

Development of Technical Skills in Meeting the Challenges of Modern Automobiles in Nigeria

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Abstract

This study investigated the level of preparedness of automobile mechanics/technicians for modern vehicles. These modern and advanced vehicles are mechatronics based, which combines the technology of both electronics and mechanical engineering. There is, therefore, the need to upgrade the training or retraining of these mechanics or technicians to meet up the challenges associated with these modern vehicles. In this study, mechanics in three South-West Nigerian cities namely, Abule-Egba (Lagos State), Ibadan (Oyo State) and Ilaro (Ogun State) were investigated. The method of investigation adopted includes visitation to the mechanic workshops, face-to-face interviews, and application of questionnaires. Fifty mechanic shops were considered within each location using a convenience sampling technique. Each shop is comprised of no fewer than ten personnel which include apprentices, journeymen, foremen and the boss. The result showed that only 18% of the mechanics in the study have heard or known how to use diagnostic equipment for troubleshooting modern vehicles. The study then proposed a model for re-educating, equipping and up-skilling this category of workers, to make them relevant and up to date in their field. It is presumed that technological institutions will be in the lead in this skill acquisition scheme which would be financed by either the government, corporate organizations or advanced countries that are willing to transfer technologies of their motor vehicle products.

Keywords: Automobile, Modern Skill, Mechatronics, Re-skilling, Model, Convenience Sampling

Citation

Awolola O.O. & Olayiwola, J.O. (2021). Development of Technical Skills in Meeting the Challenges of Modern Automobiles in Nigeria. *International Journal of Women in Technical Education and Employment (IJOWITED), The Federal Polytechnic, Ilaro Chapter*, 2(2), 30-37

ARTICLE HISTORY

Received: September 25, 2021
Revised: October 11, 2021
Accepted: November 8, 2021

1. Introduction

There are new trends in the automobile industry lately, and with the innovation and revolution in the production of modern automobiles, there has arisen the challenges faced with the repair and maintenance by the roadside mechanics. However, there are few standard repair and services outlets by accredited automobile makers' representatives in Nigeria. Equally, more than 70% of vehicles in Nigeria, are imported as used vehicles, otherwise known as 'Tokunbo' which might not find their ways to these accredited representatives may be because of high charges demanded by them. Furthermore, these vehicles are equally new trending vehicles that are more or less electro-mechanical. There is equally the need to take proper care of them whenever the need arises. Auto mechanics are the ones responsible for putting these vehicles in functional fit as may be required.

In research by Olaitan & Ike (2015), an auto-mechanic was described as one who is skilled and knowledgeable in automobile maintenance, repair and sometimes modifications. He may specialize in particular makes of automobiles or brands with the knowledge of diagnosing the problems and providing appropriate solutions to the automobiles. A study on the challenges associated with modern vehicles vis-à-vis roadside mechanics, Edunyal (2015), surveyed this challenge in *Tarkwa Nsueam* in Ghana in which he describes motor vehicles as

electro-mechanically operated and computerized machines which are common in the design of braking, steering starting and suspension systems etc., among other areas. In his observation, there is a need for them to have high competence in handling these modern vehicles, as there is a greater disparity between the 1900 models or makes and the modern models and innovations. Currently, their competence is largely on trial and error but to effectively handle modern vehicles the use of automobile scanning tools is in vogue and appropriate.

Automobile repair and maintenance is a big business; Kayemuddin & Kayum (2013), have in their report highlighted the problems and prospects of Automobile repairs/maintenance outfits in Bangladesh and concluded that though, little capital is required to start and operate an auto mechanic workshop, its contribution in alleviating poverty and its significant impact on the economy of their country, cannot be over-emphasized.

Another study in Ghana, in relation to the subject matter in *Tamale* Metropolis, assessed the skills of roadside mechanics in repairing and maintenance of modern electronic modelled vehicles, revealed that most auto-mechanic shops have spent a considerable number of years on the work, but have no knowledge in inspecting, are word and repair of electronic managed vehicles (Ziblim et al, 2018).

In an article in the Washington post Haizak (2013) in which she shed more light on how innovations have changed the job of an auto repair technician. She emphasized the need for good knowledge of computers, strong reading ability and sound understanding of Mathematics. The institute prepares trainees for expertise in various areas of automobile services. The training aims to achieve excellence certification for the job. The earlier entry point requirement was high school 'drop out'. This has been jacked up with a prerequisite of a high school diploma because the job is becoming more demanding with Mathematics becoming more sophisticated and high reading competence required. Also, with the rapid innovations in auto technology even experienced auto repairers need to upgrade their skills from time to time, hence, the importance of training and retraining.

