

What If Construction Companies Initiated to Develop the Project Friendly Mobile App for Site and Compelled the staff to use it

Mr. Atul Suresh Rao Dhanorkar * Prof. S. Sabihuddin**

**(P.G. Student (M.E. in Construction Engineering and Management)*

Dept. of Civil Engg., PRMCEAM Badnera, Amravati 444701 . (MH), India.

***HOD & Ass. Professor ,Dept. Of Civil Engg., PRMCEAM Badnera, Amravati 444701, (MH), India.*

Submitted: 01-06-2021

Revised: 14-06-2021

Accepted: 16-06-2021

ABSTRACT:

The construction industry is a one of the base pillars of the overall development of the country. The sector focuses on building fundamental facilities like houses and buildings, roads and bridges, dams and urban infrastructure etc. The construction industry creates the variety of job roles in different sectors and helps as a booster the for economic development of the country. Despite of the key role in the society, the construction industry has been in the regular requirement for application of new skills and knowledge to perform duties in the planning, designing, and overseeing construction and maintenance of building structures, and facilities smartly. Roads, railroads, airports, bridges, harbors, channels, dams, irrigation projects, pipelines, power plants, water and sewage systems, and waste disposal units are the specific areas creating millions of job employment every year. As this industry is so vast in appearance and reality, it performs the herculean tasks every day, still, especially, in India, it is noticed that very few companies could touch the date of accomplishment. Otherwise here mostly every company has to extend the date approx six months or more.

One of the reasons behind delay is the miscommunication, delay in communication, delay in essential action, delay in suggestion, instruction, supply of materials, working site issues.

This paper suggests initiatives to improve the skills and knowledge communication system preferred by the Indian construction companies for the Site Engineers, more than ever Fresh Civil engineering graduates as they lacks for experience of exact work, for their each project, with designing the Android base Mobile App and compelled to use it not only by them but by every working staff. Herewith discussed how this mobile app should be designed for each type of project and what if this practice is adopted by every construction company?

In recent years the Android Technology with web services has brought many drastic changes in the mobile application development field. Keeping this in mind, an Android based mobile application to access the remote database has to developed. This application provides a generalized solution to monitor the various works at ongoing project that are carried out by a construction company as per there policy. Also it creates the great platform for healthy inter communication within the company periphery.

Keywords - Construction Project, Companies, Android App, Mobile, Management, Civil Engineering, Online storage, Site Engineer, Duty and responsibilities.

I. INTRODUCTION

Stokes et al. (2013) defined employability skills as “the specific skills, attributes, behaviors, and characteristics considered necessary for individuals to attain and maintain employment as well as manage their careers, the concept of employability encompasses the extent to which people possess those skills, attributes, behaviors and characteristics to find and stay in the kind of work they want.” There are multiple issues in economy, affecting higher educated students to choice their career in Construction Industry due to the fear of non-employability in other sectors. Therefore, they choose Civil Engineering discipline due to grand job opportunities. Identified employability skills and its practical application on the job motivate the new comers and helps to improve their confidence level for employability in multi-cultural work environment. Actually the Civil engineering discipline is designed to build the ability to apply the knowledge acquired in subject areas like, mathematics, basic sciences, engineering sciences, and environmental sciences practically. Further, Indian Civil Engineering Institutes have focused on

creating a strong base foundation in theoretical , practical as well as experimental work to analyze, synthesize and design engineering products, projects, processes and systems to be competent for employability of students (AICTE, 2012).

