Effective Material Management for Building Construction Industry

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Abstract – India is rapidly developing the country and construction industry is lagging behind in use of information technology as compared to other major industries in the country. Results suggest that materials which are being used for construction costs around 50-60% of total project cost, Advance systems which are existing today are have some limitations to manage it's flow and control it's wastage. Even today material management at construction sites are carried out by some traditional methods and heavily depends on human skills. The Main hurdle of material management in use of ICT is shortage of user-friendly software.

Keywords: - Material Management, ICT Tool for Material Management, Effective Material Management Tech nique.

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I. INTRODUCTION

Construction industry contributes a huge percentage in GDP of a nation and has a large workforce. As Material used in construction sites costing around 50-60% of total project cost it becomes essential to managing material an efficient way to achieve the desired economy. The intention of material management is to assure that construction materials are available at right place and at right quantity and quality as they needed. Poor material management can result in increased cost during construction on other hand effective material management can result in a consequential saving in costs. If materials are purchased too early capital may be held up on excess inventory and if not purchased at right time it may lead to delay which leads to cost overruns. Ensuring a timely flow of materials is an important part of material management to ensure better economy. A construction project as the structure is an arrangement of materials according to some predetermined plan. To ensure this specific arrangement additional material, manpower and some equipment are required alongside with time and space. International Federation of Purchasing and Material Management accept the definition of material management is total concept having it's definite organization to plan and control**.**

International Federation of Purchasing and Material management accept the definition of material management is total concept having it's definite organization to plan and control all types of materials, it's supply and it's flow raw stage to finished stage so as to deliver to the customer as per his requirements in time. This involves planning, purchasing, receiving, storing, inventory control, scheduling, production, physical distribution and marketing it also controls the materials handling and it's traffic, and to manage all these process are role and responsibility of material manager or project manager or department. Nowadays there are many new tools to material management process are being used in construction industry for example JIT concept to resolves problems of space. CT being introduced in the industry to resolve problems of inventory control and tracking of materials, however, there is a problem of adapting of ICT in the construction industry due to initial high cost. Most of the ICT tools are underdeveloped.

There is tracking technology such as wireless communication, bar-coding, and RFID codes for tracking of materials, It is expected that mobile-prototype application to manage inventory to facilitate material management process to the management of material easier and faster. Therefore this research focus on deploying a Mobile prototype to improve on-site material management process, inventory control and resource management.

II. LITERATURE REVIEW

[1] This paper highlights the material management on a construction sites consist

of following material estimation, planning, scheduling,procurement,receiving,inspection, material handling and transport as well as waste management. According to author planning purchasing,inspection,stacking and storage and issuing material are important steps in material management. Most of companies prepare BOQ in order to carry out planning process. Time, cost, material and labour are major part of planning process on-site management. Purchasing procedure follows below sequence.

1) Material Indent

2) Check availability in store

3) Enquiry to vendors

4) Vendor selection and comparison.

5) Purchase order.

6) Vendor Evolution.

According to author receiving process is indicated by receipt system these receipt system can be divided into 2 parts(1)Receipt from outside suppliers and (2)Receipt from internal divisions. Author undertaken the survey of some leading companies in Ahmedabad and studied their material management process to understand the problem regarding material management and reaches the conclusion that centralised system for the material management, a proper control over tracking and monitoring of system is required, firms which uses efficient material management system increase their efficiency by 35%.

[2] In this paper Author stated that to achieve efficient material management one should consider material planning, buying and purchasing, storing and inventory control, quality and assurance control. Author studied the planned vs actual cost of the material through S curve analysis for that he/she categorized material in different classes and closely monitored the change in their cost .i.e. Planned vs actual for different materials such as steel, cement, bricks etc. After studying these changes author stated that causes in variation in cost are Administrative causes, contractor rework, and delay in material, consultant causes and client causes. Author studied a SCON Construction site as a case study. Author studied deviation in cost of materials in planned vs actual in terms of S curve using MSP tool.

[3] In this paper author focused on potential benefits of use of ICT tools in construction industry, the paper seeks to identify the implementation of ICT tools in construction material management process and investigate of acceptance of contractors for ICT tools to manage materials in construction projects. A triangulation research methodology is used for work which consists of standard derived questionaries', semi-structured interviews and review of previous research work in field. In process author concluded that ICT tools that are used in material management are generally Microsoft office, handheld tools and e-mails are generally used but there is scope for use of RFID code and bar code system can be used to track and monitor material management on construction site. Author indicated some benefits of using ICT tool for material management such as paperwork is eliminated, operational cost is lowered, cycle time reduced, increased efficiency, better space utilization and reduction in errors and rework.

Author stats some barriers to implement ICT tools for material management in construction industry which are limited technical life cycle, no innovative culture, lack of reliability, absence of trained staff, no market information etc.

[4] The paper suggests that areas where additional application might further enhance the management of materials particularly by tracking of materials on construction site. Author discussed some current technologies and concluded that some sophisticated solutions are expected to use in future such as wireless communication, bar coding and RFID tagging for transporting and logistics. Author states that use of RFID codes are useful in tracking the material on construction site. Poor handling of construction materials affects the overall performance of projects in terms of time, budget, quality and productivity in order to achieve economy.

