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A Material Management in Construction Project Using Inventory Management System

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ABSTRACT

Material management is a critical component of the construction industry. The goal of materials management is to insure that construction materials are available at their point of use when needed. A proper implemented material management program can achieve the timely flow of materials and equipment to the jobsite, and thus facilitate improved work face planning, increased labour productivity, scheduling and minimize the cost. Material management is an important function in order to improve productivity in construction project. It is defind materials management function which take off, vendor evaluation and selection , purchasing, expenditure, shipping, material receiving, where housing and inventory, and material distribution. In this project we have prepare scheme of material management in the construction industry for building project also conducting survey of industry and determine the various format for construction material management. In conclusion the wastage of material, control cost of material and time should be analyzed by using inventory management system.

KEYWORDS: *inventor, material distribution, take off, quality of material*

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I. INTRODUCTION

Material management is term to can't controlling the kind amount location movement and timing of various commodities used in production by industrial enterprises. Material management is the planning, controlling directing and coordinating those who activities which are concerned with materials and inventory requirements, from the point of their introduction into the manufacturing process. It begin with the determination of materials quality and ends with its issuance to production to meet customer 's demand as per schedule and at the lowest cost Material management is the basic function of the business that adds value directly to the product itself.

II. MANAGEMENT OF MATERIAL RESOURCES

Materials management is concerned with the management of material resources. It considers the cost we incur on materials and seeks to reduce this cost. Traditionally, we think of the cost of materials in terms of the price we pay to acquire the materials, that is, their basic cost. This is what we see in the statements of a company's annual accounts. This cost, by itself, is enormously high, as materials account for 50 to 60 per cent of the net price of a product. The materials purchase function

is particularly important in the present scenario because most of the industries of the engineering type such as automobile industry Purchase 90 to 95 per cent of items through vendors and fabricate 5 to 10 per cent in house. These 5-10 per cent items represent the core competency of the industry.

III. Efficient material planning

- Buying or purchasing
- Procuring and receiving
- Storing and inventory control supply and distribution of materials
- Quality assurance
- Secondary objectives are classified as given below
- Efficient production scheduling
- To take or buy decisions

IV. Basic Components of Material Management

- There are four basic components of material management:
- Value analysis
- Purchasing
- Material Handling
- Store Keeping
- Recycling/Disposal

V. INVENTORY CONTROL

Inventory control is the supervision of supply, storage and accessibility of items in order to ensure an adequate supply without excessive over supply. Goods or the materials are essential element of any industry, private enterprise or the government deportment..

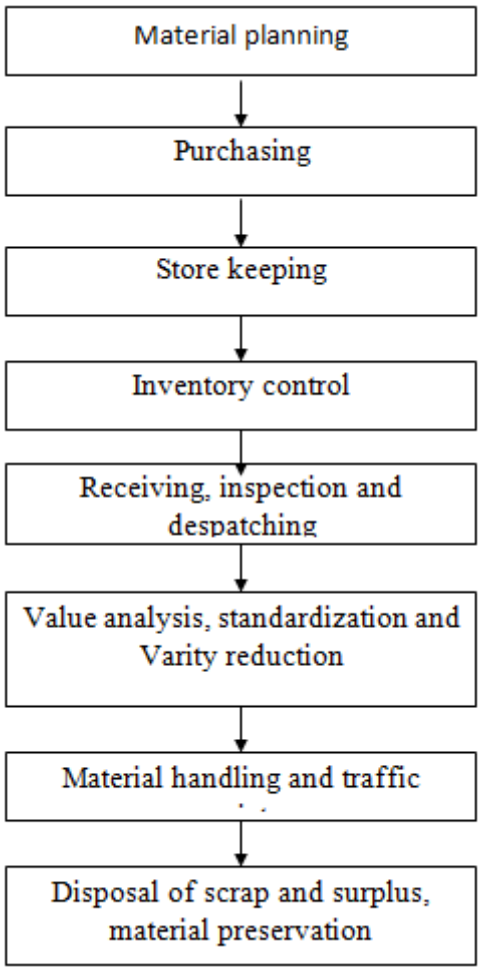
5.1Types Of Inventories

- Raw material inventory
- Bought out parts inventories
- WIP inventories
- Finished goods inventories
- Maintenance , repair, & operating store
- Tools inventories

