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An Outlook of Project Management Practices Adopted for Modular Construction System

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Abstract

The objective of undertaking this research topic is to have an outlook of the Project Management techniques that are being used for Modular Construction. This aim for the report has helped the researcher in understanding from the people working in construction industry at any professional role regarding the knowledge and experience of theirs for Project Management Techniques as well as regarding understanding for Modular Construction. Since, Modular Construction being a technique that is more practiced in developed countries and countries where the manufacturing industry has very tight grip on the financial interest of the people. The study has helped in many ways to understand the level of difficulties and challenges that are being faced by construction professional people as well as understanding the behaviors of their companies and colleagues in case if new technology gets introduced in form of Modular construction. For this purpose, Researcher has prepared a questionnaire and circulated to the professional people in construction industry. The results of the survey have been shown in the later part of report with recommendation interpreted for ease of understanding.

Keywords: Modular Construction; Project Management Technique; Construction Industry

1. Introduction

1.1. Background Discussion

Due to evolving trends in the construction industry towards building more things away from the construction site, practices for Constructing structures off-site are being used, one of these such practices involves construction of building in modules, usually termed as Modular construction. There are many companies involved in executing multiple modular construction projects throughout the world. These modular construction techniques are heavily used in regions of the world where, time is the essence of project completion with no compromise on quality and limited spaces are available to do construction.

Unlike traditional construction projects, Modular construction technique involves services of designers and contractors who ought to fabricate large number of modules away from construction site, then truck them to the designated construction area and finally stacking them on top of each other to complete the required structure. There are number of challenges involved while executing this type of construction these challenges are sometime advantageous and sometime can pose financial risks, but operations are required to be carried out to facilitate stakeholders. In our report, we will shed some light to seek advantages that can benefit construction and challenges that can be posed as threat with ways to mitigate these challenges.

Let us understand in detail regarding the exact concept behind Modular construction. Modular Construction can be referred to as a method of construction rather than referencing it to a type of a unique product of construction activity. This process is applied to construct required type of structure (whether an apartment building, business building or even homes can be built) off-site (i.e., away from designated construction site) under controlled conditions, using the same materials as of traditional construction and by following same design codes. This methodology reduces construction time to considerable limit and whole building is then transported to site with pieces that are assembled at designated construction site.

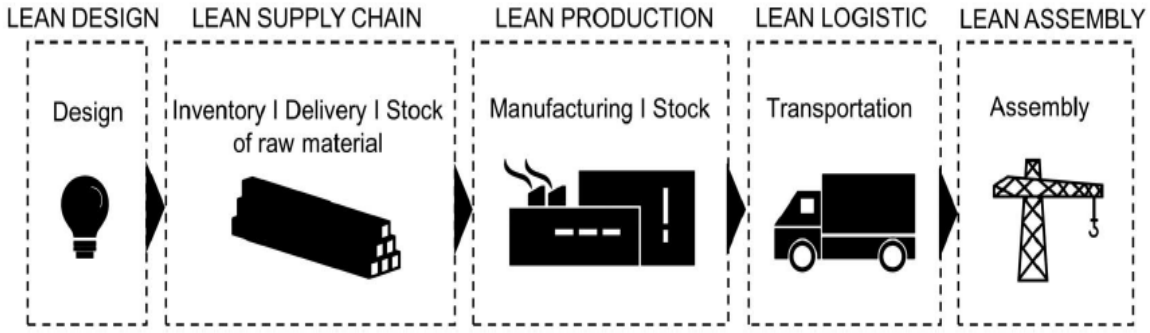

Figure 1: Production Flow For Modular Construction (Image By Authors)

Despite the fact that it can offer better solutions and cost saving towards construction many people still believe that these practices are not a long-term solution towards more sustainable and durable construction. This believe

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in researcher opinion is due to the lack of awareness towards the benefits that can be offered by Modular construction.

1.2. Problem Statement

In view of present situation where construction industry is adopting new norms in construction particularly in middle eastern environment and alternative practices are being sought that can minimize the efforts and maximize profits and gains. This need brings us to the point that how construction services can be improved using Project management practices towards modular construction. The traditional practices or methodologies utilizes process of bringing raw materials to building site so that trades can utilize the material to build structure, as these may take time for construction and can utilize significant number of manpower thereby impacting several factors of construction activities such as Delivery periods, logistics arrangement, environmental control, project supervision, etc.

