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ENHANCING WORKSHOP ORGANIZATIONAL TECHNIQUE ADOPTED BY ELECTRONIC TECHNICIANS IN THE INFORMAL SECTOR

Onuoha, Raymond Ikechukwu[i]
Department of Industrial Technology Education,
College of Education,
Michael Okpara University of Agriculture,
Umudike, Abia State, Nigeria

Abstract:
Electronics technicians have are not utilizing the workshop organizational techniques effectively for operating their workshop activities in the informal sector. This has created source of worries whereby this ineffectiveness have created lots of confusion, and inability to carry out repairs on electronic appliances, which made electronic workshops to become house of junks for unrepaired equipment. The instrument made up of 75 items structured questionnaire was used to collect data from 312 electronics technicians in Imo State was based on four research questions and four null hypotheses formulated to guide to study. Mean and standard deviation were used to answer the research questions while t-test statistics was employed to test the hypotheses at 0.05 level of significance. The findings of the study revealed that, the techniques in the electronic workshop organization which include: personnel control, safety measures, storage systems and inventory control systems were not practiced by most of the electronic technicians in the organization of electronic workshops. It was recommended among other things that appropriate practice of safety measures, constant use of safety goggle and magnifying glass be adopted to ensure protection of the eyes. Electronic technicians should organize seminars and workshops so as to constantly update their workshop organizational techniques.

Keywords: enhance, electronics, technicians, work shop organizational techniques, informal sector

1. Introduction

Electronics is a field of engineering where power is used to activate components such as diodes, resistors, transistors, and micro-chips on devices like radios, televisions, stereos,

[i] Correspondence: email nzeikeonuoha@yahoo.com

video compact discs and of course, computers. The field of electronic engineering according to Trevelyan (2005) involve the design and testing of circuits that use the properties of components such as resistors, capacitors, inductors, diodes, transistors and integrated circuit to achieve a particular functionality of an electronic gadget. Electronics technicians are trained to maintain electronic equipment. Bureau of labour statistics (2010) stated that, electronic technicians, layout, build, test, troubleshoot and repair electronic equipment such as computer equipment, radio, television and test equipment. Electronic technicians acquire training in technical colleges, related to the job experience or an associate's degree. For example, an electronic technician must have completed three or four years of vocational training, and often must have passed a licensing exam, in order to perform the job. The researchers observed that, most of the graduates turned out by technical colleges every year, acquire little or no practical skills, therefore find it difficult to set up their own workshops. This is in line with Auta, (1997) who stated that to acquire competence in skill training, practice is essential and to perform practice, good organization and effective management of workshops are paramount.

Electronic technicians carry out their activities in the workshop. Workshops which are meant for work to earn a living and for training of technicians should be properly organized. Workshop according to Jibril (2011) is a place, area, room or building where machines, hand tools, workbenches and materials are used in manufacturing or repairing of things. Workshop is therefore a building where tools and equipment are effectively and efficiently manipulated to achieve maximum results. These results can be in manufacturing or maintenance of devices or equipment. So to effectively and efficiently manipulate equipment, good workshop organization is necessary. According Della (2011) stated that, organization is planning and arranging something, so that it is successful or effective. Organization as it relates to electronic workshop is the proper arrangement of the all human resources, workshop tools and equipment for effective and efficient output. Olaitan and Mama (2001) also defined organization in the workshop context as, arrangement of all requisite resources including, human, workshop tools, utensils and materials in a systematic order. If electronics technicians organize their workshops systematically and orderly, there will be job satisfaction and their customers will also be interested in sending their gadgets to them for maintenance. That is to say, workshop organization is the efficient arrangement/coordination of human and material resources by a manager (trainer/teacher) in the work place to achieve maximum result. Most technicians are not conversant with organizational technique that should be adopted in the workshop. This is clearly evidenced by the disorderly way they usually pack customer's electronics appliances in their workshop.

Without good organizational technique, electronic technicians cannot function appropriately. There will be too many devices/components/and then gadgets to look for at any point in time, thereby creating chaos, un-coordination and eventual inability to carry out repairs. That is to say, proper workshop organizational technique is a pre-requisite for functional workshop and effective repair of electronics appliance.

Technique according to Della (2011) is the process of carrying out an activity in a particular way suitable for that purpose. According to Giachimo and Gallington (1977) and Storm (1979) technique in workshop organization include, personnel organization, safety and accident prevention in the workshop, selection and storage of workshop facilities and inventory control systems.

Therefore workshop organizational techniques are those techniques that should be adopted by electronic technicians to function effectively and perform the best they could; these would enable greater and higher productivity and good quality services. The activities in the electronics workshop are supposed to be carried out systematically and technically, in order to obtain desirable objectives of any work, there is need for effective input to proper utilization of workshop equipment which will make production faster and the general goals can be achieved without stress. So the effectiveness of these workshops depends largely on how well the electronics technicians organize their workshops. To do this, Pawalck and Ziefle (1987) identified three techniques to aid trainers in organizing facilities in the workshop, the school shop should be arranged in the manner which permits the teaching and learning most effectively, the workshop should be arranged and organized in such a way that it is a safe place to work for both the trainer and trainee, and the workshop should be organized in such a way that, it presents a pleasing artistic and attractive appearance. Andrew and Erickson (1976) had earlier noted that, the problem of good workshop organization would be simple, if the owner of electronic workshop has sufficient and competent workshop attitude and organizational techniques. More so, if he is conversant with, the existing organizational techniques adopted in the electronic workshop.

Personnel control in the electronic workshop demands conscious efforts by the manager. The functional scopes of personnel control include recruitment, selection, orientation, supervision and evaluation of staff performance (Ndu, 1997). Personnel control entails effective and efficient human resource organization, to achieve greater output in the electronic workshop. The owners of electronic workshops must possess the techniques of controlling the personnel as well as good storage facilities to achieve maximum result. Good storage of facilities helps to ease confusion. Personnel involved in the workshop activities may spend a whole day searching for a tool or component, if these facilities are not well stored. Giachimo and Gallinton (1977) and Storm (1979) listed the storage system as open or lockable tool panels which are mounted on the walls or rollers, tool storage room within the workshop, central store which serve numerous shops within an occupational cluster, tool kit which contain a complete set of frequently used tools. Storage facilities are the tool kits, toolboxes, tool panels or drawers, either mounted or constructed together in shelves either kept in a specific location or in a room for easy accessibility and identification of components and tools when the need arises. These facilities have to be well recorded to keep tract of them. Tools and equipment supply must be recorded in an inventory list to ensure safety, keep tract of supplies as well as rate of their usage. Inventory control is the taking and keeping of accurate record of incoming and outgoing equipment, material supplies and

their usage in the workshop. Bethel (1997) stated that inventory control systems are receipt storage, disbursement, and recording of materials in a manner that supplies the desired degree of services. The desired services involve safety measures necessary in the workshop. Safety refers to those activities that seek either to minimize or eliminate hazardous condition that can cause damage or injury. Safety is the process of bringing to the lowest minimal, unwanted conditions or injury that can hinder the progress of activities in the workshop. It is necessary that in organizing electronics workshop, the personnel should be conversant with electronics equipment safety measures to ensure good organization.

