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Building Construction Sites: The Need for Efficient and Suitable Approach to Material Management

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Abstract

The purpose of the study is evaluating the need for efficient and suitable approach to material management on building construction sites. The building project considers efficient and suitable approach to the materials management on building construction sites. Factors militating against efficient and suitable approach to materials management on building sites, as well as materials management problem. Data for the study was obtained through a structured questionnaire administered to respondents in different construction sites and construction companies in charge of the sites in Ekiti state of Nigeria. Findings reveal that, factors militating against efficient and suitable approach to materials management on building sites: Improper issuing of materials ranked first with mean value 0f 4.15, sourcing of materials and requisition ranked second with mean value of 3.98 and Material receiving and verification of on the construction project sites ranked third with mean value of 2.86, as well as materials management problem, respondents ranked public procurement procedure first with the mean value of 4.47, Problem of delay on the construction projects ranked second with mean value of 4.39 and Difficulty in delivery of materials on the construction projects ranked third with mean value of 4.36.. The respondent identified the following as the measures for efficient and suitable approach for Materials Management on building construction sites: Organize proper documentation, construction projects have to record receipt of goods upon receiving and issuing, monitoring of materials distribution, provision of adequate storage facilities on site, delay in material supply, adequate supervision, and good site security. Based on the findings in the study, appropriate recommendations were being made for effective material management on building construction sites.

Keywords: *Approach, Building project, Efficient, Material Management, Suitable.*

1. Introduction

The word "material" can refer to any of the following: subassemblies, consumable stores, packets of materials, spare parts and components, raw materials, etc. that are utilized in the production of goods or services. According to Al-Darweesh (1999), materials account for 80% of the project timeline and roughly 60% of the overall project cost. A 2% decrease in material costs will result in a 21% gain in profit, assuming a 5.5% margin on project costs. The benefits of having a material management system include increased worker productivity, decreased material surplus, and material availability. Materials make up more than half of the production costs for many manufacturers. The percentage of project cost that goes towards materials tends to rise as production activity gets more automated. However, the percentage of materials cost is smaller for a services company. Profit may be impacted by the cost of using and managing these commodities.

As a result, effective management of them is essential to preventing delays caused by storage, purchasing things that aren't appropriate for their intended use, or incurring significant costs that

would ultimately reduce profit, the foundation of material management. Material management is crucial since a lot of problems occur on construction sites, such as material shortages, improper handling, storage problems, and late material deliveries, among others. These problems lead to cost and schedule overruns and possibly project abandonment. It goes without saying that efficient and successful material management will lessen the issues of needless material waste, material scarcity, cost overruns, and time overruns (Olanrewaju, 2015). All tasks included in this integrated approach to material management would report to a material manager, whose role it is to oversee the acquisition and supply of materials for use by the business.

The foundation and vitality of any building sector are its material resources. This is due to the fact that understocking or improper material management will make any construction organization's production and distribution processes as well as their overall performance unstable. These materials include the aggregates, such as sand and gravel that are used in building sites. If these materials are not managed correctly, the building project will not progress well. Many noble government initiatives in Nigeria during the last 20 years, including commercial development projects aimed at supplying physical infrastructure, have remained mainly unfulfilled. Most projects fail to achieve their aims and come to fruition during the implementation phase (building). The next stage of a building project is often the implementation of the design after it has been conceptualized and designed. Many important decisions that could either help or hurt the project's ability to be completed on time must be taken at this phase of implementation.

Although the material management process is frequently undervalued, improper implementation will have detrimental effects. It is helpful to comprehend the gravity of a material manager's duties in order to appreciate this. The proper materials, in the right amounts, from the right source, at the right time and location, and at the right price must all be guaranteed by the material manager (J. R. Tony Arnold et al, 2014). This stage tests the project team's managerial abilities and capacity to complete any building project successfully. Care must be given to meet the client's demands for timely, cost-effective work that maintains high standards of quality. The aforementioned client requirements are closely related to one another and are influenced by the same variables. An extended project duration, for example, would result in higher building costs, which is ultimately undesirable. This is because more days would be spent using labour and machinery than had previously been budgeted for. If building projects are to be successfully completed on schedule, it is imperative that action be taken to prevent needless and frequent work site suspensions caused by the unavailability of building materials. Inadequate security, improper handling, and storage of building supplies can lead to theft and damage, which further delays project completion.

