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IMPLEMETATION AN AGILE PROJECT MANAGEMENT IN CONSTRUCTION INDUSTRY

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Abstract: The construction industry can use New Framework for action in the Construction project and product management, and learn from the experiences of the other industries. With this backgrounds in mind ,some construction companies are enhances the performance of their project team Improve & motivate their competitiveness and increase the added value to their clients and themselves. Agile management are more than different framework are use but in this resrech are use Scrum Framework in construction industry. This thesis has researched in what are the opportunities and benefits to implementation agile project management approach in the construction phase in industrial building. There are many advantages found of implementation an agile approach to approach to increase participation of each member of the Growth development team in the industrial project compared to the present situation. On the other hand ,critical success factors are in decreases delay, uncertainty, Cost Saving ,Splint Construction activity schedule ,Daily base meet lower Authority , Higher Authority are weekly meet and Risk Involved during construction Phase. It is also focused on time management and regular meetings, that will be beneficial to keeping track of the project progress. The Result from Analysis Study in two way, one way Case study and second is SPSS Frequency analysis. For these Three sites I have prepared one checklist for efficiency of Agile management on site. Ahead I have filled the checklist and compared all sites. In the results of case studies are, 78.46% and 74.61% efficiency of Agile management in those sites where Agile management was used as compared to those sites where Agile management was not used in this sites efficiency of 50.00%. This Result are conclude to two site are more efficiency to use agile methodology and on third site are less efficiency to not use agile methodology. In the results of data analysis in SPSS frequency analysis to questionnaire survey in use method to factors response frequency are Cronbach's Alpha 0.895.this is good in SPSS analysis Result criteria

Index Terms **– Agile Management, Scrum framework, Construction Management, SPSS Frequency Analysis Method**

I. INTRODUCTION

Project management is essential for determining how to manage, control, and coordinate any size project by selecting working techniques, establishing project responsibilities, simple Project report, and consistently adhering to project planning throughout the project. Today, Project management frequently affects the entire organization, whether it is a small business or a major public enterprise. It's been 50 years of managing projects with Agile methods on which progress is dependent. At this point, the true approach to project management has shifted. There is a gap between traditional approaches to project management and new approaches to project management, which creates vulnerability inside the business and among its employees. Individuals nowadays are occasionally attentive that they are performing in a way that does not essentially perplex the management view. Examining and defining how undertakings are now managed and conducted helps reduce susceptibility.

Our major focus will be on communication and trust management strategies. The study findings will be based on data gathered from informants' collective experiences and an assessment of the literature. Agile approaches are becoming more popular by the day. Direct communication with consumers, managers, and stakeholders is required. It allows for the handling of change requests during the development stage, as both technological and business needs change over time. Agile project management Function all areas of development, including business requirement research, planning, programming, quality assurance, testing, change management, and delivery. There are several agile approaches and kinds to choose from. Scrum Framework, Kanban Framework, and Lean Framework are three prominent and frequently studied in the literature. I chose Scrum Framework is another prominent framework approach. In India, 22 percent of organizations use agile management. Its core foundations are in the product development sector, and it was established through observational advancement. The goals of this method are not limited to that industry. It defines ideals and standards that may be adopted by other industries. Furthermore, it integrates numerous tools and tactics for carrying out an endeavor, which will motivate adherence to its characteristics and standards. Dexterous approaches are widely used in the product development sector, where the client perceives his requirement and further develops it via repeated testing.

Following are the main concepts within the agile project management:

1. Change to adaption
2. Communicate with People
3. Time & Cost Reduction
4. Follow and Splint Activity Schedule

II. OBJECTIVES

Primary objective is Application of agile project management (Scrum) and its resulting effect on the development of construction project. Secondary objective is the agile methodology of one Industrial project in work in Indian construction industry.

III. SCOPE

This research work is basically dealing with the role of Agile management Industrial area in present construction industry. The work is restricted to Ahmedabad zone. This work will enable us to know what is the present scenario of usage of Scrum methodology in Ahmedabad's construction industry and its awareness. The Survey will be conducted across various Industrial construction sites in Ahmedabad.

