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Perception of Automobile Maintenance Professionals on the Maintenance of Modern Automobiles in Niger State, Nigeria

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Abstract

The research study determined the perception of automobile maintenance artisans and technicians on the maintenance of modern automobiles in Nigeria. The study was a survey research in which data was collected through a 39 items questionnaire on a population of 150 respondents conveniently sampled from Kontagora, Suleja and Minna. The data were analyzed using Mean and Standard Deviation on a 4-point scale. Findings of the study revealed among others that the perception of automobile maintenance artisans and technicians on the maintenance of modern automobiles in Niger State has changed dramatically due to the numerous challenges posed by modern vehicles during maintenance and repair. This is due to several factors among which includes: defects of the indigenous apprenticeship method of training artisans, poor training facilities, poor curriculum in formal schools and too much emphasis in theory against practical's in formal training institutions. The study recommended among others: the urgent need to retrain and equip the automobile artisans and technicians with the necessary work skills to enable them cope with the current challenges experienced in maintenance of modern vehicles.

Keywords: Perception, Automobile, Automobile Maintenance, Professionals Modern Automobiles

Introduction

In recent years automobile maintenance activities in automobile workshops has changed from manual method of diagnosing faults to the use of Diagnostic Scan Tools, equipment and machines to enhance accuracy in fault diagnosis, maintenance and repairs. The change in the expected maintenance practices is due to the numerous innovations in modern motor vehicles designed primarily to increase fuel economy, safety, low pollution level and improved comfort. These innovations which is embedded in various new systems and sub systems in modern automobiles includes :On-Board Diagnostics (OBD), Anti-Lock Braking System (ABS), Automatic Brake Differential(ABD),Electronic Differential Lock (EDL),Integrated Starter Generator (ISG),Malfunction Indicator Lamp(MIL), Mechatronics Transmission Module (MTM), Electronic Control Unit (ECU)/Computer Control Module(CCM),Adaptive Cruise Control(ACC), Electronic Battery Sensor (EBS),Sensor and Actuator Systems, Safety Airbag Systems, Electronic Ignition System, Computer Controlled Ignition System, Electronic Fuel Injection System, Electronic Engine Management System among others (Odigiri & Ede,2010;Schwaller,1993;Hillier & Peter,2004)

Automobile safety is another area where electronics have enabled improvements, since the design of motor vehicle is now dependent on micro computers that can analyze data and then help to incorporate improved safety into the basic vehicle structure Kirpal (2006a). Safety system such as the anti lock brakes and the airbag system could not function efficiently or reliably without the use of electronics. These technological innovations have changed the perception of automobile maintenance professionals in the maintenance of modern vehicles in Nigeria. This is true because new work skills characterized by a shift towards the use of mechatronics technology, scan tools, equipment and machines for automobile diagnosis and repairs has taken over the automobile maintenance service sector.

In Nigeria the automobile maintenance service sector is dominated by road side auto mechanics (automobile artisans), craftsmen, master craftsmen and technicians. Ogwo and Oranu (2006) described road side auto mechanics (automobile artisans) as motor vehicle maintenance personnel who have acquired informal vocational training in motor vehicle maintenance and repairs through the apprenticeship system of training. According to the National Board for Technical Education (NBTE)(2001) an automobile craftsman is expected to test, diagnose, service and completely repair any fault on the motor vehicle to the manufacturers specification. The polytechnics and colleges of technology run National Diploma (ND) and Higher National Diploma(HND) leading to the production of technicians and technologists. The colleges of education and the universities run Nigeria Certificate of Education (NCE) and Bachelor's degree programmes leading to the production of automobile instructors and automobile engineers. Operationally in the context of this study, the automobile technician encompasses all categories of automobile professionals in the formal sector and includes among others: craftsmen, master craftsmen, lower and higher technicians.