Management is defined as "working with and through individual to accomplished organizational goal," according to Hersey and Blandard (2003). In addition, Bladdle and Evander (2010) defined management as "the efficient and effective use of resources to achieve objectives and achieving results with and through people" when discussing the purpose of management. The description frequently highlights the manager's concerns about achieving organizational goals and objectives. Thus, it may be claimed that managerial leadership enables organizations to attain their goals. Now that management ideas are more clearly understood, building production can be handled with an awareness of how crucial efficient material management is to the success of the project as a whole. To guarantee that project needs are fulfilled, material management is a planned process that involves the procurement, distribution, handling, and reduction of waste. Additional deductions by (Illingworth and Thain, 1998); Faniran and Caban, 1998) show that a significant portion of

contractors working in Nigeria's construction sector prefer to rely on "intuitive management," which involves managing projects based on gut feelings or prior experience, rather than using any kind of quantitative construction planning. If material management is a planning process as previously described, then raising awareness of the need to stop inappropriate behaviours is always essential to advancing the Nigerian building sector. The planning, organizing, and control of operations primarily related to the flow of materials into an organization is known as material management.

The aim of this project is to identity the efficient and sufficient material management on a building project site with a view to ensuring the completion of project on schedule and checking building cost. The specific objectives are to evaluate the factors militating against effective materials management on building construction sites, to investigate the problems associated with materials management on building construction sites and to recommend measures for effective materials management based on the research findings.

2. Literature Review

2.1. Materials Management

The control of the flow of materials into the business from the supply market forms the cornerstone of material management. "The concept concerned with the management of the flow of material into an organization to the point where those materials are converted into company's out product," according to Wamuo (2016), is how to define it. Nonetheless, the general consensus is that the duties of the material manager should involve working with designers to specify material components, acquiring appropriate materials to help locate variable economic sources of supply, receiving and inspecting materials, incoming traffic, supplier quality control, inventory control, and material control. The philosophical argument for adopting materials management envisages an organization as a service of elements," claims Ericssein (2015). According to this theory, materials management serves as a tool to support economic management for financial gain. The aforementioned indicate that all departments can collaborate as a system to successfully accomplish a corporate objective that has been established. It suggests that issues in organizations arise in their constituent parts rather than as a whole and that these issues are brought about by trying to optimize at the element level as opposed to the enterprise level. According to an alternative perspective, material administration, physical distribution management, and material management are all the same thing and are characterized as a process that encompasses the entire movement of materials from suppliers to customers for a final purpose. The goal of the wider system approach is to successfully implement the contemporary materials management concept in businesses. "The main thrust of the materials management concept in organization is to avoid sub-optimization and to look for system efficiency and effectiveness," according to Dean (2015), "as with all system approach.".

2.2. Obstacles To Successful Material Management in The Building Sector

Every organization has issues with controlling the flow of materials. An effective material management strategy is essential to a project's successful conclusion. For a project to be completed successfully, material organization is a crucial and essential topic for every business. It must be managed well. The following are the effects of material deviations: variations in quantity, quality, time, and product. Materials are essential to the processes in every sector since their scarcity can

hinder output. There are other phases that can lead to issues besides the lack of supplies. Overabundance of materials may also cause managers to face significant challenges. The cost of production and the project as a whole may increase if resources are stored.

Donyani and Flanagan (2019) have classified materials management into five distinct groups. These are measurement and specification; the procurement and purchasing process, in which the supplier receives the order; logistics of delivery to the site, including order verification, offloading, and on-site storage; the administrative and financial process of payment; and the use of materials in production on the job site, along with waste removal. The main barriers to effective material management in terms of purchasing and supply of materials are mismatching materials with orders placed, forgetting to order materials or ordering them in excess of what is needed, and poor relationships and communication between supply chain and contractor companies (Donyani & Flanagan, 2019). Other typical issues with material management on construction sites include: late orders that cause delays in projects; deliveries that occur outside of scheduled times, disrupting work schedules; over ordering; incorrect materials or incorrect material direction necessitating rework; material theft; and double handling of materials.

