iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 7 **Issue:** VI **Month of publication:** June 2019

DOI: http://doi.org/10.22214/ijraset.2019.6045

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.177
Volume 7 Issue VI, June 2019- Available at www.ijraset.com

Comparative Study of Radio Frequency Identification Technique with Conventional Technique

[1]Amit Mutkule, [2]Harshita Ambre
[1]PG Scholar, [2]Assistant Professor, Dept. of Civil Engineering (Construction Management),
Sandip University, SOET, Nashik, Maharashtra, India

Abstract*—Material management is a vital function for improving productivity in construction projects. The management of materials should be considered at all the phases of the construction process and throughout the construction and production periods. The control of materials is a very important and vital subject for every company and should be handled effectively for the successful completion of a project. Materials account for a big part of products and project costs. The cost represented by materials fluctuates and may comprise between 20-50% of the total project cost and sometimes more. Some studies concluded that materials account more than 60% of the total project cost. Many construction projects apply manual methods, not only for the tracking of materials, but also for materials management as a whole and this involves various techniques and this leads to the problematic situations with many human errors. So, a study is made to handle the material on site by RFID method and cost and time parameter is considered to compare with conventional methods.

Index Terms*— Material management, Construction materials, Radio frequency identification technique (application and study)

I. INTRODUCTION

All The construction industry is the second largest industry in India after agriculture. It accounts for about 11% of India as GDP. It makes significant contribution to the national economy and provides employment to large number of people. The management of materials should be considered at all the phases of the construction process and throughout the construction and production periods. This is because poor materials management can often affect the overall construction time, quality and production time. It is important for planning and controlling of materials to ensure that the right quality and quantity of materials and installed equipment are appropriately specified in a timely manner, obtained at a reasonable, cost, and are available when needed. The cost represented by materials fluctuates and may comprise between 20-50% of the total project cost and sometimes more. Some studies concluded that materials account more than 60% of the total project cost. [2] The material management system attempts to insure that the right quality and quantity of materials are appropriately selected, purchased, delivered and handled on site in a timely manner and at a reasonable cost. The problematic mostly occurring in the management of material is related to the shortage, availability, supply chain, inventory, handling, and the storage of material. To overcome this error and problematic, real-time information visibility and traceability is highly desired and Radio Frequency Identification (RFID) technology can be implemented. Material management is a scientific technique, concerned with planning, organizing and control of flow of materials, from their initial purchase to destination.

A. Why need of Material Management?

To have adequate materials on hand when needed. To pay the lowest possible prices, consistent with quality and value requirement for purchases material. To minimize the inventory investment and to operate efficiently.

II. NEED OF STUDY

The result of improper handling and managing materials on site during construction process will influence the total project cost, time and the quality. The costs of materials management may range from 30-80% of the total construction costs depending on the type of construction. However, the total cost accounted 50-60% of construction projects is for construction materials and equipment. Construction materials are major components on any project with value 50-60%. Therefore, there is a need for efficient materials management in construction projects. This is because poor materials management will affect the overall construction time, quality and budget. The common issues relating to materials management are storage problems incorrect materials delivery subsequent design changes, materials surplus, materials damage/loss, incorrect materials take-off; and vendor evaluation. In order to overcome the problems, proposed materials tracking process with employment of RFID in improving

©IJRASET: All Rights are Reserved

materials tracking and overall process of materials management on the construction site. Hence, a good materials management environment enables proper materials handling on construction projects activities.

III. OBJECTIVE OF STUDY

A. To survey different residential construction companies for studying and analyzing the present practices of material management.
B. To examine how many construction industries use RFID system for material management.
C. Apply & analyze the effect of RFID System on Material Management.
D. To compare conventional and RFID System applied for material management process.

