

## Scaling-up Mechanical Craft Practice Trade Facilities in Technical Colleges for Sustainable National Development in Rivers State

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**ABSTRACT:** The study scaling-up mechanical craft practice trade facilities in technical college for sustainable national development in Rivers State. Population of the study consists of 37 respondents, comprising 22 teachers and 15 technical instructors from three government owned technical colleges and one Government Craft Development Centre in Rivers State. No sampling was taken considering the small size of the population. Self-structured instrument was designed to elicit information from the respondents. Findings of the study include oxygen sensor, oscilloscope multimeter, on-board diagnostic scan tool. These findings further include distributorless ignition system (DIS), anti-lock braking system among others are modern machines expected to boost production capacity in mechanical craft practice trade. Based on the findings, recommendations were made that; the government should provide modern mechanical equipment and machines into mechanical craft practice section in technical college workshops for effective practical teaching and learning. That the government as a matter of urgency, change the name of 'technical college' to school of technology through a legislative process to attract high student enrolment into the institution and that student of mechanical craft practice should be allowed to embark in industrial training in multinational oil industries to pave way for a universal learning in the institution.

**Keywords:** Education, Mechanical Craft Practice, Scaling-up, National Sustainable Development

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### I. INTRODUCTION

Education is a system that developed individual to be useful and relevant in the activities of a nation. Okolocha and Baba (2016) described education as a right of every individual that unlocks the development of personal and national potentials of citizen of a country and the world at large. According to Okwelle (2019) education is undisputedly recognized as the bedrock of any meaningful development. This is achievable through a robust investment and thorough application of one aspect of education known as Technical Vocational Education and Training which is perceived as one of the crucial elements in enhancing economic productivity.

The Federal Republic of Nigeria (FRN, 2013) defines TVET the same way the International Labour Organization (ILO) has done, however it restricts the scope of programmes to those in the technical colleges, National Skills Qualification Frame (NSQF) institutions, and Vocational Enterprises Institutions (VEIs). FRN further stated that the objectives of TVET are to: provide trained manpower in the applied science, Technology and Business particularly at craft vocational skills necessary for Agricultural, commercial, and economic development and give training and impart the necessary skills to individuals for self-reliance economically. Okolocha and Baba in Ewuga and Bodams (2018) stated that technical education is designed to develop skills, abilities, understanding attitudes work habits and appreciation encompassing knowledge and formation needed by workers to enter and make progress in employment on a useful and productive basis. Aminu, Reuben and Musa (2018) stated that technical education is concerned with qualitative technological human resources development, building technicians and technologists in technical and vocational field at the technical college level.

Technical colleges are post-basic education schools, where students acquire skills in various occupations. According to the National Board of Technical Education (NBTE, 2014), the aim of technical colleges is to give training and impart the necessary skills leading to the production of craftsmen, technicians

and other skilled personnel who will be enterprising and self-reliant. Usman (2012) stated that standard of equipment useful in modern mechanical workshops of technical colleges for sustainable national development include oscilloscope multimeter, on-board diagnostic scan tool among others. Olaitan and Ikeh (2015) stated that modern machines expected in the technical college should meet international standards to enhance competency, expertness and efficiency in term of acquiring practical knowledge needful and requires in place of work. Kama (2018) stated that the major goals of technical colleges are to produce efficient and relevant craftsmen that will promote industrial development in the areas of maintenance, production of goods and general services. According to the Beako (2018) technical colleges offer various trades which include Bricklaying, Block-laying and concreting, carpentry and joinery, metal fabrication and welding, woodwork trade, electrical installation, mechanical craft practice.

Mechanical craft practice trade is one of the trades in technical colleges in which students are examined by the National Business and Technical Examination Board (NABTEB) for the award of National Technical Certificate (NTC) and the Advanced National Technical Certificate (ANTC). Mechanical craft practice trade is one of the trades found in technical colleges, which is aimed at training and imparting necessary skills leading to the production of craftsmen who will be self-reliant and enterprising in job areas, such as metal fitting, machining, welding, fabrication and so on.

