DTBB: DESIGNERS TEST BASED BUILT:
A NEW APPROACH TO QUALITY ASSURANCE

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ABSTRACT

Two very common issues in construction industries in India are lack of skilled workmen (especially for high-finish fit-out projects) and delays in Project Delivery& extra rework cost associated with that. In Construction Sector, unlike other sectors (e.g., Information Technology and Manufacturing), unfortunately not many efforts have been put so far to resolve these perennial problems, either by government, professional bodies or the big corporates. Because of this, Clients are generally not happy with the end products of Buildings (apartments/ villas, hotels) they get. Most Construction companies do practice or hire Quality Management Services. But they also fail to address the above-mentioned two problems amicably. Although they have defined checklists, standard operating procedures for construction processes etc. as a part of ISO certification, but those documents are found more for just 'references' rather than actual usage. There is too much of documentation, serving no useful purpose. This paper illustrates an innovative quality assurance approach named, Designer's Test Based Built (inspired from Test-Driven-Development of Agile Project Management of Software Development), which was found extremely useful in two premium Interior Fit-Out projects. This concept can be very useful in similar projects, to take care part of poor workmen skill problem.

KEY WORDS

Snag Prevention, Snags leakage, Quality Assurance, Poor workmen Skills, One-Page Checklists

INTRODUCTION

A general phenomenon in India often being reported by press every day is that most construction projects are getting delayed, getting over-budget, delivering poor quality leading to unhappy customers. Some of the key causes identified for this are:

- High amount of manual work with low Skills of the workmen

- Too many documents 'overhead' (checklists, standard operating procedures) etc., which most people don't even read.

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- Low focus on Quality Assurance & troubleshooting, while more focus on Quality Control

- Too much division of labour (specialities trades, especially in Interior Fit-Out projects)

- Management & project Team always busy (in routine work and crisis) and no time to improve project performance

- Claims & disputes due to several deviations/ changes / rework during the execution process

This paper illustrates an innovative quality assurance approach named, Designer's Test Based Built (inspired from Test-Driven-Development of Agile Project Management of Software Development), which was found extremely useful in two premium Interior Fit-Out projects. This concept can be very useful in similar projects, to take care part of poor workmen skill problem. One such application of the concept is explained below through a case study.

PROJECT SCENARIO

A Design-Build Workplace Fit-outs for American Commercial Building, measuring about 70000.Sq Ft was to be completed from the shell building. This involved main trades of MEP, Civil Finish and Interior Designer. Due to legal requirements the client had to shift exactly in 90 days time, and hence it wanted 90 days handover, and maximum 6 weeks desnagging (on week-ends) to minimize their team's inconvenience. This looked mammoth task, as for such projects project closure time in past was 13-15 weeks, on account of 1000+ snags closure, which are identified during hand-over. This was one reason, why Design-Build General Contractor wanted to utilize Lean principles to prevent and contain the snags and have a fast closure.

KEY PROBLEMS & CHALLENGES OBSERED

- **Recurrence of Snags:** Historical Snags analysis of past similar projects showed repeated snags in various rooms &workplaces, but no clear plan to avoid recurrence

- **Ineffective Sequencing of Work:** No focus on RIGHT sequencing of activities among trades, hence lot of snags & rework

- **Skill Gaps:** Shortage of skilled manpower and supervisors

- **Mediocre Supervision:** Supervisors' low understanding to interpret drawings, from Contractors' side

LEAN SOLUTIONS IMPLEMENTED

Several solutions were tried to prevent the snags and also contain them from leakage to client and to give him a good feel, in terms of quality of product. Some key of those are mentioned below. However, the main focus of this paper is to CTBB.

Design-Execution Team workshop: For understanding the critical areas and the complex portions about the key requirements of the project, so that Design is converted into reality. Some possible buildability problems were also discussed in this and resolved.
Ask from Management: For taking faster help of management in issues which can't be easily resolved by Site Team. One Electrical Contractor's work was de-scoped for example.
Daily Partnership meeting (Conference-call) with Client & his PM: For resolving issues, especially after the project delays and few possible snags identified mid-way of project. This was to resolve constraints for make-ready tasks for next day work in project, eliminating miscommunications and bringing better co-operation, to take care of inter-dependency
Just-in-time & just enough Lean Training & workshops for all Client & Sub-Contractors: For bringing common understanding all the stakeholders, for a common goal
**DTBB**: For communication with Sub-contractors for preventing snags, both for aesthetics and functionalities
Empower Site Team for the Kaizen / Contingency Fund for timely correction/ improvement: Though it's not officially announced.