IV. RESEARCH METHODOLOGY

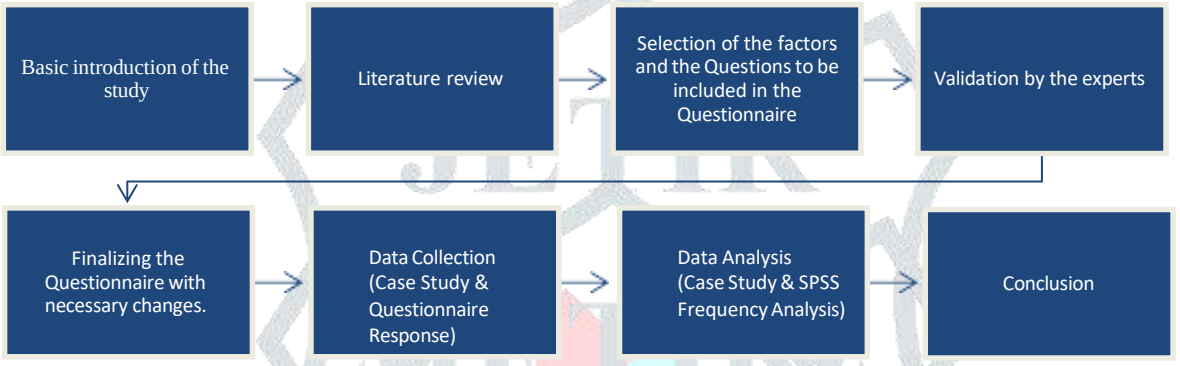


Fig. Research methodology

V. LITERATURE REVIEW

Risk Management in traditional and agile project management

(Buganová & Šimíčková, 2019)Many transportation businesses utilize the gamble board just to protect the organization's resources or the strength of its representatives or clients, and as part of the improvement project, they typically take over precisely the data from previous assignments. A responsibly chosen technique for assessing and mitigating risks to an acceptable level is a prerequisite for maintaining financial dependability and effectively recognized initiatives in transportation enterprises. When selecting a strategy, it is critical to evaluate the financial, material, and individual assets, as well as the time system for implementing the specified approach.

Method for Adaptation and Implementation of Agile Project Methodology

(Rasnacis & Berzisa, 2016)This describes changes in the sociometric indicators in the investigated project team's formal and informal connections The results indicated that all indices improved, but formal connections improved the most. The project team is more focused on formal ties and more cohesive, which are both positive features for a self-organized team.

Implementation of Scrum in The Construction Industry

(Streule et al., 2016)Scrum may be used effectively in the development industry. According to the document, no significant modifications to the original Scrum framework are envisaged. When Scrum is used in the development industry, the following points should be considered: Learn how Scrum works and assemble all necessary groups (Development team, Scrum master Product owner, Stakeholder, Product manager) along the way.

Improvisation and Agile Project management : A Comparative Consideration

(Leybourne, 2009)Do not employ any method. Adaption can be, but isn't always, a spontaneous piece of invention. Adaption is still an important component of APM, and Highsmith's five stages of APM include a "adjust" stage, with adaptation efforts being an important element of each emphasis of the improvement cycle. The conclusion is that transformation is a constant process inside APM, and differences occur as a result of criticism from key markers, which might be time, cost, execution, or task-based. It is argued that adaptable action is based on meeting a need rather than correcting a mistake.

VI. DATA COLLECTION

Generally, data collection is a plan of action which research objective can be questioned and it can be classified into two types which are quantitative approach and qualitative approach. In this study qualitative approach will be taken and by qualitative approach I have taken 3 case studies of real site data. In these case studies 2 sites are where Agile management is used and remaining 1 sites are where Agile management is not used which are demonstrated below, then I have collected data regarding Agile methodology.

One checklist are create for the purpose of, how to agile methodology use on construction site, in this checklist give rating out of 10 and note the remarks, this checklist are use on above four site and fill it. Then see the result difference between Agile management concept site and not use of agile management concept site.

Checklist of Agile management on Construction Site

SR. No	Check	Rating (0 to 10)
01	Our projects have the full support of our executive management.	
02	There is no change Start to end, there is improvement in results.	
03	Our methods are adaptable to accommodate frequent changes in project specifications	
04	To control scope changes we have mature process	
05	Project outcomes are widely communicated within our construction company..	
06	We are conducting daily face-to face meetings.	
07	All team member required necessary knowledge	
08	Our Team member are Highly motivated	
09	Our Customer are involved in the execution of the project.	
10	Documentation which provided to our customer are unnecessary.	
11	In our organization the quality importance is very high.	
12	My project are completed at or under budget.	
13	Details scheduling is an important part on my project	

Table.1 Checklist for Agile management

Agile management Factors

SR. No	Dimension	Factors
01	Management	• Strong Executive management Support • Adaptive management style
02	Process	• Agile project management approach • A systematic Project define process o Process based on values with high-level planning , design and documentation. • Significant customer commitment and response • Ongoing risk evaluations
03	Project	• Project timetables that are dynamic and fast •Complex projects that need distinct project activities
04	Organizational	• Organizational culture represented by matrix organizational. • free flow of information across the organization • Emphasis on on strong communication.
05	Human	• team member who display high level of competence and experience • Empowered and highly motivated team members. • Good customer relationships based on dedication, knowledge , trust, and respect • Customer who are genuinely involved and totally devoted
07	Technical	• Products and services that are simply created • The most important features are highlighted and supplied first. • Less documentation required