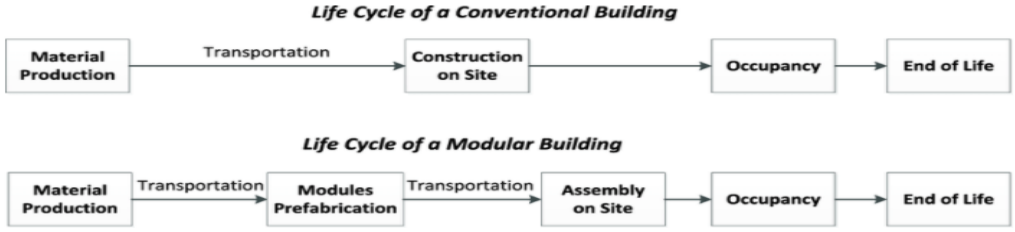

Figure 2: Life Cycle Of Modular Construction Vs. Conventional Construction (Mohammad Kamali 2017)

Keeping the above discussion in view, the researcher plans to analyze Project Management services that are being adopted during use of Modular Construction.

1.3. Study Objectives

The study objective includes analyzing project management practices currently ongoing in companies offering Modular Construction and ways to enhance these practices towards more futuristic development, that may or may not include use of software's, robotic systems, etc., These Objectives will include;

- Identifying Techniques of carrying out Modular Construction
- Analyzing these techniques
- Comparing the techniques used in Modular construction with traditional practices
- Project Management Expertise that can be applied
- How These Project Management services can be enhanced using Computer applications
- Publishing &Sharing the information to enhance customer experience

1.4. Theoretical Contribution

The researcher underwent variety of published researches but failed to find precise study addressing the project management services towards modular construction and how the project management can different in modular construction vs traditional construction. Moreover, researcher believes that since Modular Construction differs in many ways form traditional construction then project management practices and techniques should also differ. Modular construction is not a new concept, it has been practiced in past as well after World War II, Modular construction technique was used in form of Aluminum & Timber housing that was provided in in Britain (A permanent home for a temporary house - the prefab at St Fagans". museumwales.ac.uk. n.d.). Now, after evolution from many decades the advancements in this technique has led change in the industry so that new practices can be applied by using different materials for uses such as multi-family (apartments), hotels and other commercial uses (Ferdous 2019).

Modules that are part Modular construction are normally equipped with Finished Ceiling, Walls & Floors while the elements leave the factory site, means that they contain most of the interior finishes and fixtures already installed on elements. For different type of construction, different modules are designed that also depend on the transportability of the elements to the project site.

Some modular companies use common stick-building methods in their warehouses; others use highly automated robotic assembly lines. There are other flavors of off-site construction that are not modular (The Advantages and Challenges of Modular Construction n.d.).

Some of the Advantages that can reap us big rewards during modular construction are:

- Time Saving
- Lessen Climatic Impact
- Reduces Material storage requirement
- Reduced Labor Cost
- Reduction in Wastage

- Besides, the advantages that are offered by Modular Construction, there are challenges that can pose a real threat during execution if not catered for considerations during course of planning modular construction, some of the challenges can be
- Mass Production / Limited Variety
- Higher Amount of Complex Decisions / Front Loaded Design
- Approval Process Can Be Complicated
- Risk is on Few Suppliers
- Transportation Costs & Risk
- Difficult Financing Process

1.5. Applied Aspect

Investors, Developers, Industrial companies and Governments shall benefit from the findings of the study, and it shall also provide insight to the respective industries that offers modular construction techniques. Traditionally, an architect or designer are responsible to provide and guide for required design & coordination with the contractor working on site. But in case of Modular construction, Architect has an extending role including supervising prototype house for modular manufacturer to first advice on specialist practices and then secondary to reproduce the bulk as per prototype elements. This specialist usually consists of in0house designers and supervisors who are responsible for providing detailed design &construction, in this way manufacture lead towards getting Design and build project that omits the need of investor to hire a designer to design the elements. Architects' designer only outlines the design and then can be novated by the client to work for the contractor.

The role of the client shrinks to procurement process then require his approval and rest of the procurement becomes the responsibility of module manufacturer who is bound to follow the required specification from architect to comply with performance requirement and aesthetical and interior design compliance.

