PERCEIVED TROUBLESHOOTING SKILLS POSSESSED BY CELL PHONE REPAIRERS FOR EFFECTIVE JOB PERFORMANCE IN NORTH EAST GEO-POLITICAL ZONE, NIGERIA

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ABSTRACT

The study was conducted to assess the self perceived troubleshooting skills possessed by cell phone repairers for effective job performance in North East Geo political Zone of Nigeria. Specifically, the study determined: the ability of cell phone repairers to identify appropriate cell phone parts, ability of cell phone repairers to use test instruments to identify defective cell phones components and the ability of cell phone repairers to define problem area of the malfunctioning cell phone for effective job performance. Three research questions guided the study. Opinion survey research design was adopted to carry out the study. The population of the study was four hundred and thirty three (433) cell phone repairers in North East Geo political Zone of Nigeria. A 47-item structured questionnaire developed with Likert modified 5-point rating scale was validated by specialists from Technology Education Department and Sonny Ericsson Centre, Modibbo Adama University of Technology, Yola. The instrument was tried out on 45 registered cell phone repairers who did not participate in the study and data collected from the trial test were used in computing the reliability of the instrument using Cronbach alpha (α) formula. The reliability index of the instrument was 0.88. Mean and standard deviation were computed for each of the items in the questionnaire which were used to answer the three research questions formulated to guide the study. The findings of the study include, among others that the extent to which cell phone repairers are able to identify appropriate cell phone parts are moderate. Based on the findings it was recommended, among others that cell phone repairers need training to improve on identification of cell phone parts.

Keywords: Troubleshooting Skills, Cell Phone Repairers, Job Performance.

INTRODUCTION

A Cell phone is a portable telephone that does not require the use of landline telephone but works by means of a cellular radio system (Ayanda, Baba and Ayanda, 2012). It is a device that can make and receive telephone calls over a radio link whilst moving around a wide geographic area. These devices can breakdown through one or more of their components, due to misuse, mishandling, ageing and erratic power supply, hence the need for repairs. The cell phone repairers who are responsible for the repair of these equipment acquired their practical skills informally from cell phone workshops through apprenticeship and therefore lack basic scientific/technical knowledge of how to handle and troubleshoot faults in cell phones which has effect on their job performance. Job performance is how one carries out the tasks, duties and responsibilities associated with a particular job (Sonnentag and Frese, 2002). Job performance, a multidimensional concept, varies from job to job which can be referred to as achievement in terms of set goals. It is also considered as output of a staff on the job, measurable in terms of quantity and quality. The ability of cell phone repairer to troubleshoot

faulty cell phones using appropriate instrument correctly brings about effective job performance. Troubleshooting or fault finding is a form of problem solving, often applied to repair failed products or processes. It is a logical, systematic search for the source of a problem so that it can be solved and the product or process can be made operational again (Robinson and Amadike, 2009). It is also the process of analyzing the behavior or operation of a faulty circuit to determine what is wrong with the circuit. It then involves identifying the defective component(s) and repairing the circuit. Typically, when equipment fails there is a sense of urgency to get it fixed and working again. Expert troubleshooters must have a good understanding of the operation of electrical/electronics components that are used in circuits. They use a system or approach that allows them to logically and systematically analyze a circuit and determine exactly what is wrong. They also understand and effectively use tools such as prints, diagrams and test instruments to identify defective components. Holyoak (1995) defined a problem as a situational goal that an individual desires to achieve for which the solution path is not immediately known. An individual encounters a problem when an obstacle interferes with achieving a situational goal (Marzano and Kendall, 2007). Davidson, Deuser and Sternberg (1994) described the process of solving problems as the direct behavior of individuals towards identifying, evaluating, and using possible options that will accomplish the desired situational goal.

Troubleshooting is a unique problem–solving approach for ill–defined problems (MacPherson, 1998). Solutions to these types of problems do not appear rapidly after the problem solver has analyzed the givens and obstacles of the situation (Davidson et al., 1994). Ill–defined problems contain numerous undefined givens and obstacles (Jonassen, 2000) and may require testing a variety of possible solutions. The solution to the problem is not apparent or specific; rather, it is a systematic elimination of possible solutions until the correct solution is attained (Johnson, 1989). Effective troubleshooting, as described by Johnson (1989), involves a cyclic pattern of hypothesis generation and testing to generate a solution. The problem solver may have only a general awareness that a problem exists (e.g., recognizing that a piece of equipment will not function properly). The problem solver must define the goal for the situation (e.g., establish a standard for the equipment to function correctly) and then test solutions (e.g., inspect various components of the equipment to identify the obstacle causing the malfunction).

