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Change Management & the Concept of Common Data Environment in Indian Construction Industry

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ABSTRACT

Construction industry is that industry in which many spontaneous decisions are taken due to various reasons inadequate information, personal assumptions and the experience of the construction professionals. Project changes and/or adjustments are inevitable as they are a fact-of-life at all stages of a project's life cycle. Managing changes effectively is crucial to the success of a construction project. There's a need of the hour that Construction industry needs an integrated solutions to manage these changes and a systematic change management system to discipline and coordinate the process, for example, documentation, drawing, process, flow, information, cost, schedule and personnel. This research presents an integrated solution by use of OpenKM software. The methodology used will be using OpenKM in the existing construction process and making a more feasible and easier to use interface to counteract the Obstacle due to change management on daily basis and make Time/Cost optimization respectively.

Keywords- *Construction Industry, project changes, change management, OpenKM*

1. INTRODUCTION

Project changes have numerous definitions. Park (2002) mentioned project change as work status, processes, or methods that differ from the first plan. Love et al. (2002) stated that changes during a project's development may have significant and sometimes unpredictable effects on its organization and management. Arain et al. (2004) defined a change as any modification to the contractual agreement provided by the contractors or owners. Isaac and Navon (2008) asserted that changes largely owe to factors like project delays, overhead costs and differences in quality from the prescribed requirements. Sun and Meng (2009) defined change as an alteration to style , building work, project program or other project areas caused by modifications to preexisting conditions, assumptions or requirements in construction projects.

In construction projects changes are very common and likely to occur from various sources, by various causes, at any stage of a project, and may have considerable negative impacts on items such as costs and schedule delays. An Important change may cause delays in schedule, re-estimation, and extra demands of resources and overtime. Changes, if not resolved through a formalized change management process, can become the main source of contract disputes, which may be a severe risk contributing to project failure.

1.1 Need of study

More than 70% of Indian Construction Industry still works by Old Methods and there's a need of the hour to upgrade the management system and specifically Change Management & Data storage system. The data such as drawings, bids, contracts, RFIs etc. which are generated during pre and during construction process are still handled manually and preferred in hard copy only. Due to this is a huge amount of chance of misplacement of drawings, sheets etc . Also the communication between the client and contractor is always somewhat incomplete. An Integrated Solution will help solve these problems and make the construction process faster and less cumbersome.

2. LTERATURE REVIEW

Ibbs et al. (2003), Introduced a comprehensive project change management system that's founded on five principles: (1) promote a balanced change culture; (2) recognize change; (3) evaluate change; (4) implement change; and (5) continuously improve from lessons learned.

The important objective of research was to introduce a systematic change management system for projects. The change management system described may be a two-level process model, with principles because the foundation and management processes to implement those principles. By having a scientific thanks to affect changes, the efficiency of project work and therefore the likelihood of project success should increase.

Park and Peña-Mora (2003),studied the behavioral patterns in managerial change and rework. the subsequent examples demonstrate their different behavior patterns. Case I and Case II in Figure illustrate that, given the issues (a concrete hump and excess concrete pouring respectively), rework would be done by removing the matter , by adding some concrete changes can be obtained. just in case III in Figure , where floor tiling has been finished with but the specified thickness, both managerial change and rework have an equivalent behavior pattern (replacing). However, rework would be done on the matter area by removing what has been constructed and adding a replacement layer also changes can be made on the adjacent floor area that has been finished.

In addition, just in case IV in Figure, where a number of the piles haven't been correctly positioned, rework would be re-driving (adding) piles, while change would be keeping the present pile position. during this article, The authors addressed this challenging issue by introducing the concept of dynamic change management to construction planning and control. Dynamic change management focuses on capturing feedback processes caused by construction changes and minimizing their impact. to understand this idea , authors identified different characteristics and behavior patterns of construction change, and analyzed change impact on the development performance consistent with change characteristics, and to discovery status and time. Although problems encountered during construction management are dynamic, they need been treated during a static manner (Lyneis et al. 2001). As a result, chronic schedule delays and price overruns continue construction projects then, authors incorporated all research findings into a cohesive dynamic project model.

Although the research results discussed got to be further refined and developed, they demonstrate that the dynamic change management approach and therefore the developed project model would help construction managers make a choice on change or rework during construction during a way that non-value-adding change iteration are often minimized.

