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# Framework of agile management's sprint planning in construction projects – AFD method

**Blessie John**

*Assistant Professor, CARE School of Architecture, Tiruchirappalli, Tamil Nadu*

## ABSTRACT

***Though the Construction project management field is persistently developing, the construction industry with its unique nature is facing time-cost overrun during the execution phase. Through literature reviews, it has been found that delay in design documents & change orders during construction are ranked high in causing delays. Agile Management which is also known as 'Change management' with its principles belonging to IT industry is introduced into construction's execution phase. Unstructured interviews and data collection is done to understand the perspective of various professionals in this field. With an ultimate goal of delivering projects on time, within estimated cost and approved work orders, an Agile's framework for execution phase is established. Also as in IT industry, the structure of Sprint meeting is developed to ease the performance to obtain effective results in the construction project management field.***

**Keywords:** *Time-cost over-run, Agile management, Execution phase, Framework for sprint planning.*

## 1. BACKGROUND STUDY

Construction Industry is unique in nature by having multi-disciplines holding high risk with uncertainty. Uncertainty is a result of complexity with new information on each project and unpredictable future. Unlike other industries, the project cannot be test driven or squeezed because of its intangible nature. The projects are heterogeneous as client's need changes on every project. Though many improvements have come up construction projects face gaps between customer expectation and management perception, management perception of requirements and translation of the same, specification and actual delivery, actual delivery and information given by clients, service delivered and user's perception etc. Project managers and construction experts must take measures to lead and manage the life-cycle of the project which results in client's satisfaction.

### 1.1 Traditional Management:

Today Construction industry still is based on Traditional management in which the whole process is divided into phases which go in a sequential way with proper control, where no phase is revisited. At the end of each phase, deliverables are produced which become the basis for the next phase. i.e., the output of one becomes the input of the following phase with a different focus. The phases are: Briefing stage which is the process of turning client's intention into a brief; Design stage to satisfy regulatory stakeholders, possible technologies, constraints; Concept & scheme stage that affirms the quality of the concept; Planning stage where detailed working drawings are agreed to by various consultants; stage in which design assumptions are brought to ground, leading to workable and unworkable design, redefinition of Client's ideas etc; Close out stage, where handing over of completed project is given with all documents for reference to Client.

### 1.2 Identification of Problem:

Throughout history, construction projects have been successful in spite of being a conservative in nature. From the figure below, we can understand that huge sums and time are spent on execution phase of construction projects. We need to accept the fact that the way of handling projects has been changed, that construction business has to take measures in implementing it uniformly.

 

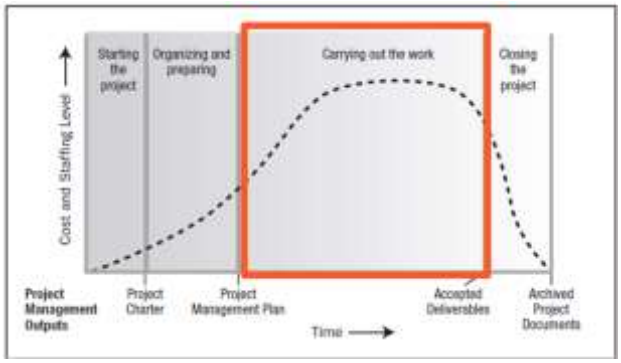


**Figure 1: Phases of Construction (Source: PMBok)**

Bringing out what was planned is the task in execution phase which includes a number of challenges, time management, quality assurance etc. Changes, misuse of resources and rework adds to the challenges. Time and Cost overruns are found to be the major drawback for any construction project in which multiple techniques were tried. For example, Sydney Opera House finally costs 15 times above the estimated cost, Boston Aetriel Tunnel was 156% higher than the planned cost, and Channel tunnel's final cost was 80% more than originally planned. Better management of execution phase has to be known to the conservative construction business to enhance the ease of implementation.