Construction activities are project based and time constrained. It takes the time, to declare a project and if so, the delay in project completion leads to the huge loss to the project and company too. Therefore, the newly appointed fresh civil engineers are mostly held responsible to assist managers inefficiently in the functional area. Completion of training isn't sufficient to adopt the work initially. They need some system in common to facilitate the hesitant communication. Hence civil engineering graduates roles should be specified according to skills, knowledge and abilities based on performance judged right by the company authorities itself. Their roles and responsibilities including performing engineering analysis, design, plan, review and inspection must be kept under review and response of the seniors. Their imparted theoretical knowledge and practical skills, engineering concepts, principles, practices and methods utilization, efficiently in handling engineering activities, in complex work environment must be watched and appreciated if find so. It will create a healthy environment in communication. As discussed above, one of the reasons behind delay is the miscommunication, delay in communication, delay in essential action, delay in suggestion, instruction, supply of materials, working site issues. if we take only 'Communication Problem' to solve, it can solve the delay issue to some extent. The Fresh civil engineer is expected to perform all tasks at one go. Actually they are not well versed to handle the situations at construction sites so efficiently. Therefore, it's true that the awareness about understanding the roles, responsibility, skills, knowledge, and company policies becomes prime responsibility of the newly joined engineers but the companies also need to initiate their own communication portal or mobile app where every staff at different location can communicate to the seniors and experts and take timely guidance to prevent the impediment in the work.

Civil site engineers are responsible to submit reports to their seniors regarding the review of completed work, progress reports etc. The new comer struggles with the ethical practices at the site. Sometimes he can hesitate to inquire or discuss or confess. If there is such mobile application made available by the company itself, where he can gather old documents, the videos of various old site works performed by company, their techniques, their

standard document making procedure etc, he can see through them, learn, and send his query to the seniors directly without hesitation. The new comers too need the appropriateness and compliance with the standard engineering practices as companies spend a lot of money on training of their fresh civil engineering graduates.

Further, study provides guideline for companies to become compatible and develop their competent mobile application communication system, user friendly, to prevent the impediments in communication. If construction companies itself initiated to develop it and compelled to use the project friendly mobile app for site engineers, working staff, the results can be just great.

Thus, the paper entitled **“What If Construction Companies Itself Initiated to Develop and Compelled to Use the Project Friendly Mobile App for Site Engineer”** suggests the steps, windows to be included, and procedure to build the Individual Adroid Application for every project. By developing such application the Construction Company can easily record their progress of various works and their day-to-day expenditures that are made at various sites and monitor their staff with their policy, also it will provide the secure platform to scan and the store the essential project related documents.

II. DISCUSSION

2.1 Civil engineering roles of Site engineer and fresh graduates.

Few points have to be discussed before understanding the importance of this application defining to engineer's roles and responsibilities.

- Organizing the work and checking the progress in accordance with the drawings and specification.
- Liaising with the project planning regarding the construction program.
- Checking materials and work in progress for compliance with the specified requirements.
- Observance of safety requirements. Resolving technical issues with employer's representatives, suppliers, sub-contractors and statutory authorities.
- Quality control in accordance with IS/procedures method statements, quality plans and inspection and test plans, all prepared by the project management team and by subcontractors.
- Liaising with clients, subcontractors and other professional staff, especially quantity surveyors and the overall project manager.

- Supervising and counseling junior or trainee engineers.
- Measurement and valuation (in collaboration with the project quantity surveyor where appropriate). Providing data in respect of variation orders and site instructions.
- Preparing record drawings, technical reports, site diary. Job review of subordinate staff.

- Mobile App with advanced computing capabilities may includes the functionalities of personal digital assists, portable media players, digital cameras, GPS navigation and high definition touch screens, web browsers and high speed data access.

The application developed with combined knowledge, skill, tools and techniques to project activities to meet project requirements can strongly assist the development of the construction.

2.2 Mobile App feature and advantage

The Table below showing the needed features for the Mobile App with description:

Feature	Description
User Friendly Interface	An easy and intuitive user interface.
Connectivity	GSM/EDGE, IDEN, CDMA, EV-DO, UMTS, Bluetooth, Wi-Fi, LTE, NFC and WiMAX.
Storage	A lightweight relational database used for data storage purposes.
Media support	H.263, H.264, MPEG-4 SP, AMR, AMR-WB, AAC, HE-AAC, AAC 5.1, MP3, MIDI, Ogg Vorbis, WAV, JPEG, PNG, GIF, and BMP

2.3 Emerging need to design the Mobile App for Site engineers and working staff

To manage the construction project smoothly and effectively, Construction Company has the hierarchy (shown in below figure no. 1). The construction jobs traditional hierarchy incorporates various job profiles like project manager, civil engineer, site engineer, construction manager, architects engineer, working staff technical, non-technical , etc.

