



ROLE OF INFORMATION COMMUNICATION TECHNOLOGY IN CONSTRUCTION INDUSTRY

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Abstract: Construction industry plays important role in the development of economy of the country. As per the fast-growing world adoption of the new technology is must, but in the case of construction industry of India is little slow to adopt to new technologies. Results of Studies and surveys performed in the last years shows, use of new technology is beneficial in the construction projects. The aim of this study analyzes the use and application of the ICT in construction industries. In this initial stage of this study some probable factors which can affect to information communication technology was listed out. This listed factor was validated by expert of this area. After the validation major important 19 factors were shorted out. For the data collection quaternary survey was performed. The data was collected by visiting deferent construction site. The total 67 responses were collected. The method of frequency index analysis is use to analysis the data and generate positive of communication information technology in construction industry. From this study conclusion was come out that use of information communication tools is beneficial for the construction industry.

Index Terms – Information communication technology, ICT tools, Construction sector

I. INTRODUCTION

One of the important development indicators for the country is construction industry and also it creates lots of opportunity for the other sectors. Construction industry plays important role in the development of economy of the country. As per the fast-growing world adoption of the new technology is must, but in the case of construction industry of India is little slow to adopt to new technologies. Results of Studies and surveys performed in the last years shows, use of new technology is beneficial in the construction projects. For the many years, the construction sector has used BIM, telematics, mobile device, and software applications. The construction sector is adjusting to new technologies such as virtual reality and augmented reality, drones, robotics, the internet, 3D printing, autonomous vehicles etc. surprisingly, many these tools must be used to assist in the resolution of other construction related issues. Project management software, BIM, VR and mobile devices can be helpful in scheduling, planning, communication, and collaboration, all of which can boost productivity.

Communication technology is an important part of today's information technology. With the latest generation of laptops, emails can be sent and received. Recently, cell phones with small microcomputers have started to appear on the market. Internet based communications is the fastest growing area. The communication network determines the ability to share information and data between all parties participating in a building project. Teamwork and coordination can be enhanced when the flow of information improves. The Industrial Revolution was brought about by the construction of information technology around the world. It has resulted in dramatic improvements in performance of construction process in terms of time, quality and customer satisfaction and stages of construction work. The use of information and communication technology (ICT) increases coordination, processes, and collaboration among clients, contractors, and engineers. Researchers in developing nations, where ICT adoption is less advanced than in developed ones, have been drawn to the state of ICT in the construction industry. Because ICT pervades everything and advancement in any sector is inextricably linked to it, the future of ICT with in construction industry appears to be a balance among adopting what appears inevitable in some ways and reaching the ideal. Some experts, on the other hand, feel that the direction of ICT adoption in the construction sector should not be a gradual shift away from old paradigms, but rather a revolutionary shift toward ICT augmentation. In this paper study will be done to implement different ICT tools in various phases and processes of construction project and to analyze the use and application of the ICT in construction industries

II. OBJECTIVES

Primary objective is to mitigate the traditional belief of not using technology in construction. Secondary objective is to boost up the upgradation of work procedures and communication efficiencies in construction projects. Third objective is to implement different ICT tools in various phases and processes of construction project. Fourth objective is to analyze the use and application of the ICT in construction industries.

III. SCOPE

This research work is basically dealing with the role of ICT 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 ICT tools in Ahmedabad's construction industry and its awareness. The Survey will be conducted across various Residential construction sites in Ahmedabad.