Re-skilling calls for more investments in human capital development and this was reiterated by *Brende* (2019) that valuing human capital does not only equip the individual with knowledge and skills to respond to systemic changes but also empowers individuals to be part of creating equality and inclusiveness for global sustainability.

There is a great deal of investment required in the re-skilling revolution. For example, in the United States of America, about \$34 billion is required for transitioning the 95% of at-risk workers in the States into new jobs through re-skilling. Among this lot, the private sector of the economy could only cater for re-skilling of about 25%, which implies that there is a need for a collaborative effort between the government and the public and private sectors for cost reduction to achieve the needed results as was asserted by *Brende* (2019).

Uwameiye & Iyamu (2004), give the following insight that in Nigeria, the apprentice method is mostly employed for skill acquisition, which has contributed immensely to economic growth, However, the training provided falls below modern global training procedures because most time the training is unstructured and unorganized. Therefore, this method can be improved through some short courses at Part-time, evening school; formal education can be provided for non-educated trainees. In addition, Industrial Training Fund, ITF's National apprenticeship scheme should be made functional by establishing a Model Vocational Training Centre in each local government area of the country and on-the-job workplace training should be provided. In another work by Uwameiye & Omofonmwan (2004) the objectives of roadside mechanics' apprenticeship programme in Mid-western Nigeria. The investigation has shown that the front line objective is to acquire technical skills which equally serve as an avenue for pre-employment for the youth. It is therefore imperative, to have a well-structured training schedule, to achieve the objective for global competitiveness in the area of technical know-how on hybrid motor vehicles. The authors opined that practical skills are devoid of knowledge and information which affect the efficiency of the apprentices, as they can hardly forecast challenge, except the ones they have observed themselves. The skill acquired by them was through imitation of what the master had done at one time or the other.

This investigated the preparedness of motor mechanics regarding the needed technical skills required for repairing modern vehicles.

2. Materials and Methods

Population for this Study

The study population is a group of motor vehicle technicians and apprentices, join-man, foreman and the leads of auto-mechanic workshops in three locations in three states of South-West Geopolitical Sub Region. These states are Lagos (LA), Ogun (OG) and Oyo (OY). The three locations are Abule-Egba (A-E), in Lagos State, Ilaro (Il) in Ogun state and Ibadan (Ib) in Oyo State. The population of the study for each location varied because of the nature of workshops visited, which is based on the number of personnel in them. In all three locations, there are leaders besides the head, the workshop, and the different number of apprentices. A study assistant for each of the locations was used who helped assist in the data collection and served as a link between them and the researcher.

Study Tools

The study tools for the research are visitation to the mechanic workshops and application of questionnaires to the study population. Visits were made to at least five workshops to have a good grasp of the methods used in repairing and maintenance. The questionnaire was divided into six sections, namely Profile information, educational training information, Apprenticeship/Traineeship, Financing your Business, Knowledge of Information and Communication Technology and workshop and workspace. Each section contained questions related to the sectional headings.

3. Results and Discussion

The result presented in Tables 1a & 1b shows that none of the 150 respondents is female. The educational statuses of the respondents show that only 58 out of 150 have formal education, who attended technical schools, monotronics or polytechnics. Seventy-five (75) respondents have worked on Japanese vehicles, 26 respondents have worked on European vehicles, 27 respondents have worked on American vehicles while 22 respondents have worked on Asian vehicles. Only 38 respondents have worked on vehicles that are above the 2010 model.

Table 2 shows the results of apprenticeship reports. Only 124 respondents have apprentices. Their training period varies from 2 years to more than 5 years. The training period is determined by mostly the age of the apprentice followed by the expertise of the trainee. Out of the respondents that have apprentice only 80 of them have a guide for the training.

Only 67% of the total respondents agreed that a proper training schedule would improve the training acquired. Most of the apprentices were primary school leavers and only 9 handfuls of them have post-secondary education. Only about 70% of the respondents know modern vehicles and only just above the average which can transfer knowledge to apprentices. 50% of the respondents have a challenge in the repair and maintenance of these modern vehicles.

Table 3 gives the result of business financing which shows 78% of the respondents have a challenge in financing their businesses and find it difficult to obtain credit facilities, However, more than 50% have thought about setting up of cooperative society to have financial assistance when needed.

