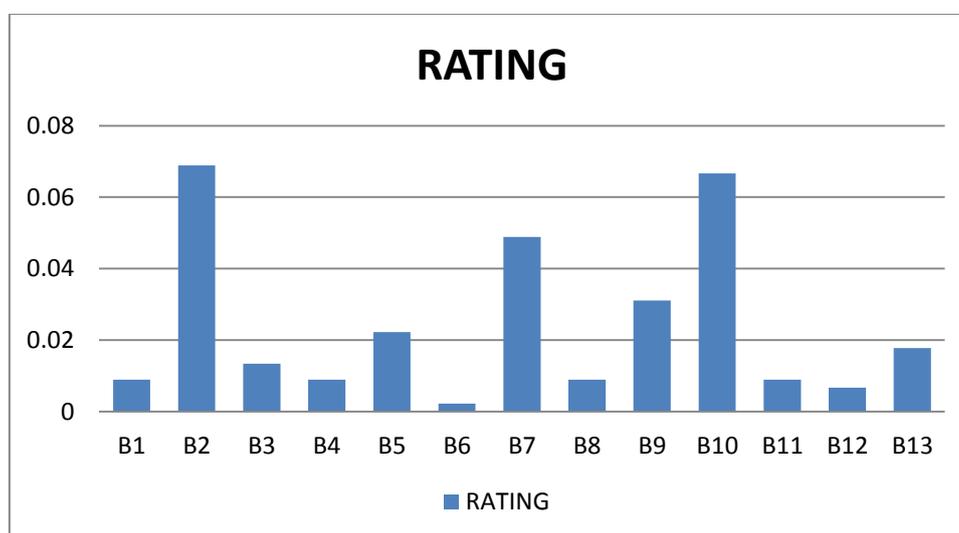
V. DATA COLLECTION

Different stakeholders are selected like Contractors, Engineers and Architect for data analysis. Around 150 questionnaire survey has been done to find the challenges of Modular Housing Technique in Surat City.

VI. DATA ANALYSIS & MAJOR FINDINGS

The factors analysis has been done by using RII technique which ultimately gives the overall ranking of factor. The major findings are the top 5 factors which create problem while utilizing Modular Housing technique in Surat City.

SR.NO	Code	Factors	Rank	Ratings (RII)
1	B2	General contractors do not have expertise of assembling prefabricated building components onsite	1	0.068889
2	B5	The financial institution restricts the use of Modular construction techniques.	5	0.022222
3	B7	Scarcity of skilled craft works locally.	3	0.048889
4	B9	Using Modular construction techniques will increase the construction cost.	4	0.031111
5	B10	Transportation restraints	2	0.066667



VII. CONCLUSION

The main result of this study says that the current scenario of modular housing technique utilization in Surat city is in very minimum stage due to various challenges like scarcity of labour, transportations problem, assembling of modular house etc. Thus, to utilize modular construction in future period it is necessary to overcome these constraints.

REFERENCES

- [1] T.U. Ganiron Jr and M. Almarwae, "Prefabricated Technology in a Modular House", International Journal of Advanced Science and Technology, Vol.73 (2014), pp.51-74.
- [2] M.F. Mohammad, A.S. Baharin, M.F. Musa and M.R. Yusof, "The Potential Application of IBS Modular System in the Construction of Housing Scheme in Malaysia", AMER International Conference on Quality of Life, Millennium Hotel, Sireh, Jakarta, Indonesia, 25-27 April 2015.
- [3] E. M. Generalova, V.P. Generalova, A. A. Kuznetsovaa, "Modular Buildings in Modern Construction", XXV Polish – Russian – Slovak Seminar "Theoretical Foundation of Civil Engineering", Procedia Engineering, 153 (2016) 167 – 172.
- [4] J. Molavi, D.L. Barral, "Construction Procurement Method To Achieve Sustainability in Modular Construction", International Conference on Sustainable Design, Engineering and Construction, Procedia Engineering, 145 (2016) 1362 – 1369.
- [5] D. Lopez, T. M Froesea, "Analysis of costs and benefits of panelized and modular prefabricated homes", International Conference on Sustainable Design, Engineering and Construction, Procedia Engineering, 145 (2016) 1291 – 1297.
- [6] J. Zhang, Y. Long, S. Lva, Y. Xianga, "BIM-enabled Modular and Industrialized Construction in China", International Conference on Sustainable Design, Engineering and Construction, Procedia Engineering, 145 (2016) 1456 – 1461.
- [7] M. Kamali, K. Hewage, "Life cycle performance of modular buildings: A critical review", Renewable and Sustainable Energy Reviews, 62 (2016) 1171–1183.