The components of the modular construction can be formed by combining separately manufactured elements of wall, frames, doors, ceiling & windows, etc., and then can be arranged together in form of puzzle at the manufacturing site with enough supports that are required for transportation to constructions site.

1.6. Scope of The Study

The scope of the study will be limited to private development projects that are subject to evaluation for the ongoing construction projects only in Middle East environment.

1.7. Study Limitations

Due to time and resource constraints, researcher shall keep the study limited to five key players of the industry with their project in running only for UAE Sector.

The Study shall only be limited to analyze the project management practices that are being implemented during off-site construction.

The study objective includes analyzing project management practices currently ongoing in companies offering Modular Construction The template is used to format your paper and style the text. All margins, column widths, line spaces, and text fonts are prescribed; please do not alter them. You may note peculiarities. For example, the head margin in this template measures proportionately more than is customary. This measurement and others are deliberate, using specifications that anticipate your paper as one part of the entire proceedings, and not as an independent document. Please do not revise any of the current designations.

2. Literature Review

(Monty Sutrisna 2019) studied the "Managing information flow and design processes to reduce design risks in offsite construction projects". The researcher based his study on two cases studied that he focused on to understand how information flow can help in managing the off-site construction and how the design process can reduce the risks in off-site construction projects. These case studies were based in UK & Australia respectively and were for off-site construction techniques for school buildings. There were similarities between the case studies such as construction technique and materials are not so different, both constructions were for school buildings etc., the only notable difference was the building in UK was earlier design ed to be constructed through traditional design methods which was then constructed to be by modular construction while the school building in Australia was based upon complete Modular design from start to finish of project. The researcher collected his data through archival study along with some help from archival custodian, the way researcher analyzed his data was based upon "the analytical explanation" which was formed from theory tracing process approach that involves finding diagnostic evidence from descriptive and casual inference of the case study. The research findings by researcher illustrated that there were five factors that should be clearly considered before pursuing towards off-site construction, these factors are Client requirements, project requirements, social aspects and Regulations. As suggested in research that these factors should be considered prior undertaking decisions related to off-site construction.

(Ayinla, Cheung and Tawil 2019) studied regarding "Demystifying the concept of offsite manufacturing method towards a robust definition and classification system" to elaborate further the classifications that are being used currently to determine relevant elements that are part of prefabrication/precast/modular construction techniques, commonly known as OSM or Offsite Manufacturing. The study further aimed to develop comprehensive definition with classification that can be referred for different elements pertaining towards OSM. The researchers in this study has evaluated number of articles based upon publications issues in journals to the case studies that are carried out related to classification of OSM. Moreover, they have also studied the articles that are related to different countries to observe trends of classifications that are in place. This conceptualization of reviewing the literature and analyzing the literature has identified gaps in existing identification methods that are being used along with proposal for further future action. The researchers have suggested that the classification systems that are in place doesn't cover the extent of globalized industry related to OSM and further research is required to fulfill the gaps

(Kyrö, Jylhä and Peltokorpi 2019) studied regarding the "Embodying circularity through usable re-locatable modular buildings". The researcher aimed to evaluate the possibilities of relocating buildings built through modular structure to avoid wasting of concrete and other material used for construction. This also helps in minimizing recycling requirements. The other aspect of the research was to develop an economic feasibility plan that helps ensure makeshift buildings that can be shifted based upon demands and needs of the customer. These buildings can help in overcoming requirements of customer in case of added hospital requirements. The approach for methodology was based upon reviewing case studies based in Finland & surroundings with semi structured interviews held with the users of the buildings. Findings through research suggests that there are benefits that can be reaped while using relocation as an option to meet fluctuating demands with challenges regarding relocation that can be faced even on low scale projects.

(Egbu 2010) studied the "Making a case for offsite construction in China" with research aimed to provide extensive overview of benefits that can be offered to cater demands of growing population needs in China. The methodology for research adopted by researcher was to evaluate the existing literature that is available for review in developed countries for catering demand of growing population and then researching through population demands that exists in China along with assessing of current facilities and adaptability potential of such kind of housing. Findings of the study suggested that since China holds significant strong point in manufacturing industry so it will be very cost efficient and time efficient to utilize manufacturing abilities to meet growing population demands through offsite or Modular construction.