5.2 Inventory Control Techniques

1. ABC analysis
2. S Curves
3. Safety stock
4. EOQ analysis

VI. Process of material management



VII. LITRATURE REVIEW

Nigeria, Olatunjiaiyetan, John small wood; " improving materials management effectiveness" This research provides a literature review in the field of uncertainty dampening methods for manufacturing systems, and proposes a new model to improve materials management effectiveness in materials requirements planning environments. The literature review gives rise to a classification framework of the models along nine structural dimensions that refer to the safety buffer treatment, the environmental characteristics and the type of approach. On the basis of the classification framework, the proposed model provides guidelines for approaching the problem of dimensioning, positioning and managing safety stocks against demand uncertainty. The effectiveness of the proposed model has been tested by comparing it to the traditional approach, through a computer- based simulation.

Khyomesh v. Patel (PG student) prof. Chetna m. Vyas (PhD. cont.) "construction materials management on project sites "This paper is written

to fill a void created by the absence of proper materials management on construction sites. To managing a productive and cost efficient site efficient material management is very essential. Research has shown that construction materials and equipment may constitute more than 70% of the total cost for a typical construction project. Therefore the proper management of this single largest component can improve the productivity and cost efficiency of a project and help ensure its timely completion. One of the major problems in delaying construction projects is poor materials and equipment management. This paper describes the main results of survey carried out in Ahmadabad that investigated the material management of 3 well known builders of Ahmedabad.

Nariah kasim; "Developing materials management"this paper is forecast that in the near future there may be a move towards the conscious development of materials management within manufacturing industry. This development will be based upon management recognition of the significance of materials management, combined with extensive pressure upon the costs and efficiency in the functions which make up the materials management systems. There will be a number of urgent motivating factors, ensuring that solutions are found to overcome any difficulties, and that change takes place to introduce the materials management concept. The final outcome is forecast to be an integration of the materials management function into one group; with the explicit task of, maintaining a constant flow of product, reducing costs where feasible, and improving relationships with both suppliers and other functions within the company.

Narimah kasim "intelligent materials tracking system for con struction projects management" This paper An essential factor adversely affecting the performance of construction projects is the improper handling of materials during site activities. In addition, paper-based reports are mostly used to record and exchange information related to the material components within the supply chain, which is problematic and inefficient. Findings from a literature review and surveys showed that there is a lack of positive examples of such tools having been used effectively. Therefore, this research focused on the development of a materials tracking system that integrates RFID-based materials management with resources modelling to improve on-site materials tracking. Rapid prototyping was used to develop the system and testing of the system was carried out to examine the functionality and working appropriately. The proposed system is intended to promote the employment of RFID for automatic materials tracking with integration of resource modelling (Microsoft Office Project) in the project management system in order to establish which of the tagged components are required resources for certain project tasks. In conclusion, the system provides an automatic and easy tracking method for managing materials during materials delivery and inventory management processes in construction projects.

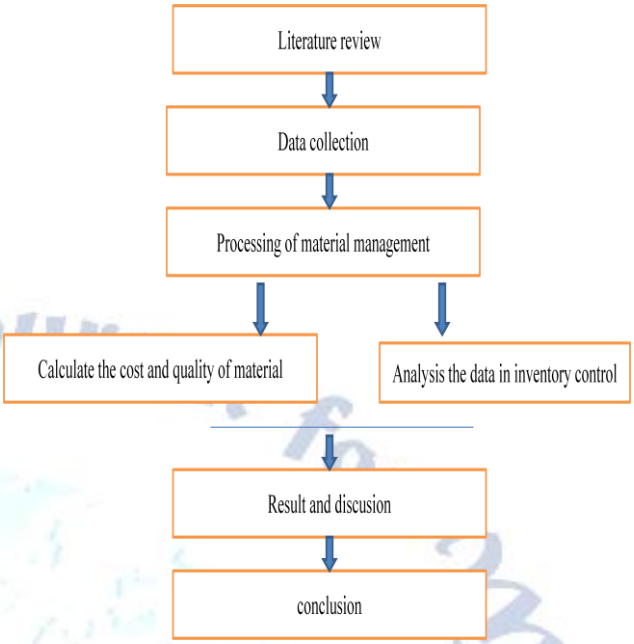
B. Madhavarao k. Mahindra, "a critical analysis of material management techniques in construction project" In this report construction sector, material management plays major role for effective completion of the project. The cost of project increases when the planning, material identification system is poor. Shortage and deficiency in storage of material will cause losses in labor productivity. To maintain the effective management, to achieve the timely supply of materials and equipment and to reduce the cost of projects, a wellplanned material management program is required. This improves planning, higher labor productivity, proper schedules and lower project costs. This paper explains about the techniques for material management for construction project by using SCurve, ABC Analysis for clear understanding the management of four important construction materials. By implementing these techniques, we have found an optimized way to reduce the cost of the project. Using S-curve technique, the variation in planned cost and actual cost is assessed. Quantity of materials procured for the project should be determined by the using A-B-C analysis.