The primary issues in logistics are incorrect material arrival times or quality, inadequate information about material arrival times or site stock, missing materials, lack of storage space, and labour waste during material search on site. Numerous factors, according to Kasim (2012), might lead to subpar materials management in building projects. The following negatively impact materials management: waste, transportation challenges, incorrect handling on site, misapplication of the specification, absence of a suitable work plan, wrong delivery of goods, and unnecessary paperwork.

2.3. The Effect of Inadequate Material Management on The Timeliness and Cost of Construction Project Delivery

One of the most prevalent issues in the construction business is material management. Inadequate handling of materials may cause problems with the project's overall schedule. Adafin and colleagues (2010) assert that construction material management plays a pivotal role in the economic advancement of the construction sector. According to Ajayi et al. (2017), material management is an integrated process that involves designing, building new structures or remodeling old ones, and employing materials more effectively. It plays a significant role in improving construction performance and resolving issues with material waste management. Numerous writers have demonstrated that a large portion of the production expenses are attributable to material waste from the building company (Saidu & Shakantu, 2016). The overall cost of a building project rises as a result of inadequate material management (Ameh & Itodo, 2013). Nonetheless, starting a project without a sufficient supply of resources and efficient planning of the materials needed for project execution is not ideal. This has the benefit of building strong relationships with the suppliers, who ought to be chosen based on their ability to achieve the standards necessary to meet delivery deadlines over an extended period of time (Adeyinka et al., 2014). Given this, efficient material management techniques are essential to a project's successful conclusion. Effective materials management techniques have the following effects on building projects:

1. **Environmental impact:** This involves preserving natural resources, cutting back on energy use, saving landfill space, and lessening the need for virgin items to reduce environmental effects throughout their life cycle (Van Ewijk & Stegemann, 2016).
2. **Economic impact:** It lowers purchasing costs because non-virgin materials are frequently less expensive than virgin resources; it lowers disposal costs and may lower material transportation costs, which lowers overall project costs; it encourages contractors to submit more competitive bids at lower costs; and it generates employment opportunities and economic activity in the reuse and recycling sectors (Beacon, 2018).
3. **Performance impact:** This includes the reclamation of salvaged or reused materials, which in many applications can function just as well as or better than virgin products; a decrease in the total cost of materials; improved handling of materials; a decrease in duplicate orders; and the assurance that materials will be available on site when needed and in the necessary quantities. Improvements to labour productivity, the project schedule, quality control, field material control, supplier relations, material surplus reduction, on-site material storage reduction, labour savings, stock reduction, purchase savings, and improved cash flow management are all anticipated (Jensen, 2014).

Additional benefits of material management techniques for the construction sector include lower material costs, increased productivity, projects that are completed on time or ahead of schedule, purchase savings, provision of sufficient material storage on site, improvements to project schedules, decreased material waste, and improved cash flow management (Albert, 2014). Planning, purchasing, receiving, inspecting, stocking and storing, issuing supplies, inventory control, and purchasing are all included in the benchmarking process that Patel and Vyas (2011) recommend for efficient material management in construction projects. Panle and Satihuddin (2015) stated in a similar study that the material management process should start with the needs that are created on the construction site. After the Stores Department receives the information acquired from these needs, materials are ordered from the store. Finally, Satihuddin (2015) noted that the best and lowest-value commodities can then be chosen from among vendors

2.4. Suitable Cost Control Methods for Improved Materials Management in Construction Projects

The goal of material control is to reduce and eliminate any wastes and losses that may occur during the procurement, handling, storing, issuing, or consumption of materials. Many strategies are employed in the stages of material planning, procurement, and storage that support and implement material cost control. Constructing new buildings will also produce a lot of waste, which will be problematic for the sector. On the other hand, good and efficient material management planning can help to minimize material waste both on the job site and during building projects. Consequently, this will raise the industry's profitability. Even though it makes less of an economic contribution than manufacturing or other service sectors, Nigeria's construction industry nevertheless plays a significant role in the country's economy (Aibinu & Jagboro, 2012). The building sector's contribution to the expansion of the national economy calls for increased industry efficiency in terms of timeliness and cost effectiveness, both of which would save national costs. It is also widely known that the execution of building projects in the sector is typically accompanied by low-quality delivery, delays in delivery, increased costs, and dissatisfied owners (Hafez, 2011). Thus, according to Abdul-Rahman and Alidrisyi (2014), the effective use and management of material profit and can cause a delay in project building.

