VOLUME 7 NUMBER 1
APRIL, 2010

ISSN 0748-471


# JOURNAL OF SCIENCE, TECHNOLOGY AND MATHEMATICS EDUCATION (JOSTMED)

Published by
DEPARTMENT OF SCIENCE EDUCATION
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

# Effects of Innovations on the Job Security and Performance of Automobile Mechanics' Craftsmen and Master Craftsmen in Nigeria

**Maigida, J. F. and Abutu Francis**
**Industrial and Technology Education Department**
**Federal University of Technology, Minna.**

## Abstract

*The research study is on the effects of innovation on the job security and performance of automobile craftsmen and master craftsmen in Nigeria. The study sought to identify how the current innovations in modern vehicles affect the job security and performance of automobile craftsmen/master craftsmen; and to identify ways to be adopted to enable automobile craftsmen/master craftsmen to cope with innovations in modern vehicles. A 20 items questionnaire was use to collect data from automobile craftsmen and master craftsmen from Federal Science and Technical College (FSTC) Orozo, and Government Science and Technical College (GSTC) Garki, both in Abuja. Mean ($\overline{X}$) and Standard Deviation (SD) were used to analyze the data collected from the respondents. The study among others found that; automobile craftsmen/master craftsmen finds it difficult to diagnose and repair most electronic faults in modern vehicles and usually complicate simple faults during troubleshooting. The study among others recommended that; federal government should organize periodic training and retraining courses to update and upgrade the work skills of automobile craftsmen/master craftsmen and to periodically review the technical college curriculum to enable automobile craftsmen to acquire the needed current innovative knowledge to improve their performance skills and to secure their job.*

***Keywords:*** Innovations, Job Security, Performance, Automobile Mechanics' Craftsmen, Master Craftsmen.

## Introduction

Education both in the formal and informal sector requires innovations due to the dynamic nature of human needs brought about by technological advancement in science and technology in which the automobile technology is one. Van der Wal (2007) defined an automobile as that which consists of complex structure of a large number of components that work together in different system and groups. The automobile technology Van der Wal explained is connected with scientific principles/knowledge applied in the design and construction of a motor vehicle. Amitabh (2009) defined innovations as the exploitation of new ideas leading to the creation of a new product process or service. According to Wikipedia (2009) the innovations in automobile industry is more rapid in three areas; electronics, composite materials and non fossil fuel forms of propulsion(example hydrogen fuel).Most modern cars are Electronic Control Unit (ECU) enabled. ECU-enabled cars refer to cars that have ECU incorporated as a major part of the

electrical system. The ECU is a computerized micro system that is programmed to centrally control all sensors and systems in a modern vehicle (Hillier, Combes and Rogers, 2006). Wikipedia (2009) revealed that today's automobile is a complex integrated product with more than 3000 parts that all need to work in harmony. Recent innovations in the automobile industry involves the increasing use of more advanced electronics, computers and wireless communication system to assist drivers and enhance safety (Salami 2007).

Schumpter (1984) defined job security as the probability that a worker will continue to keep his job or retain his job despite the advancement in technology. Ogwo and Oranu (2006) noted that the job security of automobile craftsmen depend on the relevance of the work skills they possess whether in self or paid employment. On other hand,Holderman, James and Mittchell (2006) opined that diagnostics procedures, skill development and performance are what automobile craftsmen need most to secure their job in the automobile field. According to the Federal Government of Nigeria (FGN), 2004) automobile mechanics is one of the mechanical trades offered as motor vehicle mechanics work" trade in the technical colleges of Nigeria. Technical Colleges are regarded as the principal vocational institution in Nigeria (Okoro,2006).Training in automobile technology is carried out at Technical College (TC 1 to III ) and tertiary institutions. Graduates of automobile mechanics (also called craftsmen) from technical colleges according to the National Board for Technical Education(NBTE,2002) should among others be able to inspect, identify problems, repair and service mechanical, electrical and electronic system and components in modern cars ,buses and trucks. The philosophy of automobile programme according to the National Business and Technical Education Board (NABTEB) and NBTE (2002) is to produce competent automobile craftsmen for Nigeria Technological and Industrial Development and to conduct examinations leading to the award of the National Technical Certificate (NTC) and Advance National Technical Certificate (ANTC) for automobile craftsmen/master craftsmen. NBTE (2001) refers to Master craftsmen as those highly skilled and experienced automobile mechanics that teaches or trains students to become craftsmen who may also further their education in tertiary institutions. Job performance is the ability of a worker to efficiently execute a job task with a high level of accuracy.

