

AN INVESTIGATION OF THE IMPACT OF PROPER MAINTENANCE OF MATERIAL RESOURCE INPUTS ON THE PERFORMANCE OF TECHNICAL EDUCATION GRADUATES IN BUILDING CONSTRUCTION INDUSTRIES IN LAGOS STATE

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ABSTRACT

This study investigated the impact of proper maintenance of material resource inputs on the performance of technical education graduates in building construction industries in Lagos State. Five research questions guided the study. The study adopted descriptive survey design. The population for the study was 201 building technology graduates. There was no sampling because of manageable size of the population. A structured questionnaire was used for data collection. Three experts face validated the structured questionnaire. Cronbach alpha reliability method was employed to determine the internal consistency of the questionnaire items and 0.86 reliability coefficient value was obtained. The five research questions were answered using Mean and standard deviation. The findings of the study revealed: (1) ten status of various tools and equipment used for building construction by craftsmen were revealed by the study (ii) 10 impacts of proper maintenance of tools and equipment on the performance of building craftsmen in setting out (iii) thirteen impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying were agreed upon (iv) six impacts of proper maintenance of tools and equipment on the performance of building craftsmen in flooring (v) that impacts of proper maintenance of tools and equipment on the performance of building craftsmen in wall setting found out in this study were eleven. Recommendations include that all the tools and equipment using for building construction work should be properly maintained for maximum productivity. Workshop and seminars on importance of proper maintenance of tools and equipment should be organized for building construction craftsmen

Keywords: *maintenance, resource inputs, performance, technical education, building construction.*

Introduction

Vocational and technical education in the simplest form means various skill jobs which individuals could embark upon based on ability, interest and exposure to a complimentary or relevant pedagogy for possible inquiry and development in future due to innovations (Olaitan, 2020). Simply put, the term, vocational and technical education could be illustrated as follows: Vocation means relevant jobs or occupations like agriculture, home economic, technology and business occupations in addition to relevant pedagogy such as educational psychology, methodology of instruction, measurement and evaluation, guidance and counseling, work experience in the industry or schools among others. A combination of any occupation in vocation and pedagogy leads to a well-trained individual in vocational or technical education. Building construction is any industry that has the main objective of

constructing, renovating demolishing, relocating, maintaining and repairing of buildings, chimneys sporting, recreational activities waste disposal, fencing, landscaping structural works using building equipment and tools (Krause, 1996). Building construction according to Duruzeochi (1999) covers a wide range of loosely integrated group involved in the construction, renovation, alteration repairs and maintenance of buildings. Sley (1993) observed that building construction satisfies man's needs for shelter and infrastructures such as houses, schools, offices, hospitals, shops, factories, recreational facilities ware houses, banks, churches etc. and to construct all equipment, tools and materials are involved. Thus building construction is the pivotal and primary conduit for infrastructure development in developed and developing countries. Building construction is an organized education which is directly related to preparation of individual for paid or unpaid employment or for additional preparation for a career. Knowledge and skills acquired by individuals in building construction are used to erect buildings that serve as homes for humans.

Buildings serve as shelters for humans and their belongings. They must be properly planned, designed and erected to obtain desired satisfaction from the environment. The factors to be observed in building construction include durability, adequate stability to prevent its failure or discomfort to the users, resistance to weather, fire outbreak and other forms of accidents. The styles of building construction are constantly changing with the introduction of new materials and techniques of construction. Consequently, the work involved in the design and construction stages of buildings are largely that of selecting materials, components and structures that will meet the expected building standards and aesthetics on economy basis.

The building that is well designed and constructed is required to satisfy the basic needs, which include the following: resistance to penetration of rainwater, sun, and protection against wind. Buildings are also expected to regulate heat (thermal insulation), insulate sound, and provide resistance to fire outbreak and security to man and materials among others. Ezeji (1984) observed that these are the basic functions of buildings. He explained that, buildings that do not satisfy these functions have not satisfied the objectives of their construction. Non-satisfaction of the objectives could result from lack of technical expertise required and good workmanship of construction activities of such building. American Society of Civil Engineer ASCE (2007) stated that most building were less efficient and were designed more conservatory than necessary because of limited knowledge of personnel, at the same time pressure to achieve efficiency or economy in design or versatility in occupancy may lead to system that have little inherent energy absorbing collapse. To reduce frequent occurrence of building collapse there is need to have plans or take series of actions which will improve the performance of the craftsmen/graduates to ensure competencies in performing their responsibilities. Parts of the series of actions to be taken include proper maintenance of hand material resource inputs such as tools and equipment.