In order to make sure that requirements are fulfilled, material management is a planned process that involves the procurement, distribution, handling, and reduction of waste (Illingworth & Thain, 2011). Culvert (2013) asserts that in order to guarantee material availability, a thorough material schedule and coordination of the material order and requisition are crucial. The secret to excellent productivity on the job site is effective material planning. If the material planning process is not carried out correctly, productivity will suffer from ordering, scheduling, and quantifying. A comprehensive idea for a material management system (mms) was presented by Bell and Stukhart (2017). It integrated and consolidated the material take-off, under assessment, purchasing expediting, warehousing, and distribution operations. The approach reduced costs and increased worker productivity and manpower. Al-Jibouri (2002) presented a computer simulation model that, by maintaining a preset list of the order and delivery time of all the materials on site, helps to solve the problem of order and delivery of materials in real life. Project delivery errors of any kind pertaining to materials management can lead to major cost overruns and delays in project completion. These cost inefficiencies will hurt the world's ability to compete, which is why owner operators, engineering, procurement, and construction firms are working to optimize project workflows.

If supplies needed for specific tasks are unavailable, delays and additional costs may occur. Materials may also deteriorate while being stored or be stolen. Manufacturers in many other industry sectors outside of construction have adopted modern material management techniques (Kaming et al., 2017). Sheriff et al. (2015) define cost control as the process of analyzing unprocessed data from projects, operating divisions, and special staff divisions and connecting it to different project cost estimates and schedules in order to provide the results in reports to all levels of management within the company, the client, and external agencies. The goal of cost control of a project is to obtain the maximum profit within the allotted period and satisfactory quality of work. It also entails measuring and collecting the cost record of a project and work progress and comparing the actual project with the planning. Because of this, implementing cost control procedures during site operations will result in efficient site materials management. The following are the primary cost control strategies that may be applied to accomplish this: budget planning; tracking expenses; efficient time management; project change control; and utilization of earned value.

3. Research Methodology

Eighty (80) questionnaires were distributed to the relevant professionals which include Architects, Builders, Quantity Surveyors and Engineers practicing in Ekiti State. The professionals involved are Architects, Builders, Engineers and Quantity Surveyors in the study area. However, Seventy (70) copies of questionnaires were retrieved and they were good enough for analysis. This is representing a response rate of 85 percent, which is far above the usual response rate of 20-30 percent for questionnaire surveys in construction management studies which were suggested by Akintoye, (2000). Data obtained was further analyzed using descriptive statistic such as, measure of central tendency (mean), percentages/proportion and measure of dispersion (standard deviation). The variables used for measurement is ordinal and interval scales. Asika (2010) and generally Excel Spread Sheet was used to analyze and process data obtained.

For the purpose of quantifying qualitative variables, the Likert scale, which asks respondents to rate items on a scale between 1 and 5, was established for use in social sciences and management

research. It gathered information about building construction sites: The need for efficient and suitable approach to material management. On a scale from 1 to 5, the replies to the questionnaire's items were recorded. The items on the questionnaire were scored on a 5-point scale ranging from 1 to 5. "Strongly Agree" received a score of 5, "Agreed" received a score of 4, "Undecided" received a score of 3, "Disagreed" received a score of 2, and "Strongly Disagreed" received a score of 1. Bakhary (2005) proposed an equation for calculating the mean item score (MIT) in prevalence data:

$$\text{MIT} = \frac{\sum \mu}{AN} \qquad (0 \leq index \leq 1)$$

Where μ is the weighting assigned by respondents to each factor.

A has the most weight (i.e., 5 in this case).

N represents the total number of respondents

4. Data analysis and discussion

Data analysis and discussion shows the analysis and results of the data obtained from the fieldwork concerning the objectives of this research.