The complexity in automobiles will continue to grow exponentially in response to the requirement for technologies to achieve low pollutant emissions and to meet the high

expectations of the modern vehicle owners (Hillier and Rogers, 2007).The continues use of more advanced electronics gadgets in modern vehicles has changed the work skills and competencies required of automobile craftsmen/master craftsmen. The shift in work skills brought about by innovations has made many automobile craftsmen and master craftsmen to become redundant and poses a threat to their job security (Kirpal,2006).There are several cases where automobile craftsmen/master craftsmen in the process of repairing a faulty vehicle ignorantly remove sensitive electronic components, wrongly position them or even damage them, which further worsen the vehicle fault (Kirpal,2006). The lack of advance specialized skills to diagnose repair and maintain modern vehicles obviously creates fear in both the craftsmen/master craftsmen and owners of modern vehicles. It is the seemingly inadequacy of the work skills possessed by automobile craftsmen and master craftsmen in Nigeria that necessitate this study.

**Research Questions**

Two research questions guided the study:

1. How does the current innovations in modern automobile vehicles affect the job security and performance of automobile craftsmen/master craftsmen?
2. What are the ways that could be adopted to enable automobile craftsmen/master craftsmen to cope with innovations in modern vehicles

**Methodology**

The study was a survey research which investigated the effects of innovations on the job security and performance of automobile craftsmen in Nigeria. Nworgu ( 2006) defined survey research as one in which a group of people or items is studied by collecting and analyzing data from people or items considered to be representative of the entire group. The research study covered two technical colleges in Abuja which include: Federal Science and Technical College (FSTC), Orozo-Abuja and Government Science and Technical College (GSTC), Garki-Abuja. All master craftsmen and craftsmen of the two technical colleges were used as the respondent. A 20 items questionnaire structured on a 4-point scale response options was used to collect data from the respondents. The questionnaire was validated by 3 lecturers in the Department of Industrial and Technology Education(ITE),Federal University of Technology (FUT), Minna and corrections made appropriately before it was administered .The data obtained from the respondents were analyzed using Mean ($\overline{X}$) and Standard Deviation (SD).Therefore items with mean score below

2.50 were regarded as disagreed while those with mean score of 2.50 and above were regarded as agreed.

**Research Question 1**

How does the current innovations in modern automobile vehicles affect the job security and performance of automobile craftsmen/master craftsmen?

**Table 1**

**Mean($\bar{X}$) and Standard Deviation (SD) of respondents on how the current innovations in modern automobile vehicles affects the job security of automobile craftsmen/master craftsmen**

| S/N | ITEMS | $\bar{X}$ | $SD$ | Remark |
|---|---|---|---|---|
| 1 | Automobile craftsmen/ master craftsmen finds it difficult to maintain modern vehicles. | 3.13 | 0.57 | Agreed |
| 2 | Automobile craftsmen/master craftsmen cannot handle electronic faults in modern cars. | 3.10 | 0.59 | Agreed |
| 3 | Auto craftsmen/master craftsmen cannot repair faults in the electronic control unit of modern cars. | 3.11 | 0.81 | Agreed |
| 4 | Owners of modern cars lack confidence in automobile craftsmen. | 3.02 | 0.48 | Agreed |
| 5 | There is a great reduction in the maintenance work brought to automobile craftsmen/master craftsmen. | 2.70 | 0.75 | Agreed |
| 6 | Vehicle owners believes auto craftsmen skills are insufficient. | 3.00 | 0.80 | Agreed |
| 7 | Automobile craftsmen/master craftsmen cannot repair vehicle security | 2.80 | 0.92 | Agreed |

**craftsmen**

| | | | | |
|---|---|---|---|---|
| | system faults. | | | |
| 8 | Craftsmen/master craftsmen cannot handle faults in the automobile computer system. | 3.20 | 0.93 | Agreed |
| 9 | Craftsmen/master craftsmen usually complicate simple faults during troubleshooting. | 2.90 | 0.36 | Agreed |
| 10 | Mechanics usually damage sensitive components during repair. | 2.92 | 0.58 | Agreed |

The data presented in table 1 revealed that respondents agreed with all the items with mean score between 2.70-3.13.