These senior executives have dense experience; they already have handled various projects. They already have faced lots of difficulties, problems that occur during the project execution. Taking their experience knowledge, which can be

proved useful to guide the site engineer and making it available through made videos or vice- versa, can open the gates of easy guidance. we should add all possible functions into mobile the application. By keeping all parameter in consideration there should be made available the facilities, like calculator, unit converter, MS Office, the scanned storage of old and current documents from every various sections of the project. There must be a window to send the query to the competent authorities. With this great site management tool, the site engineer can enhance his ability and confidence. He can get all the information needed, and solutions to his doubts in hand and he can perform his duty efficiently leading towards the successful of project completion.

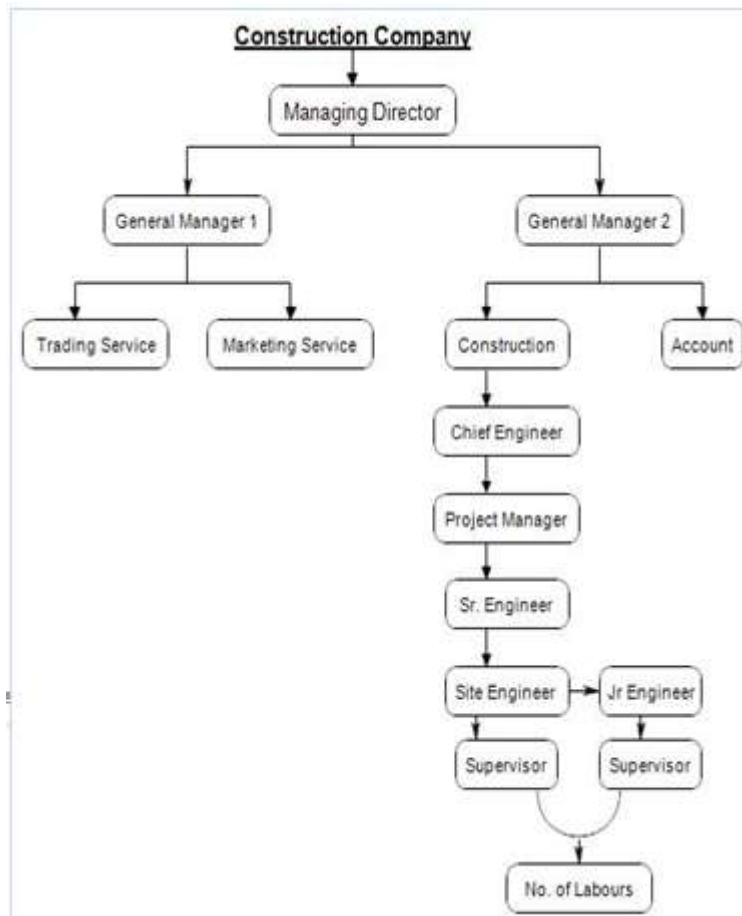


Fig 1:- Construction Company working hierarchy sample

III. METHODOLOGY TO DESIGN THE MOBILE APP:

A) Layout of Mobile App , Design and Function:

Site engineer and mostly fresh graduate engineer always face many problems during his site work execution. Due to lack of experience and less project handled. He always gets under confident and fearful while working. He mostly hesitates to ask his query and problem to seniors faced by him while working. May be after passing time and taking experience he will get his answers with respect to more time passed. But it takes more duration and many times he does mistakes, hides them or takes more time to finish the assigned task.

Site engineer is always held responsible to maintain the work progress, quality control, records, daily progress report, concrete work, reinforcement, layout, material quality, material reconciliation, material consumption and much more. Each task is time consuming and needs high attention to perform. If he does any mistake, company has to face great economical loss or impediment in the work.