These automobile maintenance professionals are currently experiencing difficulties in terms of technical know-how needed for effective maintenance of modern vehicles coming into Nigeria from various manufacturers globally. According to Ogwo (2004); Odigiri & Ede (2010) these automobile maintenance professionals now believes that the traditional apprenticeship method of training artisans is ineffective and rapidly losing significance, as the current trend in automobile maintenance and repairs deprives auto mechanics of job satisfaction and breeds job insecurity. The inadequacy of the apprenticeship system coupled with poor curriculum and the inconsistency in organizing retraining course makes identification and appropriate application of sensors, actuators and vehicle identification number (VIN) difficult .They further stated that new work skills and a good knowledge of automobile mechatronics are needed by automobile

maintenance professionals to enable them cope with the current challenges in the maintenance and repairs of modern vehicles.

Several factors have been attributed to the current difficulties experienced by automobile maintenance professionals in the maintenance of modern vehicles in Nigeria. Okoro 1993; Ogwo and Oranu (2006) lamented on the problem of skill acquisition in the informal apprenticeship system which is devoid of training curriculum ,scientific knowledge, theoretical principles and characterized by haphazard /disorderly nature of training plus the low level of education of the trainees. They also complained of too much emphasis on theory than practical's in the formal sector technical and technological institutions and the poor collaboration between automobile industry and training institutions and centers. Elobuike,(1999) stated that this poor linkage/collaboration has deprived automobile mechanics of the correct procedures for servicing and repairs of new automobile systems and subsystems. It also led to ignorance, negligence to safety rules and safe work practices by artisans, craftsmen and technicians which leads to complication of minor electronic faults during repairs involving the electronic control unit.

Emphasizing the current maintenance challenges during instructional process, equipping training institution and centers with diagnostic scan tools, equipment machines and other training facilities was suggested by Peter (2009) to help the situation. The perception of automobile vocational experts in the automobile industry and training institutions are diverse sometimes conflicting as new technologies in motor vehicles brings new maintenance challenges for automobile service personnel and adversely affect their training, work output and job satisfaction. It is based on these premises, that the researcher analyzed the perception of automobile maintenance professionals on the maintenance of modern automobiles in Nigeria.

Statement of the Problem

It is obvious that the new technological innovations in automobile technology which focuses on improving drivability, comfort, low environmental pollution and safety has greatly generated numerous maintenance challenges to automobile artisans, craftsmen, technicians and professionals in Nigeria. The perception of these automobile personnel which was based on manual dexterity and has now changed dramatically because the manual method , traditional apprenticeship method and theoretical class room knowledge of training automobile maintenance professionals and sub professionals is no longer effective to cope with the current trends and challenges in the maintenance of modern vehicles. The study therefore sought out to

analyze the perception of automobile maintenance professionals on the maintenance of modern automobiles in Nigeria.

Purpose of the Study

The major purpose of the study was to conduct a research on the perception of automobile maintenance professionals on the maintenance of modern automobiles in Nigeria.

Specifically, the study:

1. Identified the perception of automobile maintenance professionals on the current trends in the maintenance of modern automobiles in Nigeria.
2. Determined the factors affecting the maintenance of modern automobiles in Nigeria.
3. Identified the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles.

Research Questions

The following research questions guided the study:

1. What is the perception of automobile maintenance professionals on the current trends in the maintenance of modern automobiles in Nigeria?
2. What are the factors affecting the maintenance of modern automobiles in Nigeria?
3. What is the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles?

Research Hypotheses

The following null hypotheses guided the study:

H₀₁ : There is no significant difference in the mean responses of road side automobile artisans and automobile technicians on the current trends in the maintenance of modern automobiles in Nigeria.

H₀₂ : There is no significant difference in the mean responses of road side automobile artisans and automobile technicians on the factors affecting the maintenance of modern automobiles in Nigeria.

H₀₃ : There is no significant difference in the mean responses of road side automobile artisans and automobile technicians on the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles.