Table 4 presented the responses relating to business patronage and the need for knowledge upgrading. About 35% have low patronage in the business which could be attributed to lack of either of facilities or expertise they have. 15 respondents are willing to acquire the necessary tools. Only 73 respondents are willing to enrol for training in a designated training centre and 52 are not ready while 25 respondents are undecided.

Table 5 is a report on knowledge of ICT. 72 respondents were having android phones while only 23 respondents know computer applications.

Table 6 shows that only 28% of respondents have necessary tools, only about 27% can diagnose engine performance accurately, only 27% has diagnostic tools and 68% are ready to learn new skills.

Table 1a: Profile information

Questions	Variable	A-E (LA)		Ib (OY)		II (OG)		Total	
		F	%	F	%	F	%	F	%
Gender	Male	50	100	50	100	50	100	150	100
	Female	0	0	0	0	0	0	0	0

Table 1b: Educational Training/Experience information

Questions	Variable	A-E (LA)		Ib (OY)		II (OG)		Total	
		F	%	F	%	F	%	F	%
Level of educations	ND	20	40	3	6	15	30	38	25.3
	HND	10	20	0	0	10	20	20	13.3
	Non formal education	20	40	47	94	25	50	92	61.3
Educational training	Technical Training school	0	0	3	6		0	3	2.0
	Monotechnic/polytechnic	30	60	0	0		0	30	20.0
	University	0	0	0	0	25	50	25	16.7
	other Technical Training educational institution	0	0	7	14	5	10	12	8.0
What type of vehicles do you mostly work on?	vocational center	0	0	40	80	20	40	60	40.0
	Japanese vehicle	18	36	37	74	20	40	75	50.0
	European vehicle	15	30	3	6	8	16	26	17.3
	American vehicle	7	14	10	20	10	20	27	18.0
What model are these vehicles?	Asian vehicle	10	20	0	0	12	24	22	14.7
	Below 2000 model	5	10	27	54	8	16	40	26.7
	2000 model	5	10	10	20	7	14	22	14.7
	Below 2010 model	10	20	10	20	10	20	30	20.0
	2010 model	10	20	0	0	10	20	20	13.3
Above 2010 model	20	40	3	6	15	30	38	25.3	

The results in table 1 show that most of the respondents have no formal education, which makes it a bit challenging to grab the needed knowledge that should be impacted in them, in their preparation for the new technological know-how on motor vehicle repair/maintenance. The response regarding the vehicle types could be as a result of having more imported Japanese vehicles than others. Most of the mechanics have worked on vehicle models below 2000 model which could be as a result of the low understanding of the operational principles of these vehicles, and only 38 respondents which may be among those that have technical education of either OND or HND.

Table 2: Apprenticeship/Traineeship

Questions	Variable	A-E (LA)		Ib (OY)		II (OG)		Total	
		F	%	F	%	F	%	F	%
Do you have an apprentice?	Yes	36	72	50	100	38	76	124	82.7
	No	14	28	0	0	12	24	26	17.3
How many do you have per period of	Less than 5	15	30	43	86	10	20	68	45.3

training?	Above 5	10	20	7	14	12	24	29	19.3
	Ten	6	12	0	0	12	24	18	12.0
	Above Ten	5	10	0	0	4	8	9	6.0
What is the period of training?	About 2 years	14	28	7	14	10	20	31	20.7
	More than 2 years	20	40	27	54	14	28	61	40.7
	About 5 years	2	4	16	32	8	16	26	17.3
	More than 5 years	0	0	0	0	6	12	6	4.0
What determines the period of apprenticeship?	Age	20	40	17	34	10	20	47	31.3
	Expertise	8	16	20	40	15	30	43	28.7
	Finance	8	16	13	26	13	26	34	22.7
Do you have a schedule for training?	Yes	16	32	40	80	24	48	80	53.3
	No	20	40	10	20	14	28	44	29.3
Do you think a proper training schedule will improve the training?	Yes	25	50	43	86	20	40	88	58.7
	No	25	50	7	14	18	36	50	33.3
What is the level of education of the apprentice/trainee?	Primary	12	24	37	74	8	16	57	38.0
	Secondary	20	40	13	26	20	40	53	35.3
	ND	4	8	0	0	10	20	14	9.3
	HND/degree	0	0	0	0	0	0	0	0.0

From Table 2 the reports of apprenticeship show that only 124 respondents have apprentices. Their training period varies from 2 years to more than 5 years. The training period is determined mostly by the age of the apprentice followed by the expertise of the trainee. Out of the respondents that have apprentice, only 80 of them have a proper guide for the training while 67% of the total respondents agreed that a proper training schedule would have improved the training acquired. Most of the apprentices were primary school leavers, and a few of them have post-secondary education. Equally, about 70% of the respondents know modern vehicles, and which is just above average. Regarding the knowledge of apprentices, 50% of the respondents have a challenge in the repair and maintenance of modern vehicles.