Multiple obstacles could arise during troubleshooting depending on the complexity of the problem. Once obstacles are identified, possible solutions can be identified and evaluated to reach the established standard. Davidson et al. (1994) noted that obstacles could be characteristics of the problem solver. Gitomer (1988) stated that novices lack practice at organizing new information, the ability to sift through strategies to use, and the ability to access knowledge out of context. Poor troubleshooters engage in random repairs without first defining the problem space and determining paths to a solution (Morris and Rouse, 1985). Identification and implementation of an effective strategy is the most difficult skill set for troubleshooters to develop (Johnson, 1989). However, the moment the strategy is developed, troubleshooting becomes easy and ultimately brings about effective job performance.

Statement of the Problem

The demand for cell phones has become so high that it is found in almost every home in Nigeria today. A mobile cell phone is designed to give the user maximum freedom of movement while still connected with the desired contacts. As a result of this freedom, the number of mobile phone users has continued to increase (Kuboye, Alese and Fajuyigbe, 2009). The functionality of electronic products is not without breakdown. Most repairs are done by trial and error

method with inadequate repair tools and test equipment to enhance their job performance. The situation leads too many unrepaired or partially repaired mobile sets and some are even dumped and new ones purchased. The dumping of these devices due to inability to repair causes electronic waste (e-waste) problems which cause environmental damage if not dealt with in an appropriate way. It is against this background that this study assessed the perceived troubleshooting skills possessed by cell phone repairers in North East Geo Political Zone in Nigeria, identify the areas which hindered their effective job performance and to offer useful suggestion that would help improve their performance and enhance their service delivery.

Purpose of the Study

The purpose of this study is to assess the self perceived troubleshooting skills possessed by cell phone repairers for effective job performance in North East Geo political Zone of Nigeria. Specifically, the study determined the:

1. Ability of cell phone repairers to identify cell phone parts for effective job performance.
2. Ability of cell phone repairers to use test instruments to identify defective cell phone components.
3. Ability of cell phone repairers to define problem area of the malfunctioning cell phone.

Research Questions

The following research questions guided the study:
1. To what extent are cell phone repairers able to identify appropriate cell phone parts?
2. To what extent are cell phone repairers able to use test instruments to identify defective cell phone components?
3. To what extent are cell phone repairers able to define problem areas of the malfunctioning cell phones?

METHODOLOGY

This study employed descriptive survey design. This is suitable because it sought the opinion of the representative of the entire population with specific emphasis on cell phone repairers in North East Geo political Zone of Nigeria in order to describe the outcomes for generalization. The sample size of the study was 433 drawn from a population of 548 cell phone repairers. Stratified random sampling technique was used to select one local government from each of the three senatorial districts in all the six states that constitute North East Geo political Zone of Nigeria. A questionnaire validated by three experts was used for data collection. The reliability of the instrument was determined using Cronbach alpha method and the alpha value obtained was 0.88. The structured questionnaire used for this study was scaled very high extent (VHE), High Extent (HE), Moderate Extent (ME), Low Extent (LE) and Very Low Extent (VLE). The instrument was administered and retrieved by the researcher and two research assistants. The responses were scored and the data obtained were analysed using mean and standard deviation for the research questions. The decision rule for answering the research questions were based on real limit of numbers. Any item with the mean values from 3.50 and above was rated high extent, while any item with the mean values of 2.50 – 3.49 and less than 2.50 was rated moderate extent and low extent respectively.

RESULTS

The results of the data analysis in this study are presented in Tables 1, 2, and 3.

Research Question 1: To what extent are cell phone repairers able to identify cell phone parts? The results of Table 1 show the extent at which cell phone repairers in North East Geo Political Zone are able to identify cell phone parts.