Research Methodology

Survey research design was adopted by the researcher to carry out research on the perception of automobile maintenance professionals on the maintenance of modern automobiles in Niger State, Nigeria. The study was carried out in Kontagora, Suleja and Minna. The study used a population of 150 respondents comprising of 50 automobile technicians and 100 road side automobile artisans. A 39 item questionnaire structured on a 4-point scale response option was used to collect data from the respondents to indicate the degree to which respondents accept or reject each item. The questionnaire was validated by three experts from Peugeot maintenance service units in Minna and Zuba, and an automobile lecturer from Department of Industrial and Technology Education of Federal University of Technology, Minna. Corrections were made before it was administered. The Mean and Standard Deviation (SD) were used to answer the research questions. Therefore items with mean score below 2.50 -cut off point were rejected while those with mean score of 2.50 and above were accepted. The t-test statistics was used to test the hypotheses at 0.05 level of significance. The t-critical value for accepting or rejecting the null hypotheses was ± 1.98 .

Results

Research Question 1

What is the perception of automobile maintenance professionals on the current trends in the maintenance of modern automobiles in Nigeria?

Hypothesis 1

There is no significant difference in the mean responses of road side automobile artisans and automobile technicians on the current trends in the maintenance of modern automobiles in Nigeria.

Table 1: t-test analysis of mean responses of respondents on the current trends in the maintenance of modern automobiles in Nigeria.

S/N	ITEM STATEMENT	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	t-cal	REM
1	Traditional apprenticeship method of training is rapidly losing significance.	3.33	0.60	2.82	0.40	0.34	NS
2	Artisans, craftsmen and technicians now require new work skills in mechatronics.	3.68	0.30	3.05	0.10	0.88	NS
3	Identification and application of sensors and actuators in automobiles poses problem to auto mechanics.	3.34	1.20	2.97	0.30	0.62	NS
4	Auto mechanics faces challenges in the interpretation of vehicle identification number to ascertain vehicle characteristics.	3.00	0.36	3.06	0.70	1.25	NS
5	Mechanics faces challenges in the interpretation of diagnostic trouble codes.	3.01	1.21	3.75	0.65	1.21	NS
6	Description of the operation of each of the new automobile systems poses problems to auto mechanics.	3.10	0.83	2.71	1.27	0.60	NS
7	Owners of modern vehicles in Nigeria lack confidence in auto mechanics.	3.20	0.32	3.01	0.81	0.50	NS
8	A fault in electronic control unit creates tension and fear in auto technicians.	3.71	1.00	3.36	0.72	0.59	NS
9	Complication of faults in modern vehicles is a common practice among auto mechanics.	3.56	1.39	3.70	0.63	0.50	NS
10	Repair of computerized ignition system poses a threat to auto mechanics.	3.71	1.29	3.45	0.74	0.21	NS
11	Increase in electronic subsystems in automobiles makes mechanics redundant in their places of work.	3.51	1.11	3.44	0.67	0.23	NS
12	Auto technicians are deficient in the appropriate work tools needed	3.23	1.00	4.41	0.71	0.57	NS
13	Current trends in automobile maintenance and repairs deprive auto mechanics of job satisfaction	3.20	0.9	3.11	0.78	0.59	NS

***Note : REM=Remark**

The presentation on table 1 shows that all the items presented had their weighted mean values ranged from 2.47-3.75. This values are above the cut off point of 2.50 which signifies that the respondents accepted the items on the current trends in the maintenance of modern automobiles in Nigeria.

The t-test analysis revealed that all the items had their t-calculated values less than the t-table value of ± 1.98 . This implies that there was no significant (NS) difference in the mean ratings of the responses of the respondents on the current trends in the maintenance of modern automobiles in Nigeria. Therefore we accept the null hypothesis.

Research Question 2

What are the factors affecting the maintenance of modern automobiles in Nigeria?

Hypothesis 2

There is no significant difference in the mean responses of road side automobile artisans and automobile technicians on the factors affecting the maintenance of modern automobiles in Nigeria.