This result also reveals that apprentices who are few, most of the time the highest number is five persons. This is an indication that there is not much interest in the trade, and this is not different from what was reported in Fajobi *et al.* (2017). Other factors which may serve as an impediment to apprenticeship could be deduced from the responses regarding the period of training, determining factor of the period of training, scheduling of the training and entry point of apprenticeship. According to Fajobi *et al.* (2017), the evaluation of their apprenticeship to basic training can only be done after three months and then after two years, the evaluation of their appreciation of the basic knowledge of skill acquisition is also done. Therefore, if there is a proper schedule for the training, it will encourage higher-level education holders to have an interest in skill acquisition.

Table 3: Business Financing

Questions	Variable	A-E (LA)		Ib (OY)		II (OG)		Total	
		F	%	F	%	F	%	F	%
Do you have a challenge in finance?	Yes	35	70	47	94	35	70	117	78.0
	No	15	30	3	6	15	30	33	22.0
Is it easy to obtain credit facility (loan) from bank?	Yes	8	16	3	6	5	10	16	10.7
	No	42	84	47	94	45	90	134	89.3
Is there a possibility of setting up a cooperative society to raise funds?	Yes	32	64	13	26	38	76	83	55.3
	No	18	36	37	74	12	24	67	44.7

The results on business financing presented in Table 3 show that 78% of the respondents were having a challenge in financing their businesses and finding it difficult to obtain credit facilities. However, more than 50% have thought of setting up a cooperative society that could be of immense financial assistance when needed. There is a challenge of small-medium enterprises (SMEs) business finance in Nigeria and the vehicle mechanics are not excluded. This can be attested to, going by the result of the survey. It was reported by Olaitan and Ikeh (2015) that most of the financing comes from personal savings, family support or cooperative society. There is a need for proper education on how cooperative society works and how it can be helpful in terms of economic advancement of the skilful mechanics.

Table 4: Business Patronage/knowledge upgrading

Questions	Variable	A_E Los		Ib (Oyo)		Lar (OGs)		Total	
		F	%	F	%	F	%	F	%
Do you have enough patronage (customers)?	Yes	30	60	43	86	25	50	98	65.3
	No	20	40	7	14	25	50	52	34.7
If the answer to the above is no, why?	No facility	10	20	0	0	15	30	25	16.7
	No required expertise	10	20	7	14	10	20	27	18.0
What efforts have you put to overcome the challenge?	Seek more knowledge	5	10	0	0	10	20	15	10.0
	Acquiring the necessary tools	15	30	7	14	15	30	37	24.7
Will you be willing to enrol for training on these vehicles?	Yes	30	60	23	46	30	60	83	55.3
	No	20	40	20	40	15	30	55	36.7
	Undecided	0	0	7	14	5	10	12	8.0
Where and how?	Enroll for training in a Training center	32	64	17	34	25	50	74	49.3
	On the job training	18	36	33	66	25	50	76	50.7
Do you know an analysis of engine performance with scanning tools?	Yes	10	20	7	14	10	20	27	18.0
	No	40	80	43	86	40	80	123	82.0
Are you ready to learn a new skill?	Yes	42	84	20	40	40	80	102	68.0
	No	8	16	30	60	10	20	48	32.0

The responses relating to business patronage and the need for knowledge upgrading presented in Table 4 shows that about 35% has low patronage in the business, which could be attributed to lack of either facilities or expertise with only 15 respondents willing to acquire the necessary tools. Only 73 respondents were willing to enrol for training in a designated training centre while 52 are not ready and 25 respondents are undecided. However, all of them showed eagerness in acquiring new skills which may equally be a challenge without the necessary tools and facilities. When this is done the mechanics would be ready for the challenges that may arise when the old vehicles are phased out. This was supported with the responses, excerpted from our interview sessions:

- *We are ready to go for the training but we need support from the government for getting the training and providing the necessary tool for us (Response Via Interview (RVI), 32 years, mechanic, Ibadan)*
- *I am not ready to have the experience of suffering I had when I first learned the mechanic trade; getting freedom and tools were great tasks for me then. Therefore, I need support (RVI, 33 years, Mechanic, Ibadan)*

Table 5: Knowledge of Information and Communication Technology (ICT)

Questions	Variable	A-E (LA)		Ib (OY)		II (OG)		Total	
		F	%	F	%	F	%	F	%
Do you have a browsing phone?	Yes	30	60	17	34	25	50	72	48.0
	No	20	40	33	66	25	50	78	52.0

Do you know computers?	Yes	10	20	3	6	10	20	23	15.3
	No	40	80	47	94	40	80	127	84.7

Table 5 shows are the reports on knowledge of ICT. 72 respondents were having android phones, while only 23 respondents know computer applications.