Ss. Asadi, " improving materials management on Construction projects"this report is An essential factor adversely affecting the performance of construction projects is the improper handling of materials during site activities. Materials management is made problematic by materials shortages, delays in supply, price fluctuations, damage and wastage, and lack of storage space. The results were used to develop a real-time framework for integrating RFID-based materials tracking and resource modelling. It is concluded that the prototype system developed can improve materials management on construction projects. And to improve the real-time management of materials on sites, and hence improve project performance.

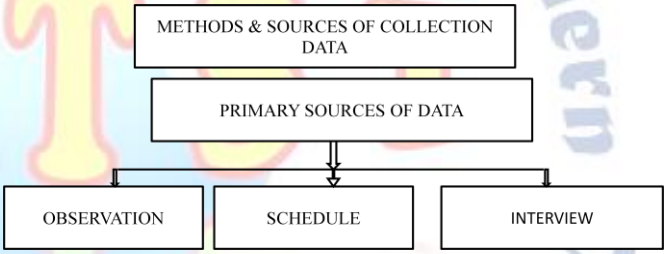
Narimah kasim1, "ICT implementation for materials management in construction projects: case studies "this paper is Construction materials usually constitute a major portion of the total cost in a building construction project. Materials management is made problematic by materials shortages, delays in supply, price fluctuations, damage and wastage, and lack of storage space. Despite the potential benefit of ICT, convincing construction organisations to embrace its use and implementation has proved a difficult task. Microsoft Excel Spreadsheet and handheld devices are found to be the common ICT tools adopted in the materials management processes finally, this paper concludes the finding from interviews towards the ICT implementation of materials management in the construction projects.

Mr.m.kalilurrahman1, mr.s.s.janagan, "construction waste minimization and reuse management "This paper is Construction industry has been developing rapidly around the world. The development has led to serious problem in generation of construction wastes in many developing countries and expectation of the natural resources to large extend. The construction wastes clustered into physical and non-physical waste and it has greater impact to environment, economy and social of each country. Before it can be managed well, it is important to understand the root cause of the generation. This paper identifies and detects factors contributed to the generation of construction waste. Mapping technique was applied for identification works and interview was conducted to detect the physical and non-physical waste. These factors were grouped into seven categories: Design, Handling, Worker, Management, Site condition, Procurement and External factor. The significant factors of each category of waste were determined. The findings will help construction players to avoid, reduce and recycling the physical and non-physical wastes. Furthermore, the paper has put forward some recommendations for better improvements in construction