However, the organization of electronics service workshops, leave much to be desired. Electronic technicians seem to be ignorant about the importance of properly organized workshops, because the equipment and services in their electronic workshops are not properly organized for efficiency and effectiveness. As at now, poor organization of electronic workshops, or lack of it entirely have manifested in production of graduates that cannot set up good and organized workshop. This is because electronic workshops are not properly organized as they had become house of junks for unrepaired equipment. Sometimes electronic technicians misplace their client's equipment because there are no record of inventory. Also electronics technicians complain of serious eye problem because of their inability to apply correct safety measures to protect their eye. Perhaps, it is time to alter the concept of underdevelopment and think in terms of organization; these would focus the attention on helping unorganized electronic workshops, to improve their organization of electronics service workshops to enhance improved effective and efficient output.

The enhancing electronic workshop organizational techniques schema (fig.1) illustrates the relationship of enhancing electronic workshop organizational techniques and practices by interlinking and showing interaction of those relevant techniques imbedded into those organizational techniques, the proper control of personnel, storage facilities, inventory control systems, and safety measures in electronic workshop. The schema is dynamic in nature in a way that the techniques are shown in straight line arrows which interlink each other with the workshop organizational techniques.

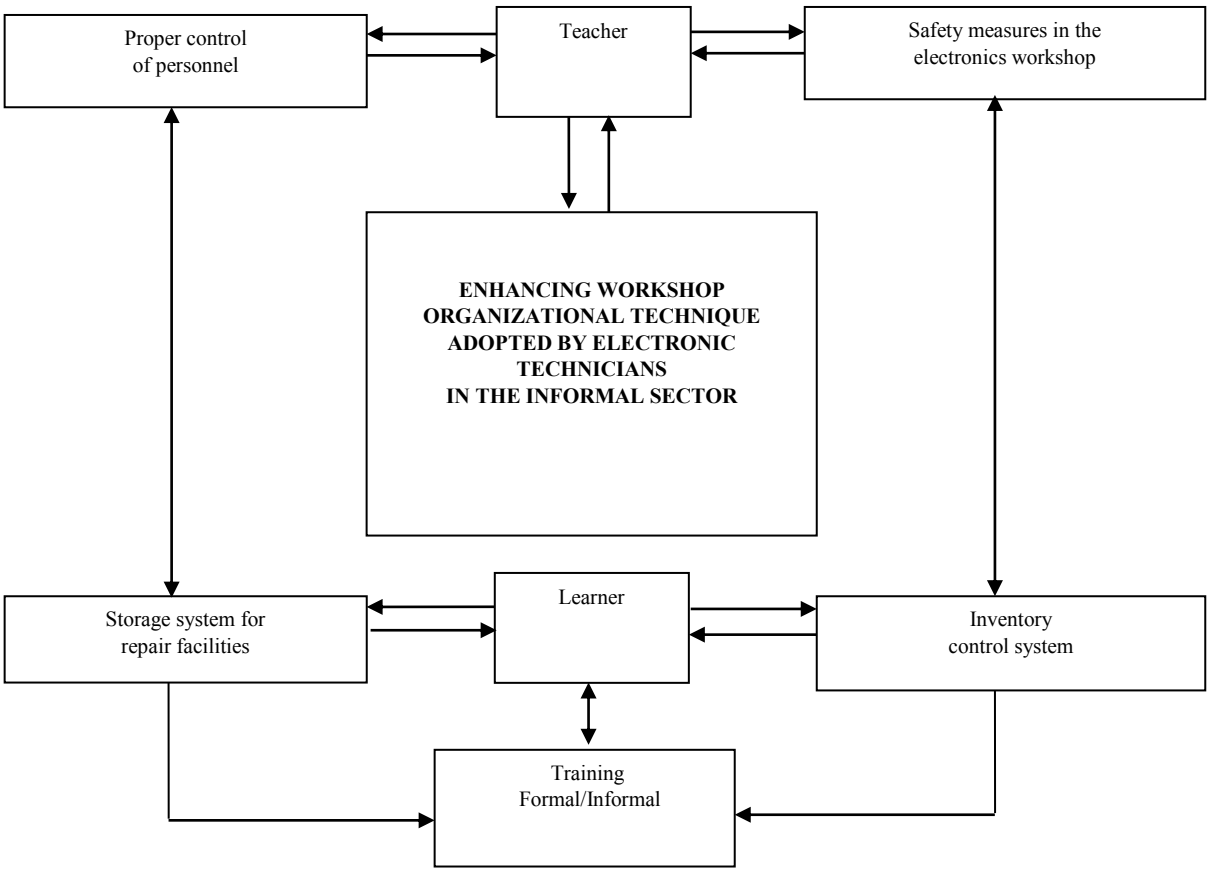

Figure 1: Enhancing Electronic Workshop Organizational Technique (EEWOT) Model (Developed by the researchers 2017)

2. Workshop Organization

A good electronic workshop is a shop where personnel, tools, and equipment are well spaced and organized, air is conditioned, noise reduced to barest minimum, safety is the watch word and adequate lighting and adequate utility services are provided to ensure greater output. Jibril (2011) stated that, workshop is a place where machines, equipment, hand tools, workbenches and materials are in use for manufacturing or repairing of things.

Organization is the process of planning and arranging something so that it is successful or effective. Electronic workshop need good organization which Della, (2011) stated that, it is the way in which the different parts of a system are arranged and work together. Good organization is applicable to all individuals because an individual is said to be organized if he or she can plan and execute his or her program systematically and orderly. Organization in electronics workshop context is the proper way of arranging the workshop and its activities to achieve maximum result.