Table 2: t-test analysis of mean responses of respondents on the factors affecting the maintenance of modern automobiles in Nigeria.

S/N	ITEM STATEMENT	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	t-cal	REM
14	Negligence of safety rules and safe work practices by automobile mechanics.	3.24	0.81	2.67	0.84	0.46	NS
15	Low level of education among automobile artisans.	3.56	0.13	2.61	0.48	0.89	NS
16	Inadequacy of the apprenticeship system and its disorderly nature of training.	3.53	0.81	3.81	0.59	0.78	NS
17	Inconsistency in curriculum review.	3.46	0.54	3.21	0.58	1.43	NS
18	Inadequate knowledge of the scientific and theoretical principles in automobiles.	3.65	0.59	3.43	0.70	1.23	NS
19	Absence of government in the affairs of auto mechanics in the informal sector.	3.41	0.92	2.97	1.01	0.64	NS
20	Inconsistency in organizing retraining courses on recent innovations.	2.55	0.88	2.56	0.81	0.56	NS
21	Absence of diagnostic scan tools, equipment and modern facilities in training centers and institution.	2.90	1.77	2.73	0.74	0.55	NS
22	Poor collaboration between automobile industry and training institutions.	2.51	0.73	2.70	1.07	0.54	NS
23	Problem of identification and selection of appropriate work tools for new automobile systems.	2.57	0.73	2.53	0.90	0.35	NS
24	Inadequate knowledge of the principle of operation of electronic control unit.	2.53	0.81	2.53	0.49	0.52	NS
25	Ignorance of the correct procedures for servicing and repair of modern vehicles.	2.65	0.92	2.70	2.70	0.57	NS
26	Absence of standard code of practice and licensing of auto mechanics.	2.73	0.63	2.83	0.89	0.67	NS

The data analysis in table 2 revealed that all the items had their mean values ranged from 3.56-3.81. Since the values are above the cut off point of 2.50, it indicates that the respondents accepted all the items as the factors affecting the maintenance of modern automobiles in Nigeria. The t-test analysis also revealed that all the items had their t-calculated values less than the t-table value of ± 1.98 . This implies that there was no significant (NS) difference in the mean ratings of the responses of the respondents on the factors affecting the maintenance of modern automobiles in Nigeria. Hence we uphold the null hypothesis.

Research Question 3

What is the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles?

Hypothesis 3

There is no significant difference in the mean responses of road side automobile artisans and automobile technicians on the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles.

Table 3: t-test analysis of mean responses of respondents on the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles.

S/N	ITEM STATEMENT	\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	t-cal	REM
27	Review of automobile technology curriculum to cope with new challenges.	3.09	0.68	2.90	0.70	0.44	NS
28	Organizing retraining courses to upgrade the work skills of auto mechanics.	2.77	0.48	2.75	0.71	0.83	NS
29	Master craftsmen should be taught modern teaching procedure.	3.68	1.10	3.10	1.41	0.67	NS
30	Review of teacher training curriculum in training institutions.	2.70	1.15	2.95	0.45	1.26	NS
31	Developing practical curriculum for training apprentices in the informal sector.	3.04	0.96	3.40	0.41	1.17	NS
32	Certification of training offered by informal apprenticeship system.	3.74	1.39	3.12	1.07	0.65	NS
33	Combining vocational automobile training with evening school in informal sector.	3.68	0.36	2.90	0.69	0.53	NS
34	Teaching automobile professionals modern diagnostic and service procedures.	3.11	0.42	2.71	0.74	0.56	NS
35	Training workshop and institution should be updated to reflect the work place.	3.35	1.12	2.65	1.15	0.66	NS
36	Conducting research to identify maintenance challenges from new vehicles.	3.11	0.42	2.71	0.74	0.56	NS
37	Establishing strong linkage between auto industry and training institutions.	2.63	0.45	2.72	0.64	0.59	NS
38	Emphasizing current maintenance challenges during instructional process.	3.35	1.12	2.65	1.15	0.66	NS
39	Equipping training institutions and centers with diagnostic scan tools, equipment and other training facilities	2.82	1.08	2.65	1.13	0.60	NS