VIII. METHODOLOGY



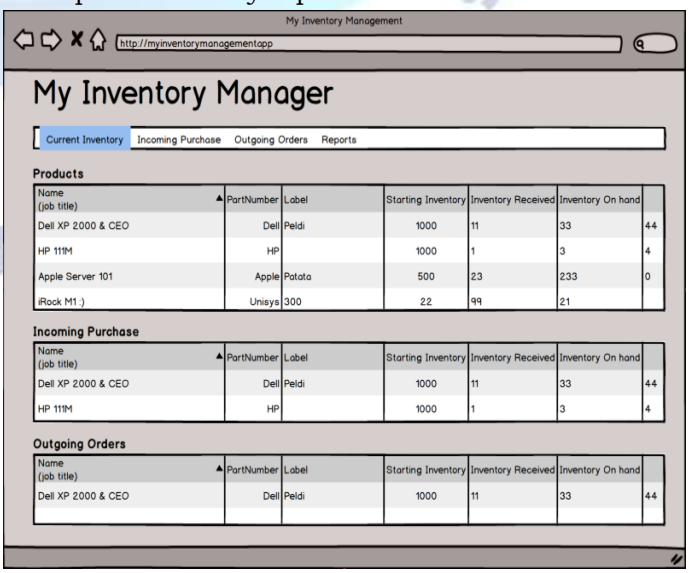
IX. DATA COLLECTION



OBSERVATION

Inventory management system has observed by giving visit to the store department. Bin card. Coding of inventory, inward and outward of inventory, ABC technique all things related to inventory management has been observed.

Example of inentory report



No of floor	Cement quantity in bags	Sand quantity in tons	Aggregate quantity tons	Bricks
Ground floor	4463	303	388	7500
First floor	4595	312	399	8000
Second floor	4595	312	399	8000
Third floor	4595	312	399	8000
Fourth floor	4595	312	399	8000
Fifth floor	4595	312	399	8000
total	32033	2175	2782	47500

X. CALCULATE THE COST AND QUALITY OF MATERIAL

cement quantity and cost

No of floors	cum	Quantity in kgs	Bags	Rate	Amount
Ground floor	405	223155	4463	320	1428160
First floor	417	229767	4595	320	1470400
Second floor	417	229767	4595	320	1470400
Third floor	417	229767	4595	320	1470400
Fourth floor	417	229767	4595	320	1470400
Fifth floor	417	229767	4595	320	1470400

Sand quantity and cost

No of floor	Quantity kgs	Cum	Tons	rate	amount
Ground floor	303490	189.68	303	1500	454500
First floor	312483	195.3	312	1500	468000
Second floor	312483	195.3	312	1500	468000
Third floor	312483	195.3	312	1500	468000
Fourth floor	312483	195.3	312	1500	468000
Fifth floor	312483	195.3	312	1500	468000
total	1865905	1166.18	1863	9000	2794500

Aggregate quantity and cost

No . Of floor	Quantity kgs	Cum	Tons	rate	amount
Ground floor	388289	268	388	550	213400
First floor	399794	276	399	550	219450
Second floor	399794	276	399	550	219450
Third floor	399794	276	399	550	219450
Fourth floor	399794	276	399	550	219450
Fifth floor	399794	276	399	550	219450
total	2787053	1924	2782		1530100

Bricks quantity and cost

No . Of floor	Cum	In 1 cum	Tons	rate	amount
Ground floor	15	500	7500	7	52500
First floor	16	500	8000	7	56000
Second floor	16	500	8000	7	56000
Third floor	16	500	8000	7	56000
Fourth floor	16	500	8000	7	56000
Fifth floor	16	500	8000	7	56000
total	111		55500		388500

Cost and quality

S. No	Materials	Cost	Unit	Quantity
1.	Cement	10250560	Bags	32033
2.	Sand	3262500	Tons	2175
3.	Aggregate	1530100	Tons	2782
4.	Brick	388500	No. Of	55500
	Total cost	15431660		

ABC analysis

Material quantity in percentage=(each materials cost/total cost of materials)*100

Total four material cost = 15431660.00/-

Percentage of cement =(10250560/15431660)*100 =66.42%

Percentage of sand =(3262500/15431660)*100 =21.14%

Percentage of aggregate=(1530100/15431660)*100 =9.91%

Percentage of brick =(388500/15431660)*100 =2.51%

"A"class-5%to 10% of the items represent 60%to70%of money value

"B"Class-15%to 20%of the item represent 15%to 20%of money value

"C"Class-60%to 70%of the item represent 5%to 10%of money value

"A" Material is cement

"B" Material is sand

"C" Material is aggregate and bricks

Safety stock

The safety stock protects firm from trade from tradeoffs due to unanticipated demand for the items level of inventory investments is however increased by the amount of safety stock. Safety levels are ascertained in inventory as apart because there is always an uncertainly involved in time lag usage rate or other factors.

ECONOMIC ORDER QUANTITY (EOQ):

The economic order quantity to the refers to the order size that will result in the lowest total ordering and carrying for an items of inventory. If a firm place unnecessary ordering it will incur unneeded order costs. if a firm places to few order, it must maintain large stocks of goods and will have excessive carrying cost

a) The formula is written as:

$$Q = \sqrt{\frac{2*C_O*S}{C_U*I}}$$

Q= the EOQ order quantity.