Electronics repair is skill oriented and need a well-organized workshop where repair activities could be carried out systematically. Electronics repair work is heavily dependent on workshop activities which contain tools and equipment that should be

well organized. Good organization of workshop will make people enjoy working there. Before repair activities are started, a good environmental work area is needed where repair can be performed.

2.1 Overview of Electronic Repair work in the Informal Sector

An informal sector is a concept which is not amenable to generalization. Ogwo and Oranu (2006) stated that craftsmen of different trades conduct informal vocational education, that this type of program is referred to more appropriately as vocational training rather than vocational education. It is characterized by non-existence of any written curriculum and structure. The master craftsman decides out of experience what the apprentice should learn. Habila (2008) opined that apprenticeship can be described as the learning of an art, trade or other vocations by practical experience under the guidance of a master.

The origin of the apprenticeship system was with man's discovery of fire and how to control it. Skill indigenous technicians maintain/repair various type of equipment thereby helping the country to conserve resources which otherwise would be invested on expatriates. The sector contributes immensely to national development by making people to be productively self-employed, he concluded.

However, the apprenticeship system is among the most common method of vocational training in Nigeria today. In view of technological changes in the country, the concept of apprenticeship has become a vital system, as many modern applicable trades that have survived despite changes in the techniques, and knowledge required.

2.2 Personnel Control in the Electronic Workshop

Workshop according to Nwachukwu (2006) is a fixed facility positioned in a particular place for the performance of specified and specialized operations for providing required services. Workshop activities are coordinated by personnel. Personnel on the other hand according to Hornby (2011) are a person who works for an organization. The functional scopes of staff personnel control include recruitment, selection, orientation, supervision and evaluation of staff performance (Ndu, 1997). With all these responsibilities, the need for effective human resource control has increased growth. The owner (managers) of electronic workshop must possess the skill of properly controlling the personnel in their workshop to achieve maximum result of setting up such workshop. The control of personnel in an electronics repair shop should be designed to maximize degree of workshop organizational process. Improvements of staff leadership include supervisory activities and maximize personnel satisfaction of every staff member and reduce tension.

Electronic service technician, organize their daily jobs according to the amounts and types of work booked by customers, clerks, dispatchers and supervisors. Electronic technician generally complete one repair at a time, but may perform other tasks on other repair jobs when waiting for parts and supplies. He may assign tasks and schedule the activities of apprentices and junior technicians to ensure customers are served quickly and tools, equipment and bench space are used efficiently.

2.3 Storage Systems

Storage systems vary greatly among occupational workshops, but basic systems apply to all of them. Giachimo and Gallingtom (1977) and Storm (1979) listed the systems as follows: open or lockable tool panels which are mounted on the walls or rollers, tools storage room (tool cribs) within the workshop, tool kit which contain a complete set of frequently used tools. A good and successful repairing technician must be equipped with numerous components and spare parts commonly used in electronics servicing and these equipment and spare parts must also be properly organized to ease confusion because a technician may spend a whole day searching for a tool or component that hid in a corner. Time and money are wasted if proper storage systems are not set up. Regardless of the system or method used for the storage of tools and materials, Sonderman (1976) and Storm (1979) established basic principles which should govern the system of storing materials, tools and equipment. These are, tools should be stored, so that they can be secured quickly and with minimum confusion, frequently used tools, equipment and instrument should be located with closed proximity of the general work area, tools, equipment, and instrument should be stored so that, shortage can properly be ascertained, frequently use tools, and instruments should be arranged, and located accessibly for fast visual inspection. Tools, equipment, and instrument should be displayed all attractively and yet conveniently.

Tools, materials, and instrument should be stored in such a manner, as to give the students an appreciation for good tools, and care taken in storing them. Tools, materials, instrument, and equipment should be stored in such a manner, as to make possible locking them, when and if necessary. Whenever possible, portable equipment, and frequently used instrument, tools, and equipment should be issued to the student only at the beginning of the workshop period. As managers of electronic workshops, electronic technicians should be conversant with both, the systems and methods of storage. The knowledge of storage system, is a positive added input into shop organizational techniques and must be seen as such. In agreement of the assertion, Silvius and Curry (1978) contended that proper storage, and control of material is a vital function. The efficiency of electronics workshop organization is in direct proportion to the availability and suitability of storage space. Electronics technicians should know this and cultivate the virtue of system and method of storage system alongside with other system outlined, so that the program of electronics technology can succeed.

2.4 Inventory Control System

Uzoagulu (1995) defined inventory control system as means of keeping accurate records of quality, size, type and number of material resources, tools and equipment available at each point in time in an organization or enterprise such as technical college program. Accurate records of material resources, supplies, as well as rate of their use in the workshop must be provided, if wastage control and effective workshop organization is to be carried out. An inventory control system enables the electronics workshop manager to carry out its responsibility for the security of workshop equipment and material. It helps in reducing vandalism or pilferage of material and the rate of

interruption in the workshop practice caused by equipment miss-organization or short supply. In agreement with forgoing, Bethel (1997) defined inventory control system as, "the systematic receipts storage, disbursement, and recording of materials in a manner that supplies the desired degree of services".

Yong (2011) made some suggestions that lead to good organization to include, customer's complaint is a vital piece of information. The person who is attending to the customer must be very efficient and well-trained to get a precise description of the faculty equipment. Keep the record of all jobs, and their progress until the set is repaired and returned to the customer. Write the description of the fault, how the set is repaired so as when similar problem is encountered, reference can be made to remedy the situation. In order to speed up the job, service centre software management packages are needed, which will serve as a data bank of faults, their remedies and can also provide an instant reference to a particular customer, generates invoices and progress reports. The software management packages may also offer a method for tracking and scheduling tasks. Within the tracking information, the system will show the job information, the current status of the job, and a listing parts ordered for the particular job, and a schedule of service performed.

2.5 Safety Measures in Electronic Workshop

The electronic technician should not only be knowledgeable enough with the practical techniques of the electronics devices, and equipment but also should be well informed with the safety techniques for handling tools and equipment, to avoid risk of accident in the workshop. Whenever working on any electronics equipment safety must come first. Electricity must be handled properly, or else it can injure or cause fatalities. Before maintenance activity is carried out on any electronic equipment, a conducive work environment is needed.