Hand tools are simple objects used to carry out a given task. Nkaru (2010) described hand tools as an object designed to do a specific kind of work such as cutting or chopping by directing manually applied force or by means of a motor. Examples of building construction hand tools include trowel, shovel, cutlass, head pan, line, range etc. Equipment on the other hand are tools that are more complex and required special knowledge and skills for their operations. Equipment according to Microsoft (2009) is the intellectual and emotional

resources that enable somebody to succeed at a task. When hand tools and equipment are misused they reduce job performance of the users such as craftsmen. Misuse can also cause fatal accidents. Hand tools and equipment has great impact on performance of building construction craftsmen. In Lagos State, among building construction craftsmen, researcher observed that they work with all kinds of tools and equipment without carrying out proper maintenance and this has resulted to low productivity among the craftsmen in the site. These craftsmen often sustain injuries and have accidents at building construction site. Bad maintenance culture of these craftsmen results to low performance of craftsmen of building construction. The negative impact could be eliminated by embarking on proper maintenance of hand tools and equipment. It could also improve the performance of craftsmen. The craftsmen, who are specifically trained, through formal academic and practical experience, to manage the production process of building project on day to –day basis, are builders (Bamisile, 2006). A craftsman is a skilled manual worker who uses tools and machinery in a particular craft. The status is considered between a laborer and a professional, with a high degree of both practical and theoretical knowledge of their trade. These artisans/tradesmen/craftsmen are the bricklayers/block layer, masons, carpenter/joiners, glazers, electricians, plumbers, painters/decorations, plasterers, welders/iron workers, scaffolders, building inspectors, site supervisors and others that may be required in the building construction services.

Building construction graduates, craftsmen and builders work together in the site. Builders are professionals at the center of the physical construction of building. Their roles in building development process in general, are to construct building. They do these by taking charge of the activities on a building construction site in translating designs, working drawing, schedules and specifications into physical structure. Performance in the statement of Quirk (1995) is the process of carrying out a piece of work or function.

Maintenance is an activity that is done regularly to keep a machine, building, or piece of equipment in good condition and working order (Bakare, 2014). Maintenance including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring. The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. This may be by preventing the failure before it actually occurs which planned maintenance and condition based maintenance help to achieve. It is designed to preserve and restore equipment reliability by replacing worn components before they actually fail. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure. The need for maintenance is predicated on actual or impending failure – ideally, maintenance is performed to keep equipment and systems running efficiently for at least design life of the component(s).

Maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring. The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. This may be by preventing the failure before it actually occurs which planned maintenance and condition based maintenance help to achieve. It is designed to preserve and restore equipment reliability by replacing worn components before they actually fail. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure. The need for maintenance is predicated on actual or impending failure – ideally, maintenance is performed to keep equipment and systems running efficiently for at least design life of the component(s).

There are different types of maintenance to be carried out on hand tools and equipment: Breakdown maintenance means that people wait until equipment fails and repair it. Such a thing could be used when the equipment failure does not significantly affect the operation or production or generate any significant loss other than repair cost.

Corrective maintenance can be defined as the maintenance which is required when an item has failed or worn out, to bring it back to working order. Corrective maintenance, sometimes called repair, is conducted to get equipment working again (Boston, 2014). Corrective maintenance improves equipment and its components so that preventive maintenance can be carried out reliably. Equipment with design weakness must be redesigned to improve reliability or improving maintainability. Corrective maintenance is probably the most commonly used approach, but it is easy to see its limitations. When equipment fails, it often leads to downtime in production. In most cases, this is costly business. Also, if the equipment needs to be replaced, the cost of replacing it alone can be substantial. It is also important to consider health, safety and environment (HSE) issues related to malfunctioning equipment. Corrective maintenance is carried out on all items where the consequences of failure or wearing out are not significant and the cost of this maintenance is much greater than preventive maintenance. Maintenance prevention indicates the design of new equipment.