(Bendi, et al. 2020) studied "An off-site construction readiness maturity model for the Indian construction sector". The researcher intended to understand the preparedness and readiness of the companies that are involved in construction around cities in India. The multi-stage methodology adopted for research that consisted of literature review and semi structured interviews and the findings of studies suggested that 17 points variables comparison with 3 structured maturity level studies derived for companies that are involved in construction sector. Aim of research was also to identify and address areas of concern and further developing the methods to take advantage of OSM construction methods.

3. Research Methodology

The study was qualitative & quantitative in nature. The researcher aimed to organize the study in bi-dimensional scenario; the explanation for these scenarios are based upon following categorization

Scenario – 01 - Companies executing project for Modular Construction

Scenario – 02 - Peoples who are related with Construction

In Scenario – 01, Researcher intended to approach companies that are currently involved in business related to Off-Site Construction / Modular Construction technique in areas in UAE. For this purpose, Researcher have used various channels and resources in identifying those companies. Researcher found around 10 Companies that were involved in construction. The name of companies is shown in table below. Besides this, Researcher has created list of questions in form of Surveys but was unable to execute the survey due to certain issues. These issues include restriction for mobility due to job involvement, acquainted sources within those organizations and secrecy of those companies due to specialized involvement and their pricing. Due to this, Researcher was unable to gather any data from them.

However, Researcher executed successfully Scenario-02, which was aimed to gather data from Peoples who are related with Construction. Researcher has developed Questionnaire with aim as defined in the Study Objective. This Questionnaire was circulated to the Construction Circle of Researcher Resources with no targeted data collection. Researcher aimed to collect sample size of at least 35 numbers different opinions that were then categorized to rationalize the information collected in lieu of support to this Researcher Project. However, Researcher got successful in collecting information from almost 42 people out of which 39 were related to the field of construction.

Researcher has developed the questions of Questionnaires after extensive literature review with target to get qualitative input from as many possible related construction peoples as required.

Reasons for not going with Scenario – 01

Researcher have got contacts for most of the companies that are currently undertaking the projects related to Modular Construction, Due to limitation of Research scope and limited time. Researchers have skipped approach to gather data from companies that are involved in these businesses.

Other reason for not going with this scenario was that many companies may not be willing to share the data on their ongoing as well as completed projects due to secrecy and competitiveness nature of their businesses.

Reasons for the Scenario-02

The researcher has got contacts with many construction people in the field that are located in UAE.

Respondents of the study

Respondents were the project managers, engineers and related staff working for various companies around UAE.

Questionnaire for data collection

An interview guide was prepared for conducting unstructured interviews with said project managers and engineers.

3.1. Selection of Respondents

Respondents to which Questionnaire was circulated were selected based largely upon experiences and the positions they held. This was done intentionally as Researcher does not intend to collect data from People how are new to the field of Construction, as Researcher was intending to eliminate the theoretical knowledge that are mostly present in the newcomers that starts fresh in field of Construction. Researcher was opting only to confirm the focus for respondents of questionnaires to have held the senior or experienced positions.

3.2. Data analysis and report writing

Data was recorded in black and white and will be analyzed highlighting the nature of responses and the practices that are observed in Construction.

3.3. Reliability and validity of Data

The researcher had exercised utmost care while collecting data and this is the reason why data was collected with the help of Google forms, this shall ensure the reliability of data with contacts of respondents recorded in Black and White for the aim of study.

Additionally, Researcher works very hard in taking due care for ensuring that the best practice resources should respond. Along with sources that can be traced back by future researchers as well. Hence, the issue was treated with appropriate referencing while ensuring that right amount of data has been collected and analyzed.

4. Data Analysis and Findings

4.1. Study Group

In identifying & analyzing appropriate Construction process, researcher has approached the organizations in identifying the best possible techniques. To know these techniques a structured questionnaire was prepared and circulated among various functional managers in order to get their reviews in form of answers to that questionnaire.