[5] In this paper author stats that materials costs more than 50-60% of total project cost and in order to achieve economy in construction one has to introduce material management in project. The proper material management can improve productivity and cost efficiency which ensure timely completion of the project. The material management system attempts to ensure quality and quantity of material are available at desired location at the desired time. Author conducted surveys in Maharashtra to understand current material management process and to

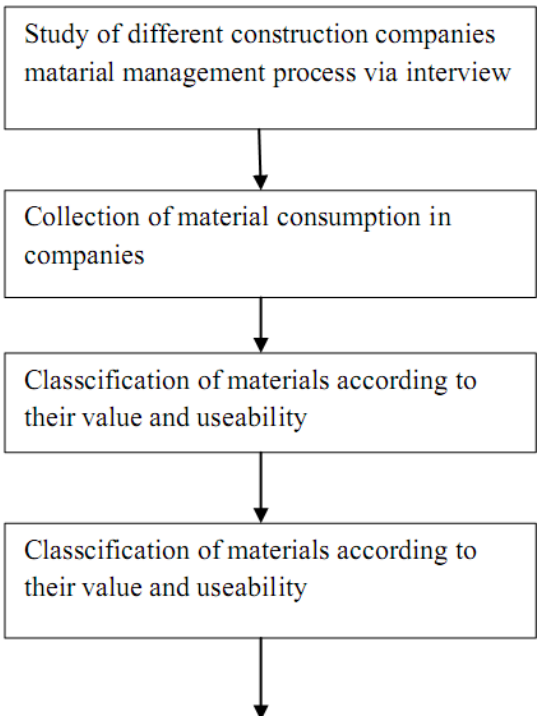
compare it to the ICT based management process.

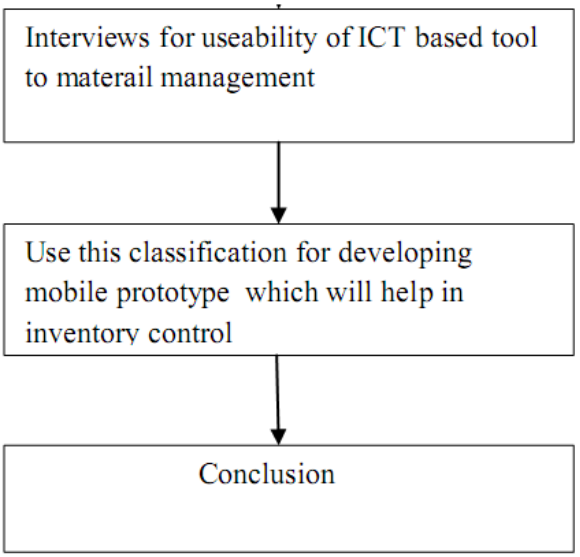
Author conducted some survey in Maharashtra from which he drew some conclusions which are like material management in Maharashtra is carried out in major firms by manual method which leads to more paperwork, details cannot be found easily ,data to be studied while reconciliation is huge, not punctional, difficult to take on-site decisions, difficult to update, communication problem etc. Author further compared the management practices and concluded that ICT can give exact consumption of material, stocked material location of material, which also reduces manual errors.

III. OBJECTIVE OF STUDY

- To study construction industries to understand and analyze present material management techniques used.
- To see how many companies adopting ICT based tools to manage material management.
- To understand barriers in applying ICT tools in the construction industry.
- To develop a mobile prototype for inventory control for building projects which could help to reduce human efforts in management of materials**.**

IV. METHODOLOGY





V. SURVEY STUDY

In Pune, Five Companies are surveyed to understand their current material management process. This survey consist of questionaries' which regarding acceptance of ICT based tool in construction industry for material management, it's benefits and barriers of ICT tool in industry.

Table No. 1

Company Name	Type of Project	Material cost in %
Company 1	Residential	65%
Company 2	Residential	60%
Company 3	Residential	55-65%
Company 4	Residential and Commercial	60%
Company 5	Residential	60%

Table No. 2

Company Name	Method of MM	Satisfaction with current MM
Company 1	Manually	Yes
Company 2	Manually	No
Company 3	Software	Yes
Company 4	Manually	No
Company 5	Software	Yes

Table No.3

Company Name	Benefit of Current MM	Problems of Current MM
Company 1	Less cost,easy to understand.	Mannual errors,Details not find easily
Company 2	Less cost,less manpower,Non Technical person can do job	Difficult to update
Company 3	Details can easily find out,updating is easy,stock remaining information can easily found.	Need Technical person but satisfied with current process
Company 4	Less Manpower,Less cost	Not accurately Function
Company 5	Reduce wastage,easy to communicate	Skilled person required

VI. CONCLUSION OF SURVEY

After these surveys following are outcomes are found out regarding material management process from different companies (firms)

6.1 Manual Material management process

- For small construction Firms manual material management process is fine.
- Unskilled person or non technical person can do these process.
- It is easy to understand**.**
- Requires less manpower.

6.2 Problems in manual Material Management Process

- Paperwork in more
- Not easy to update
- Details are difficult to find
- The mannual error may occur
- Misplaces of papers may occours which leads to problem while reconciliation.

VII. DISCUSSION

The proposed work will help to establish stronger research design for material management ICT tool.

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