Preventive maintenance is a daily maintenance (cleaning, inspection, oiling and re-tightening), design to retain the healthy condition of equipment and prevent failure through the prevention of deterioration, periodic inspection or equipment condition diagnosis, to measure deterioration (Mike, 2013). It is further divided into periodic maintenance and predictive maintenance. Just like human life is extended by preventive medicine, the equipment service life can be prolonged by doing preventive maintenance. Preventive maintenance is maintenance performed in an attempt to avoid failures, unnecessary production loss and safety violations. The effectiveness of a preventive maintenance schedule depends on the RCM analysis which it was based on, and the ground rules used for cost-effectively.

Time based maintenance consists of periodically inspecting, servicing and cleaning equipment and replacing parts to prevent sudden failure and process problems. Predictive maintenance is a method in which the service life of important part is predicted based on inspection or diagnosis, in order to use the parts to the limit of their service life. Compared to periodic maintenance, predictive maintenance is condition based maintenance. It manages trend values, by measuring and analyzing data about deterioration and employs a surveillance system, designed to monitor conditions through an on-line system.

Maintenance is really a productive activity both at the private (leads to lower depreciation cost) and at the national levels (leads to lower expenditures on replacement). To achieve maintenance goals some issues need to be developed like, proper guidelines and standard, proper scheduling of activities, and provide necessary resources (financial and human) (Duffuaa, 1992).

These craftsmen need the basic skills to handle and maintain hand tools, equipment and materials accurately, efficiently and safely. Good manual dexterity, eye-hand coordination,

physical fitness and a sense of balance are important. Building craftsmen erect building structures. This involves hard work and risk taking, which require competence of craftsmen. These craftsmen need to be well qualified in their areas of specialty and keep their knowledge and skills up to date in the world of work. In the light of this, McClelland (2001) asserted that the implication of the changes in the construction industries require the continued development of professionals in the building industry. In Nigerian for instance, and Lagos state in particular, there is lack of proper professional growth among construction workers (National Institute of Standards and Technology, 2001). Consequently, this construction workers knowledge, skills, attitudes to work is obsolete and cannot give what they lack. Such construction workers employ unsuitable methods of construction; use inferior materials, which result to faulty construction and foundation failure. There is need to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State.

Statement of the Problem

Hand tools and equipment are relevant facilities for building all kinds of houses in Lagos State. They are used because of their convenience. First class or well maintained hand tools and equipment are expected to increase job performance of building construction craftsmen in setting out, foundation laying, flooring and wall setting. In Lagos State, among building construction craftsmen, researcher observed that they work with all kinds of tools and equipment without proper maintenance and this has resulted to low productivity among the craftsmen in the site. In order to confirm the observation of the researcher that low performance of craftsmen is as a result of using hand tools and equipment that not are properly maintenance, this study is now set up in order to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State.

Purpose of the Study

The major purpose of the study was to investigate the impact of proper maintenance of material resource inputs on the performance of technical education graduates in building construction industries in Lagos State. Specifically the study found out the:

1. Status of various tools and equipment used for building construction by craftsmen
2. Impact of proper maintenance of tools and equipment on the performance of building craftsmen in setting out
3. Impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying
4. Impact of proper maintenance of tools and equipment on the performance of building craftsmen in flooring
5. Impact of proper maintenance of tools and equipment on the performance of building craftsmen in wall setting

Research Questions

The following research questions were developed to guide the study:

1. What are the types of tools and equipment used for building construction work by craftsmen?

2. What is the impact of proper maintenance of tools and equipment on the performance of building craftsmen in setting out?
3. What is the impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying?
4. What is the impact of proper maintenance of tools and equipment on the performance of building craftsmen in flooring?
5. What is the impact of proper maintenance of tools and equipment on the performance of building craftsmen in wall setting?