D=annual order of the product in. This is the Total quantity of the Material procured by the company.

S= product order cost. The flat fee charged for production of order and is self-sufficient of Q. This is obtained by calculations done.

H= Holding is portion of product cost, considering 5% of the per unit Rate.(This Rate is considered low comparatively, Since the materials is procured for various projects and precast yard having a exclusively excess storage area)

S Curve analysis

S curve analysis is an important project management tool. This analysis is carried for comparison between planned and actual for material items. S-curve provides at view of project performance in terms of cost and time. Analysis of S-curve permits project management team to essay identify the project growth, slippage, and potential problems that could adversely impact the project if no corrective action is taken.

S-curve analysis cost variance is calculated as difference between budget costs for work performed (BCWP)and actual cost for work performed (ACWP).cos performance is calculated as ratio of budget cost for work performed to actual cost for work performed.

XI. CALCULATION

Grade of concrete: M60

Mix proportions 1:1.36:1.74 (1=cement, 1.36=sand, 1.76=aggregate)

Ground floor concrete work =405 (cum) 1CUM of cement = 551 (kgs) Oproxmatily 12bags of cement

Required cement for ground floor (kgs) =area of ground floor *1 cum of cement =405*551 =223155 (kgs)

Cement bags required for ground floor =223155/50=4463 bags for 405 (cum)