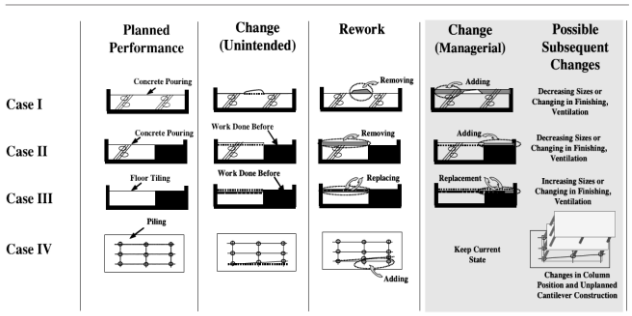

Fig.1. Behaviors of managerial change and rework

Chan and Leung (2004) presented a conceptual model of a metadata-based data system for data exchange among Web-based documents for construction project management. The system retrieves useful data from the first documents, reorganizes the knowledge consistent with specific tasks or users, and displays the knowledge in an integrated website. Study identifies the great functional requirements from existing Web-based collaboration systems. This research is meaningful for Web-based project management therein it explores a replacement direction for information integration, i.e., intelligent search. The study bridges the gap between present and future development of the web by exploring the likelihood of intelligent search together direction for the event of a Web-based project management tool.

Hao et al. (2008),Change may be a common denominator altogether construction projects, though the dimensions , scope, and complexity of projects may vary significantly from case to case. Change management may be a critical problem faced by the development industry. the trouble of managing change orders has imposed an enormous burden on project management. Changes are identified because the major explanation for project delay, cost overruns, defects, or maybe project failure. More seriously, playing games on changes cause serious ethical problems and disputes within the industry. Changes in construction projects are quite common and certain to occur from different sources, by various causes, at any stage of a project, and should have considerable negative impacts. This paper addresses the kinds the changes, also as their stakeholders, causes, impacts and correction actions within the context of typical stages/phases during a construction project. Effectively managing change orders in construction processes isn't trivial because change orders are a neighborhood of contract and that they got to be strictly traced in terms of contracts, documents, approval process, payment claim, etc.

Chen et al. (2015) presented a completely unique construction project management system called the online project-based change management (WPCM) system. The WPCM system responds to changes in information efficiently so as to facilitate change management among project participants (e.g. general contractor, suppliers, and subcontractors) during a construction project environment. Capable of accelerating information sharing in construction change management, web-based technology also can provide cost savings via the web. A case study involving a billboard building project in Taiwan demonstrates the effectiveness of both the proposed WPCM system and knowledge sharing in change control during the development phase.

The Authors sheds light on the roles of project participants in change management, alongside the info required to develop an adequate questionnaire. The questionnaire includes the essential profile of the participating companies and respondents.

The next section discusses the wants for construction change management in practice with reference to change type, change roles, and alter management phases during implementation of change management. Case study also includes questions that not only reflect the need of construction change management in practice, but also explore how the proposed WPCM system impacts functionality of the system, use of the system and capability of the system in terms of the share of improvements made. With a complete of 20 questions, the questionnaire is shipped to the case participants. Supported the obtained data, analyses are performed, with those results discussed in Test results.

3. OPEN KM

OpenKM an Enterprise Content Management Software, often mentioned as Document Management Systems (DMS). OpenKM could also be document management software that integrates all essential document management, collaboration and sophisticated search functionality into one easy to use solution. The system has administration tools to define the roles of varied users,& access control, Prioritize document security and detailed logs of activity and automation setup.

OpenKM document management software builds a highly valuable repository of corporate information assets to facilitate knowledge creation and improve business deciding, boosting workgroups and enterprise productivity through shared practices, greater, better customer relations, faster sales cycles, improved product time-to-market, and better-informed deciding .

With OpenKM enterprise document management you can:

- Control your enterprise content.
- Collect information from any digital source.
- Collaborate with colleagues on documents and projects.
- Empower organizations to maximize accumulated knowledge by locating documents, experts, and knowledge sources.
- Enterprise content management features.
- Manage digital content.
- Manage documents.

4. METHODOLOGY

The methodology is divided into four parts. See below flowchart for reference.