IV. RESEARCH METHODOLOGY

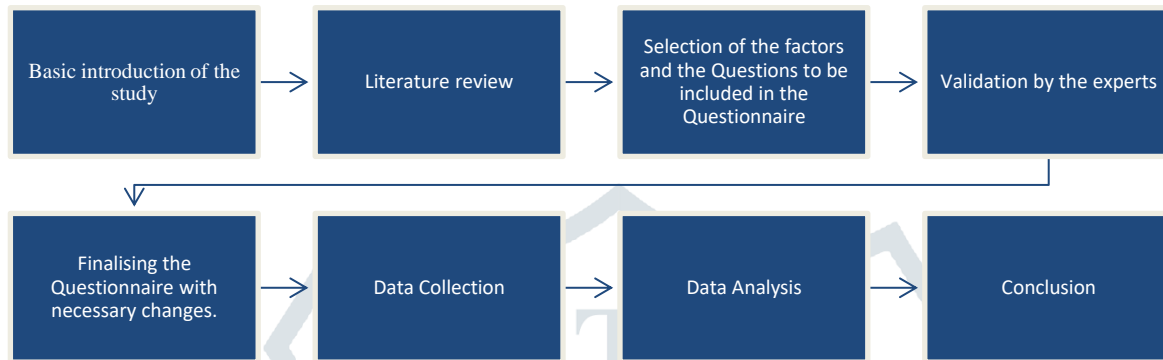


Fig. Research methodology

V. LITERATURE REVIEW

The Dutch Building Research Foundation SBR began a research project on ICT in Construction, claims the author, in 2004. The initial objective was to evaluate the ICT-based technologies that are accessible to the construction sector and how they are being applied. The second objective was to determine which indicated technology is most likely to be adopted widely. Finally, the author concluded that ERP systems, satellite-based location systems, and mobile internet are the three most promising technologies today. The step-by-step procedure, where staff acceptance and committed adoption are of vital importance, needs to be given special attention if new technology is to be introduced successfully and effectively.

The primary activities of architecture, engineering, and quantity surveying have been heavily automated, according to a survey carried out in Southwest Nigeria. Traditional methods are still used for managing data and documents. The role of construction experts, the uses and advantages of ICT, the research methodology, analysis and discussion of the findings, and the conclusions reached are all covered in this paper. 180 randomly chosen consultants (60 architects, 60 engineers, and 60 quantity surveyors) participated in a questionnaire survey. Out of all these, 107 correctly filled-out surveys from 29 architects, 38 engineers, and 40 quantity surveyors were collected, yielding a response rate of 59.4 percent.

In this study, the author used the Three View Point Method (3VPM) approach—originally created for productivity analysis of process changes—to examine how a significant Scandinavian construction company's procurement process may be improved. A particular arrangement of work tasks in space and time, with a beginning and an end as well as inputs and outputs that are well-defined. The author of this work also uses UML (unified modelling language) for business modelling. In the VPM approach, the activity-based costs were estimated after the logical process diagrams and an analysis of the process performance had been created. The three perspectives were finally blended. The need for professional interviews and the need for modelling work are drawbacks of the 3VPM technique.

All parties must work together, communicate, and coordinate informally during the development of a building. Complex project team arrangements can be found in several locations. Just as the world has become a global village, only the use of ICT can perform the "Magic" of efficient teamwork. Developing countries should encourage modern building construction through Collaboration with researchers in developed countries.

VI. DATA COLLECTION

Survey was done by having interactions/interviews with different designated members associated with construction site. By doing so, perceptions and views of individual members can be acknowledged. This survey will be done on ongoing construction sites, so a general conclusion can be obtained.

Firstly, the Sampling method for finalizing the sample on which the Survey has to be conducted is selected

The Likert Scale is used for conducting the survey with the scale from Strongly Agree to Strongly Disagree (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree).

The Questionnaire survey is bifurcated into two methods:

- Floating the physical copies of Questionnaire
- Floating the Google link of Questionnaire

Few of the responses are obtained from the physical forms of Questionnaire by floating the copies among some of the on-going construction sites of Ahmedabad. The response obtained was collected and modified into an Excel sheet in an organized manner.

Hence majorly the responses were obtained from the Google form by floating the URL link to various Project Managers, Consultants, Contractors and Site Engineers in Ahmedabad zone.

The responses obtained from both the physical forms and the google forms are collected and incorporated into a single sheet of Excel.

6.1 SAMPAL SIZE:

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

Where, Z- confidence level = 1.96
 P= Percentage picking a choice=50%
 C = Confidence interval-12 %
 SS= 67 no.