IV. METHODOLOGY

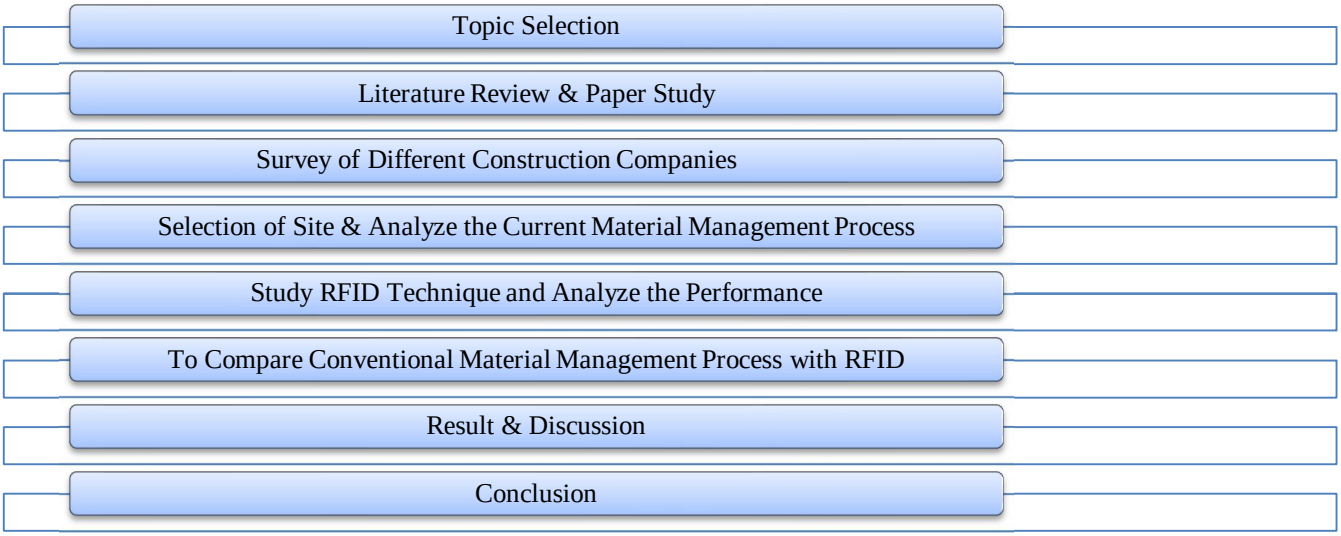


Figure no 1-flow chart of work method

V. DATA COLLECTION

A. Data Collection

Visits to different residential projects in Nasik, Mumbai and Pune were done for the study and to understand their method of material management. The main aim of survey was to get the details study of RFID technique and compare with conventional method. The site selected for the conventional method and RFID method are discussed below.

B. Detail Survey of Construction Companies

Survey of different construction companies was done to understand their material management process. In different company's different process are used to better understand their various work process and material handling technique some of the below shortlisted companies were selected.

Table no 1 survey of construction companies

Sr. No	Name of the company	Material Management process
1	Kolte patil pvt ltd	Conventional
2	Ashoka Buildcon Ltd	RFID
3	Supreme Universal Pvt. Ltd	ERP/ SAP
4	Relicon Pvt.Ltd	Conventional
5	Elite Landmarks.	Conventional
6	Kalpataru constructions	Conventional

For comparing the work method and studying the RFID process two companies were taken and data collected to analyses the how the time, cost and productivity can be increased by making the change in material management process and making the entire process smooth and easy. The top two companies were selected for our project work. Detail background study about the

©IJRASET: All Rights are Reserved

reputed firm was studied and basic work process was understood so as to have correct data collection which is required for the thesis.

C. Site Selection for Detail Study

Site selection was the most important parameter during the selection of site. The site selected for the thesis work is residential projects both the firms is reputed. All the data shown and discussed is for study purpose only. One site is of Pune and other is in Nasik (sinner) but both the projects are of same category i.e. residential projects. Both the site has different methods of their material handling and they are running their projects smoothly. But the need of advanced technique for the better management and cost effectiveness in overall project is required.

VI. DATA ANALYSIS

The time and cost parameter are the factor which are important in material handling. Thus in conventional method to maintain the musters and to have eye on inventory management there is a need of human resource. The company has a separate billing and estimation department in which many peoples are engaged in this manual process. And thus by having the data in form written or manually noted there are chances of getting error and time consuming also. For the different work different person are employed so that work can be made early possible time.