Cost of cement bags (50kg) =300.00/-

Total cost of the cement bags for 405(cum)= 4463*300 =1338900.00/-

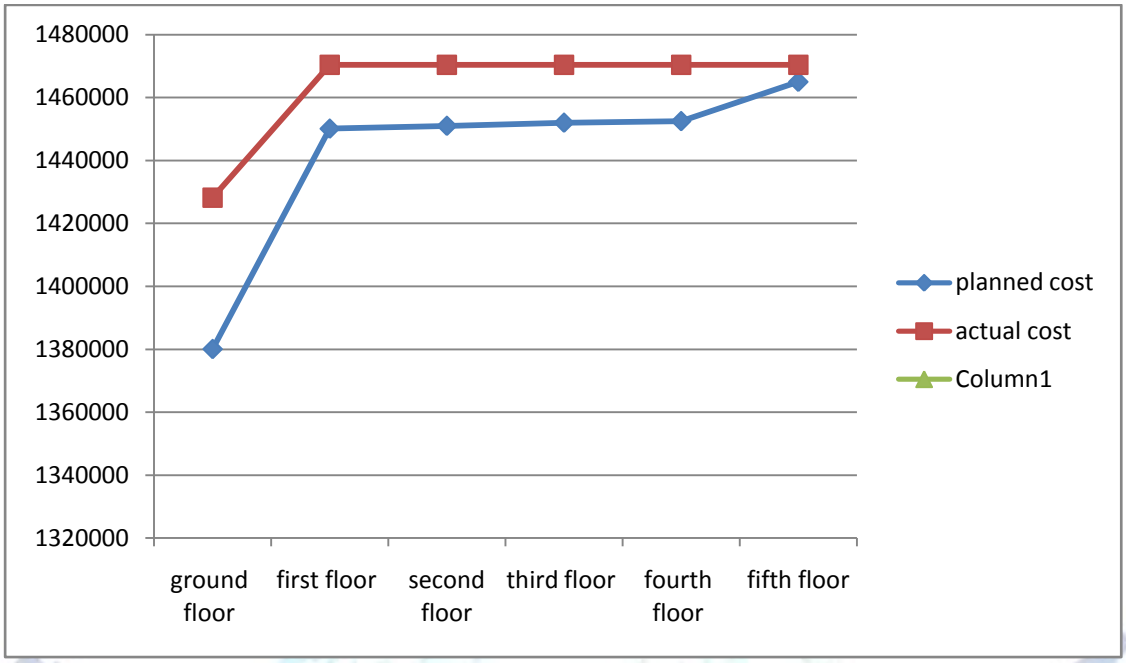


Figure S curve for cement

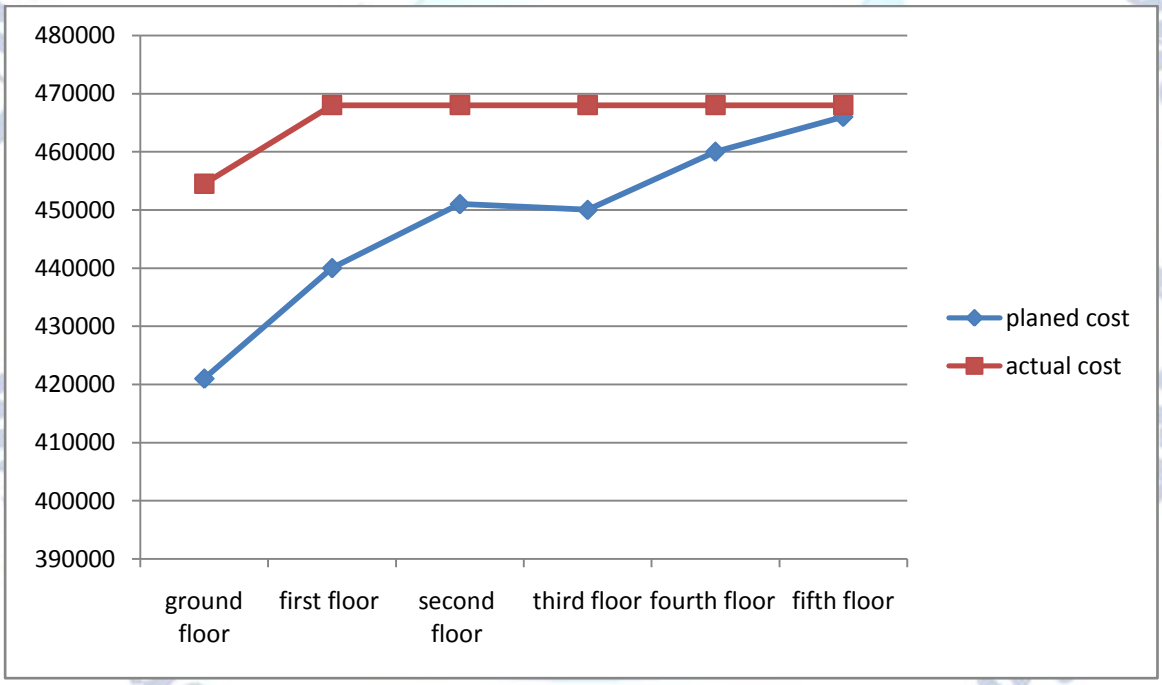


Figure S curve for sand

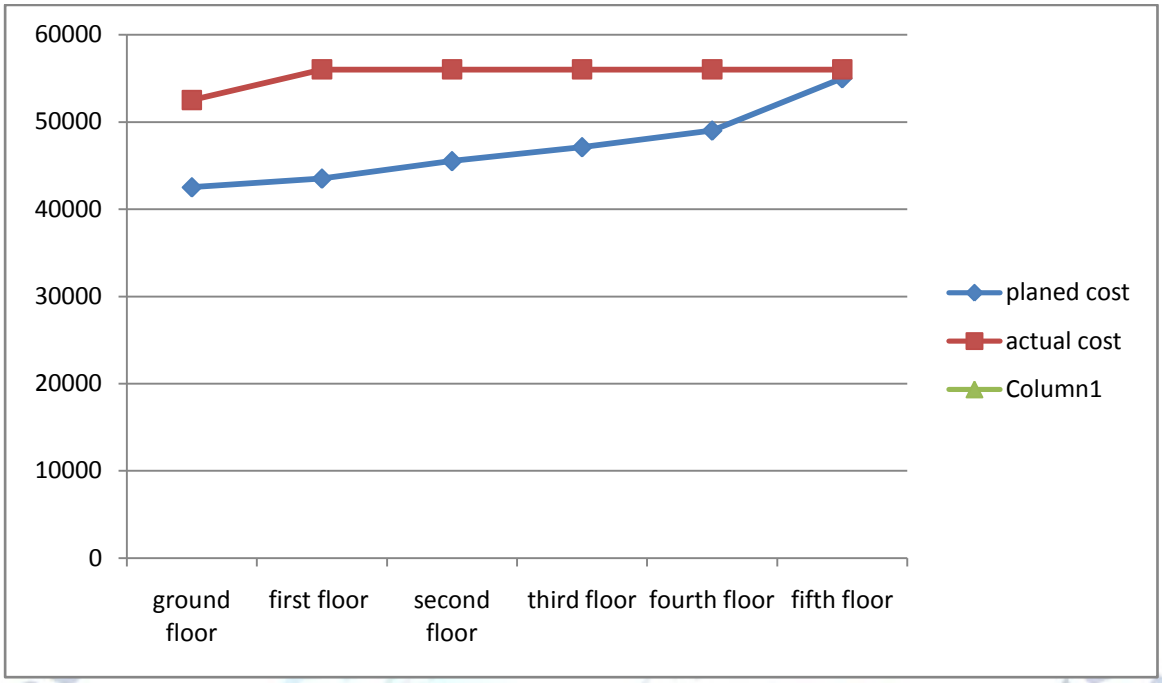


Figure S curve for brick

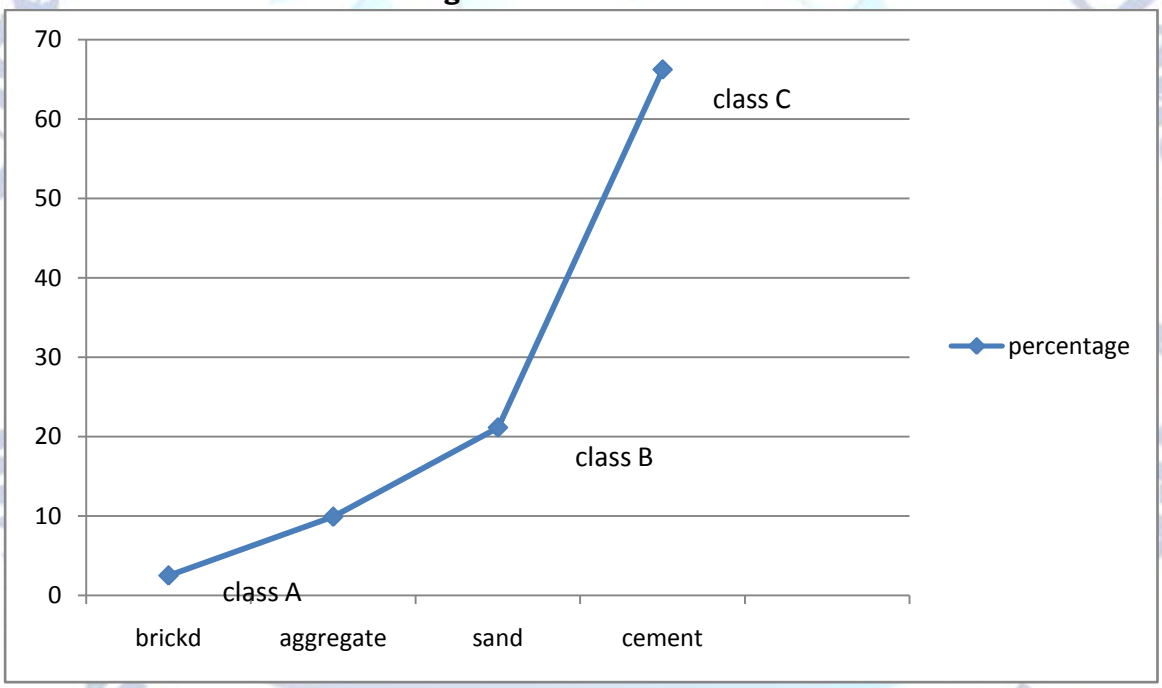


Figure ABC analysis graph

XII. CONCLUSION

In construction industries 70-80% of amount will be used to purchasing material. Sometimes, material fluctuation may give profit or loss to contractor or client. Economic order quantity analysis for cement, which is 506 bags repetition of requesting days which has succeeded the problems of stock out successfully over the actual site stock record. In this project we have proper scheme of material management in the construction industry for building process also conducting survey of industries and to collected all the data also information about the controlling the wastage of material. And analysed all the required data and minimized cost of material by using inventory management system.

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