The requisites of a good workshop according Yong , (2011) are as follows, the workshop should have 3 pronged (grounded) electrical outlets, good lighting and well ventilated, it should be well-equipped with test instruments, tools and should have sufficient storage space for spare parts and related accessories. Floor material should be anti-static, non-sticky, easily cleaned and non-slipping. It should be kept clean of dust, dirt, webs, and insects. The workshop should have five extinguisher and first-aid kit box. The workbench should be equipped with a complete power strip with surge protectors, fluorescent lighting and a magnifying lamp. The workbench also should have sufficient space for keeping test instrument, tools, soldering iron and set under test. The basis for good shop keeping is organization. Without specific plan, it is mutually impossible to set in motion those practices which produce an attractive learning situation.

2.6 Scientific Management Theory by Taylor, F. W. (1911)

Taylor developed four principles of scientific management: A scientific management methodology be developed. Managers should assume the responsibility for selecting, training and developing the employee. Managers should fully cooperate with

employees to insure the proper application of the scientific management method. Management should be involved with the work of their employees as much as possible. (Sheldrake, 2003) Scientific management consisted of a system for supervising employees, improving work methods, and providing incentives to employees through the piece rate system. Taylor's Principles became enormously popular in America as well as in Europe providing organizational theory an aura of science. Scientific management led to time and motion studies, efficiency experts and others spreading the gospel. Taylor's optimistic belief that study of the organization through his scientific method would provide the answers necessary to resolve the most difficult productivity problems is extremely important to contemporary management. He was the first to point out that it is management's primary responsibility to make an organization productive.

In an electronic service workshop which operates as a system, the theory applies that, the electronics technician who is the owner of the shop is the manager who controls the activities of repair shop to achieve the objective of setting up the workshop. He must make sure that the human and material resources are well organized to achieve efficient output. An organization is a continuing system, able to distinguish and integrate human activities. The organization utilizes, transforms and joins together asset of human and material resources for problem solving. The main function of workshop organization is to satisfy specific human needs an interaction with other sub-system of human activities and resources in a given environment. Therefore the growth of electronics workshop should be enhanced concurrently, and also promote growth of the individual.

3. Purpose of the Study

This main purpose of the study is to profess ways of enhancing workshop organizational techniques adopted by electronics technicians. Specifically, the study sought to identify:

1 Personnel control in the electronic workshop.
2 Storage system for electronic repair facilities in the workshop.
3 Inventory control system for electronic repair facilities
4 Safety measures in the electronic workshop.

3.1 Research Questions

The following research questions guided the study:

1 What are the personnel controls in the electronic workshop?
2 What are the storage systems for electronic repair facilities?
3 What are the inventory control systems for electronic repair facilities?
4 What are the safety measures in the electronic workshop?

3.2 Hypotheses

1. There is no significant difference in the mean ratings of electronic technicians trained in the formal system and those trained in the informal system on personnel control in the electronic workshop
2. There is no significant difference in the mean ratings of the electronic technicians trained in the formal system and those trained in the informal system on the storage system for electronic repair facilities.
3. There is no significant difference in the mean ratings of the electronic technicians trained in the formal system and those trained in the informal system on the inventory control system for electronic workshop facilities.
4. There is no significant difference in the mean ratings of electronic technicians trained in the formal system and those trained in the informal system on the safety measures to ensure good electronic workshop organization.

4. Methodology

Four research questions guided the study and four null hypotheses were formulated and tested at 0.05 level of significance. Survey research design was adopted for this study. Survey research design according to Ezeji (2004) researcher collects detailed description of existing phenomena with the intent of using data to justify current condition and practices or to make better plan for improving phenomena. The questionnaire titled enhancing Electronic Workshop Organizational Techniques (EEWOT) was used to collect data for the study.

The study was carried out in Imo State of Nigeria. A total of 312 electronic technicians were used for the study. The population for the study constitute all the formally and informally trained and registered 312 electronic technicians in Imo State. The figure comprised 111 electronic technicians trained in the formal sector and 201 electronic technicians trained in the informal sector. The information was obtained from the records (pages 23 – 35) of Imo State electronic technicians association. No sampling, hence the population was not too large. A structured questionnaire enhancing electronics workshop organizational technique (EEWOT) was used to solicit responses from the respondents. The EEWOT was divided into two parts; part 1and 2. Part 1 is concerned with the bio data of the respondents while part 2 was divided into four sections; section A, B, C and D, require the respondents response to set of statements that were made to measure electronics workshop organizational techniques.

Section A sought information on the personnel control to ensure good workshop organization, Section B sought information on safety measures necessary in the electronics workshop, Section C sought information on the storage system for electronics repair facilities in the workshop, while section D sought information on inventory control system for electronics workshop. The instrument utilized a 5-point scale of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD) with the assigned scores 5, 4, 3, 2, and 1, respectively with 77 generated items. The instrument was validated by three experts in the Department of Industrial

Technical Education, University of Nigeria, Nsukka. Cronbach Alpha reliability method was used to determine the internal consistency of the instrument through trial testing, were used in computation. An internal consistency reliability estimate of 0.99 was obtained from the items in the instrument. Three hundred and twelve copies of questionnaire were administered with the help of five research assistants. All the copies were retrieved and analyzed using mean and standard deviation to answer the research questions while t-test statistic was used to test the null hypotheses at 0.05 level of significance.

5. Results/ findings

The result of the data analyzed in this study is presented below;

Research Question 1
What is the personnel control in the electronic workshop?

Table 1: Mean ratings of respondents on personnel control in the electronic workshop

S/No	Items	Mean	Decision
1.	Apprentices/learners are inspired to the electronics service workshop	3.64	Agreed
2.	There is sensitivity to the feelings of apprentices/learners in the workshop.	3.49	Disagreed
3.	Workshop product customers are always communicated effectively.	3.15	Disagreed
4.	Willingness to seek advice from other technicians.	3.28	Disagreed
5.	Difficult customers are effectively handled.	2.92	Disagreed
6.	Task in the workshop is always defined.	3.08	Disagreed
7.	Possess the techniques in assigning work to apprentices.	3.44	Disagreed
8.	Performance of apprentices are always monitored to ensure task accomplishment.	.31	Disagreed
9.	Possess the technique in realistic evaluate personal strength.	3.17	Disagreed
10.	Possess the technique in accomplishing work in an unstructured situation.	2.58	Disagreed
11.	Possess the technique in sustaining long hours of work	2.78	Disagreed
12.	Possess the technique in flexibility adapt to changes.	3.00	Disagreed
13.	Work is accomplished as at when due.	2.74	Disagreed
14.	Work is accomplished even under stressful condition.	2.77	Disagreed
15.	Desire to set high standard in job performances.	4.15	Agreed
16.	Orderliness in the workshop is always ensured.	3.74	Agreed
17.	Notice of uncollected repair is always sent to customers.	2.47	Disagreed
18.	Invoice or receipt is always giving to customers.	2.69	Disagreed

The data presented in table 1 above in research question 1 indicates that the respondents agree with only item 1, 15 and 16 in all items. Item 15 recorded the highest mean of 4.15 which deals with desire to set high standard in job performance.