Table no 2 Number of Employees

SR.NO	DEPARTMENT	NO. OF PERSON
1	Estimation and Billing department	6
2	Purchase department and quality control	4
3	Administration	3
4	Project manager	1

The more manual work and data entry works have to maintain charge sheet and entry for all separate items. Each entry recorded each time requires trained staff and time for all this rigorous work thus the process becomes time consuming and chances of getting error also increases. For an example the quantity workout above can be measured in terms of time required for the given site is shown.

Table no 3 Number of employee and time required

Sr.no	Name of work	Number of employees	Time required (Days)
1	Estimation and quality control	8	3
2	Billing Department	4	2
3	Store keeper	2	1
4	Administration	3	1

A. Data Analysis for RFID Technique

Exact quantity of material is estimated and right quantity and right quality of material is purchased every time. Some of the material list with their codes is shown in below table. These codes are scanned and automatically recorded so as to get the inventory check.

Table no 4 showing material and its tags

SR.NO	NAME OF MATERIAL	TAGS
1	CEMENT	
	ULTRA TEC CEMENT	
	JK CEMENT	
	BIRLA GOLD	
2	TMT Steel	
	TATA (FE500)	
	JINDAL (FE500)	
	JINDAL (FE415)	
3	RED BRICKS	
	9 × 4¼ × 2¾ in	
4	CONCRETE BLOCK 17.3 in × 8.5 in × 3.9	
5	PAVER BLOCK	
6	COARSE AGGREGATE	
	9mm	
	12mm	
7	ARTIFICIAL SAND	
8	RIVER SAND	
9	TILES	
	VITRIFIED TILES	
	MOSIAC TILES	
10	MARBLES	
	WHITE MARBLES	
	RED ROSE MARBLE	

©IJRASET: All Rights are Reserved

The manpower engaged as compared to conventional method is comparatively less as there is less paper work and also the data is processed with scanner and noted in the computer. There is a smaller number of people required to maintain and manage the inventory control. Thus, time and cost both the factors are minimized.

Table no 5 Number of persons required - RFID

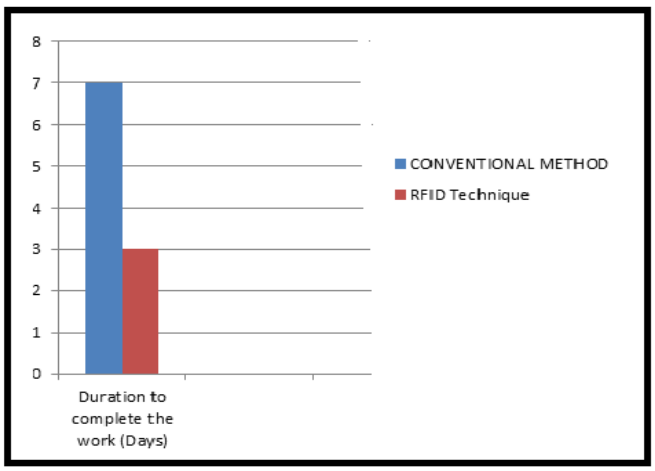
SR.NO	DEPARTMENT	NO. OF PERSON
1	Estimation and Billing department	2
2	Purchase department and quality control	1
3	Administration	2
4	Project manager	1

VII. COMPARISON BETWEEN CONVENTIONAL MATERIAL & MANAGEMENT RFID PROCESSES

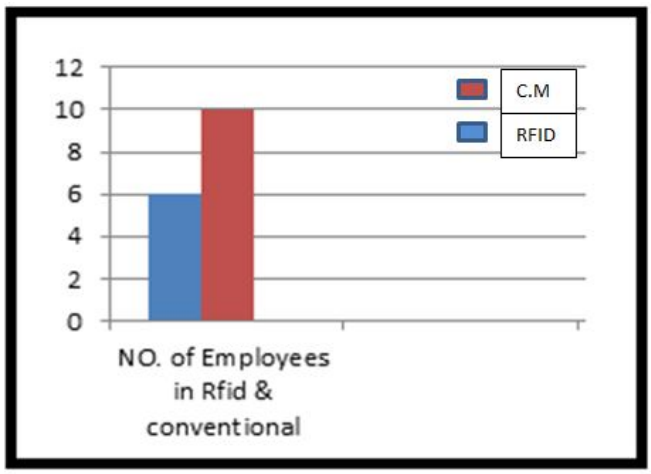
	Conventional Management Method	RFID Management Method
1	Manually Oriented	System Oriented
2	Possibilities of Human Error	Operation is Error Free
3	Process is tedious	Process is fast
4	Requires more time for approvals	Requires less time for approvals.
5	Computer knowledge illiterate person can work.	Computer Knowledge Literate person required.
6	Accuracy is less	Accuracy is high
7	Requires more time for finding details.	On a single click details are obtained
8	Less initial cost	Initial cost is high
9	Affordable for small construction companies whose turnover is below 100 Cr.	Affordable for construction companies whose turnover is above 100 Cr
10	Difficult to track inventory	Easy to track inventory
11	Wastage of papers.	No wastage of papers
12	Data is remotely stored	Data is centralized.