VII. DATA ANALYSIS AND DISCUSSION

This chapter presents data analysis as well as the findings from the survey. It begins with frequency index 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 67. The data collected from the above questionnaire are the basic information of the respondent and his/her company, what kind of ICT infrastructure does his/her company possess, what kind of ICT tools are being used by them and what are the changes or positive impacts they have experienced by using those apps.

Table.1 Frequency analysis

Awareness of ICT	62
Knowledge of ICT tools	63.67
how do you feel the need for more ICT tools to be applied in your organization	83.67
acceptance level of those ICT tools not applied in your organization	67
Project completed on time	77.00
Project completed within budget	72.33
Project faced minimum reworks	76.67
improvement noticed in the efficiency of various project phase	80.67
Positive Return on Investment has been experienced	78.00
The project members were highly satisfied and motivated	79.33
Software skills have been enhanced	84.67
Ease in work is experienced	83.33
The team felt that working on these ICT tools was gratifying.	77.33
Efficiency in maintaining Inventory stock has been achieved	80.00
Manipulation of data in Inventory control has been reduced	78.33
Wastage of material in various Construction procedures has been reduced	77.00
The final product has quietly impressed the customer.	79.67
The customers' requirements were met efficiently.	79.00
Customer-Agency relations were benefitted from the usage of ICT	85.00
Excessive reduction in usage of Stationery items	91.33

Analyzing the bar-chart of ICT awareness among the workforce in the organization it is quite visible that there are still many construction firms which don't have enough technologically skilled labor-force. Knowledge of ICT tools among the workforce, the judgement can be drawn that yes Ahmedabad has number of companies having technically skilled labor, but it is not enough though. The acceptance level of those ICT tools which are still not applied in the organization must be good enough to bring a constructive change in the working methodology. No matter how much change the higher-level management brings to their organization, until the workforce is not adaptive to such changes or the acceptance level of the change is weak then it becomes difficult to work with such environment. For bringing a change in the routine, the basic thing is the "Need for the change". Hence after examining the bar-chart of How do you feel the need for more ICT tools to be applied in your organization.