Table.2 Factors for Agile management

SR. No	Dimension	Factors
01	Quality Achievement	Delivering to anticipated quality in the construction Quality is very importance in side of firm. High quality standards are followed. Quality assurance procedure are employed.
02	Scope Compliance	• Providing what was promised to provide •Meeting all requirements and objectives
03	Timeless	• Delivering on or ahead of schedule is essential; • Timeliness and meeting deadlines are essential; • Detailed scheduling is essential.
04	Cost Target Achievement	• Our construction delivering under budget. • Construction are closely monitoring expense. • Cost overruns are thoroughly investigated

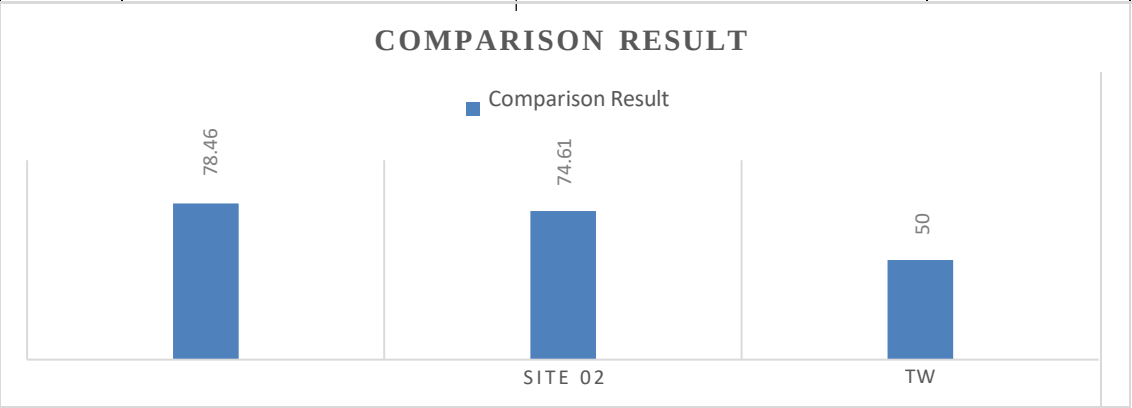
Table.3 Critical Success Factors for Agile management

VII. DATA ANALYSIS AND DISCUSSION

This chapter presents data analysis as well as the findings from the survey. It begins with SPSS frequency analysis of the general variables of participating firms and respondents. Responses are collected from both the physical questionnaires and the google form for the same. The data analysis of the above collected data is done in Excel using different functions of Excel and bar charts. The total number of responses finalized to conduct the data analysis of the survey is 96. The data collected from the above questionnaire are the basic information of the respondent and his/her company.

Case study Results

SR. No	Site Name	Use Agile Management	Result
01	Site 01	Yes	78.46%
02	Site 02	Yes	74.61%
03	Site 03	No	50.00%



SPSS Frequency Analysis

Sample Size

Sample Size for infinite population,

$$ss = \frac{Z^2 \times (p) \times (1-p)}{c^2} \text{ ^2}$$

Where,

S = Sample size for infinite population.

Z = Z Score

P = population proportion (Assumed as 50% or 0.5)

Confidence interval-12 %

Note: Z score is determined based on the confidence level.

Confidence level	z-score
80%	1.28
85%	1.44
90%	1.65
98%	2.33
95%	1.96
99%	2.58

Table.4 Confidence level

Confidence level :

For example, the Z score for a 98% confidence level is 2.33. The error margin: It is described as a little sum set aside in the event of an error or a change in circumstances. The margin of error is usually set at 5%, or 0.05. Confidence Level are 98 % are 96 Response and my response are 100%

Descriptive Statics							
	N	Minimum	Maximum	Mean		Std. Deviation	Variance
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic
Q1	96	1.0	5.0	3.698	.1119	1.0966	1.203
Q2	95	1.0	5.0	3.326	.1415	1.3795	1.903
Q3	94	1.0	5.0	3.511	.1077	1.0446	1.091
Q4	95	1.0	5.0	3.768	.1104	1.0764	1.159