**Research Question 2**

What are the ways that could be adopted to enable automobile craftsmen/master craftsmen to cope with the innovations in modern vehicles?

**Table 2**

**Mean ($\bar{X}$) and Standard Deviation(SD)of the respondents on the ways to be adopted to enable automobile craftsmen/master craftsmen to cope with the innovations in modern vehicles.**

| S/N | ITEMS | $\bar{X}$ | SD | Remark |
|---|---|---|---|---|
| 11 | Automobile craftsmen/master craftsmen should acquire training in the application of scan tools for diagnostics and repair. | 3.50 | 0.54 | Agreed |
| 12 | Automobile craftsmen/master craftsmen should acquire knowledge on the principles of operation of electronic control unit. | 3.70 | 0.58 | Agreed |
| 13 | Master craftsmen should be conversant with the modern teaching procedures. eg Teaching orderly from simple to complex. | 3.50 | 0.48 | Agreed |
| 14 | The technical college Curriculum should be periodically reviewed to bring in innovations. | 3.50 | 0.85 | Agreed |
| 15 | Periodic training and retraining courses should be organized to update craftsmen/master craftsmen knowledge. | 3.70 | 0.45 | Agreed |
| 16 | Automobile craftsmen/master craftsmen should be with On-Board Diagnostics (OBD) techniques. | 3.70 | 0.90 | Agreed |
| 17 | Craftsmen/master craftsmen should be conversant with various sensors and actuators in modern cars. | 3.70 | 0.58 | Agreed |
| 18 | Craftsmen/master craftsmen should be able to utilize the Vehicle Identification Number (VIN) to ensure accurate replacement of components. | 3.60 | 0.65 | Agreed |
| 19 | Government should regulate and certify the automobile practices in Nigeria. | 3.70 | 0.68 | Agreed |
| 20 | Craftsmen/master craftsmen should be familiar with the input and output devices linked with the automobile computer in modern cars. | 3.80 | 0.70 | Agreed |

The data presented in table 2 showed that all the respondents agreed with all the items with mean score ranging from 3.35-3.72

**FINDINGS OF THE STUDY**

Based on the data collected and analyzed, the following findings were made on how the current innovations in modern vehicles affects the job security and performance of automobile craftsmen /master craftsmen as well as the ways that could be adopted to enable craftsmen/master craftsmen cope with innovations in modern vehicles.

On how the current innovations in modern vehicles affects the job security and performance of automobile craftsmen /master craftsmen, both respondents agreed with the followings :

1. Automobile craftsmen/master craftsmen find it difficult to diagnose and repair most electronic faults in modern vehicles.
2. Vehicle owners believes automobile craftsmen/master craftsmen skills are insufficient.
3. Owners of modern vehicles lacks confidence in craftsmen/master craftsmen.
4. Automobile craftsmen/master craftsmen usually complicate simple faults during troubleshooting.
5. There is a great reduction in the maintenance work brought to craftsmen/master craftsmen.
6. Automobile craftsmen/master craftsmen usually complicates simple during troubleshooting.

While on ways that could be adopted to enable craftsmen/master craftsmen cope with innovations in modern vehicles, both respondents agreed with the following:

7. Periodic retraining courses should be organized for automobile craftsmen/master craftsmen to upgrade and update their their skills.
8. Master craftsmen should be taught modern teaching procedures.
9. The technical college curriculum should be periodically reviewed to bring in innovations.
10. Federal government should regulate and certify the automobile practices in Nigeria..