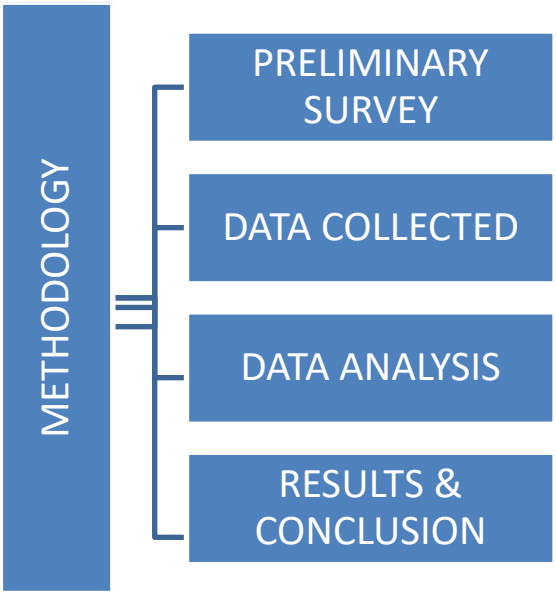

Fig. 2 Flow chart of methodology

In the first part, Preliminary Survey is to be done in which selection of site is the main Objective. The second part consists of the collection of all the necessary data for the project. In the third part, an analysis will be made for the data collected and the Common data environment will be initiated using OPENKM. The fourth part will be running the OPENKM interpreting the result and reporting the same with the conclusion.

After the Preliminary Survey is done. DATA Collection is the next step. it includes selection of Construction Site , all the necessary construction drawing , estimation of project, Planning and scheduling details of the Project & all the other data that are relevant and connected to Cost & Time.

For Any Data collection the Correct Selection of Site is very crucial for the Research Work. Since the Work require various data adhering to the site. We should see to it that our Construction site have readily available all the necessary information and access is also granted.

The following points should be kept in mind for selection of Site.

1. Access to the Site should be permitted.
2. The Site should be using all the Latest advance technique used in Construction Industry.
3. Access to the Construction Drawings should not be a Problem.
4. The Site should have a designated authority for all the Communication related to research work.
5. Permission should be given to use all the Data Collected from the Site for the Research work solely.

With the Above points keeping in mind the site which was selected is Located at Mankhurd, Navi Mumbai. The Name of the Project is “Construction of Building including services, Generator Platform, Fire Alarm, Fire Fighting & Augmentation of C.no 98 WED for Provisioning Automated Storage and Retrieval System (ASRS) at Mankhurd, Mumbai”.

4.1 Request for information

For most construction projects, the agreement, drawings, and specifications might not address every small aspect of the work. Therefore, when clarification is required, an RFI document is issued which details the extra information required. For example, this might be the most contractor asking the architect for clarification of a specification item, or a sub-contractor asking the most contractor for information regarding their specific a part of the works. Generally, RFIs are issued more often at the start of a project, like the planning or bidding stage. The inconsistencies that are addressed before work starting on site will help reduce delays during the development phase. RFIs also is a record of communication between the involved parties regarding the knowledge requested and provided. this is often invaluable just in case of a dispute. it's important that each one RFIs are accessible and archived in project folders or within your construction management software. Many RFIs when answered can cause additional management processes such a Variation/Change Orders or Extension of your time (EOT) claims. An RFI are often issued for literally any quite situation where clarification or additional information is required. It are often used during all phases of a project (design, tender/bidding, construction). Mostly, RFIs are used to clarify aspects of the design and/or material selection within documents such as:

- Construction plans
- Specifications
- Contract clauses
- Building standards
- To solve any Changes that may occur during Construction