- So first of all, the company needs to create research team, to analyse the problems faced by site engineers and other technical and non-technical staff.
- This research team will finalise the needed features to be used in the mobile application, which prove helpful to all to all the staff.
- In this application there must be server based cloud storage where the staff can submit his daily progress report with site progress photos within time and other superior will receive immediately for surveillance. There can be scanned document copies stored with various sections. If someone needs to produce or present the old document of the projects, its available there. This app must have the functions to access other project related document for example, tender documents, mix design copies, RAD, GAD, Govt guideline etc.

- This mobile app must have integrated Unit convertor related to engineering parameters.
- Engineering Calculator.
- Engineering formulas.
- Standard document format.
- IS code
- This app also must have company dashboard where employee can find company policy, leave application, company work guidelines and direction. Day to day instruction and notices. Announcements about upcoming holidays, site visit of executives etc.

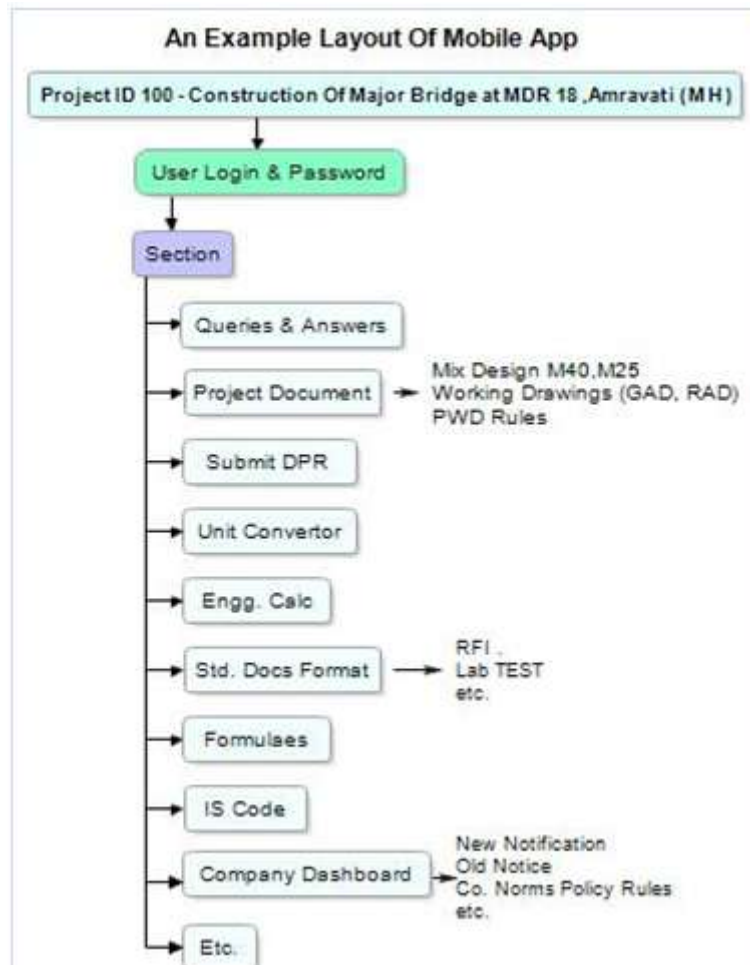


Fig 2:- Layout of design of Mobile App function.

B) Design the Mobile App according to the type of project and its requirements:

- Company has to design Mobile App requirements with respect to the project type.
- Project type - In civil engineering there are various type of project.
 For examples, 1) Construction of bridge. 2) Construction of Road. 3) Construction of Residential Building, commercial building. 4) Irrigation Project, Canal Dams. 5) Treatment plant. 6) Industrial projects. 7) Pipeline project 8) Power plant etc.
 So, If there are 8 different types of project run by company, then company has to develop 8 different

mobile applications. This will contain all data as per project type only for the smooth flow of communication in mobile application and it will become less space using and user friendly.

- This mobile app processing should be performed on a remote cloud server. So this application doesn't need to store all the data in mobile device. Mobile application will pull the data from server as per the user request and demand. He can download the needed data and after use he can delete if he doesn't need later. Server and all project related data will be maintain by its admin.