Moreover, Results of the survey has in cooperated responses from peoples other than Construction Industry which accounted for total of 1 Respondent rest of 41 Respondents belonged to Construction Industry, as shown in below graph

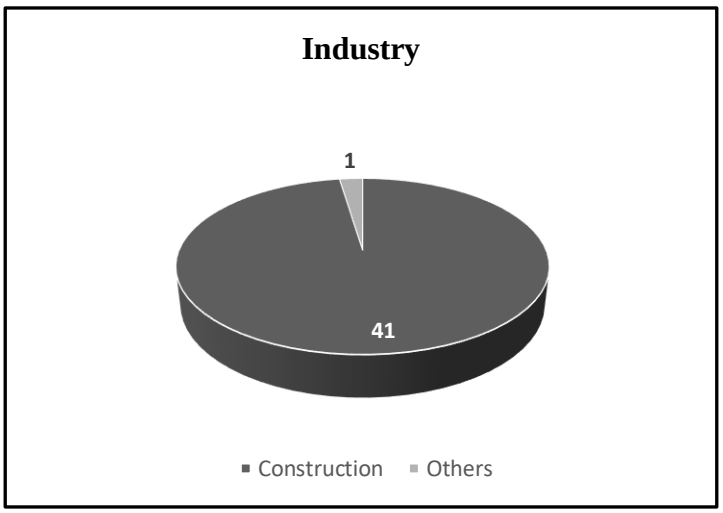

Figure 3: Responses Showing Industry Distribution (By Authors)

In addition to this, results of the survey have also revealed that majority of people participated in the survey were Project Managers as well as other Senior managers of the companies who have decision power in gearing their companies towards wealth of knowledge.

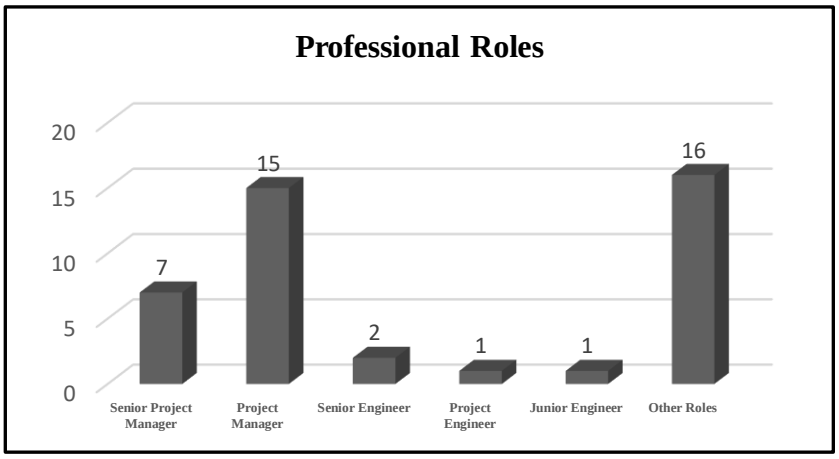

Figure 4: Responses Showing Professional Roles Of Respondents (By Authors)

Majority of respondents belonged to Contractor background followed by Design consultant & Project Management Consultant positions.

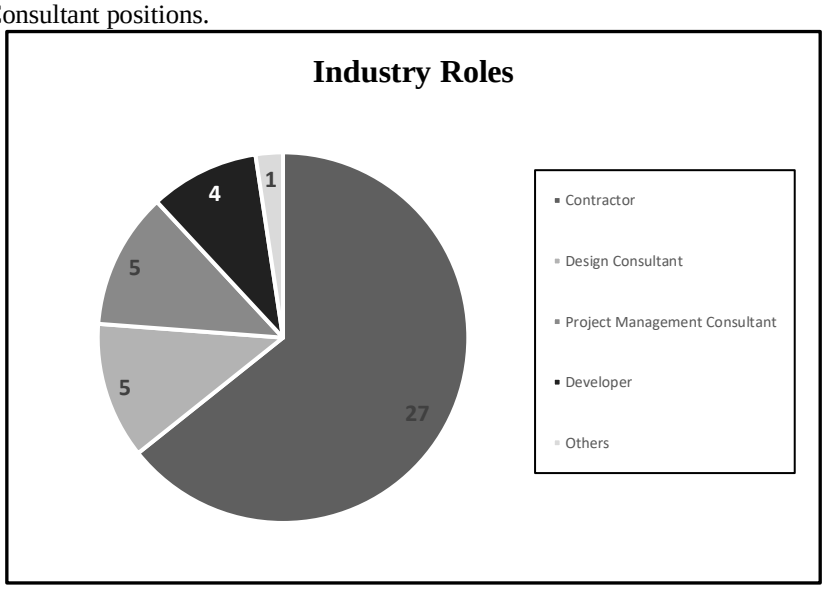

Figure 5: Responses Showing Distribution Of Respondents From Construction Industry Roles (By Authors)

Since Questionnaire was divided in 8 Parts, this division was in line with formulation of the study so that first to understand what are the current construction techniques that are being used in the industry, along with identifying the challenges, flexibility & readiness of managers to accept changes from traditional to more modern construction technique and then taking the manager towards awareness about Offsite Construction.