Table 1: Sex of Respondents

S/N	Classification	Frequency	Percentage (%)
1.	**Female**	25	30
2.	**Male**	45	70
3.	**Total**	**70**	**100**

Source: Field Survey, (2024)

The demographic information of the respondents is presented in Table 1. The table provided the necessary information to check the quality of the obtained data. From table 1, 30% percent represent female out of the sex of respondents while 70% percent are male. The purpose of the sex of the respondents is to balance the gender equality among males and females.

Table 2: Profession of Respondent

S/N	Classification	Frequency	Percentage (%)
1.	**Architect**	13	19
2.	**Builder**	16	23
3.	**Engineer**	12	17
4.	**Quantity Surveyor**	15	21
5.	**Structural Engineer**	14	20
6.	**Total**	**70**	**100.00**

Source: Field Survey (2024)

Engineers and Quantity surveyors represent more than half of the population with 36% and 34% respectively, Architects connote 20% and Builders represent 10% of the profession of the respondents. The purpose of the profession of the respondents is to have adequate and relevant

responses as related to each professional's contributions on the course of the studies in relation to the use of this research.

Table 3: Academic qualifications

S/N	Classification	Frequency	Percentage (%)
1.	**NCE/ND**	12	17
2.	**HND/ B.Sc./B.Eng/B. Tech**	38	55
3.	**M.Sc/M.Tech/M.Eng**	10	14
4.	**PhD**	10	14
5.	**Total**	**70**	**100.00**

Source: Field Survey (2024)

Table 3 showed that 17% of the respondent have NCE/ND as their academic qualification which can undergoes tutelage courses and become a fully registered of each profession, 55% of the population have HND/ B.Sc./B.Eng/B. Tech, 14% of the respondents have M.Sc/M.Tech/M.Eng., and 14% of the respondents have PhD.

Table 4: Years of experience

S/N	Years of experience	Frequency	Percentage (%)
1.	**1 - 5**	17	24.28
2.	**6 - 10**	12	17.14
3.	**11 - 15**	6	8.57
4.	**16 - 20**	14	20
5.	**21 - Above**	21	30
6.	**Total**	**70**	**100.00**

Source: Field Survey (2023)

In terms of year of experience, those with a range of 1-5 years were 21%, 6-10 years" experience was 32%, 6% represent those within 11-15 years, 14 represent 16-20 years and those above 20 represent 27%.

Table 5: Rank and Position

S/N	Classification	Frequency	Percentage (%)
1.	SSML	18	26
2.	MML	23	33
3.	KLML	8	11
4.	Operation level	21	30
5.	**Total**	**70**	**100.00**

Source: Field Survey (2023)

Lastly, concerning the number of projects handled by each profession 30% have handled 1-5 number construction projects. 6-10 construction projects were 14%, 10% of the population

belongs to 11-15 numbers of executed projects, 15- 20 numbers are 27% while 20 above number of executed projects is 17%. Based on the findings above this can be affirmed that the data provided by the respondents are reliable.

Table 6: Factors militating against effective materials management on Construction project sites.

S/N	Factors	Mean	Ranking
1.	Improper issuing of materials on the enterprise's construction projects site	4.15	1st
2.	Sourcing of materials and requisition	3.98	2nd
3.	Material receiving and verification of on the enterprises construction project sites	2.86	3rf
4.	Possession of qualified staff on the enterprise construction sites	2.83	4th
5.	The enterprise's procurement process of materials	2.82	5th
6.	The enterprise's quality inspection and control system	2.80	6th
7.	Types of construction materials	2.77	7th
8.	The enterprise's construction project sites staff level of awareness	2.75	8th
9.	Type of construction project	2.73	9th
10.	The enterprise's material demand estimation system	2.71	10th
11.	The enterprise has selected and pre-determined supplier in the construction project sites	2.70	11th

Source: Field Survey (2024)

Table 6 showed that majority of the construction professionals believe that the factors which have bigger effect on material in the enterprise's construction site are improper issuing of materials with mean value (4.15), sourcing of materials and requisition with mean value(3.98), materials handle with mean value (2.38), stock and waste control system (2.30), project duration of time (2.40),time management system(2.56), financial managing ability (2.66), availability of construction equipment (2.66),material transportation system (2.66). On the other hand, the factors, which have lower effect to materials management on defence construction enterprise's construction project sites, are material receiving and verification (2.86), qualified staff (2.84). From the above it can be deduced that, improper issuing of materials, sourcing of materials and requisition, wrong stock and waste control system and not enough duration of time for project completion are the major factors that are affecting effective materials management in defence construction enterprise construction project sites.

