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Material Management – Using Barcode System

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Abstract : *Construction materials management plays a Significant role in the success and profitability of construction Projects. Some of the problems relating to materials Management are materials shortages, delays in supply, price Fluctuations, damage and wastage, and lack of storage space. To Overcome the problem, the advent of ICT has been largely Exercised in developed countries to aid and improve construction Materials management. Overall, there are five processes involved within the materials management, namely planning, Procurement, logistics, handling, stock and waste control Processes. Studies have shown that the use of ICT in managing The materials on site has not fully utilised by many construction Firms despite of the potential benefits. This is due to some Barriers faced by the construction firms in adopting the ICT. Through some qualitative approaches like questionnaire survey and face to face semi-structure interviews data is collected. The findings showed that There were high numbers of common ICT tools involved at the Planning and procurement stage of materials management Processes while handling and waste and stock control stage have The lowest adoption of ICT tools. It was also found that modern Tracking technologies such as RFID and bar coding system used In developed countries has not been utilized and can be Considered as non-existence in construction firms' materials Management. According to the respondents, this was due to the Requirements needed to purchase the ICT tools such as high Investment on the hardware, staffs training and qualified ICT Specialist on specific software knowledge and technology testing on automation or wireless technologies* ***Keywords :*** *Construction Materials, ICT, Materials management Process.*

I. Introduction

Generally material management is based on traditional method. In traditional method inventory management is utilized in most of the projects. As per traditional method construction materials are not managed properly. It seems that use of traditional method cause wastage of material with time and more manpower is to be employed and that result in increase the cost of project. The traditional method is carried out manually which is paper based, labour intensive, inaccurate and error prone. Applications of information communication technology in materials management are as follow: 1. Inventory tracking. 2. Material status and inventory. In this area of interest, survey is to be carried out for material management in various construction industries and find out the problems and benefits regarding use of ICT. The application of ICT would automatically reduce the cost of material management and indirectly reduces the time which involves managing construction materials. This is beneficial to the construction industry

The construction industry has been slow in the adoption and embracing of ICT tools and techniques as compared to Other sectors (Ahuja et al., 2009). Despite the advancement of Technologies designed to facilitate materials management Processes, the existing barrier towards effective use of ICT is still found in the recent construction industry. Consequently, It has hindered the construction industry from moving rapidly Forward (Ang and Kasim,

2009). The research reported by Kasim (2011), on recent tracking Technologies such as bar-coding and RFID stated that these are Tools that are hardly adopted in the materials management. Kasim (2011) has also conducted research among the Construction firms in identifying the current materials Management practices and problems in construction projects As well as the ICT applications used to manage it. Her Findings revealed that the inefficient use of ICT could result in Increase of problematic use of paper-based reports for Exchanging information relating to materials component within the supply chain. In addition, the range for human Errors will also increased due to manual operations of Materials tracking during delivery times and at the storage Area. Based from the problems pertaining in ICT usage in materials Management, this research was designed to identify the Different types of ICT applications used among construction Firms at different process of materials management which was not emphasised in similar previous research. This research also focused on the requirements needed to increase the usage Of ICT application in materials management among the Construction firms.

II. Barcode technology

Basically barcode technology is an automatic identification Technology. Bar code is a predefined format of dark bars And white spaces .It is structured to contain a specific Piece of information which allows real-time data to be Collected accurately and rapidly. It consists of a series of parallel, adjacent bars and spaces. More precisely, it is simply a series of stripes on a very Light background that can be scanned and read directly Into a computer. They are interpreted virtually Instantaneously and unerringly by a bar code reading System. The elements (bars and spaces) in a bar code Symbol must be of a consistent, proportional thickness and Thinness. The widest element could be as thick as a pencil Or as thin as a business card, as long as the corresponding Thin bars and spaces in the bar code remain proportionally Thin. To read information contained in a Barcode symbol, A scanning device, such as a light pen is moved across the Symbol from one side to the other. As a scanning device is Moved across the symbol, the Barcode width pattern of Bars and spaces is analysed by the Barcode decoder, and The original data is recovered. The typical tasks associated with a material management System are:

- Procurement and purchasing
- Expediting.
- Materials planning.
- Materials handling.
- Distribution Cost control.
- Inventory management / Receiving.
- Warehousing.
- Transportation

List of Software that can be used**:**

- SAP Software.
- ERP Software.
- Primavera.