In the responses, there was very low knowledge of ICT even among those that use android phones. They fail to understand the accompanying phone manuals due to the challenge of low education. With this, only a good understanding of ICT can make them appreciate that innovations can be effectively deployed to access faults. This was further corroborated by one of the mechanics as excerpted from the interview:

- *All I do with my phone was just call, receive a call or check pictures on my Facebook, I don't know our phone can be gainfully deployed to handle useful functions that it has other better functions. (RVI, male, 35 years, workshop owner, Ilaro).*

The knowledge and skills in ICT are very important tools for the skills needed to repair these modern vehicles. This response from one of the respondents excerpted from the interviews, says it all;

- *I don't have an android phone, I don't see the need for it, I just need something to call and receive calls with (RVI, male, 37 years, workshop owner, Abule-Egba).*

This experience below was shared by a car owner of his experience in one of the visits as excerpted below:

- *One day I took a newly imported, used vehicle to a mechanic and the fellow tampered with the wiring system and this led to the malfunction of components such as the inner lights and the boot, the said mechanic could not rectify the problem until I involved someone who used diagnostic tool to determine where the problem emanated from and then put it back to a functional state. (RVI, 55 years, a car owner at mechanic shop Abule-Egba).*

Table 6: Workshop and workspace

Questions	Variable	A-E (LA)		Ib (OY)		II (OG)		Total	
		F	%	F	%	F	%	F	%
Do you have the necessary tool?	Yes	15	30	17	34	10	20	42	28.0
	No	35	70	33	66	40	80	108	72.0
Do you have the expertise to determine engine performance accurately?	Yes	15	30	10	20	15	30	40	26.7
	No	35	70	40	80	35	70	110	73.3
Do you have a diagnostic tool or engine scanner?	Yes	10	20	7	14	10	20	27	18.0
	No	40	80	43	86	40	80	123	82.0

Table 6 presents that only 28% of respondents have necessary tools and only about 27% can diagnose engine performance accurately, while only 18% have diagnostic tools. From the outcome of the survey, most of the respondents have a challenge of not having the necessary tools, for example, the acquisition of a diagnostic tool is a big challenge. This makes it a bit difficult for them to acquire skills to do the job. However, they have shown eagerness in acquiring new skills, which may equally be a challenge without the necessary tools and facilities. When there are necessary tools and equipment, the mechanics would be in a better position to repair and maintain these vehicles when the old vehicles are phased out. The following responses give support to the above challenges as excerpted from the interview sessions:

- *We are ready to go for the training but we need support from the government for getting the training and providing the necessary tool for us (KVI, 32 years, mechanic, Ibadan)*

- *I am not ready to have the experience of suffering I had when I first learnt mechanics; to get freedom and tools were great tasks for me then. Therefore, I need support (RVI, 33 years, Mechanic, Ibadan)*

4. Conclusion

Having collated and analyzed the questionnaires and some excerpts from the interview sessions, the following points ensured from the study: There is an influx of new high-tech vehicles that may not be well handled by ordinary roadside mechanics, and this calls for the re-engineering of mechanics with the required skills to be able to overcome the challenges that may arise when the old vehicles are phased out. This study then concluded that the level of the preparation is with the respect to the following: The educational level of most of the mechanics is very low which means there is a need for up-scaling of their educational level; There should be a well-structured, scheduled apprenticeship training for the right knowledge impacting; There is a financial challenge for mechanics which can only be rescued by government involvement through interventions and knowledge impartation of the importance of cooperative society for easy access to credit facility when needed; Business Patronage is low and there is a need for knowledge upgrading which a greater proportion of respondents is ready for; There is low knowledge of ICT by the mechanics which must be able to meet up with the challenge and the workspace must be improved with the provision of the needed facilities and tools as new skills are learned by the mechanics.

Acknowledgement

The authors appreciate the efforts of research assistance; Messrs Seye, Ahamdiya Bus-Stop, Abule-Egba, Saheed Olowoake, Ibadan and Rahman Olaifa, Ilaro, Mechanic Village, Ogun State. for their efforts towards achieving this study.

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