4.2. Current Construction Techniques and Classifications

As part of Survey process and data collection related to Current Construction Technique and classification, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggest that most of the respondents are aware about Construction Techniques and Classification.

Table 1: Summary Of Respondent Views On Current Construction Techniques And Classifications

Part I Current Construction Techniques and Classifications		
	Frequency	Percentage
Strongly Agree	12	29%
Agree	19	45%
Neutral	7	17%
Disagree	3	6%
Strongly Disagree	1	2%
	42	100%

4.3. Challenges with Current Construction Techniques

As part of Survey process and data collection related to Challenges with Current Construction Technique, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents are aware about Construction Techniques and Classification.

Table 2: Summary Of Respondent Views On Challenges With Construction Techniques

Part II Challenges with Current Construction Techniques		
	Frequency	Percentage
Strongly Agree	11	25%
Agree	20	48%
Neutral	8	20%
Disagree	2	5%
Strongly Disagree	1	2%
	42	100%

4.4. Project Management Methods being practiced currently

As part of Survey process and data collection related to Project Management Methods being used currently, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents are aware about Construction Techniques and Classification.

Table 3: Summary Of Respondent Views On Project Management Methods Being Practiced

Part III Project Management Methods being practiced currently		
	Frequency	Percentage
Strongly Agree	5	12%
Agree	8	19%
Neutral	6	14%
Disagree	12	28%
Strongly Disagree	12	28%
	42	100%

4.5. Flexibility to adapt to new technology

As part of Survey process and data collection related to flexibility to adapt to new technology, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents agree related to their acceptance towards adoption of new technology for construction works.

Table 4: Summary Of Respondent Views On Flexibility To Adopt New Technology

Part IV Flexibility to adapt to new technology		
	Frequency	Percentage
Strongly Agree	5	12%
Agree	8	19%
Neutral	6	14%
Disagree	12	28%
Strongly Disagree	12	28%
	42	100%

4.6. Identifying Techniques of carrying out Off-Site Construction

As part of Survey process and data collection related to techniques identification for techniques regarding carrying out Off-site Construction, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents are aware about Off-Site Construction Technique.

Table 5: Summary Of Respondent Views On Techniques Related To Off-Site Construction

Part V Identifying Techniques of carrying out Off-Site Construction		
	Frequency	Percentage
Strongly Agree	5	12%
Agree	8	19%
Neutral	6	14%
Disagree	12	28%
Strongly Disagree	12	28%
	42	100%

4.7. Benefits of Using Modular Construction

As part of Survey process and data collection related to benefits of using modular construction, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents are aware about benefits related to use of Modular Construction.

Table 6: Summary Of Respondent Views On Benefits While Using Modular Construction

Part VI Benefits of Using Modular Construction		
	Frequency	Percentage
Strongly Agree	5	12%
Agree	8	19%
Neutral	6	14%
Disagree	12	28%
Strongly Disagree	12	28%
	42	100%

4.8. Comparing the techniques used in Modular construction with traditional practices

As part of Survey process and data collection related to comparison of techniques that are used in Modular Construction with regards to Traditional Practices, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents are aware about Techniques that are different from traditional practice in Modular Construction.

Table 7: Summary Of Respondent Views Regarding Comparing Techniques Used In Modular Construction With Traditional Practices

Part VII Comparing the techniques used in Modular construction with traditional practices		
	Frequency	Percentage
Strongly Agree	5	12%
Agree	8	19%
Neutral	6	14%
Disagree	12	28%
Strongly Disagree	12	28%
	42	100%

4.9. Analyzing challenges related to Modular Construction

As part of Survey process and data collection related to analyzing the challenges related to Modular Construction, below is the summary of results collected from the respondents of the survey. The findings as accumulated in the summary below suggests that most of the respondents are aware about challenges related to Modular Construction.