Table 1: Mean Ratings and Standard Deviations of Responses of Cell Phone Repairers on their ability to Identify Cell Phone Parts

S/N	Cell phone parts	N= 433	Extent of Identification $\bar{x}$	δ	Remark
1.	Antenna		3.58	1.14	HE
2.	Battery Connectors		3.26	1.19	ME
3.	Casings		3.03	1.27	ME
4.	Buzzers		3.01	1.63	ME
5.	Camera		3.34	1.33	ME
6.	Charger accessories port		3.54	1.30	HE
7.	Flex		3.15	1.29	ME
8.	Flex Connectors		3.03	1.27	ME
9.	Calibrator		2.60	0.97	ME
10.	Internal keypad interface		2.95	0.60	ME
11.	Joystick		3.01	1.63	ME
12.	Liquid Crystal Display (LCD) Screen		3.23	1.24	ME
13.	LCD Connectors		2.76	1.26	ME
14.	Screws		3.75	1.34	HE
15.	SIM Connectors		3.15	1.29	ME
16.	Power Switch		3.01	1.63	ME
17.	Vibrator		2.85	0.45	ME
18.	Backup Battery		3.87	1.04	HE
19.	USB Interface IC		2.41	1.13	LE
20.	RF signal Processor		2.31	0.72	LE
21.	Display Connector		2.22	0.82	LE
22.	Ear piece socket		3.26	1.19	ME
23.	Printed Circuit Board		3.64	1.34	HE
24.	SIM Holder		3.03	1.27	ME
25.	Memory Card Sitter		3.26	1.19	ME
26.	Flash		3.23	1.24	ME
27.	External Keypad		3.63	1.34	HE
28.	Mouth piece		3.26	1.19	ME
29.	Charging port		3.13	0.59	ME
30.	Data port		3.03	1.27	ME
	Grand Mean ($\bar{X}_G$)		3.12	1.17	

Key: $\bar{x}$ = Mean rating of cell phone repairers, δ = Standard Deviation; HE = High Extent;

LE = Low Extent; ME = Moderate Extent.

From Table 1, the result presented indicates the responses of cell phone repairers on the extent to which they could identify cell phone parts. Out of the 30 items, cell phone repairers rated three items (19, 20 and 21) below 2.50 which is low extent. Twenty one (21) items (2, 3, 4, 5, 7, 8, 9, 10, 11, 12, 13, 15, 16, 17, 22, 24, 25, 26, 28, 29 and 30) were rated above2.50 which is moderate extent while six (6) items (1, 16, 14, 18, 23 and 27) were rated above 3.50 which is high extent. The mean ratings of responses ranged from 2.22 to 3.87. The standard deviations ranged from 0.45 to 1.63. On the whole, the grand mean $(\overline{X}_G)$ for this analysis is 3.12 while the standard deviation is 1.17. This implies that the extent to which cell phone repairers were able to identify cell phone parts is moderate. The smaller the value of the standard deviation from the mean the closer the raters agree among themselves in their respective ratings.

Research Question 2: To what extent are cell phone repairers able to use test instruments to identify defective cell phones components?

From Table 2, it can be seen that cell phone repairers rated 4 items (2, 3, 8 and 10) high with mean ratings above 3.50 while items (1, 4, 5, 6, 7 and 9) were rated below 2.50 which is low.

Table 2: Mean Ratings and Standard Deviations of Responses of Cell Phone Repairers on their ability to use test instruments to identify defective cell phones components

S/N	Ability to use	Extent of use of test instruments to identify defective cell phones components		Remark
		$\overline{x}$	δ	
1.	transistor tester to test defective transistors	2.08	1.13	LE
2.	ohm meter to test defective resistors	3.21	1.16	HE
3.	digital multimeter to test defective diode	3.35	0.84	HE
4.	ic tester to test defective integrated circuits	1.77	1.02	LE
5.	inductance meter to test defective inductor	2.07	1.11	LE
6.	capacitance meter to identify defective capacitor	2.37	1.18	LE
7.	screen tester to test faulty screen	1.25	0.43	LE
8.	digital multimeter to test for continuity on flex	3.61	1.06	HE
9.	printed circuit board tester	1.33	0.71	LE
10.	digital multimeter to test for continuity on mains supply cord	3.98	1.27	HE
	Grand Mean $(\overline{X}_G)$	2.50	0.99	

Key: $\overline{x}$ = Mean rating of cell phone repairers; δ = Standard Deviation; HE = High Extent; ME = Moderate Extent; LE = Low Extent.