VIII. RESULTS AND DISCUSSIONS

Material management is very important branch for any construction company. Generally material management is carried out manually in construction companies. To adopt such software for material management the companies turn over must be more than 100 cores. Then only it becomes economical. But to achieve a profit there is need to change process of material management. The project manager MR Yogesh Patil has a 15year experience of real-estate projects and working for Ashoka buildcon from since last 6yrs. The overall project cost is around 80cr and it get tuff job to have control over the material if it is managed by conventional method so to have better management software company installed RFID. There is tremendous scope after the application of RFID the graphs can be plotted to showcase the details properly.



Graph No 1 Represents No. of Employee



Graph No 2 Represents No. of days

©IJRASET: All Rights are Reserved

Thus, The work done by the conventional method and RFID method is of great benefit as the task is completed in very few days as graphical representation shows. Thus it can be stated that less the number of employee less the time is required to complete the work ultimately the cost is reduced in overall project. As construction material constitutes more than 60% of the total cost of the project, so every construction company carries material management process. The 30-40% of cost is directly controlled because of material wastage and proper planning and accurate quantity of material.

IX. CONCLUSIONS

In survey it was found that every construction company carries material management. Many of construction firms were using conventional material management method. When we compare the material management by conventional method and by RFID application, the RFID application saves considerable cost, when we calculate for the whole project. By implementing RFID Technique in material management, we can effectively minimize human errors. It reduces administrative time considerably and helps for planning of material procurement effectively. There are rare construction companies which can adopt technique for material management. The main barriers of implementation are its high initial cost of up to 2 Cr. and lack of agreement amongst all the board of directors. Implementation of RFID is feasible for construction companies whose turnover is above 100 Cr. which saves approximately 65 % cost on manpower resources & reduces 80 % Time with respect to material management.

REFERENCES

[1] Rohan J. Madgi, Prof. Shashank comparative RFID statement School of Energy, Geoscience, Infrastructure and Society, Heriot-Watt University, Edinburgh EH14 4AS, UK.

[2] Eleni Iacovidou, et the use of smart technologies in enabling construction component reuse: A viable method or a problem creating solution? In journal of Journal of Environmental Management, Elsevie 2017 15988-16008.

[3] Mohammed Azhar Khan, Mohammed Irfan Qureshi el al Inventory management is a science primarily about specifying the shape and percentage of stocked goods International journal of chemical science 2016 vol 52(1), pp , 51-66.

[4] S. Prakash Chandar, et al The topic developing Of RFID Automation Technique In Material Management For Various Construction Project in journal International journal of chemical science 2016 vol 21, pp 321-3265) Mohammed Azhar Khan, Mohammed Irfan Qureshi el al Inventory management is a science primarily about specifying the shape and percentage of stocked goods International journal of chemical science 2016 vol 52(1), pp , 51-66.