Table 8: Summary Of Respondent Views On Challenges Related To Modular Construction

Part VIII Analyzing challenges related to Modular Construction		
	Frequency	Percentage
Strongly Agree	11	25%
Agree	18	43%
Neutral	9	22%
Disagree	4	10%
Strongly Disagree	0	0%
	42	100%

5. Summary, Conclusions and Recommendations

5.1. Summary

The main objective of this study was aimed to analyze the project management technique that are being used in field of construction within UAE. For purpose of collecting data, the researcher has developed questionnaire and gathered data from several people related to construction industry. This collection was in form of structured survey in which different parts of questions were aimed to gather information that can provide outlook of management practices being implemented in traditional as well as in Modular construction. The researcher managed to get qualitative and quantitative input from the relevant managers working within UAE. The responses from all the respondents have been adequately presented in form of Likert scale to understand the level agreements and disagreements they have against the questions that were asked from them.

5.2. The Salient Features of the Findings are as Under

The analysis states that majority of the respondents are aware about different Construction techniques.

The data shows that majority of the respondents are aware about challenges in traditional construction.

The data analysis implies that majority of the respondents feel that traditional construction techniques are outdated.

The data indicated that majority of the respondents want to experience change in construction.

The data indicated that majority of the respondents are satisfied with level of technology being used in their companies

The data indicated that majority of respondents are satisfied about classification of current construction techniques

The data indicated that majority of respondents feels that traditional construction incurs more time.

The analysis states that majority of respondents feels that traditional construction incurs more cost.

The analysis reveals that majority of respondents are exerting considerable efforts in completing project successfully.

The data indicated that majority of respondents oversees more involvement of project towards design collaboration and negotiations to avoid changes.

The data indicated that majority of respondents spends at least 30 percent of project time in negotiating to avoid changes in design.

The data shows that majority of respondents are aware about current methodologies being used in practicing construction.

The data indicated that majority of respondents are aware about PMI &Prince 2 Methodology for Construction projects

The data indicated that majority of respondents can accept changes in the project.

The data indicated that majority of respondents have tried changing from traditional construction to more advanced form of construction during their projects.

The data indicated that majority of respondents are getting training for other construction methods.

The data indicated that majority of respondents wants more technology concentration.

The data shows that majority of respondents received support from their managers while introducing new technology in the company.

The data indicated that majority of respondents confirmed that behavior from their colleagues was satisfactory while introducing new technology in the project.

The data indicated that majority of respondents are aware about different off-site construction techniques.

The data indicated that majority of respondents are aware about Pre-fab Construction.

The data shows that majority of respondents are aware about Pre-Cast Construction.

The data indicated that majority of respondents are aware about Modular Construction.

The data indicated that majority of respondents believes that Modular Construction can save time.

The data indicated that majority of respondents believes that Modular Construction can Lessens Climatic Impact.

The data indicated that majority of respondents believes that Modular Construction can reduce requirement for Material storage

The data shows that majority of respondents believes that Modular Construction can reduce labor cost.

The data indicated that majority of respondents believes that Modular Construction can reduce wastage

The data indicated that majority of respondents believes that Modular Construction can cater Immediate population demand.

The data indicated that majority of respondents believes that Modular Construction can meet demand for Mass Production.

The data indicated that majority of respondents believes that Modular Construction can design period of project

The data indicated that majority of respondents believes that Modular Construction can help in faster approval process from all concerned stakeholders.

The data indicated that majority of respondents believes that Modular Construction can reduce the risk of procurement.

The data indicated that majority of respondents believes that Modular Construction can reduce the Transportation Cost and Risk.

The data indicated that majority of respondents want more design duration before execution phase.

The data indicated that majority of respondents agree that modular construction requires less resources than traditional construction requirements.

The data indicated that majority of respondents believes that relocation is possible while using Modular Construction Technique.

The data indicated that majority of respondents agrees that major manufacturing countries are using modular construction.

The data indicated that majority of respondents agrees that their companies are helping them in getting training about modular construction.

The data indicated that majority of respondents can provide Customer's products based upon their requirements.

The data indicated that majority of respondents feels that they can cater financial interest of stakeholders by using Modular Construction.