4.1.1 Proposed Format

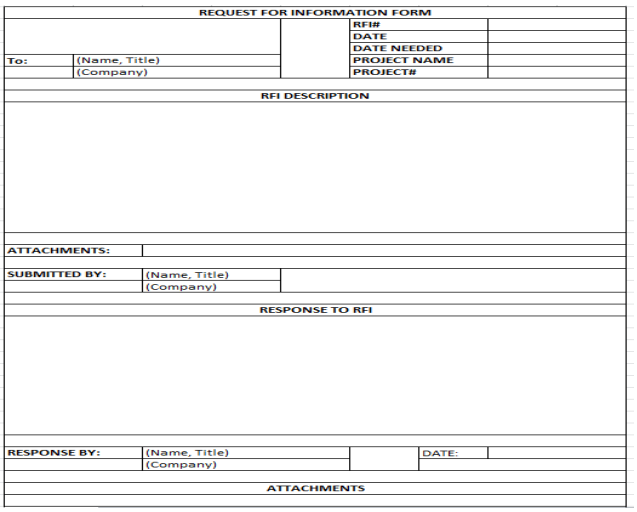

Fig.8

4.1.2 Flow chart of how RFI works

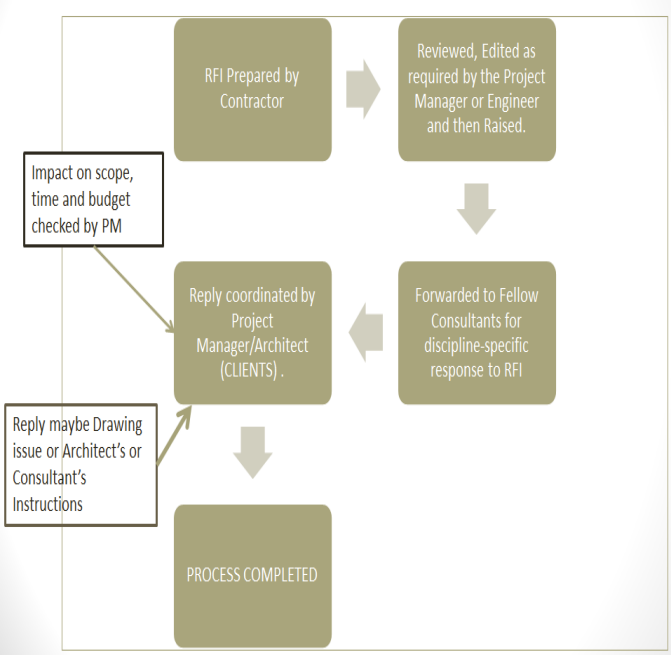

Fig.9

4.2 Creating a common data environment on open KM

In our Project we are going to use the OPENKM as Management Tool and use it to create a Common Data Environment Involving all the acting Parties in a Construction Project.

First we need to create a local server and then create a login id and password and distribute to the parties involved . by use of that everyone can log in and use OPENKM and get access to all the information regarding the project with just a single click .The below screen capture is of the LOGIN page of the said OPENKM software.

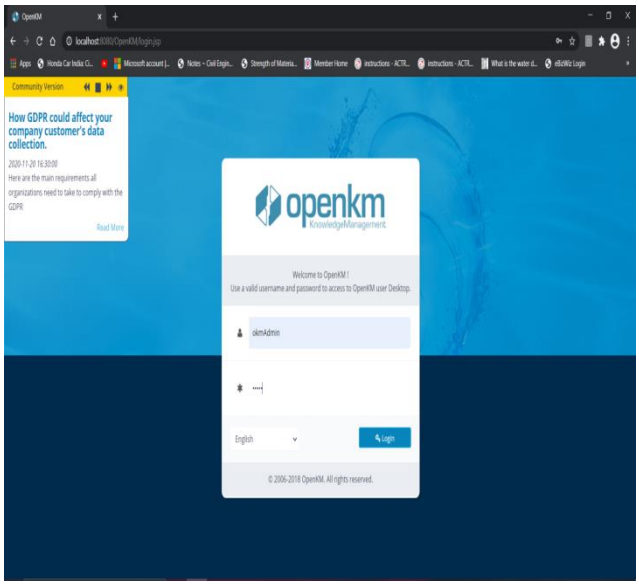

Fig. 3 OPENKM login page

By common data environment we are saying that all the parties involved in the construction project are to be given equal access to all the data generated or that are to be generated during the construction phases on the OPENKM.

See below given screen capture for clear understanding of what the actual Common Data Environment Means.

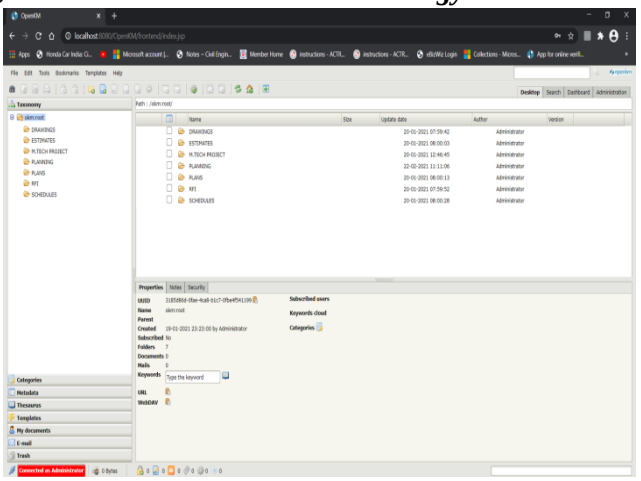

Fig. 4 Common Data Environment Created on OPENKM

One of the most beneficial trait of OPENKM is the onsite we might have various drawings with same name or numbers. It shows a preview of the file that we want so time saved eventually by not accessing wrong file.