METHODOLOGY

Design of the Study

The study adopted a survey research design. A survey is a research which involves the assessment of public opinion using questionnaire and sampling method. Survey research design is suitable for the study because Osuala (2001) stated that the survey research is interested in the accurate assessment of the characteristics of the whole population of the people. Therefore, survey research focuses on people, the vital facts of people, their beliefs, opinions, attitudes, motivations and behavior. The survey research design is suitable for this study since data were collected through questionnaire from building construction craftsmen in order to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State.

Area of the Study

The study was carried out in Lagos State because low performance and poor work output has been noticed among building construction craftsmen. In order to carry out this study successfully a reasonable number of building construction craftsmen are required. These make Lagos state a good place for this study.

Population for the Study

The total population for the study was 201. This includes all building construction craftsmen in registered building construction industries in Lagos state of Nigeria. Information about the respondents is obtained from registered construction industries. Therefore, there was no sampling since the population was small to be managed.

Instrument for Data Collection

The instrument for data collection was structured questionnaire. The questionnaire is made up of two parts: namely, Part 1 and 2. Part 1 will solicit information on personal data of the respondents while part 2 with five sections A, B, C, D and E. Section A solicits information on status of various tools and equipment used for building construction by craftsmen, section B dwelt on impact of proper maintenance of tools and equipment on the performance of building craftsmen in setting out, while section C was on impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying. Section D seeks information on the impact of proper maintenance of tools and equipment on the performance of building craftsmen in flooring. Section E centres on impact of proper maintenance of tools and equipment on the performance of building craftsmen in wall setting. The response option of the questionnaire is structured on five point Likert scale as follows: Highly Required, Required, Undecided, Not Required, Highly Not Required with value of 5,

4, 3, 2 and 1 assigned to them respectively. The scale is assigned numerical values as shown below:

Responses	Values	Ranges
Strongly agree	5	4.50 - 5.00
Agree	4	3.50 - 4.49
Undecided	3	2.50 - 3.49
Disagree	2	1.50 - 2.49
Strongly disagree	1	0.50 -1.49

Validation of the Instrument

The instrument was face validated by three Experts from the School of Technical Education, Federal College of Education (Technical) Akoka Lagos State. These experts were asked to scrutinize each item of the questionnaire for clarity of statements. They will be requested to examine the appropriateness and suitability of all items of the questionnaire in providing appropriate responses or data for answering each of the research questions. Their suggestions and recommendations were used in the final production of the questionnaire items.

Method of Data Collection

The researcher administered the copies of instruments on the building construction craftsmen in their various registered building construction industries in Lagos state through personal contact and with the help of three research assistants. The research assistants were briefed on how to questionnaire will be administered. The copies of the questionnaire were collected back five days later by the research assistants and researcher in order to give respondents adequate to react to the questionnaire. Through personal administration of the instrument, a hundred percent return rate was anticipated.

Method of Data Analysis

The five research questions were answered using Mean and standard deviation. Any item with a mean value of 3.50 and above was regarded as agree. Any item with a mean value of less than 3.50 was regarded as disagree. Also, any item whose standard deviation is below 1.96 that is 95% confidence limits indicates that the respondents are close to the mean and not too far from one another in their responses while any item with standard deviation above 1.96 that is 95% confidence limits indicates that the respondents are far from the mean and from one another in their responses.

Table 1
Mean Responses of the Respondents on the types of tools and equipment used for building construction work by craftsmen

S/N	Item statements	X	S.D	Remarks
1	Trowels used for construction work are appropriate	3.50	0.70	Agree
2	Hand tools available for construction work are first class	3.68	0.68	Agree
3	Equipment for construction work are obsolete	3.79	0.82	Agree
4	Construction hand tools are not properly maintained	3.50	0.64	Agree

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5	Equipment for construction work are bad beyond maintenance	3.56	0.79	Agree
6	Some modern construction work equipment and tools are not available for work	3.88	0.84	Agree
7	Little available modern tools and equipment are not useful because of the technical skills involvement	3.59	0.68	Agree
8	Precautionary measures for available tools and equipment are not stated	3.62	0.82	Agree
9	The craftsmen lack operational skills for operating most of the building construction equipment	3.65	0.70	Agree
10	The life span of the equipment and hand tools used for building construction are short	3.78	0.65	Agree

Keys: X = Mean of Respondents, SD = Standard Deviation

The data in Table 1 revealed that all the items had their mean values ranged from 3.50 to 3.88 and were above the cut off point of 3.50. This indicated that all the 10 items were the statuses of tools and equipment of building construction used by craftsmen. All the 10 items had their standard deviations ranged from 0.64 to 0.84. This indicated that the respondents were not too far from the mean and from one another in their responses.