Generally, it is interesting that the respondents need all these technique to enhance the personnel control in the organization of their electronics workshop. The effect of this finding will surely be production of technicians with effective workshop organizational capabilities.

Research Question 2

What is the storage system for electronic repair facilities in the workshop?

Table 2: The mean ratings of respondents on the storage systems for electronic repair facilities in the workshop

S/No	Items	Mean	Decision
19.	Large portion of the workshop is set aside as storage area.	3.05	Disagreed
20.	Frequently used tools are kept on the work bench.	3.55	Agreed
21.	A permanent storekeeper takes charge of keeping the shop facilities.	2.27	Disagreed
22.	The shop requirements are selected by the manager.	3.78	Agreed
23.	Incoming gadgets are arranged separately on the panels (shelves).	2.44	Disagreed
24.	Repaired gadgets are also arranged separately on the panels (shelves)	2.44	Disagreed
25.	Junks are packed at different part of the panels (shelves).	2.30	Disagreed
26.	Tool panels are used to store tools.	2.30	Disagreed
27.	Resistors are stored by their colour codes in drawers.	2.85	Disagreed
28.	Capacitors are stored according to types in kits.	3.77	Agreed
29.	Transistors are stored according to their types in drawers or boxes.	3.94	Agreed
30.	Diodes are kept according to types in boxes.	3.82	Agreed
31.	Integrated circuits are stored separately according to types.	3.62	Agreed
32.	Inductors are kept in drawers according to types.	2.76	Disagreed
33.	Small chippings from leads, wire and solder sucker refuse are gathered in a small desktop cup/containers.	2.24	Disagreed

Table 2 in research question 2 indicates that the respondents agree with 6 items out 15 items, and disagree with the remaining 9 items. These show that the respondents need greater technique in organization of their electronics workshop. These will focus the attention of the electronics technicians on overcoming the problem of misplacement of electronics components and equipment.

Research Question 3

What is the inventory control system for electronic repair facilities?

Table 3: Mean rating of respondents with regards to the inventory control system for effective organization of electronic workshop

S/No	Items	Mean	Decision
34.	The record of supplies is audited by the manager.	3.77	Agreed
35.	The material supply is dependent on the supplies.	3.28	Disagreed
36.	Supplies are ordered only when needed for a particular purpose.	3.25	Disagreed
37.	Record of incoming gadgets is kept.	2.35	Disagreed
38.	Record of gadgets with identified faults is kept.	2.08	Disagreed
39.	Record of gadgets wit unidentified faults are kept.	2.67	Disagreed
40.	Record of finished gadgets is kept.	2.67	Disagreed
41.	The drawers/boxes are labelled.	2.76	Disagreed
42.	The kits are labelled.	2.97	Disagreed
43.	Components supply record is carefully maintained to ensure continued supply.	2.67	Disagreed
44.	Card is used to write the names of items in the workshop.	2.89	Disagreed
45.	Record of returned equipment to customer is kept.	2.25	Disagreed
46.	Record of description of fault of equipment is kept.	2.44	Disagreed
47.	Record of repairs is kept.	2.35	Disagreed
48.	Record of listing of parts ordered for a particular job is kept	.50	Disagreed
49.	Record of schedule of service performed by all apprentices are kept.	2.40	Disagreed
50.	Notice of uncollected equipment is sent to the concerned customer.	2.05	Disagreed

Table 3 in research question 3 shows that the respondents disagreed with almost all the items except item 1 which showed that these techniques were not adopted by electronics technicians in the electronics workshops. It implies that respondents do not know the importance of recording keeping which must be enhanced to reduce confusion, in coordination, chaos and inability to carry out repairs. These items if adopted will help improve the services rendered by electronics technicians to attract much interest, specialization and improved services.

Research Question 4

What is the safety measure necessary in the electronic workshop?

Table 4: Mean rating of respondents with regards to the safety measures in the electronic workshop

S/No	Items	Mean	Decision
51.	Equipment is always turned off and the electric chord is unplugged before beginning to work.	2.72	Disagreed
52.	Capacitor is always discharged before beginning to work.	2.14	Disagreed
53.	Safety precaution lessons are held.	2.88	Disagreed
54.	Safety notices depicting 'danger' conspicuously displayed.	3.21	Disagreed
55.	Electric live wire is protected.	3.56	Agreed
56.	Correct clothing is always worn in the workshop.	3.55	Agreed
57.	Fighting and playing in the workshop are prohibited.	4.21	Agreed
58.	Safety goggle is always worn in the workshop.	2.80	Disagreed
59.	Magnifying glass is always used in the workshop.	2.75	Disagreed
60.	Possess the technique in avoiding prolonged exposing the		

eyes from beams.	2.54	Disagreed
61. Hand gloves are always worn in the workshop.	3.09	Disagreed
62. Possess the technique in avoiding prolonged exposure of vapour from chemical spray.	2.88	Disagreed
63. Excessive inhalation of fumes from lead is always avoided.	3.41	Disagreed
64. Posses the technique in avoiding prolonged exposure to x-ray	.2.82	Disagreed
65. Rubber button shoes or sneakers are always worn in the workshop.	3.15	Disagreed
66. Workshop is swept every day before work.	3.79	Agreed
67. Workshop is swept every day after work.	3.55	Agreed
68. Tools and materials are not littered on the floor.	3.29	Disagreed
69. Other foreign objects are not littered on the floor.	3.34	Disagreed
70. The surrounding of the workshop is always kept tidy.	3.40	Disagreed
71. Workshop floor is always kept dry.	4.20	Agreed
72. The workshop is properly ventilated.	3.01	Disagreed
73. The workshop is properly illuminated.	3.29	Disagreed
74. Tables/chairs are properly arranged in their assigned portion of the workshop.	2.94	Disagreed
75. Waste disposal dustbin are placed at strategic locations in the workshop.	2.90	Disagreed

Table 4 in the research question 4 indicates that the respondents disagree with all the items except items 55, 56, 57, 66, 67 and 71 out of 27 questionnaire items which correspond with the mean ratings of 3.56, 3.55, 4.21, 3.79, 3.55 and 4.21 respectively. These items focused on the techniques in electric live wire is protected, technique of wearing correct clothing in the workshop, fighting and playing in the workshop are prohibited, technique of sweeping the workshop every day before and after work, and workshop floor is kept dry. This indicates that safety measures adopted by the electronics technicians in the organization of their workshops need to be enhanced to ensure that life of personnel working in the workshop and equipment are secured, thereby promoting healthy working environment.