Q5	94	1.0	5.0	3.543	.1253	1.2152	1.477
Q6	95	1.0	5.0	3.600	.1265	1.2325	1.519
Q7	96	1.0	5.0	3.719	.1001	.9809	.962
Q8	96	1.0	5.0	3.667	.1001	.9805	.961
Q9	96	1.0	5.0	3.708	.0959	.9394	.882
Q10	96	1.0	5.0	3.375	.1168	1.1448	1.311
Q11	96	1.0	5.0	3.708	.1097	1.0752	1.156
Q12	96	1.0	5.0	3.688	.1277	1.2508	1.564
Q13	96	1.0	5.0	3.573	.1125	1.1026	1.216
Q14	96	1.0	5.0	3.521	.1397	1.3687	1.873
Q15	96	1.0	5.0	3.385	.1294	1.2680	1.608
Q16	96	1.0	5.0	3.531	.1175	1.1512	1.325
Q17	96	1.0	5.0	3.708	.1137	1.1137	1.240
Q18	96	1.0	5.0	3.552	.1202	1.1776	1.387
Q19	96	1.0	5.0	3.604	.1010	.9892	.979

Table.5 Descriptive Statics

Confidence Interval Descriptive

Descriptive				
			Statistic	Std. Error
Q1	Mean		3.719	0.1141
	98% Confidence Interval for Mean	Lower Bound	3.449	
		Upper Bound	3.989	
	5% Trimmed Mean		3.799	
	Median		4	
	Variance		1.159	
	Std. Deviation		1.0765	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		0	
	Skewness		-1.371	0.255
	Kurtosis		1.487	0.506
Q2	Mean		3.303	0.1459
	98% Confidence Interval for Mean	Lower Bound	2.958	
		Upper Bound	3.649	
	5% Trimmed Mean		3.337	
	Median		4	
	Variance		1.896	
	Std. Deviation		1.3768	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		2	
	Skewness		-0.62	0.255
	Kurtosis		-0.955	0.506
Q3	Mean		3.506	0.1097
	98% Confidence Interval for Mean	Lower Bound	3.246	
		Upper Bound	3.766	

	5% Trimmed Mean		3.562	
	Median		4	
	Variance		1.071	
	Std. Deviation		1.0349	
	Minimum		1	
	Maximum		5	
	Range		4	
	Interquartile Range		1	
	Skewness		-0.959	0.255
	Kurtosis		0.667	0.506

Cronbach's Alpha

Cronbach's alpha is the most often used internal consistency metric ("reliability"). It is most typically used when many Likert questions create a scale in a survey/questionnaire and you want to know if the scale is dependable. If you're worried about inter-rater reliability, we have a guide on how to utilize Cohen's () kappa that you might find useful.

Case processing summery			
		N	%
cases	Valid	89	92.7
	Excluded	7	7.3
	Total	96	100

Table.6 Case processing summery

Reliability Statistics	
Cronbach’s Alpha	N of Items
0.895	19
Cronbach’s Alpha Are .05 to up	

Table.7 Cronbach’s Alpha

Cronbach’s Alpha	Internal Consistency
$\alpha \geq 0.9$	Excellent
$0.9 > \alpha \geq 0.8$	Good
$0.8 > \alpha \geq 0.7$	Acceptable
$0.7 > \alpha \geq 0.6$	Questionable
$0.6 > \alpha \geq 0.5$	Poor
$0.5 > \alpha$	Unacceptable

Table.8 Cronbach’s Alpha Criteria

This Analysis are SPSS Frequency Analysis in Cronbach's Alpha is 0.895.

VIII. CONCLUSION

General Conclusion

The implementation of Agile management on construction site is Time and cost reduction, Daily and weekly meet, adaptive management style ,risk evaluation , customer good communication, construction delivery under budget, activity Splint out. Agile management on construction site gives best result. The main reason behind not has been using agile management on construction site is less awareness around people and it needs to aware public regarding this spontaneous system and their benefits. From the work on construction site conclude that the Main factors of Agile management affect on site are Knowledge.

Theis Personal Conclusion

In the results of case studies are, 78.46% and 74.61% efficiency of Agile management in those sites where Agile management was used as compared to those sites where Agile management was not used in this site efficiency of 50.00%. This Result are conclude to two site are more efficiency to use agile methodology and on third site are less efficiency to not use agile methodology. In the results of data analysis in SPSS frequency analysis to questionnaire survey in use method to factors response frequency are Cronbach's Alpha 0.895.this is good in SPSS analysis Result criteria. This Theis objective are full fill criteria in conclusion of implementation of agile management in construction industry.

IX. RECOMMENDATIONS

The thesis work is carried out in Ahmedabad & Gandhinagar region it covers majority of construction company of the Ahmedabad & Gandhinagar. So, there is a scope of the study in the Gujarat state construction company and other cities of India.my thesis work are SPSS Analysis method are use and future scope are use of QRS statistic method.

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