Table 2
Mean Responses of the Respondents on the impact of Proper Maintenance of Tools and Equipment on the Performance of Building Craftsmen in Setting Out

S/N	Item statements	X	S.D	Remarks
1	Proper maintenance of hand tools makes setting out neater	3.57	0.77	Agree
2	Proper maintenance of equipment for construction work makes the setting out activities easier	3.61	0.68	Agree
3	Setting out activities becomes fasters when maintained equipment and tools are employed	3.79	0.70	Agree
4	Well maintained wheel barrow conveys more concrete to setting out point	3.58	0.66	Agree
5	Use of well-maintained trowel for setting out saves time of craftsmen	3.51	0.57	Agree
6	Maintenance of tools helps in determining site plan and specifications	3.72	0.64	Agree
7	Well maintained equipment assists in comparing site plan and specification with other available plans	3.78	0.68	Agree
8	Use of well-maintained tools and equipment results to easy location of existing features from site plan	3.62	0.78	Agree
9	Proper maintenance of hand tools allows the craftsmen to locate the position of proposed construction works from site plan	3.64	0.70	Agree
10	Proper maintenance of hand tools and equipment makes the excavation of top soil to become easier	3.79	0.65	Agree

Keys: X = Mean of Respondents, SD = Standard Deviation, N = Number of the Respondents

The data in Table 2 revealed that all the items had their mean values ranged from 3.51 to 3.79 and were above the cutoff point of 3.50. This indicated that all the 10 items were the impacts of proper maintenance of tools and equipment on the performance of building craftsmen in setting out. All the items had their standard deviations ranged from 0.57 to 0.77. This indicated that the respondents were not too far from the mean and from one another in their responses.

Table 3
Mean Responses of the Respondents on the Impact of Proper Maintenance of Tools and Equipment on the Performance of Building Craftsmen in Foundation Laying

S/N	Item statements	X	S.D	Remarks
1	Proper maintenance of tools makes foundation laying neater and attractive	3.78	0.76	Agree
2	Use of well-maintained equipment saves time and energy of the craftsmen	3.70	0.63	Agree
3	Use of proper maintained hand tools increases the output of the craftsmen	3.71	0.82	Agree
4	Well maintained tools and equipment helps in carrying out soil surveys to ascertain the compressibility or consolidation potentials as well as bearing capacity of the soil.	3.82	0.64	Agree
5	Use of proper maintained hand tools make the Clearing, scraping and leveling of the building site neater	3.56	0.73	Agree
6	Well maintained hand tools and equipment help in laying continuous membrane over the whole area of the building	3.72	0.64	Agree
7	Maintained equipment helps in digging trenches around the perimeter of external walls and under load bearing walls.	3.52	0.68	Agree
8	Well maintained tools help in using 2*10 boards to build forms for the footings	3.62	0.83	Agree
9	Proper maintained hand tools assist in marking column base to achieve a smooth level	3.64	0.71	Agree
10	Well maintained hand tools helps in accurately marking center wall lines to know where wall forms will be placed	3.70	0.65	Agree
11	Maintained tools results to well laid reinforcement bars in the trenches	3.90	0.65	Agree
12	Maintenance of construction equipment assists in carrying out mechanical vibration to consolidate the concrete and eliminate air pockets	3.67	0.66	Agree
13	Proper maintenance of building construction equipment helps in carrying out compaction to expose invisible holes under the ground easily	3.70	0.65	Agree

The data in Table 3 revealed that all the items had their mean values ranged from 3.52 to 3.90 and were above the cutoff point of 3.50. This indicated that all the 13 items were the impact of proper maintenance of tools and equipment on the performance of building craftsmen in

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foundation laying. All the 13 impacts had their standard deviations ranged from 0.63 to 0.83. This indicated that the respondents were not too far from the mean and from one another in their responses.