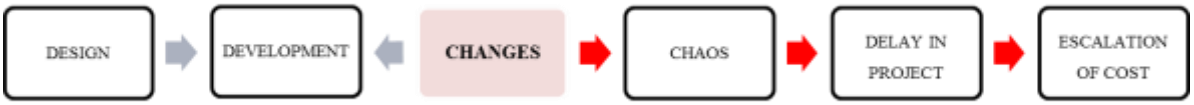


**Figure 2 Effect of changes in the development of the project**

Figure1, as project flows from design to completion, if changes arise then chaos is created leading to increase in cost, rework, and delay in project duration. A need for a more flexible approach to managing these changes has been raised. Thus, agile management of software industry comes into the picture of construction project management which is a contrast to Traditional management to find a more relevant and efficient role in each phase.

### 1.3 Agile Management:

Following the five-step process of the traditional method makes the construction industry more conservative. Now creative people in the field have explored various methods to follow, which could increase the efficiency in delivering the product. But as yet, those changes incorporated in construction management systems are bringing confusion and ambiguity. So, scrutiny and definition are needed to clarify the changes to manage the project and to ease the management practices.

According to Softhouse, Agile methods are good in theory but they couldn't hold up in practice as it is empirical in nature. Multi-National Companies have the lead with new techniques, but small groups fall short of it. Kevin Aguanno explains that the strength of Agile is to manage the impact of change on a project in a way to maximize the value of the project at an orderly approach, by controlling risk that those changes bring. Agile project management is an iterative approach to plan and guides the project process. It can shift any organization from "management as planning" to "management as organizing".

Research in the past has proved that agile management can be implemented in the design phase of construction projects as it is the only stage where software (design) is involved. Changes in the design do not cost as much as the execution phase.

## 2. RESEARCH STATEMENT

This research intends to find the potential of agile management's input in the execution phase of construction. So the research question is as follows:

***"Finding potential and structure of agile project management in the execution phase of construction industry"***

### 2.1 Research Methodology

- Literature study aimed to find the causes for time-cost overrun during construction's execution process.
- The intervention of agile management's principles at execution phase of construction.
- Data Collection to understand the current practice of construction industry in all scales of projects and also through unstructured interviews to understand the perspective of professionals on agile's methodology.
- Develop Agile's framework with sprint structure for construction industry which could be recommended to reduce the delay caused due to various reasons especially changes.

 

### 2.2 Scope &Limitations:

The area of this paper has been limited to find problems and recommendation only in the execution phase of construction projects. Downsides that might be caused are not taken into account. It is done to benchmark the agile management's framework against traditional management to realize the benefits we could yield out of it.

## 3. TIME-COST OVERRUN IN CONSTRUCTION

Completing large construction projects on time is challenging since delays can occur for various reasons. Among them, it is difficult to identify the uniform root cause as it could vary depending on different project environments. Many small and large size contractors in recent years have voiced their concerns over the difficulty to overcome delay problems. Delays often contribute to costly dispute and the adverse relationship amongst the project participants such as clients, consultants, contractors, sub-contractors, and suppliers.

### 3.1 Causes and Effects of Delay:

Various reasons were listed by researchers in the past as causes for delay such as: delay in design information, contractor's improper planning at the initial stages of a project, poor site management for systematic work progress, inadequate work experience of contractor as projects were awarded for lowest bidder, delay in progress payments from clients, lack of coordination with subcontractors, shortage of resources like men and material, unavailability of equipment or failure of the same, mistakes during construction, working with old drawings, addition or reduction of project's scope during construction industry.

Due to above-listed causes for delay, statistics found that it leads to time- cost overruns, disputes, arbitration, litigations or to total abandonment of the project. Stakeholders involved in the process try to blame the other for causing the effect to the project and no one takes the responsibility for the overruns. So this is a high time to mitigate the same with proper management techniques or principles.