6. Statistical Significance of Hypotheses

Hypothesis 1

There is no significant difference between mean responses of electronics technicians trained in the formal system and those trained in the informal system on personnel control in the electronic workshop.

Table 5: t-test scores of the means responses of the respondents on personnel control in the electronic workshop

S/No	Items	$\bar{X}1$	SD1	$\bar{X}2$	SD2	t-cal	Sig(2-tld)	Decision
1.	Apprentices/learners are inspired to the electronics service workshop.	3.69	1.16	3.61	1.09	0.61	0.54	Accepted
2.	There is sensitivity to the feelings of apprentices/learners in the workshop.	3.88	1.11	3.28	1.18	4.43	0.00	Rejected
3.	Workshop product customers are always communicated effectively.	3.20	1.30	3.13	1.36	0.47	0.64	Accepted
4.	Willingness to seek advice from other technicians.	3.35	1.27	3.25	1.28	0.63	0.53	Accepted
5.	Difficult customers are effectively handled.	2.93	1.32	2.93	1.37	0.05	0.94	Accepted
6.	Task in the workshop is always defined.	3.30	1.42	2.90	1.37	2.07	0.04	Rejected
7.	Possess the technique in assigning work to apprentices.	3.35	1.26	3.49	1.25	-0.94	0.35	Accepted
8.	Performance of apprentices are always monitored to ensure task accomplishment.	3.48	1.17	3.22	1.24	1.81	0.07	Accepted
9.	Possess the technique in realistic evaluate personal strength.	3.43	1.30	3.03	1.38	2.48	0.01	Rejected
10.	Possess the technique in accomplishing work in an unstructured situation.	2.83	1.44	2.44	1.16	2.58	0.01	Rejected
11.	Possess the technique in sustaining long hours of work.	2.90	1.49	2.72	1.42	1.13	0.26	Accepted
12.	Possess the technique in flexibility adopt to changes.	3.32	1.36	2.82	1.42	2.99	0.00	Rejected
13.	Work is accomplished as at when due.	2.82	1.44	2.70	1.47	0.72	0.47	Accepted
14.	Work is accomplished even under stressful condition.	2.90	1.26	2.70	1.25	1.34	0.18	Accepted
15.	Desire to set high standard in job performances.	4.15	0.35	4.16	0.37	-0.34	0.74	Accepted
16.	Orderliness in the workshop is always ensured.	3.87	1.06	3.67	1.12	1.56	0.12	Accepted
17.	Notice of uncollected repair is always sent to customers.	2.54	1.23	2.44	1.18	0.71	0.48	Accepted
18.	Invoice or receipt is always giving to customers.	2.85	1.43	2.61	1.30	1.47	0.14	Accepted

The data analysis in table 5 revealed that the above levels of items 2, 6, 9, 10 and 12 which have scores of 0.00, 0.04, 0.01, 0.01, and 0.00 respectively were less than the stated 0.05 level of significance therefore the null hypothesis is rejected. However, the significance level of items 1, 3, 4, 5, 7, 8, 11, 13, 14, 15, 16, 17 and 18 are greater than 0.05 therefore the null hypothesis is accepted.

Hypothesis 2

There is no significant difference between mean responses of electronics technicians trained in the formal system and those trained in the informal system on the storage systems for electronic repair facilities in the workshop.

Table 6: t-test scores of the means responses of the respondents on the storage systems for electronics repair facilities in the workshop

S/No	Items	$\bar{X}1$	SD1	$\bar{X}2$	SD2	t-cal	Sig(2-tld)	Decision
19	Large portion of the workshop is set aside as storage area.	3.00	1.23	3.08	1.20	-0.49	0.62	Accepted
20	Frequently used tools are kept on the work bench.	3.61	1.23	3.52	1.20	0.65	0.51	Accepted
21	A permanent storekeeper takes charge of keeping the shop facilities.	2.25	1.04	2.28	1.11	-0.15	0.87	Accepted
22	The shop requirements are selected by the manager.	3.60	1.32	3.89	0.94	-2.20	0.02	Rejected
23	Incoming gadgets are arranged separately on the panels (shelves).	2.44	1.19	2.44	1.21	-0.02	0.98	Accepted
24	Repaired gadgets are also arranged separately on the panels (shelves)	2.41	1.17	2.45	1.22	-0.29	0.77	Accepted
25	Junks are packed at different part of the panels (shelves).	2.31	1.07	2.30	1.05	0.11	0.91	Accepted
26	Tool panels are used to store tools.	2.32	1.08	2.29	1.07	0.26	0.80	Accepted
27	Resistors are stored by their colour codes in drawers.	2.86	1.36	2.85	1.37	0.11	0.91	Accepted
28	Capacitors are stored according to types in kits.	3.85	1.12	3.72	1.31	0.91	0.36	Accepted
29	Transistors are stored according to their types in drawers or boxes.	93	0.96	3.94	0.98	-0.11	0.91	Accepted
30	Diodes are kept according to types in boxes.	3.82	1.05	3.83	1.08	-0.05	0.96	Accepted
31	Integrated circuits are stored separately according to types.	3.65	1.19	3.61	1.24	0.28	0.78	Accepted
32	Inductors are kept in drawers according to types.	2.72	1.30	2.79	1.32	-0.46	0.65	Accepted
33	Small chippings from leads, wire and solder sucker refuse are gathered in a small desktop cup/containers.	2.25	1.04	2.24	1.03	0.13	0.90	Accepted

The data analysis in table 6 above indicates that only item 22 which has score of 0.02 less than the stated level of significance, therefore the null hypothesis is rejected. But significance difference exist in the t-test analysis of mean responses of electronics technicians trained in the formal system and those trained in the informal system on the storage systems for electronics repair facilities in the workshop in items 19, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 and 33 therefore the null hypothesis is accepted.