Table 3 shows that all the items presented had their weighted mean values ranged from 2.90-3.74. This values are above 2.50 indicating that the respondents agreed to the items on the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles. The t-test analysis shows that all the items had their t-calculated values less than the t-table value of ± 1.98 . This implies that there was no significant (NS) difference in the mean ratings of the responses of the respondents on the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles. Thus we fail to reject the null hypothesis three.

Summary of Major Findings of the Study

Regarding the perception of automobile maintenance professionals on the current trends in the maintenance of modern automobiles in Nigeria, the study revealed among others the following as major perception:

1. Traditional apprenticeship method of training is disorderly, inadequate, ineffective and rapidly losing significance
2. Current trends in automobile maintenance and repairs create redundancy and deprive auto mechanics of job satisfaction.
3. Auto mechanics faces challenges in the interpretation of vehicle identification number and in the interpretation of diagnostic trouble codes.
4. A fault in electronic control unit creates tension and fear in auto technicians as complication of faults in modern vehicles is a common practice among auto mechanics.

Concerning the factors affecting the maintenance of modern automobiles in Nigeria, the study among others exposes the following factors:

1. Low level of education among automobile artisans, absence of training curriculum and haphazard nature of apprenticeship training.
2. Inconsistency in curriculum review and organization of retraining courses on recent innovations.
3. Poor collaboration between automobile industry and training institutions leading to ignorance of the correct procedures for servicing and repair of modern vehicles.
4. Absence of diagnostic scan tools, equipment and modern facilities in training centers and institution.

While on the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles, the study revealed among others the following:

1. Review of automobile technology curriculum to cope with new challenges..
2. Conducting research to identify maintenance challenges and organization of retraining courses to upgrade the work skills of auto mechanics..
3. Equipping training institutions and centers with diagnostic scan tools, equipment and other training facilities
4. Establishing strong linkage between auto mechanics workshop & training institutions for availability of new information and retraining courses to upgrade technician's work skills.

Discussion

From table 1, the analysis showed that the respondents agreed with the 13 items to be among the major perception of automobile maintenance professionals on the current trends in the maintenance of modern automobiles in Nigeria. For instance, the respondents opinion that the traditional apprenticeship method of training is disorderly, inadequate, ineffective and rapidly losing significance is in agreement with the views of Okoro (1993) who revealed that apprenticeship training does not involve teaching of theoretical

principles and the mode of training does not prepare apprentices for opportunities to judge situations based on available theoretical principles. He further stated that the absence of theoretical principles in apprenticeship training leads to poor performance skills in roadside mechanics.

According to Ogwo (2004); Odigiri & Ede (2010) these automobile maintenance professionals now believes that the traditional apprenticeship method of training artisans is ineffective and rapidly losing significance, as the current trend in automobile maintenance and repairs deprives auto mechanics of job satisfaction, breeds fear and job insecurity. Findings from study also confirm that roadside auto mechanics and technicians find it difficult to diagnose and repair most electronic faults in modern vehicles. This is in agreement with Rajput (2007) who asserted that modern automobile engines are sufficiently complex to discourage even the professional mechanics because modern vehicles rely on Hi- Tech electronics for controlling almost every system ranging from engine management to entertainment systems and climate control.

The acceptance of all the items on table 2 revealed that all the items are valid as regard to the factors affecting the maintenance of modern automobiles in Nigeria. The respondents identified among others: low level of education among automobile artisans, absence of training curriculum and haphazard nature of apprenticeship training; poor curriculum ,inconsistency in curriculum review and organization of retraining courses on recent innovations; poor collaboration between automobile industry and training institutions leading to ignorance of the correct procedures for servicing and repair of modern vehicles, absence of diagnostic scan tools, equipment and modern facilities in training centers and institution and too much emphasis on theory than practical's in formal technical and technological institutions. Their views was supported by Ogwo (2004) who lamented that the crude methods , manual tools and equipment used by roadside mechanics usually complicates minor automobile faults or create new problems in the system.