Table 4
Mean Responses of the Respondents on the Impact of Proper Maintenance of Tools and Equipment on the Performance of Building Craftsmen in Flooring

S/N	Item statements	X	S.D	Remarks
1	Filling of the room spaces with high quality hardcore becomes easier when well maintained hand tools are used	3.58	0.78	Agree
2	Proper maintained tools help in ramming down the hardcore until it is level with the bottom of the walls.	3.70	0.60	Agree
3	Using well maintained equipment conserves craftsmen energy in laying damp proof course over the floor area	3.89	0.58	Agree
4	Maintained hand tools or equipment help in fixing formwork against the external sides of the walls to a depth above the wall	3.81	0.64	Agree
5	Properly maintained tools assist in wetting the rammed hardcore and walls thoroughly and treat the internal faces of the formwork with used motor oil.	3.52	0.70	Agree
6	Placing of mixed concrete is always carried out by using good and well maintained tools and equipment	3.78	0.66	Agree

The data in Table 4 revealed that all the items had their mean values ranged from 3.52 to 3.89 and were above the cutoff point of 3.50. This indicated that all the 6 items were the impacts of proper maintenance of tools and equipment on the performance of building craftsmen in flooring. All the items had their standard deviations ranged from 0.58 to 0.78. This indicated that the respondents were not too far from the mean and from one another in their responses.

Table 5
Mean Responses of the Respondents on the Impact of Proper Maintenance of Tools and Equipment on the Performance of Building Craftsmen in Wall Setting

S/N	Item statements	X	S.D	Remarks
1	Proper maintenance of tools and equipment results to right determination of the number of blocks required for the first course	3.59	0.78	Agree
2	Maintained tools are used to scrap pieces of 3/8" plywood to fill in the mortar joint between each block	3.71	0.61	Agree
3	Well maintained tools and equipment helps in removing blocks and preparing for the laying of the first course	3.79	0.83	Agree
4	Maintained equipment helps to drop plumb bobs down from the corner string and at positions about three out from the corner	3.50	0.64	Agree
5	Proper maintained marking tools make marking of the location of the corner block on the footing base	3.57	0.71	Agree

6	Well maintained hand tools effectively assist in transferring lines from the foundation, beginning from the external corners of the buildings	3.72	0.64	Agree
7	Use of well-maintained hand tools makes the construction of corner walls easier	3.52	0.68	Agree
8	Proper equipment make stretch gauge or course line so as to build a straight wall	3.62	0.58	Agree
9	Use of well-maintained hand tools makes mixture of mortar easy	3.64	0.70	Agree
10	Mortar is best Spread by using well maintained tools and equipment	3.77	0.65	Agree
11	Number of blocks required for the first course is best determined by using well maintained hand tools and equipment	3.65	0.65	Agree

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The data in Table 5 revealed that all the items had their mean values ranged from 3.50 to 3.79 and were above the cutoff point of 3.50. This indicated that all the 11 items were the impacts of proper maintenance of tools and equipment on the performance of building craftsmen in wall setting. All the 11 impacts had their standard deviations ranged from 0.61 to 0.83. This indicated that the respondents were not too far from the mean and from one another in their responses.

Discussion of findings

The findings of the study revealed 10 statuses of various tools and equipment used for building construction by craftsmen. These include equipment for construction work are obsolete, construction hand tools are not properly maintained, equipment for construction work are bad beyond maintenance, some modern construction work equipment and tools are not available for work, little available modern tools and equipment are not useful because of the technical skills involvement, precautionary measures for available tools and equipment are not stated, the craftsmen lack operational skills for operating most of the building construction equipment, the life span of the equipment and hand tools used for building construction are short. The findings were in agreement with the opinion of Ayininuola and Olalusi (2004) that craftsmen and other construction workers hardly used well maintained tools and equipment for construction work.