Table 7: Materials management problem

S/N	Factors	Mean	Ranking
1.	Public procurement procedure	4.47	1st
2.	Problem of delay on the construction projects	4.39	2nd
3.	Difficulty in delivery of materials on the construction projects	4.36	3rf
4.	Damage of materials at the construction project sites	4.34	4th
5.	Surplus materials at the construction project sites	4.28	5th
6.	Congestion at loading area on the construction project sites	4.26	6th
7.	Material management problem due to weather condition on construction project sites	4.22	7th
8.	Operation limitation at the enterprise's Construction project sites due to security considerations	4.19	8th
9.	Dust pollution due to poor material management system on construction project sites	3.90	9th
10.	Material management problem due to lack of storage space on construction project sites	3.87	10th
11.	Selected and pre-determined supplier in the construction project sites	2.70	11th

Source: Field Survey (2024)

Table 7 above shows the materials management problem on construction, the public procurement procedure has impact on the enterprise material management system is high with mean value of 4.47, followed by delay on enterprise's construction projects with mean value of 4.39, difficulty in delivery of materials have the mean value of 4.36, while materials damage with mean value of 4.39. It can be inferred that the hope of solving the materials management problem lies not only on the hands of the construction professionals of the enterprises but also on the hands of procurement policy maker.

Table 8: Measures for effective materials management

S/N	Factors	Mean	Ranking
1	Organize proper documentation on the construction project sites	4.21	1st
2	Construction projects have to record receipt of goods upon receiving and issuing	4.18	2nd
3	Monitoring of materials distribution	4.17	3rd
4	Provision of site store safe from theft and vandalism on the construction project sites	4.13	4rh
5.	Receiving and inspecting materials on site have to be exercised on the enterprise's construction project sites	4.11	5th
6.	Ensure quality assurance/control processes are in place	4.09	6th
7.	Implementation of proper assigning of material codes on construction project sites	4.07	7th
8.	Storage and issuing of materials to construction site	3.99	8th
9.	Logistics for tracking and transportation of materials to site	3.98	9th
10.	Education/training/enlightenment of staff in charge of materials management	3.97	10th
11.	Usage of qualified construction professionals.	3.94	11th
12.	Provision of complete quality records of materials	3.91	12th
13.	Relate properly construction activities and schedule of materials	3.87	13th
14.	Timely placing of orders for materials	3.77	14th
15.	Established material management system on building construction sites.	3. 69	15th
16.	Materials return from the construction project sites is to be submitted weekly.	3.55	16th

Source: Field Survey (2024)

Table 8 shows the measures for effective materials management. The respondents strongly agree that should be measures for effective materials management practices in defence construction enterprise construction project sites, since all have the mean value above 3. 50

5. Findings and Discussions

The information gathered for this research was dispersed equally among all kinds of construction sites where materials management systems are in place. Nonetheless, the study reveals the most typical ways in which poor material management causes a delay in the project's completion date. The results indicate that bulk material procurement for construction sites is more common on the enterprise's construction project sites when a monthly market study is conducted prior to ordering. This is a best practice for materials procurement for construction sites that promotes efficient materials management. The study has also determined that the following factors contribute to material waste on building construction sites: improperly handled and reworked damage; insufficient storage facilities on site; incorrectly chosen construction work methodology; low-quality material; inadequate coordination and communication between the consultant engineer, client, and contractor; delayed material supply; faulty planning on construction works; inadequate

supervision; altered material specifications and design By giving workers greater authority over the site and protection throughout the initial phases of the contract, good site management will sincerely try to address these issues.

6. Conclusion

Materials management processes require a transformation to improve the overall in handling of materials for more efficiency and effectiveness on the construction project sites. This is because poor handling of construction materials affects the overall performance of construction projects in terms of cost, time, quality and productivity. The minimization of materials wastage during the construction phases is important in order to avoid loss of profits. Damage by mishandling, inadequate storage facilities on site, delay in material supply, inadequate supervision, poor site security, weather and other natural occurrence, rework, alteration of designs, over ordering of construction materials, theft and Vandalism.