[5] Nawaj Kalim Hannure and Sushma Shekhar Kulkarni Comparative Study of Traditional Material Management and Material Management with ICT Application Current Trends in Technology and Science ISSN: 2014 2279- 0535. Volume: 3, Issue: 4

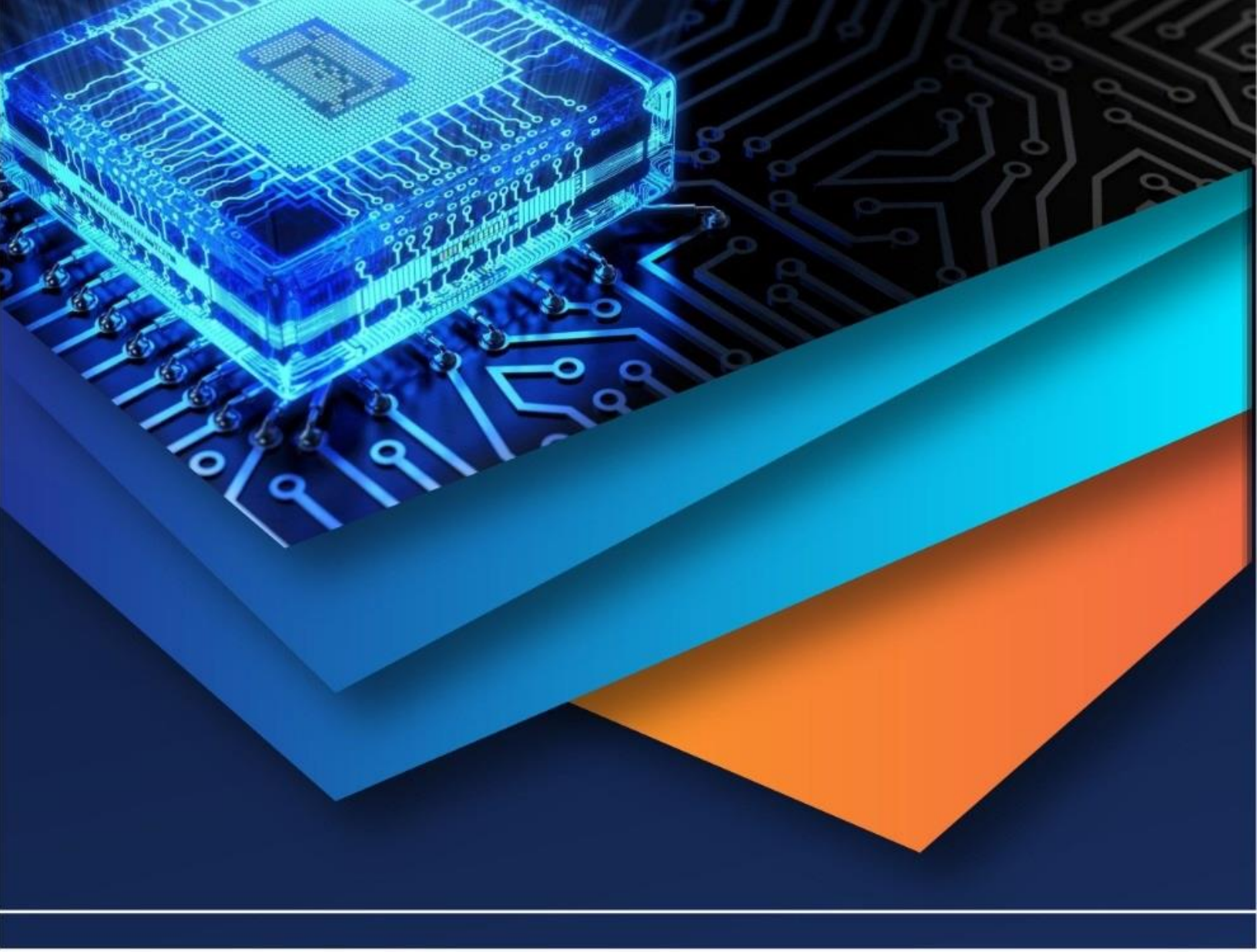
[6] Dr.G.Brindha Inventory Management International Journal of Innovative Research in Science, Engineering and Technology 2014 Vol. 3, Issue 1, January.

[7] Ville RFID tracking implementation model for the technical trade and construction supply chains in the journal of Automation in Construction, Elsevier. 2013 Vol 119, No 4. 698-714.

[8] Narimah Kasim, et al RFID technology for material management in construction projects, 2012 Vol. 2 No.

[9] Chetna M. Vyas, et al construction materials management on project sites in journal National Conference on Recent Trends in Engineering and Technology 2012 e-ISSN: 2278-1684,p-ISSN: 2320-334X, Volume 13, Issue 4 Ver. II

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)