The mean response of the respondents ranged from 1.25 to 3.98 while standard deviations ranged from 0.43 to 1.27. On the whole, the grand mean $(\overline{X}_G)$ of this research question is 2.50 while the standard deviation is 0.99. This implies that the extent at which cell phone repairers is able to use test instruments to identify defective cell phones components is moderate. This rating is further verified by the values of the standard deviation from the mean which is 1.00 and this low value of standard deviation indicates the closeness in the ratings by the individual respondents.

Research Question 3: To what extent are cell phone repairers able to define problem areas of the malfunctioning cell phones?

From Table 3, it can be seen that cell phone repairers rated 2 items (5 and 6) high with mean ratings above 3.50. Items (1, 2 and 7) were rated above 2.50 which is moderate extent while items (3, and 4) were rated below 2.50 which are low.

Table 3: Mean Ratings and Standard Deviations of Responses of Cell Phone Repairers on their ability to define problem areas of the malfunctioning cell phones

S/N	Ability to define problems in	Extent of defining problem area of defective cell phones		Remark
		$\bar{x}$	δ	
1.	Transmitter section	2.99	1.33	ME
2.	Receiver section	2.76	1.10	ME
3.	Analog and digital basebands processor sections	2.37	1.18	LE
4.	Control section	1.76	0.85	LE
5.	Power management section	3.78	0.73	HE
6.	Switching and charging sections	3.55	1.27	HE
7.	Audio codecs section	2.99	1.33	ME
	Grand Mean $(\bar{X}_G)$	2.89	1.11	

Key: $\bar{x}$ = Mean rating of cell phone repairers, δ = Standard Deviation; HE = High Extent;
LE = Low Extent; ME = Moderate Extent.

The mean response of the respondents ranged from 1.76 to 3.78 while standard deviations ranged from 0.73 to 1.33. On the whole, the grand mean $(\bar{X}_G)$ of this research question is 2.89 while the standard deviation is 1.11. This implies that the extent at which cell phone repairers is able to define problem area of a malfunctioning cell phone is moderate. This rating is further verified by the values of the standard deviation from the mean which is 1.00 and this low value of standard deviation indicates the closeness in the ratings by the individual respondents.

FINDINGS/DISCUSSION

The findings of research question one revealed that the extent to which cell phone repairers in the North East Geo Political Zone of Nigeria are able to identify cell phone parts is moderate. Out of 30 items suggested by the study as cell phone parts, cell phone repairers could only identify 27 cell phone parts. This implies that the cell phone repairers could identify cell phone parts for replacement when the need arises. This finding is in agreement with that of Ayanda, Baba and Ayanda (2012) that learning and understanding cell phone parts by cell phone repairers helps in the improvement of cell phone repairs job performances. The results of research question two revealed that the extent at which cell phone repairers in Northeast Geo Political Zone is able to use test instruments to identify defective cell phones components is moderate. The cell phone repairers could use multimeters to detect faulty transistors, diodes and breakage in conduction path on printed circuit boards efficiently. However, their ability to use integrated circuit tester, transistor tester, inductance meter, screen tester, capacitance meter and printed circuit board tester is low. The instrument they are this could be as a result of in on availability of the instrument during the course of their training. The findings of research

question three showed that the extent at which cell phone repairers in Northeast Geo Political Zone is able to define problem area of a malfunctioning cell phone is moderate. The repairers could identify problems emanating from Power management section and Switching and charging sections while identification of problems in Transmitter section, Receiver section and Audio codecs section was moderate. Analog and digital basebands processor sections and Control section was low.

CONCLUSION and RECOMMENDATIONS

From the findings of this study, it can be concluded that the extent to which cell phone repairers in North East Geo Political Zone of Nigeria could identify cell phone parts, use test instruments to identify defective cell phones components and define problem area of the malfunctioning cell phone are moderate.

Based on the findings of this study, the following recommendations are proffered:

1. Cell phone repairers in the North East Geo Political Zone of Nigeria should be trained to improve on the identification of appropriate cell phone parts.
2. Cell phone repairers in the North East Geo Political Zone of Nigeria should be trained in the use of test instruments to identify defective cell phones components.
3. Cell phone repairers in the North East Geo Political Zone of Nigeria should be trained to improve on defining problem area of the malfunctioning cell phone for effective job performance.

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