6.1. Recommendations

Based on the results of this study, the following recommendations are made to foster effective materials management practice of construction projects:

1. There should be an improved methods and facilities for properly storing building materials are required at the construction site to avoid unnecessary damage and waste.
2. There should be a provision for training and retraining of management and site personnel.
3. The project manager should coordinate dimensions between materials ordered for on-site use and those specified during design in order to advise site staff on minimizing waste.
4. Strict adherence to the project documents and appropriate planning of material management should be implemented from the beginning of the project's execution.
5. Regardless of the size of the building site, material management should be implemented

7. References

Abdul Rahman, H. & Alidrisyi, M. N (2014). A Prospective of Material Management Practices in a Fast-Developing Economy: The case of Malaysia. Construction Management & Economics, 12, 413-422

Adafin, J. K., Daramola, O. & Ayodele, E. O. (2010). Studying of Material Control Strategies in some Selected Construction Firms in Nigeria. Continental Journal of (online) Sustainable Development 1:62-72.

Adams, Z. . Hashim. H & Jagboro, S. A (2012). Factors Affecting Material Procurement, Supply and Management in Building Perspective. 168 185. Available at www.worldscientificnews.com.

Adeniyi, S. O., Adams O, Akinadee, O. O., Bilal, M., Alaka, H. A. & Owolabi, H. A. (2013). Optimizing material procurement for construction waste minimization: An exploration of success factors. Sustainable Material and Technologies, 11, 38-46.

Adeyinka, B. F., Jagboro, G. O., Ojo, G. K. & Odediran, S. J. (2014). An assessment of construction ethical standards in the Nigerian construction industry. Journal of Construction Project Management and Innovation, 4(1), 863-881.

Akintoye, J. N. & Haupt, T. C. (2000). Implementation of Health and Safety Practices: Do

Demographic Attributes Matter? Journal of Engineering Design & Technology, 12(4), 531 550. Available at www.emeraldinsight.com/1726 -0531.htm

Asika, A. A. & Jagboro, G. O. (2010). The Effects of Construction Delays on Project Delivery in Nigeria Construction industry. International Journal of Project Management, 20, 593-599.

Ajayi, J and Hachey, D (2017) Effects of delay times on production rates in construction, 43 Journal of Construction Engineering and Management, 121(1).

Al-Darweesh. A. (1999). Measuring the Effectiveness of Materials Management for Industrial Construction Projects.

Ameh, V.K. and Itodo, O (2013) Forecasting productivity by work sampling, Construction Management and Economics, 7, 19-28.

Bakhary, N. (2005): "Arbitration in Malaysia Construction Industry" Retrieved 12th January, 2008 from http://www.efka.utm.my/thesis/images/

Beacon, B. M. (2018). Sustainability and the future of supply chain management. Operations and Supply Chain Management, 1(1), 4-18.

Bell, L. C. & Stukhart, G. (2017). Attributes of Material Management System. Journal of Construction Engineering and Management, 112, 14-21

Bladdle E. and Evander P. (2010). Determining Sample Size for Research Activities. Educational and Psychological Measurement, 30, 607610.

Culvert, A. A., & Adogbo, K. J. (2013). Assessment of Level of Implementation of Health and Safety Requirements in Construction Projects Executed by Small Firms in Abuja.

Donyani. R. Ogunsemi, O. A. Awodele & A. E. Oke (2019) Proceedings of the 2nd Nigerian Institute of Quantity Surveyors Research Conference. Federal University of Technology, Akure. 1st 3rd September. 467 482.

Donyani, S. & Flanagan, R. (2019). The Impact of Effective Material Management on Construction Site Performance for Small and Medium Sized Construction Enterprises. Proceedings of the Association of Researchers in Construction Management, pp. 11-20.

Ericssein, A and Flanagan, R and Norman and Notman, D (2015) The changing role of builder merchants in the construction supply chain, Construction Management and Economics, 16, 351-361.