**Table 1 ranking made from the literature review**

| CAUSES / PAPERS | Poor Site Management | Site Conditions | Low Speed Approval | Change Orders Rework | Lack of Communication | Documents | Material | Finance |
|---|---|---|---|---|---|---|---|---|
| Time Performance | 1 | 2 | 3 | - | 1 | 2 | - | - |
| Indonesia | 5 | 4 | - | 1 | - | 2 | 3 | - |
| Large Construction | - | - | - | 1,3 | - | 4,1 | - | 2 |
| Egypt | 4 | 3 | - | 2 | - | - | - | 5 |
| Hong Kong | - | 2 | 4, 5 | 1 | - | 3 | - | - |
| India | - | 1 | 4, 5 | 2 | - | - | - | - |
| Evaluation of time | 1 | 2 | 3 | 5 | 5 | 4 | - | - |
| Malaysia | 2 | - | - | - | - | - | - | 3 |

Table 1 explains the overall understanding of various papers on time- cost overruns in a different country, from which we could identify that change orders and rework caused by design and documentation leads to the delay in the construction industry.

### 3.2 Changes in the Construction Industry:

Changes in construction projects are a very serious problem which is likely to happen from different bases, by various causes at any stage of a project which has considerable negative impacts on costs and schedule. Causes of change orders are a change of plans by owner, error, and omission in design, change in material, poor working drawing, poor planning by schedule, change in design by consultants, etc. A critical change may cause successive delays in the project timeline, re-estimation of work statement, additional equipment, additional materials, additional laborers, overtime, demolition and rework, increase in overhead cost, decrease in quality of work, contractual disputes, hold of work in associated areas, additional money for contractors, etc. So, it is proved that there is a need for "CHANGE MANAGEMENT".

## 4. DEVELOPMENT OF FRAMEWORK AND ANALYSIS

Agile Project Management, which is also known as "Change Management" is an effective management technique followed in the software industry, is found to be worthwhile in delivering projects on time with required quality and within budget. This paper defines the opportunity and structure of agile management's sprint planning to ease and stabilize the implementation which can help the stakeholders to follow.

### 4.1 At Design Phase

Agile management recommends starting the project's design phase with project kick-off meeting (face to face conversation) with pre-qualified consultants and client to envision the requirement as the first phase. Pre-qualified consultants are the ones who must

 

have experience in handling the same kind of project in the past and they need not be the same chosen party on the execution phase, but involved to get a better understanding on various perspectives to envision the requirements. This acts as the start of architect's design thinking process. Drawings then are made is discussed with other consultants in the next meeting and updated if necessary. The revised drawings are given for tendering; this process can control the change of design in the middle of the execution and helps in the efficient bidding process. After selection, **a** contract should be signed agreeing that they abide by the agile management framework by accepting for weekly meetings with consultants and daily meeting with site people.

**At Execution Phase**

Site kick-off meeting should be held on site with selected consultants by signing the second contract with prepared product backlog. Product backlog shows the milestones to be achieved like excavation, column, and ground floor roof etc which acts as the base for Sprint meeting. This need not have complete work breakdown structure but only the milestone to avoid ambiguity in handling project. Product backlog acts as the skeleton of the sprint meeting. The interval between the sprint meetings will be decided up on the time taken for a milestone to get completed or in the middle. Status of each milestone should be updated in the meeting as open or closed or on the process with respective color codes. This is placed at site office as well as in the work environment as a medium of visual communication. This aims at motivating the employees and keeps them informed about the progress of work.