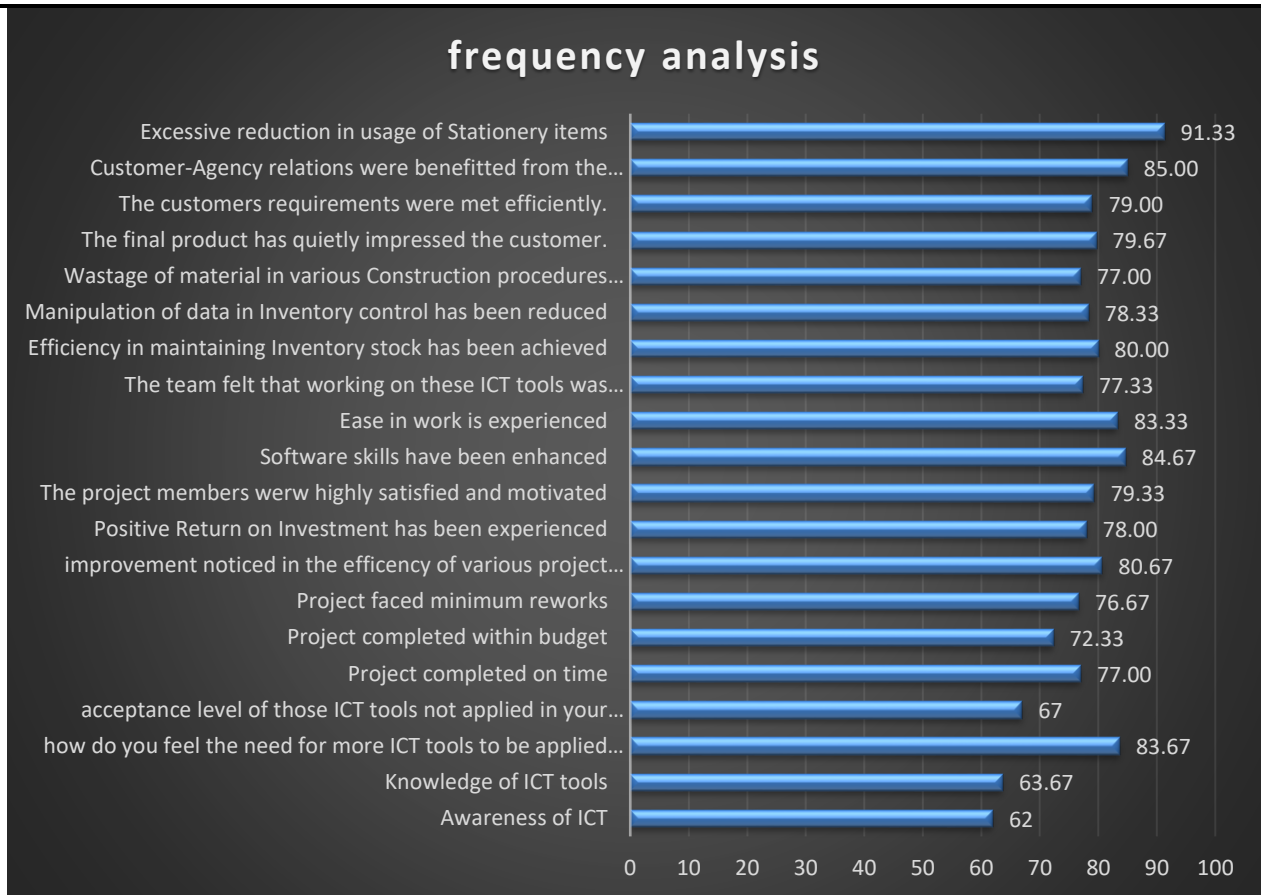


Fig.2 Frequency analysis

The questionnaire filled by 67 respondents when converted into an excel sheet and then framing a Bar-chart as represented in Fig.3 explains which tool is used by how many respondents in their construction firm.