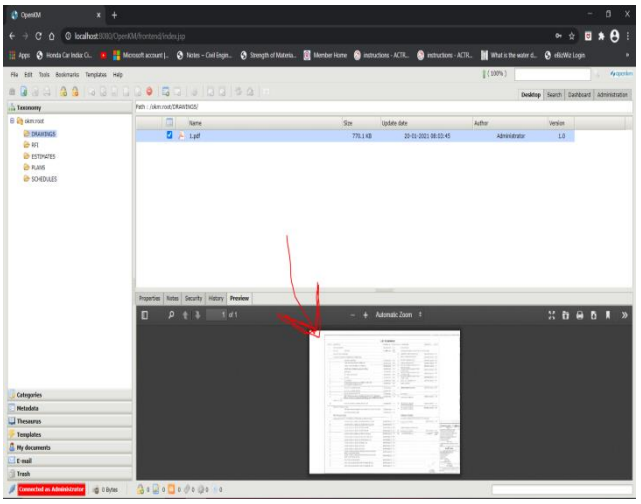

Fig. 5 Some features of OPENKM

5. RESULTS AND DISCUSSION

Here we will see all the Results that we obtained by using the OPENKM onsite.

Which we collected is now inserted in OPENKM and the work that we do through it will be discussed.

- All the Data of the Site are Uploaded in the OPENKM in suitable format for access to everyone.

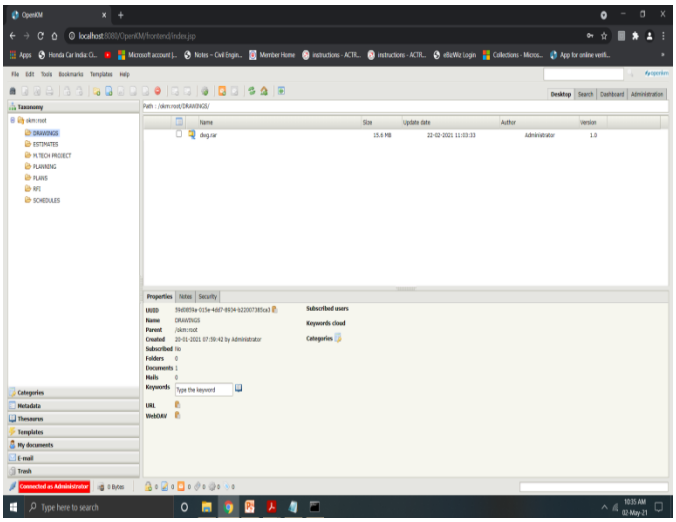

Fig. 6.1 Data in OPENKM

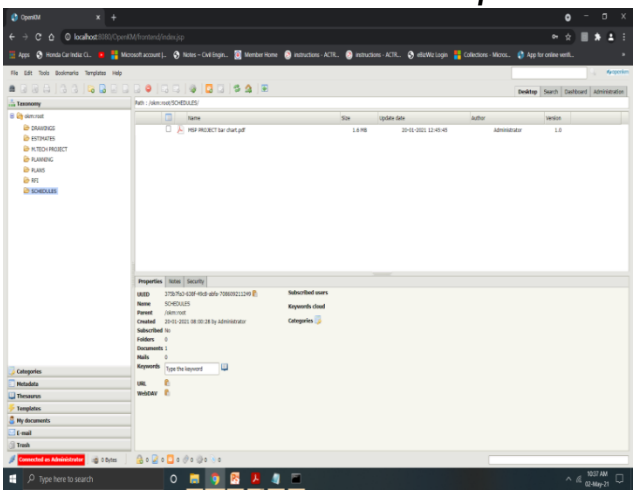

Fig 6.2 DATA in OPENKM

Users Created in OPENKM for the smooth communication and working of Construction Site.