- Mobile app must have the function of queries and answer, where user no. 1 may put his query, doubt. This Query will get displayed to all other users also but it will stay confidential who asked this query. Senior will see this query and they will reply with solution and everybody can get this answer for his general professional knowledge. Due to this procedure no one will feel any hesitation to ask query or questions, where only admin can get known about seeker, so privacy is too maintained.
- Mobile app having unit convertor, IS code, Formulas, only related to project type, for easy filter.
- Mobile App should have search function for easiness.
- Login ID and password will keep app authenticate. Company management would decide how many employees should use this app according their work profile.
- This mobile app will be like one in all solution. Project progress, Daily report everybody can see with virtual time whenever required. All documents will get feasible at any location and any time easily as it is stored on server. Upload and download, search and get. No need to store in device.

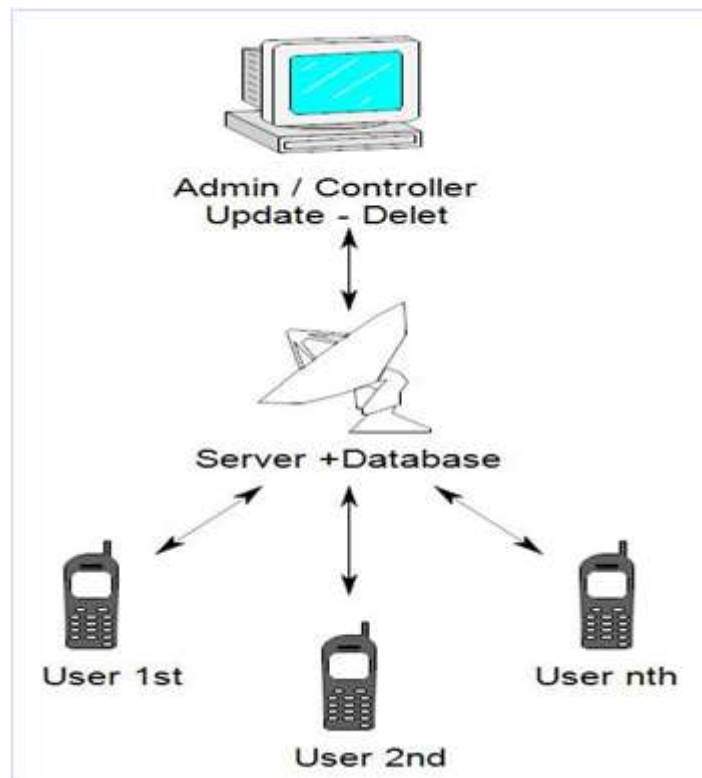


Fig 3: Flow of Mobile Application.



Fig 4: The image of Site progress photo uploaded by site engineer.

IV. CONCLUSION AND ANSWER OF WHAT IF.....

The construction industry deals with the vast amount of works that should be exchanged between the project participants. The development of mobile application will create the platform for the proper and smooth exchange of information. In this paper, the development of a mobile application system is presented, which supports collaboration between mobile users at construction sites and other project participants at the field offices as well as management at the home office. This mobile application will reduce the cost of more gadgets required to maintain the project. It will add advantage to reduce the excessive use of paper by every user as he will get all the needed data remotely and visible at mobile to read and send to anybody. This habit binds to user to not to keep photocopies of each document, but of those needed regularly. This app also reduces often happened risk of loss of document. Site engineer can use this mobile application to improve the collaboration, simplify work, access the important project information and enter vital data from the jobsite to update back to office systems and reports. As we know, Mobile application is application that goes where the user goes. So he doesn't need to carry all hardcopy data with him so this app will eliminate paper processes.