Hachey N. and Christian (2015). Residential Project Obstacles and Problems in Kuwait MS Project Development of Civil Engineering, Kuwait University.

Hersey B, and Blandard A, Hiraki, J. O. & Itodo, E. D. (2013). Professionals views of 44 materials wastage on construction sites. Organization, Technology and Management in Construction: An International Journal, 5(1), 747-757.

Hiraki, G (2014) Greening the construction supply chain in Singapore, European Journal of Purchasing and Supply Management, 6, 195-206. Jessop, M. (2004). Lean Waste Stream: Reducing Material Use and Garbage Using Lean Principles. CRC Press.

Illingworth, J. and Thain, K. (1998). *"Material Management is it Worth It?"* Technical Information Service, The Chartered Institute of Building ASCOT. 93, 1-5.

J. R. Tony Arnold, Stephen N. Chapman, Lloyd M. Clive (2014). Introduction to Materials Management sixth edition. Pearson Education, Inc., Upper Saddle River, New Jersey 07458.

Kaming, P.F., Olomolaiye, P.O., Holt, G. O. & Haris, F. C. (2017). Factors Influencing Construction Time and Cost Overruns on High-rise Project in Indonesia. Construction Management and Economics, 15(1), 83-94

Kasim, N. (2012). Material Management Practices in Construction Projects. Department of Construction and Real Estate Management University Tun Hussian in Malaysia.

Lu, K (2006) A framework of supply chain management literature, European Journal of Purchasing and Supply Management, 7, 39-48

Morenikeji, W. (2006). Research and Analytical Techniques (for Social Scientists, Planners & Environmentalists). Jos: Jos University Press Ltd.

Olanrewaju, S.B.O, (2015). Appraisal of Material Management Strategies of Construction Firms in Ekiti state, Nigeria. Unpublished M.Tech Thesis, Department of Building Technology, Abubakar Tafawa Balewa University, Bauchi, Nigeria.

Patel, K. V., & Vyas, C. M. (2011). Construction Material Management on Project Sites. In National Conference on Recent Trends in Engineering & Technology. 1-5.

Pauline, N. L. (2014). Factors Affecting Material Management in Building Construction Projects. International Journal of Scientific Engineering and Technological Research 03(1021332137).

Rivas, A. (2011). Analysis of Factors Influencing Productivity Using Craftsmen Questionnaires. Journal of Construction Engineering and Management, 312-320.

Saidu S. & Shakantu, J. A. (2016). Limitations of the waste hierarchy for achieving absolute reductions in material throughput. Journal of Cleaner Production, 132, 122-128.

Satihuddin, I. & Shakantu, W. (2015). The contribution of construction materials waste to project cost overruns in Abuja, Nigeria: review articles. Acta Structilia: Journal for the Physical and Development Sciences, 23(1), 99113.

Sheriff, M. H., Remon, F. A. & Hala, M. M. (2015). Optimal Techniques for cost Reduction and Control in Construction Sites. Journal of Human Research Management, 3(3), 17- 26.

Shittu, A. A. (2016). Influence of Organisational Characteristics on Health and Safety Practices of Small and Medium-sized Construction Companies in Abuja. Unpublished PhD Thesis, Ahmadu Bello University, Zaria.

Shittu, A. A., Ibrahim, A. D., Ibrahim, Y. M. & Adogbo, K. J. (2015). Assessment of Level of Implementation of Health and Safety Requirements in Construction Projects Executed by Small Firms in Abuja. In D. R. Ogunsemi, O. A. Awodele & A. E. Oke (Eds). Proceedings of the 2nd Nigerian Institute of Quantity Surveyors Research Conference. Federal University of Technology, Akure. 1st 3rd September. 467 482.

Van Ewijk, S. & Stegemann, J. A. (2016). Limitations of the waste hierarchy for achieving absolute reductions in material throughput. Journal of Cleaner Production, 132, 122-128.

Wamou, A (2016) Just-in-time application and implementation for building material management, Construction Management and Economics. 13, 105-113.

Zenz, H and Proverbs, D (2003) Construction time performance: an evaluation of contractors from Japan, the UK and the US, Engineering, Construction and Architectural Management, 9(2) 81-89