EXPLANATION FOR DESIGN-TEST-BASED-BUILT (DTBB)

As mentioned above, a new concept named DTBB, was introduced, based on success of this concept in previous projects. DTBB is a single page simplified construction comprehensive 'check-list' document, which captures client expectation with aesthetical and key functional requirements, for one-class of components, say all types of Windows. Here the basic concept is derived from Agile Project Management in Information Technology Product Development (IT).Where, while gathering the requirements and the needs of the customers, the test-cases are also collected, from the users/ clients so that the software developed is tested against those, and any re-work is avoided. In Construction, getting the Client very often is a challenge, therefore the Designers who interact and understand the Client best, for testing Aesthetic & functional needs are utilized to prepare a single-page document, from various drawings (say for all the different type of Doors used in the whole building). This is used to explain to Foremen/ Workmen, so that later Client's perception for workmanship/ specifications do not lead to rejections and hence rework cost and delays. A sample DTBB is shown in the figure later in this paper.

DTBB is a single page simplified construction document, which captures client expectation with aesthetical and key functional requirements. Following four phases are followed to use this concept optimally.
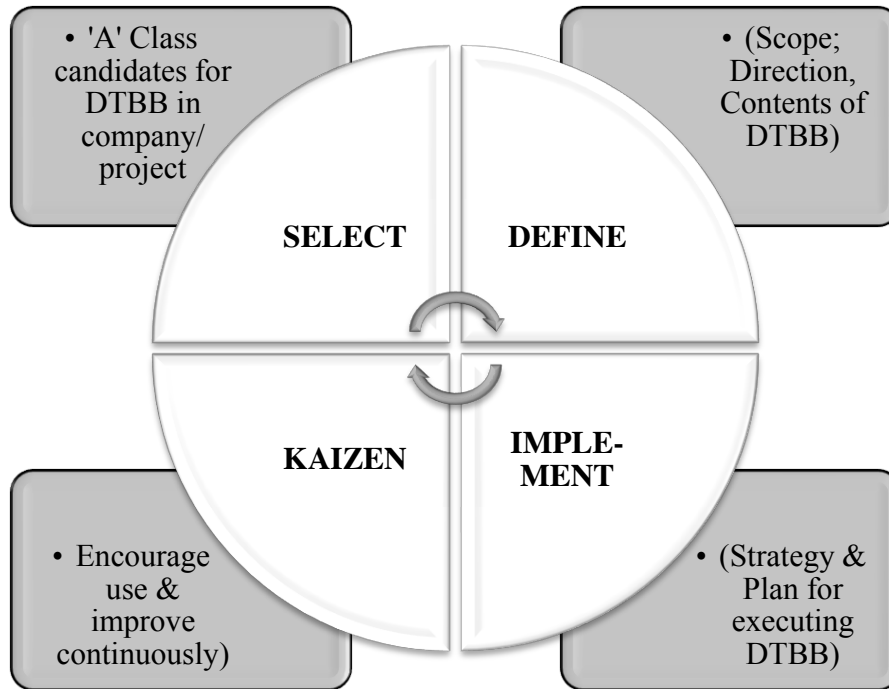
Phase 1: SELECT 'A' Class candidates for DTBB in project, using two selection criterion

- **Historic Data** (Frequency of snag occurrence/ quality issue, example - Flooring, Switch socket, Door, Painting, Ceiling Closure

- **Criticality** (Client's importance/ perception about snags-example Board Room, Reception, Toilet etc.)

Phase 2: DEFINE (Scope, Direction, Content of DTBB)

- **Aesthetic/Functional** (snags which disturb 3 major human senses like **Seeing**-visual damage, **feeling**-roughness/ smoothness, hard/soft, figure, solidity; **hearing**-Noise)

- **Technical details/ Process Based-** snags created due to improper Steps, activities sequence, lack of tips for better workmanship or, critical internal DTBB for each stage of handoffs between two trades

- **Direction for implementation** (criteria formini-mock up, need to conduct multi-trades problem-solving workshop, create matrix, use drawing to show possible locations of snags)

Phase 3: IMPLEMENT (Strategy & Plan for executing DTBB)

- Identify the frequency/ criticality

  - Collect & Consolidate snags historical/ current Data

  - Agree the sequence, stage, dependency, tips

  - Define criticality

- Educate people including contractors & possibly client

- Confirm the Process (using mini-mock up, if necessary), involve client

- Implement/ Record DTBB using visual method like drawing, establish check to ensure implementation in right spirit

Phase 4: KAIZEN (Encourage and Improve continuously)

- Define and implement penalty, reward and recognition for compliance

- Define Lessons learned and update selection criteria, definition or implementation strategy

DTBB is a great practice, which can save lot of rework cost, delays, and also frustrations of Trade contractors and workmen.

BENEFITS DELIVERED USING DTBB AND OTHER SNAGS PREVENTION MEASURES

- Improved Quality of Product by preventing more than 60% of possible 1000 snags ; Reduced Rework by 35%

- Closed the project in 6 weeks, after handing over, as only 40% of possible snags leaked to Client (identified during desnagging)

- Lesser conflicts of Contractors / their savings. Some of the trained one retained for the long-term partnership with our client

- A written appreciation letter from the American Client

CONCLUSION

This paper demonstrates that Construction Industry can learn lots of good practices from other Industries. Like Lean is derived from manufacturing, many good practices of IT industry also can be adapted suitably. DBTT is one such good practice. It is hoped similar interventions will help others also to get the more benefits of Lean.

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