Hypothesis 3

There is no significant difference between mean responses of electronics technicians trained in the formal system and those trained in the informal system on the inventory control systems for electronics repair facilities.

Data for testing this hypothesis area presented in Table 7.

Table 7: t-test scores of the means responses of the respondents on inventory control systems for electronics repair facilities

S/No	Items	$\bar{X}1$	SD1	$\bar{X}2$	SD2	t-cal	Sig(2-tld)	Decision
34	The record of supplies is audited by the manager.	3.81	0.99	3.75	1.08	0.47	0.49	Accepted
35.	The material supply is dependent on the supplies.	3.35	1.24	3.24	1.29	0.70	0.58	Accepted
36.	Supplies are ordered only when needed for a particular purpose.	3.31	1.26	3.23	1.30	0.55	0.71	Accepted
37.	Record of incoming gadgets is kept.	2.32	1.13	2.37	1.19	-0.37	0.88	Accepted
38.	Record of gadgets with identified faults are kept.	2.09	0.86	2.08	0.87	0.16	0.57	Accepted
39.	Record of gadgets with unidentified faults are kept.	2.72	1.20	2.65	1.22	0.57	0.77	Accepted
40.	Record of finished gadgets is kept.	2.65	1.09	2.69	1.12	-0.30	0.77	Accepted
41.	The drawers/boxes are labelled.	2.76	1.01	2.76	1.01	0.03	0.97	Accepted
42.	The kits are labelled.	2.94	1.17	3.00	1.17	-0.42	0.67	Accepted
43.	Components supply record is carefully maintained to ensure continued supply.	2.64	0.95	2.69	0.96	-0.43	0.67	Accepted
44.	Card are used to write the names of items in the workshop.	2.81	1.33	2.94	1.33	-0.83	0.41	Accepted
45.	Record of returned equipment to customer is kept.	2.24	0.85	2.26	0.88	-0.23	0.82	Accepted
46.	Record of description of fault of an equipment is kept.	2.43	0.84	2.45	0.87	-0.22	0.82	Accepted
47.	Record of repairs is kept.	2.34	1.02	2.35	1.05	-0.11	0.91	Accepted
48.	Record of listing of parts ordered for a particular job are kept.	2.49	1.01	2.50	1.02	-0.12	0.91	Accepted
49.	Record of schedule of service performed by all apprentices are kept.	2.38	0.91	2.41	0.94	-0.26	0.80	Accepted
50.	Notice of uncollected equipment is sent to the concerned customer.	2.05	0.83	2.05	0.86	-0.05	0.96	Accepted

The data analysis in table 7 showed that the significance level for all the items which have scores of 0.49, 0.58, 0.71, 0.88, 0.57, 0.77, 0.77, 0.97, 0.67, 0.67, 0.41, 0.82, 0.91, 0.80, 0.96 are greater than the stated 0.05 level of significance, therefore the null hypotheses were accepted. This follows that whatever difference that exist between the mean responses of electronics technicians trained in the formal system and those trained in the informal system on inventory control systems for electronics repair facilities were statistically significant in all the cases.

Hypothesis 4

There is no significant difference between mean responses of electronics technicians trained in the formal system and those trained in the informal system on the safety measures in the electronics workshop.

Table 8: t-test scores of the means responses of the respondents on safety measures in the electronic workshop

S/No	Items	$\bar{X}1$	SD1	$\bar{X}2$	SD2	t-cal	Sig(2-tld)	Decision
51	Equipment is always turned off and the electric chord unplugged before beginning to work.	2.71	1.01	2.73	1.03	-0.13	0.90	Accepted
52	Capacitor is always discharged before beginning to work.	2.14	1.01	2.15	1.04	-0.07	0.94	Accepted
53	Safety precaution lessons are held.	2.84	1.44	2.91	1.47	-0.40	0.70	Accepted
54	Safety notices depicting 'danger' conspicuously displayed.	3.12	1.36	3.26	1.36	-0.85	0.40	Accepted
55	Electric live wire is protected.	3.51	1.33	3.60	1.30	-0.55	0.58	Accepted
56	Correct clothing is always worn in the workshop.	3.46	1.32	3.59	1.33	-0.80	0.42	Accepted
57	Fighting and playing in the workshop are prohibited.	4.20	0.40	4.21	0.41	-0.31	0.76	Accepted
58	Safety goggle is always worn in the workshop.	2.85	1.39	2.77	1.23	0.55	0.58	Accepted
59	Magnifying glass is always used in the workshop.	2.97	1.30	2.63	1.07	2.54	0.01	Rejected
60	Possess the technique in avoiding prolonged exposing the eye from beams.	2.53	1.34	3.10	1.30	-0.14	0.89	Accepted
61	Hand gloves are always worn in the workshop.	3.06	1.34	3.10	1.30	-0.23	0.82	Accepted
62	Possess the technique in avoiding Prolonged exposure of vapour from chemical spray.	2.83	1.29	2.92	1.32	-0.57	0.57	Accepted
63	Excessive inhalation of fumes from lead are always avoided.	3.46	1.23	3.38	1.20	0.62	0.54	Accepted
64	Posses the technique in avoiding prolonged exposure to x-ray.	2.74	1.38	2.87	1.35	-0.83	0.41	Accepted
65	Rubber button shoes or sneakers are always worn in the workshop.	3.15	1.37	3.15	1.36	-0.03	0.98	Accepted
66	Workshop is swept every day before work.	3.91	0.75	3.72	1.06	1.66	0.10	Accepted
67	Workshop is swept every day after work.	3.56	1.09	3.54	1.14	0.22	0.83	Accepted
68	Tools and materials are not littered on the floor.	3.39	1.21	3.24	1.37	0.97	0.33	Accepted
69	Other foreign objects are not littered on the floor.	3.41	1.17	3.30	1.30	0.73	0.46	Accepted
70	The surrounding of the workshop is always kept tidy.	3.62	1.18	3.29	1.37	0.73	0.03	Rejected
71	Workshop floor is always kept dry.	4.19	0.39	4.21	0.41	-0.40	0.69	Accepted
72	The workshop is properly ventilated.	3.08	1.37	2.97	1.41	0.70	0.48	Accepted
73	The workshop is properly illuminated.	3.33	1.39	2.97	1.41	0.40	0.69	Accepted
74	Tables/chairs are properly arranged in their assigned portion of the workshop.	2.94	1.44	2.94	1.37	0.01	0.99	Accepted
75	Waste disposal dustbin are placed at strategic locations in the workshop.	2.85	1.40	2.94	1.44	-0.53	0.60	Accepted

The data analysis in table 8 revealed that the levels of items 59 and 70 with scores of 0.01 and 0.03 respectively were less than the stated 0.05 level of significance therefore the null hypothesis is rejected. However, the significance level of items 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, 72, 73 74 and 75 are greater than 0.05 therefore the null hypothesis is accepted.