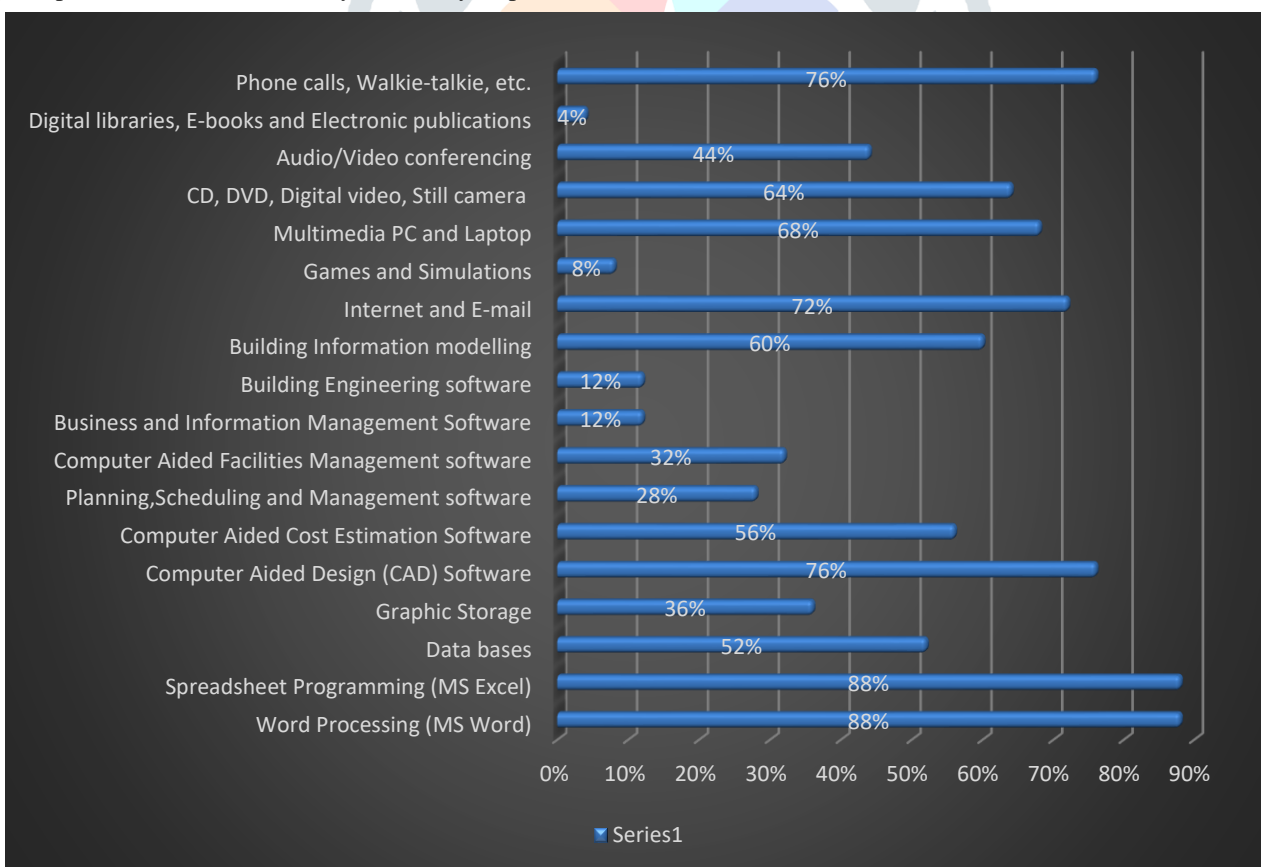


Fig.3 Usage of ICT tools

From the above Bar-chart, it is evident that many of the normal ICT tools like Phone calls, Walkie-Talkie, Multimedia PC and Laptop, Internet and E-mail, Word processing software's, Spreadsheet programming software's and Computer Aided Design (CAD) Software are used to quite a good extent. But mostly all the sophisticated ICT tools like Audio/Video conferencing, Digital libraries, Games and simulations, Graphic storage, Data bases and

few of the technical ICT tools like Building Information Modelling (BIM), Computer Aided Facilities Management software, Building Engineering software, Building and Information Management software, Planning, Scheduling and Management software and Computer Aided Cost Management software are used to a very low extent. These ICT tools provide great comfort in working by reducing the tedious and laborious work and also by reducing manual errors. Hence use of such ICT tools must be promoted to increase the productivity in construction industry of Ahmedabad.

VIII. CONCLUSION

From this study conclusion was come out that the use of ICT in the construction industry could be beneficial. In the construction sector, the use of information, communication, and technology (ICT) tools is a strong approach to create value, save money, save time, and maintain quality. Although, as previously said, the current technology use in the construction business is not up to par, this does not exclude its adoption. This study paper discusses the benefits of ICT in the construction sector, such as real time monitoring, early identification of potential faults on site, reduced paperwork, adequate standardization, and multi-disciplinary collaboration on the same platform to establish a base for future disputes. Although it has various drawbacks, such as security breaches, terminating worker, and implementation expenses, it has the potential to overcome these drawbacks in order to achieve its beneficial outcomes. Many other sectors have implemented ICT tools into their manganate production and processing. Undoubtedly, the use of Technology tools in the present construction scenario is more prevalent in large-scale enterprises, while smaller firms are still hesitant to adopt new technologies. It will take time, but we will have no choice but to adapt and become accustomed to the technology as soon as possible.

Lastly, it is important to note that the most significant factors affecting the acceptance of ICT are:

- Budget limits for Technology investments.
- A lack of support and commitment of the company's management to ICT.
- There is a lack of ICT training and technical assistance for construction personnel.
- Construction education's ICT content is insufficient.
- Inadequate capacity to adapt the change in traditional methods.

IX. RECOMMENDATIONS

In the construction industry, construction n company should adopt the use of ICT and it is necessary to invest some fund for the ICT. Construction company must organize n some training programs for implementation n in use of ICT Construction company should implement education related to ICT tool.

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