Okoro (1993) pointed out the “lack of curriculum” as one of the lapses in the indigenous apprenticeship in Nigeria. He further stated that the absence of curriculum is the cause of the disorderly, unorganized and unstructured nature of the vocational training provided by roadside mechanics. Alabi (2006) attributed the poor maintenance skills in roadside auto mechanics and technicians to the inadequate training facilities in most automobile workshop and training institutions in Nigeria. The inadequacy of the apprenticeship system coupled with poor curriculum and the inconsistency in organizing retraining course makes identification and appropriate application of sensors, actuators and vehicle identification number (VIN) difficult. Odigiri & Ede (2010) also complained of too much emphasis on theory than practical's in

the formal sector technical and technological institutions leading to the production of graduates who are skill deficient.

The acceptance of items 27-39 in table 3 showed the perception of automobile maintenance artisans and technicians on how to improve on the maintenance of modern motor vehicles in Nigeria. The perception of the respondents concerning regular review of the automobile technology curriculum and involvement in retraining courses was supported by Okorie (2000) who stated that the new technologies in modern vehicles demand new work skills and thus new technical educational requirements. He added that the re-training of automobile artisans and technicians is necessary in order to upgrade their technical knowledge and vocational skills to cope with new maintenance challenges posed by modern vehicles. According to UNESCO -Nigeria: 2008- 2011 regular review of automobile technology curriculum would enable the school programs to reflect the automobile work place .Also the findings also revealed that, regular review of the technical teacher training curriculum is necessary for effective implementation since this will equip technical teachers with technical and pedagogical skills they will need to facilitate teaching and learning of the new work skills.

On the hypotheses, the study found out that there was no significant difference in the mean ratings of the responses of the respondents on: the current trends in the maintenance of modern automobiles in Nigeria; the factors affecting the maintenance of modern automobiles in Nigeria, and the perception of automobile maintenance professionals on how to improve on the maintenance of modern motor vehicles. Hence the opinions of the respondents did not differ in all the items identified. This implies that the technicians are faced with a lot of problems in the maintenance of modern automobiles in Nigeria, which calls for the need to initiate improvement techniques needed to improve maintenance of automobiles in the work place. Therefore the null hypotheses ($H_{01}, H_{02},$ and H_{03}) was accepted for all the items.

Conclusion

The automobile is an indispensable means of transportation in modern societies because it plays a major role in people's lives whether used for daily transportation or used for pleasure. From the findings of the study it is clear that the automobile artisans and technicians has ill-perception in relation to the challenges faced in the maintenance and repair of modern automobiles in Nigeria. This is due to several factors ranging from defects of the indigenous apprenticeship method of training artisans, poor training facilities, poor curriculum in formal schools and too much emphasis in theory against practical's in formal training institutions. There fore there is urgent need to retrain and equip the automobile artisans and technicians with

the necessary work skills to enable them cope with the current challenges experienced in the maintenance and repair of modern motor vehicle in Nigeria.

Recommendations

To improve on the maintenance of modern vehicles in Nigeria, the study recommends the following:

1. Review of automobile technology curriculum to cope with new challenges.
2. Conducting research to identify maintenance challenges and organization of retraining courses to upgrade the work skills of auto mechanics.
3. Equipping training institutions and centers with diagnostic scan tools, equipment and other training facilities.
4. Establishing strong linkage between auto mechanics workshop & training institutions for availability of new information and retraining courses to upgrade technician's work skills.
5. Emphasizing current maintenance challenges during instructional process.
6. Master craftsmen should be taught modern teaching procedure.
7. Combining vocational automobile training with evening school in informal sector

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