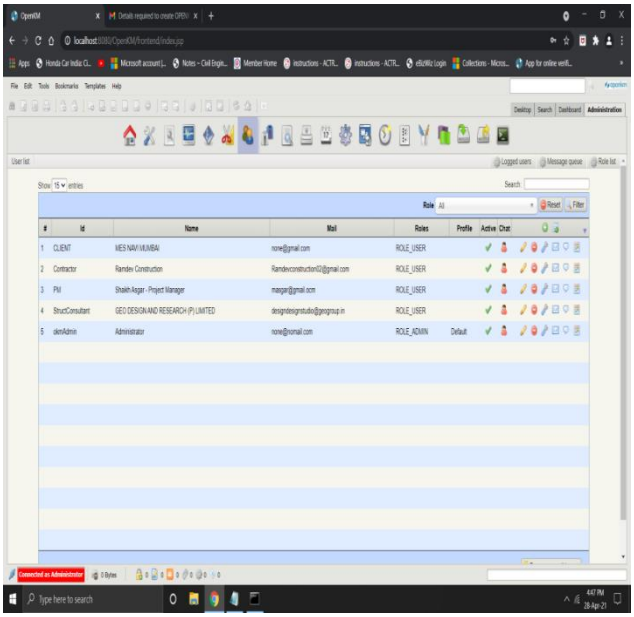

Fig. 7

RFI being generated by contractor and submitted to the Clients or the Competent Authority and subsequently the process of change management now begins

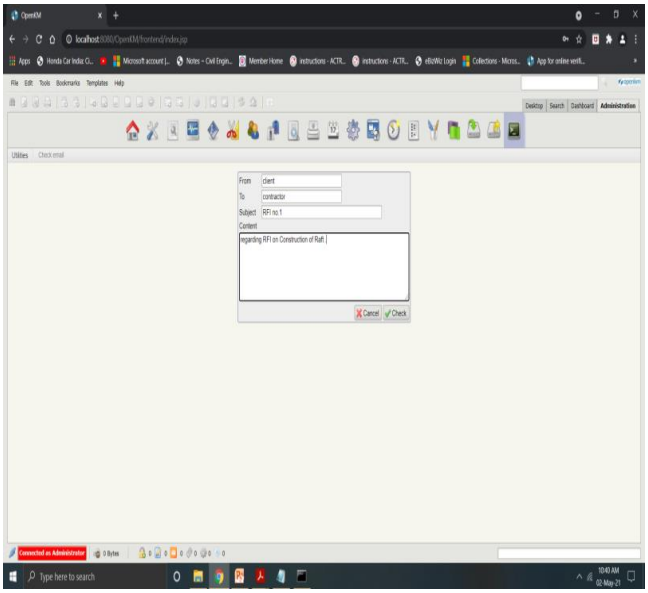

Fig.9

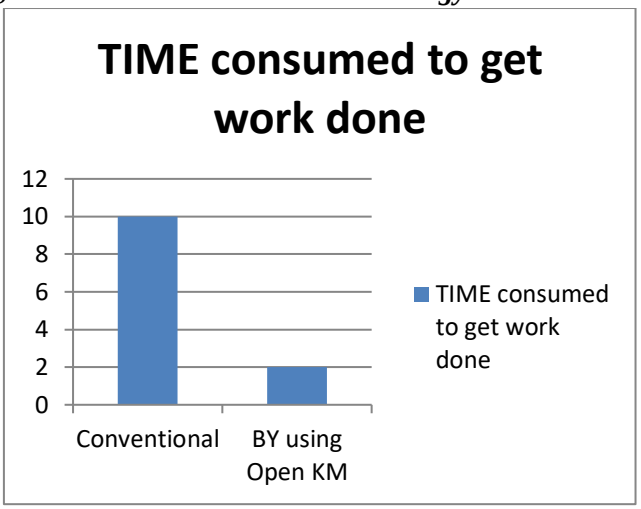

Fig.10 a comparison of time taken to complete same task by the conventional method & by OPENKM

6. CONCLUSION

The use of OPENKM accelerates the working process and helps in the decision making . With the help of graph , we can derive that many man hours have been saved . And eventually the OPENKM helps optimize the TIME/COST parameter of the construction project.

The cumbersome of handling many files be it drawings, planning or scheduling files or any other project related file offline has been omitted. Thus making it safe and easy for the use.

The Communication gap which would arise during manual handling of decision making or changes handling of project can be completely avoided using OPENKM.

One restriction that aroused during onsite use of OPENKM is that the technology is latest and INDIAN contractors or Clients hesitated to use it.

With time the technology can be of great use . And at present its still new concept in the field of Construction Industry.

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