**DISCUSSION OF FINDINGS**

Analysis from table 1 revealed that automobile craftsmen/master craftsmen 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 findings revealed that vehicles owners believe automobile craftsmen/master craftsmen skills are insufficient and lack confidence in craftsmen. This is in line with Ogwo (2004) who lamented on the insufficient nature of the skills possessed by automobile craftsmen/master craftsmen in Nigeria due to lack of innovations in their training . In addition, the findings of the study revealed that owners of modern vehicles lacks confidence in automobile craftsmen/master craftsmen due to the manual and crude method craftsmen adopt to service modern automobiles.The study also reveals that automobile craftsmen/master craftsmen usually complicates simple faults during troubleshooting. This also agrees with Ogwo (2004) who lamented that the crude methods , manual tools and equipment used by craftsmen/master craftsmen usually complicates minor automobile faults or create new problems in the system. Furthermore, the findings shows that the defects in auto mechanics maintenance technique breeds fear in vehicle owners and therefore leads to a great reduction in the maintenance work brought to craftsmen/master craftsmen which makes them to become redundant, thereby gradually loosing significance.

Findings from table 2 indicated that periodic retraining courses should be organized for automobile craftsmen/master craftsmen to upgrade and update their skills. This was buttress by Mani (2001) who asserted that innovative policies are needed to provide sufficient stimuli for automobile service industries to invest in training and retraining courses to salvage the skills development situation in the automobile service industry. The study also revealed that master craftsmen should be taught modern teaching procedures e.g. teaching orderly from simple to complex. This is in agreement with Ogwo and Oranu (2006) who recommended that to improve skill acquisition in vocational training, teaching must be orderly from simple learning tasks through gradual progression into complex tasks.

Findings as evident from the study revealed that technical college curriculum should be periodically reviewed to include innovations. This was supported by Okoro (2006) who defined curriculum review in vocational and technical education as an innovative process of bringing new ideas into an existing curriculum to strengthen the curriculum to meet the demands of the present society. He further recommended that existing curriculum should be periodically reviewed to correct the weaknesses of the curriculum to enable learners to cope with changes and advancement in technology. The study further revealed that government should regulate and certify automotive practices in Nigeria. The views of the respondents agrees with Mani (2001) who advised that government needs to provide enabling policies targeted at the automotive service sector for the training and retraining of the automobile craftsmen and master craftsmen.

**Conclusions**

The current innovations in modern vehicles adversely affect the job security and performance of automobile craftsmen/master craftsmen in Nigeria due to the inadequacies in the work skills possessed by craftsmen and master craftsmen. Therefore, efforts should be made towards reviewing the curriculum of technical colleges to include current innovations that would enable automobile craftsmen/master craftsmen to acquire and develop modern work skills needed to maintain modern cars so as to retain their job. The master craftsman and craftsmen should make effort to tackle factors that reduce their performance skills in maintaining modern vehicles. It is worthy to state here that unless these facts are seriously taken into consideration and fully implemented, the automobile craftsmen/master craftsmen in will be adversely affected by innovations which could make them to lose significant and subsequently loose their job.

**Recommendations**

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

1. The technical college curriculum should be periodically reviewed to bring in current innovations.
2. Federal Ministry of Works and Transportation in collaboration with the National Automotive Council (NAC) should organize periodic retraining courses to update and upgrade the work skills of automobile craftsmen/master craftsmen.
3. Master craftsmen should be taught modern teaching procedures, such as teaching from simple tasks through gradual progression into complex tasks.
4. Automobile craftsmen/master craftsmen should be conversant with the use of modern troubleshooting devices.
5. Government should also purchase modern troubleshooting devices and equipment in training centers for training automobile craftsmen/master craftsmen.

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**CITATION AND PUBLICATION DETAILS**

Maigida, J. F. & Abutu F. (2010). Effect of Innovations on the Job Security and Performance of Automobile Mechanics Craftsmen and Master Craftsmen in Nigeria. *Journal of Science, Technology and Mathematics Education (JOSTMED)*, 7(1),113- 119.
**Publisher:** Department of Science Education, Federal University of Technology, Minna, Nigeria.
**Date Issued:** 11th April, 2010.
**Series/Report No:** JOSTMED, 7(1),113- 119.
**Identifiers:** ISSN: 0748-4710.
**Sponsors:** Maigida James Felix.
**Publication Collection Category :** Journal Article.
**Website:** www.futminna.edu.ng