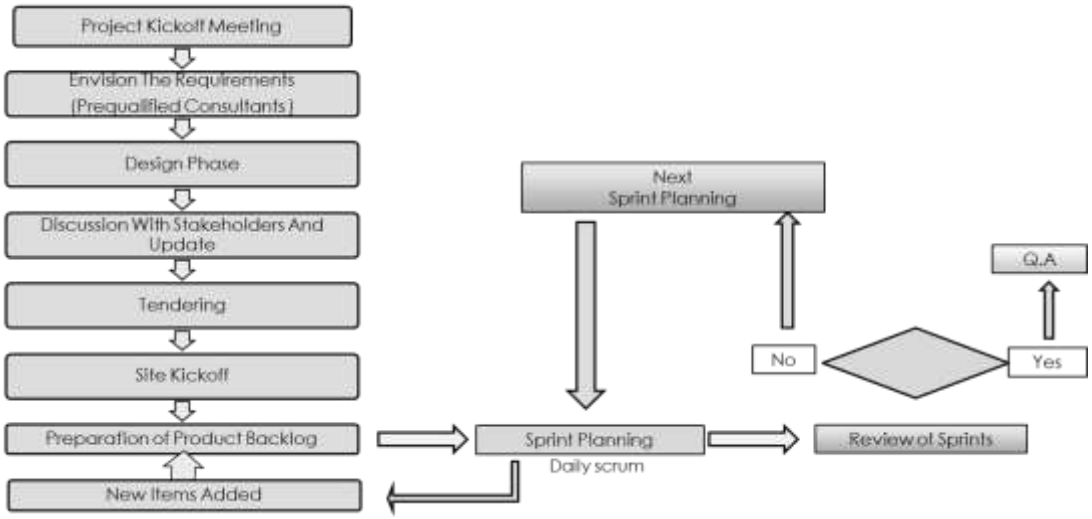


**Chart 2 Developed an Agile framework for construction projects**

**4.3 Meetings during execution phase:**

With response to the scale of the project, the schedule is divided as "Sprints" in the size of two to four weeks (14 – 28 days) duration with a respective task which is discussed and agreed by consultants. This integrates five chosen principles of agile management like Short term planning, Client involvement, Reconciliations, Required reflection & adaptation, and Business people & developers work together which can address all the causes for the delay. The timing for sprint meeting with consultants will be 45 to 60 minutes. Meetings should be headed by Scrum master who can be a project manager exclusively for handling agile framework.

In the meeting, evaluation of work of **a** completed sprint (previous weeks' work) as per product backlog is carried out. If qualified work with respect to the specification given by the contractor is completed then it is marked as "closed"**;** if not done with anticipated quality then it will be added to next sprint**,** additional to the work allotted for the upcoming sprint. Doing this, ambiguity and uncertainty of client about quality is avoided thus giving them satisfaction. As the quality test is done at every sprint by the quality tester, rework is avoided resulting in no loss of time and cost. Simple and necessary documentation is only done for future reference by project managers thus avoiding overloading.

Daily Scrum meeting at the site has to be conducted by the Scrum master cum project manager with employees who are involved at work the same day for 10 to 15 minutes. As in IT industry, project Manager should ask three question as follows: 1. What was done yesterday? 2. What is the allotted work for today? 3. Will there be any problem or delay for tomorrow's work? On addressing these issues, he/she ensures on-site management.

**4.4 Sprint's "AFD" method:**

On each sprint meeting, Approval (A), Finalisation (F), Discussion (D) has to be carried out. To brief**:** "Approval of upcoming sprint, Finalization of the next sprint and Discussion of the third sprint" should be done. As each meeting is done with all the consultants involved in the project, it helps them to forecast the following procedures, do necessary arrangements for their own task, discuss if any work could interrupt their work during same sprint duration etc.

 

The first meeting should be conducted three weeks before the commencement of work on site. On the first meeting of Sprint, Approval- Finalisation- Discussion of sprint 1, 2, 3 respectively should be done. Procedures for handling changes, the time limit for freezing the design converse, agreed and fixed.