7. Discussion

The main purpose of this study was enhancing workshop organizational techniques adopted by electronics technicians. The findings related to personnel control in the electronics workshop revealed that the technicians need to adopt most of these techniques as it would permit smooth operation and organization of the electronics workshop. It was observed that personnel control ensures better workshop organization since the electronics technician should not rely entirely on his own effort to ensure good workshop. To ensure safety of lives and properties, the word 'safety' must not be taken seriously. Electronic technicians who operate with hazardous unseen but felt electricity are still ignorant of the danger they are exposing their lives and equipment. This indicates that safety measures practiced by the electronic technicians in the organization of their workshops need to be enhanced to ensure that life of personnel working in the workshop and equipment are secured. On storage system, the findings revealed that, the storage systems suggested by Giachimo and Gallington (1977) and Storm (1979) include: Open or lockable tool panel, which is mounted on the wall or rollers, tool storage room within the workshop, central storeroom and tool kits which contain frequently used tools. Despite the findings seemly disagreement with experts' views, the fact still holds that effective storage techniques are indispensable for effective organization of electronics workshops. It is pertinent to say that, electronic technicians do not practice inventory control in their workshops, those that operate only manage it as a casual technique without knowing that inventory control system if practiced will save the electronic technicians from danger of total eradication of confusion, misplacement of components/ equipment and in coordination.

The findings of the hypotheses revealed that there was no significant difference in most of the mean ratings of electronic technicians trained in the formal system and those trained in the informal system on the personnel control. This indicates that personnel control must be improved to ensure effective and efficient electronics workshop organization. Also on the mean ratings of the electronics technicians trained in the formal system and those trained in the informal system on the safety measures to ensure good electronic workshop organization. There was an indication that significant difference existed in half of the mean ratings of the responses which implies that adequate care must be taken among the electronics technicians to protect lives and properties. On the mean ratings of the technicians trained in the formal system and those trained in the informal system on the storage system for electronic repair facilities. Significant differences existed in the mean responses of both groups which indicate that adequate measure should be taken to ensure electronics technicians are updated with

techniques of their trade to become relevant and efficient in their chosen carrier. Difference that exist between the mean ratings of electronic technicians trained in the formal system and those trained in the informal system on inventory control systems for electronic repair facilities were statistically significant in most of the cases. This indicates that both groups do not practice organized inventory control system to eliminate confusion in the workshop.

8. Conclusion

Based on the findings of this study, the following conclusions were made: Techniques for the personnel organization and customer care satisfaction were identified. If efforts are made towards adopting those identified techniques and learning new ones, the burden of workshop organization will go a long way in achieving maximum result. The safety measure meant to prevent accident in the electronics workshop to safe guide lives and properties were also identified. If these safety measures are adopted by electronics technicians, apprentices will not be apprehensive of workshop activities but will have their interest stimulated in practical activities in the electronics workshop. The study equally reveals the desirability of sound selection and storage techniques to be deep-rooted in electronics technicians in order that not only the desirable tools and materials are procured for use in the workshop. Equally identified is the importance of storage techniques to be adopted by electronics technicians so as to facilitate training and learning of practical oriented instruction. Electronics technicians lack most of the modern inventory control system as techniques necessary for improving workshop organization. They also lack efficient customer communication system to reach out to customers when need arise. If the electronic technicians improve on these techniques to remove their deficiencies in techniques practiced to enhance workshop organization, the workshop organization will be fashioned to achieve efficient and effective results.

8.1 Implication of the Study

The findings of this study have implications for the electronic technicians/teachers, students/trainees, technical institutions and curriculum planners. If the identified lapses on selection of appropriate tools, storage system, and safety measures are resolved, the organization of electronics workshop as well as the teaching of practical will be made effective. In the same vein, if electronics technicians and apprentices are aware of the benefits they could derive from functional workshops, they will always strive towards providing these inputs that will enhance workshop organization. Apprentices' capabilities are developed through apprentices' personnel organization. If apprentices' personnel organization practices are enhanced, these will go a long way in inculcating the virtues of leadership as well as stimulating their interest in these practices thereby lessening the trainers burden. Safety practices are essential for the survival of any organization. If these identified safety measures are adopted in the workshop daily policies, not only workshop activities will flourish but also the system will go a long way in shaping the life pattern of both the apprentices and electronics technicians. If the

apprentices and electronics technicians are exposed to the basic techniques in systems of inventory control, it will help them in the art of record keeping beyond the four walls of electronics workshop. These techniques will help them in their homes as well as any other sphere of life.

Curriculum and curriculum planning play a major role in the education attainment. If the findings of the study with regards to the enhancing workshop organizational techniques are implemented, the result will be the realization of the objective to which electronic maintenance was conceived. The full implementation of the findings of this study will have a long term strive to move towards technological advancement which is the new world orientation.

8.2 Recommendations

Based on the findings of this study, subsequent discussions and their implications, the following recommendations were made:

1. Electronic technicians should organize seminars and workshops so as to constantly update their workshop organizational techniques. Where skills are lacking, appropriate routine training on these techniques should be adopted.
2. The electronic technicians must make sure they constantly adopt the use of safety goggle and magnifying glass to ensure protection of their eyes, most of them have serious eye problem which have led to their inability to read component marking and easy drop out of job.
3. The federal ministry of labour and productivity should set standards for professional practice and insist on the registration of all electronics technicians across the country.
4. Service centre software management packages are needed, which will serve as a data bank of faults, their remedies and can also provide an instant reference to a particular customer, generates invoices and progress reports.

8.3 Further Research

What are the human and the material resources development for the sustainability of electronic workshop organization?

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