The data indicated that majority of respondents feels that they can help meeting client requirements by using Modular Construction Technique.

The data indicated that majority of respondents feels that they can help meeting Project requirements by using Modular Construction Technique.

The data indicated that majority of respondents feels that they can help in matching social aspects for Stakeholder requirements by using Modular Construction Technique.

The data indicated that majority of respondents can comply requirements of authorities and can meet regulations as specified by authorities in meeting their requirements.

The data indicated that majority of respondents agrees that Modular construction technique can be limited to some options during design selection and means that design in Modular Construction does not provide more flexibility in Modular Construction Technique.

The data indicated that majority of respondents agrees that Modular construction can cater needs of Current Industry practice.

The data indicated that majority of respondents agrees that Aid of computer application can enhance Project Delivery using Modular Construction Project.

6. Conclusion

Based on the data analysis and findings, following conclusions can be drawn:

Table 9: Survey Results regarding Survey composition based on Frequency for Different Parts of Survey

Data Analysis								
	I	II	III	IV	V	VI	VII	VIII
Strongly Agree	12	11	5	14	18	14	16	11
Agree	19	20	8	19	15	16	17	18
Neutral	7	8	6	7	5	9	6	9
Disagree	3	2	12	2	3	2	3	4
Strongly Disagree	1	1	12	0	1	0	0	0
	42	42	42	42	42	42	42	42

Table 10: Survey Results regarding Survey composition based on Percentage for Different Parts of Survey

Data Analysis								
	Part I	Part II	Part III	Part IV	Part V	Part VI	Part VII	Part VIII
	%	%	%	%	%	%	%	%
Strongly Agree	29	25	12	32	43	34	39	25
Agree	45	48	19	45	36	39	40	43
Neutral	17	20	14	17	11	22	15	22

Disagree	6	5	28	5	8	5	7	10
Strongly Disagree	2	2	28	1	1	0	0	0
	100	100	100	100	100	100	100	100

Majority of respondents are aware about Construction Techniques, challenges with traditional construction, they are also flexible in adopting new norms of the industry, they are aware about classification of Off-site Construction, they are able to analyze challenges that Modular Construction can overcome which are currently issue with Traditional construction practices. The opinion only goes in disagreement regarding the methodologies that are being practiced in construction. Since there are 8 common methodologies but many people engaged with construction industries are aware about few of the techniques only.

Table 11: Survey results regarding Professional Roles who have contributed to the Survey in terms of frequency

Data Analysis on Professional Roles Distribution						
	Senior Project Manager	Project Manager	Senior Engineer	Project Engineer	Junior Engineer	Other Roles
	f	f	f	f	f	f
Strongly Agree	2	4	0	0	0	6
Agree	3	6	0	10	0	0
Neutral	1	3	0	0	0	3
Disagree	0	2	0	0	0	1
Strongly Disagree	0	0	0	0	0	1
	6	15	0	10	0	11

Table 12: Survey results regarding Professional Roles who have contributed to the Survey in terms of Percentage

Data Analysis on Professional Roles Distribution						
	Senior Project Manager	Project Manager	Senior Engineer	Project Engineer	Junior Engineer	Other Roles
	%	%	%	%	%	%
Strongly Agree	33	27	0	0	0	55
Agree	50	40	0	100	0	0
Neutral	17	20	0	0	0	27
Disagree	0	13	0	0	0	9
Strongly Disagree	0	0	0	0	0	9
	100	100	0	100	0	100

Moreover, in context of the findings as illustrated in the table above, the majority of respondents are in experienced roles who are about the Outlook of the Project Management practices being observed in construction Industry, particularly in Modular Construction.

Recommendation for Construction Companies & Participants of the Survey

A more practical approach can be adopted while undertaking traditional projects

Since, benefits of Modular construction outweighs the traditional construction so more preference is required while selecting appropriate practice

Environmental gains are of utmost importance so dedications are required from individual levels in protecting environment

More training can be given to the staff so that to create awareness on modern construction methods

Recommendation for Future Researches

The data presented, analyzed and findings identified through this research can be helpful for the future researchers in expanding their knowledge base.

Since, the study was limited to participants only that are working on professional roles in construction industry, future researchers can expand the research towards companies that are practicing Modular Construction methods.

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