Using mobile applications, construction managers can improve the efficiency and transparency of the entire construction project, from authorization and accountability to scheduling and monitoring. Construction projects consist of multiple authorization controls in order to progress, for example, during a road maintenance project, supervisors are able to provide real-time approvals when one layer is cured, allowing the next layer to be placed. They are also able to flag any complications that arise during the project. This mobile application will replace manual, paper-based data entries, which can be cumbersome and time-consuming. Paperwork takes days to process and can get lost in the shuffle. For even more measurable results, mobile provides transparency of activities so deadlines can be managed better. Integrating mobile apps into every process improves the accuracy of project sequences, enhances workforce accountability and provides hard metrics upon completion of each service, which helps to improve the relationship between all parties involved in the construction project.

A common complaint between project managers, owners, and supervisors is that there isn't a lot of communication or understanding

between the three. Owners might not know what the project managers are doing while project managers might not know what happened in the field. Communication between the three can make all three feel involved and better understand where the project is and what resources are needed. This mobile app can improve communication between the branches of project management. Improving communication not only increases visibility among project stakeholders, but it also makes stakeholders feel more involved. By feeling involved and like their voice is heard, and knowing where things went wrong makes people more likely to want to work together. Which saves people time on decisions, and fosters good relationships making the stakeholders more likely to work together and the most important, the project becomes able to touch the timeline.

REFERENCES

- [1]. Venkatraman, S., and Yoong, P. (2009). "Role of Mobile Technology in the Construction Industry – A Case Study." *International Journal of Business Information Systems*. Vol No. 4(2), Pg: 195–209.
- [2]. Weippert, A., Kajewski, S., and Tilley, P. (2011). "Online Remote Construction Management (ORCM)." *Proceedings of the International Council for Research and Innovation in Building and Construction* CIB w78 Conference, 12-14 June, Arhus, Denmark. Vol No. 25(18), Pg: 423-456
- [3]. Izkara, J., Perez, J., Basogain, X., and Borro, D. (2017). "Mobile Augmented Reality, an Advanced Tool for the Construction Sector." *Vol No. 17(10)*, Pg: 423-45.
- [4]. Arslan et al(2014), "Real time environmental monitoring, visualization and notification system", *Journal of Information Technology in construction*, vol.19. pg. 79-91.
- [5]. Shaveta Bhatia 1, Saba Hilal 2 (2013), "A new approach for location based tracking", *IJCSI International Journal of Computer Science issues*, vol. 10, No 1.
- [6]. "Remote Access of Building Management System on Windows Mobile Devices"- an IEEE paper by
- [7]. Ondrej Krejcar, Department of measurement and control, VSB Technical Institute of Ostrava, Czech Republic
- [8]. Engineering Competencies < [http : // www.cewd.org / Documents / EngCompModel.pdf](http://www.cewd.org/Documents/EngCompModel.pdf) >. Jain, A. What type of work does a fresher civil engineer do?

- [9]. Roles and Responsibility of Site Engineer. (2017).
<<https://theconstructor.org/construction/civil-site-engineer-roles-responsibilities/18446/>>.
- [10]. Aurora, N. (2017). Blog: The Role of Civil Engineers in the Construction Industry. Retrieve from
<<https://www.constructioncrossing.com/article/480003/The-Role-of-Civil-Engineers-in-the-Construction-Industry/>>.
- [11]. Paper by Vincent T. H. CHU "200 Questions and Answers on Practical Civil Engineering Works"
- [12]. Review Article "Some Major Challenges Faced by Civil Engineering Professionals in the Execution of their Profession and the impact of the challenges to the Environment, Society and Economy of Developing Countries" by Franklin Ngosong Tougwa, University of Salford, UK, DOI: 10.33552 / CTCSE. 2020.05.000622 , ISSN: 2643-6876
- [13]. "Methodologies for problem solving: An engineering approach" by James J. Sharp ,[https://doi.org /10.1080 / 10408347308003631](https://doi.org/10.1080/10408347308003631)
- [14]. Blog "Ways Construction Management "from [https : / esub.com / blog / 4-ways-for-construction-to-benefit-from-mobile-apps](https://esub.com/blog/4-ways-for-construction-to-benefit-from-mobile-apps).
- [15]. Kim, C., Park, T., Lim, H., & Kim, H. On-site construction management using mobile computing technology. Automation in construction, 35, 415-423, 2013