**Chart 2 Developed AFD for Sprint Meeting**

Changes are allowed only for the 3rd sprint work i.e. tasks in the discussion. This will control the change during execution phase and necessary actions can be taken in the weeks before commencement or any comments can be discussed and the decision can be taken in the common forum. If changes are required, the justification and negotiation of the change are to be done by the consultant followed by written approval of the client. As signed in the contract, "Exchange Request" is given in place of "Change request" in the traditional method. The advantage of this is, changes without written approval are not allowed and no additional material or cost is added as exchange replaces the old material and cost given in BOQ with new estimation.

**4.5 Illustration of "AFD":**

In a project, if the schedule is divided into sprints of 14 days duration, then the first sprint meeting should be scheduled three weeks before commencement of work at the site. Successive three sprint's works have to be discussed in a meeting. For example, if first sprint task includes marking and excavation for 14 days, plinth & column work on second sprint and column work & brick work on the third sprint. In first sprint meeting, approval for excavation will be given and will finalize the plinth details so that procurement of resources can be done to eliminate delay on materials, equipment, and payment. Also, discussion of the column with brick work**,** which is on the third sprint**,** is made and if changes are required on the task then it should be justified and negotiated by consultants at this stage. Revised drawings can be discussed at the next sprint meeting and finalized with written approval. If agreed, Project managers should revise the contract with approved exchange request with cost duly signed by contractors and client for acceptance.

In the second meeting, evaluation of excavation including removal of soil from the site is made at the beginning. If the completed work does not comply with specification given and fails to achieve the quality expected, then it is either demolished or reworked upon. This gives the manager stronghold on the task and this affects only two weeks effort**.** Whereas in traditional method quality is tested at the last stage and rework or demolition will not be workable as it will incur huge sum of cost and time. Approval of immediate sprint task i.e. plinth with column work and its budget is given, finalization of revised drawings (which was discussed at last sprint meeting) with estimated cost after which changes will not be accepted and also discussion of third sprint's task i.e roof slab is conversed. Documentation of the previous sprint is made by the project manager for future reference adhering to the agile principle of simplicity.

## 5. CONCLUSION

The reason for time cost overrun in construction projects are change orders, delay in design documents and poor site management heading at top three positions. A need for management of changes to bring out the positive outcome has arisen. Therefore proposal of agile management in construction's execution phase was made to find its valuable effect on reducing and managing the changes during the construction project. Introducing "Sprint Planning" with its chosen principles could manage the problems caused by change orders, poor site management, site conditions, and delay in documents. Dividing the schedule into "sprint**s**" gives a clear understanding of each week's task and cost incurred by it

Client involvement at every stage and face to face discussion with consultants helps in getting approval on finance- design-changes, better coordination with consultants, efficient procurement management, shared responsibility of risk, quality test at each sprint level are the expected result by following "Sprint AFD" at the execution phase. This concludes that agile management is a technique not applicable only in the software industry but its role can also be found in the execution phase of a construction project with control on time and cost.