It was found out that the following were the impacts of proper maintenance of tools and equipment on the performance of building craftsmen in setting out: proper maintenance of hand tools makes setting out neater, proper maintenance of equipment for construction work makes the setting out activities easier, setting out activities becomes faster when maintained equipment and tools are employed, well maintained wheel barrow conveys more concrete to setting out point, use of well-maintained trowel for setting out saves time of craftsmen, maintenance of tools helps in determining site plan and specifications, well maintained equipment assists in comparing site plan and specification with other available plans and use of well-maintained tools and equipment results to easy location of existing features from site plan. These are in agreement with the opinion of Yates (2002) that setting out activities becomes faster when maintained equipment and tools are employed by building construction craftsmen.

The finding revealed 13 impacts of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying. The impact are proper maintenance of tools makes foundation laying neater and attractive, use of well-maintained equipment saves time and energy of the craftsmen, use of proper maintained hand tools increases the output of the craftsmen, well maintained tools and equipment helps in carrying out soil surveys to ascertain the compressibility or consolidation potentials as well as bearing capacity of the soil, use of proper maintained hand tools make the Clearing, scraping and leveling of the building site neater, well maintained hand tools and equipment help in laying continuous membrane over the whole area of the building, maintained equipment helps in digging trenches around the perimeter of external walls and under load bearing walls, well maintained tools help in using 2*10 boards to build forms for the footings and proper maintained hand tools assist in marking column base to achieve a smooth level. These findings are in consonance with the opinion of Rahmat (2000) that well maintained tools and equipment helps in carrying out soil surveys to ascertain the compressibility or consolidation potentials as well as bearing capacity of the soil.

It was found that proper maintenance of tools and equipment has impacts on the performance of building craftsmen in flooring: filling of the room spaces with high quality hardcore becomes easier when well maintained hand tools are used, proper maintained tools help in ramming down the hardcore until it is level with the bottom of the walls, using well maintained equipment conserves craftsmen energy in laying damp proof course over the floor area, and maintained hand tools or equipment help in fixing formwork against the external sides of the walls to a depth above the wall. These findings are in consonance with the opinion of Oladapo (2013) that proper maintained tools help in ramming down the hardcore until it is level with the bottom of the walls.

The finding of the study revealed 11 impacts of proper maintenance of tools and equipment on the performance of building craftsmen in wall setting. The impact are proper maintenance of tools and equipment results to right determination of the number of blocks required for the first course, maintained tools are used to scrap pieces of 3/8" plywood to fill in the mortar joint between each block, well maintained tools and equipment helps in removing blocks and preparing for the laying of the first course, maintained equipment helps to drop plumb bobs down from the corner string and at positions about three out from the corner, proper maintained marking tools make marking of the location of the corner block on the footing base, well maintained hand tools effectively assist in transferring lines from the foundation, beginning from the external corners of the buildings, use of well maintained hand tools makes the construction of corner walls easier and proper equipment make stretch gauge or course line so as to build a straight wall. These findings are in consonance with the opinion of Yates (2002) that well maintained tools and equipment helps in removing blocks and preparing for the laying of the first course.

Conclusion

Hand tools and equipment are relevant facilities for building all kinds of houses in Lagos State. They are used because of their convenience. First class or well maintained hand tools and equipment are expected to increase job performance of building construction craftsmen in setting out, foundation laying, flooring and wall setting. In Lagos State, among building

construction craftsmen, researcher observed that they work with all kinds of tools and equipment without proper maintenance and this has resulted to low productivity among the craftsmen in the site. It was in this direction that this study was carried out to determine the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State and the study found the proper maintenance of tools and equipment has impact of the performance of building construction craftsmen.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. All the tools and equipment using for building construction work should be properly maintained for maximum productivity.
2. Building construction industries should always provide first class tools and equipment to their workers for better performance
3. Workshop and seminars on importance of proper maintenance of tools and equipment should be organized for building construction craftsmen

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International Journal of Management, Social Sciences, Peace and Conflict Studies (IJMSSPCS), Vol.4 No.4 December, 2021;
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