METHODOLOGY

Action Plans

- Survey of different construction industries
- Categorize the site on A,B,C as per turn over
- Selection of site and analyse the current material management process
- Apply ICT technique on site and analyse the performance

- Apply ICT technique on site and analyse the performance
- Conclusion

plan of proposed work:

Phase – I

- Carry out survey to analyse current material management process in various construction industries.
- **7** sites were surveyed near Andheri, Santacruz, Dadar most of them having old/ Traditional/ Mustard method for maintaining materials detail.

Phase – II

- Selection of case feasible to apply ICT technique.
- Study the current material management process on site and preparation of ICT technique.
- Some construction firms were surveyed in which small scale, medium scale, large scale were classified as per there investment in project and data is collected regarding their current material management process.
- After the survey was done, it is found that large scale company used softwares like ERP, SAP for material management and medium or small scale companies prefer manual material management process.

Table No. 1:Table for analysis of surveyed construction firms

Type of Company (Based on investment)	Type-A (Large scale)	Type-B (Medium Scale)	Type-C (Small scale)
Present method of material management	ERP	Muster method	Muster method
Problems faced in present material management	No problem	More paper/ registered work Manual Error	More paper/ registered work
Barcode Technique (Yes/ No)	No	No	No
Conclusion	Initial cost of the project is high therefore, it requires precisely skilled as well as technical man force for this project. It is advisable to use when project cost is high.	If the initial cost is high, there is requirement of skilled and technical man force. It is advisable to use Barcode system or any other suitable software when project cost is high.	There is no initial investment and this system requires less man power and it has less cost. It is advisable to use Barcode system for material management

Phase – III

After surveying above sites, one of the surveyed sites was selected. It consisted of two buildings, one of the building had material management by traditional muster maintained by store keeper for other building barcode system was used. Materials like cement bricks, cement bags, steel bars, paints, plumbing materials, etc were labelled and material management is done.

Following steps were followed for the barcode technique:-

1. Details of each item are entered in simple computer software systems when it received on site
2. Inward entry of that material is done.
3. Barcode label is stick on the material.
4. Material is kept in store in at entered location.
5. When is needed on sit it is just to be scan by barcode scanner then automatically stock is updated and inventory report can be printed.

Phase – IV

Barcode system was successfully implement on the site. For the application of barcode system two persons are required out on which at least one should be technically skilled person. Initial cost of system in this method may be a cause for higher cost. But when we compare the mayerial management by traditional method and barcode application, bar code application saves a particular amount and hence we calculate for the whole project these cost comes up to be a large amount.

Result

Benefits of using barcode technique in construction

- Represent unique identity of a product.
- Accuracy of data input (error free).
- Aid effective management of resources and
- Inventories.
- Labour savings by avoiding manual system.
- Real time data collection.
- Rapid access to total production costs.
- More accurate dispatch.
- Work can get easy.

Barriers of barcode technique in construction

- Materials like sand, crush sand, bricks cannot manage by using bar code.
- Need to train workers.
- High initial cost.

III. Conclusion

Based on the findings of this research, it can be concluded that construction firms do practices construction materials management through partially computerized method. Hence, they could not fully validate on the feas0 ibility of the technology-aided approaches such as RFID and bar coding system in materials management. However, they did practices all the materials management processes through the planning, Procurement, logistics, handling and waste and stock control Stage using basic ICT tools that are not that expensive to be Purchased.

In addition, findings have also demonstrated that computer, printer, fax machine, internet, Microsoft Excel and Microsoft Word were the most common ICT tools in the current Industry's practice. There was also some special software such as IFCA used by the construction firms during the materials procurement stage. Subsequently, planning and procurement stage in materials management were the stage considered to involve the highest investment of ICT tools. Low usage of ICT were found at the logistics, handling and waste and stock control process as majority of the respondents practice those processes manually using ISO standard form.
It was found that tracking technologies such as RFID and bar coding system were highly recommended at the logistics, handling and waste and stock control stage as it enable more convenient tracking and identification of material flow, lower operation expenses, higher productivity and better space utilization, thus making the follow

up on material quantity an easy task.
It can also be concluded that the utilization of ICT for materials management was considered to involve high hardware investment. Especially when other processes such as materials logistics and handlings required a greater investment in ICT tools such as bar-coding tools for tracking materials. Besides, the requirements for staffs training and qualified ICT specialist on specific software knowledge was needed that made the process even more expensive. Lastly, technology testing for automation or wireless technologies was also required to ensure security for future implementation and good return on investment that once again contribute to high investments costs.
Indeed, overcoming the previous barriers could eventually lead to the industry-wide implementation of technology -supported tracking processes. With the availability of bar-coding and RFID, the monitoring of materials management will be effective, thus improving the materials flow and tracking.

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