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## 7. REFERENCES

[1] Ahsan, M.K., Gunawan, I.,. (n.d.). Analysis of cost and schedule performance of International development projects. International Journal of Project Management 286878.
[2] Alia Alaryan*, Emadelbeltagi, Ashraf Elshahat, Mahmoud Dawood. (n.d.). Causes and Effects of Change Orders on Construction Projects in Kuwait. Journal of Engineering Research and Applications 2014.
[3] Al-Najjar, J. M. (n.d.). Factors Influencing Time and Cost Overruns on Construction Projects in the Gaza Strip.
[4] Al-Najjar, Jomah Mohammed. (n.d.). Factors Influencing Time And Cost Overruns On Construction Projects In The Gaza Strip.
[5] Binder, Jean. (2014). The Project Management Cocktail Model : An Approach For Balancing Agile And ISO 21500.
[6] Current state of interface management in mega construction projects. (n.d.).
[7] Daniel W.M Chan, M. M. (n.d.). An Evaluation Of Construction Time Performance In B.Industry. Building Environment Vol 31 1996.
[8] Daniel W.M Chan, Mohan M Kumaraswamy. (1996). AN EVALUATION OF CONSTRUCTION TIME PERFORMANCE IN B.INDUSTRY. Building Environment Vol 31 1996.
[9] Development, Real Estate. (2014). Agile perspectives in construction projects – How to improve efficiency in the design phase Master of Science thesis. thesis.
[10] Hampson, S. &. (n.d.). IDENTIFYING THE IMPORTANT CAUSES OF DELAYS in C.Projects. Australian Cooperative Research Centre for Construction Innovation.
[11] Hemanta Doloi a,Anil Sawhney b, K.C. Iyer b, Sameer Rentala c. (n.d.). Analysing factors affecting delays in Indian construction projects. International Journal of Project Management 2011.
[12] Hemanta Doloi a, □. A. (n.d.). Analysing factors affecting delays in Indian construction projects. International Journal of Project Management 2011.
[13] Iyer, K. J. (2005). Factors affecting cost performance: evidence from Indian Projects . International Journal of Project Management 23,283295.
[14] Iyer, K.C., Jha, K.N.,. (2005). Factors affecting cost performance: evidence from Indian Projects. International Journal of Project Management 23,283295.
[15] Jim, M. (n.d.). The Agile Manifesto.
[16] Karrbom, Tina. (2012). Agile project management in the construction industry - An inquiry of the opportunities in construction projects Master of Science thesis. thesis.
[17] Kim Dikert,Maria Paasivaara,Casper Lassenius. (2016). Challenges and success factors for large-scale agile transformation.
[18] Kim Dikert,Maria Paasivaara,Casper Lassenius. (n.d.). Challenges and success factors for large-scale agile transformation.
[19] Kumaraswamy, D. W. (n.d.). A comparative study of causes of time overruns in Hong Kong. International Journal of Project Management 1997.
[21] Ming Sun a, *, Xianhai Meng b. (2009). Taxonomy for change causes and effects in construction projects. International Journal of Project Management.
[22] Ming Sun a, *. X. (n.d.). Taxonomy for change causes and effects in construction projects. International Journal of Project Management 2009.
[23] Mohamed , Hossam, Abdel Razek. (2013). EVALUATION OF CHANGE MANAGEMENT EFFICIENCY OF CONSTRUCTION CONTRACTORS. HBRC Journal .
[24] Mohamed M Marzouk, T. I.-R. (n.d.). ANALYSING DELAY CAUSES IN EGYPTIAN CONSTRUCTION. Journal of Advanced Research (2014).
[25] Murali Sambasivan, Y. W. (2007). CAUSES AND EFFECTS OF DELAYS IN MALAYSIAN CONSTRUCTION INDUSTRY. International Journal of PM .
[26] qian chen, g. R. (2014). Interface management – Facilitator of Lean & Agile Project Management . Science Direct.
[27] R.L. Owen, L. Koskela. (2004). AGILE CONSTRUCTION PROJECT MANAGEMENT. The Research Institute of the Built & Human Environment,.
[28] Robert owen,Lauri koskela,Guilherme Henrich,RicardoCodinhoto. (2016, october).
[29] Sadi A. Assaf *, S. A.-H. (n.d.). Causes of delay in large construction projects. International Journal of Project Management 24 (2006).
[30] Sadi A. Assaf *, Sadiq Al-Hejji. (2006). Causes of delay in large construction projects. International Journal of Project Management 24.
[31] Samin SHOKRI,Seungjun,Thomas,Carl.T.Hass,Sanghyun Lee. (n.d.). Current state of interface management in mega construction projects.
[32] Weiming Shen,John Russell Thomas. (n.d.). Change management in construction projects. ResearchGate 2008.

## BIOGRAPHY

Ar. Blessie John is an Architect who has completed her Masters in Architecture with Specialisation on Building management. She is currently working as Assistant professor in C.A.R.E School of Architecture.

 