According to the Beako (2017) mechanical craft practice trade is also one of the severally recognized engineering fields that start from the practice of machines, an art of trial and an error to the application of scientific method in research, design and production. It is equally the branch of engineering which deals with machines and mechanized processes, particularly concerned with power generation, transmission, utilization of tools and equipment. Mechanical craft practice is expected to produce an educated, skilled and motivated workforce critical to national development. However, graduates of mechanical craft practice had been seen within and around the cities struggling to enterprising or be self-reliant at various location. But, consider the negative perceptions generated against technical colleges which include low capacities of enrolment, government neglect on the remuneration of technical teachers and instructors, inadequate mechanical tools to the workshop had helped degrade the college, hence required scaling-up in mechanical craft practice trade with the view to boost production capacities, disabuse society negative perception and encourage high students enrolment in mechanical craft practice trade. Okorieocha, Beako and Ojotule(2018) opined that change the name of the school 'technical college' to school of technology, well-equipment staff offices fixed with safety devices, automatic employment to graduate of technical college in the local council, state and federal Government would help to enlarge or scaling-up the scope of the institution and enhance high student enrolment. Ibeneme and Okwelle (2018) stated that there are varieties of ways where public relations can tailor activities towards improving student enrolment in technical colleges. These may include; media, open house and networking.

Scaling-up is the process of improving on the existing designs to meet up of the contemporary events and demand of the people. Wikipedia (2019) explained that scaling-up mean to make something larger in size, amount among others than it used to be. In this study, scaling-up refer to increase or enlargement of facilities and capacities of equipment, tools and machines of the mechanical craft practice with the aim to boost production processes, restructuring the technical manpower and encourage students enrolment into the trade in technical colleges for sustainable national development in Nigeria. Thomas (2013) stated that school workshops accommodate instructional materials such as tools, equipment, machines and consumables for practical activities. Hence, students must require the competency and ability to operate and repair various modern machines such as lathe, shaping, milling, band sawing machines, drilling in the workshop through the application of relevant modern tools and equipment expected to be mounted in mechanical workshop with the view to be relevant in the multinational oil industries and to be self- enterprises for sustainable national development. Wilcox (2013) stated that machines used in multinational oil industries and other places of work would help the students to easily adapt and master practical works at the various technical college workshops. Adapting to these practical skills in the workshop will enable students of mechanical craft practice be versatile and relevant in enterprising and the multinational oil industries hence will lead to sustainable national development.

Sustainable national development is the meeting the requirement for sustaining growth in every aspect of human endeavour in a particular country. Wikipedia (2019) opined that national development is the ability of a country or countries to improve the social welfare of the people for instance by providing social amenities like quality education, portable water, transportation, infrastructure, medical care among others. The two broad objectives of vision 2020 are to make efficient use of human and natural resources to achieve rapid economic growth translate the growth into equitable social development for all citizen. In this study, national development is the ability of a country or countries to improve capacities in mechanical craft practice by providing modern machines, equipment and improve incentives of technical teachers and instructors with the view to scaling-up and attract high students enrolment in technical workforce of a country. A country that has low technical

workforce could be lacking manpower development, as such would depend by the result of its machines, equipment and personnel used for training, teaching in the technological institutions such that would determine the scaling-up and expertness of its product. It is against this backdrop that, the study scaling-up mechanical craft practice facilities in technical college for sustainable national development in Rivers State was investigated.

### **Statement of Problem**

Mechanical craft practice trade is one of trade offered at technical college level which the expectation of the society and the graduates is that of gaining employment in multi-national oil industries, mechanical industries and establishing vehicle repair/maintenance shop or going for further studies after graduation. However, Okolocha and Baba (20016) observed that mechanical craft practice graduates lack requisite skills to use modern equipment and operate modern machines to optimal practical performance and maintenance work to the expectations and satisfaction of their employers. Beako (2017) attributed the trend to the few available sub-standard and outdated equipment, tools and machines used in training which are not performing the requisite tasks optimally in mechanical craft practice trade in a dilapidated workshops in technical college in Rivers State, hence demand scaling up in mechanical craft practice. It is in light of the foregoing, the study scaling-up mechanical craft practice trade facilities in technical colleges for sustainable national development in Rivers State was investigated.

### **Purpose of the Study**

The main purpose of this study is to examine the scaling-up mechanical craft practice trade facilities in Technical College for sustainable national development in Rivers State. Specially, the study sought to:

- 1) Ascertain modern mechanical tools and equipment expected to scale-up skills acquisition and production capacities of mechanical craft practice in technical colleges in River State.
- 2) Determine capacity of machines expected to scale-up skills acquisition and production capacities of mechanical trade in technical colleges in Rivers State.
- 3) Find out factors to enhances high student enrolment in mechanical craft practice in technical colleges in River State.

### **Hypotheses**

The following null hypotheses ( $H_0$ ) were formulated to guide the study and were tested at 0.05 level of significance.

1. There is no significant difference in the mean response of Technical Teachers and Instructors on modern mechanical tools and equipment expected to scale-up skills acquisition and production capacities of mechanical craft practice in technical college in River State.
2. There is no significant difference in the mean response of Technical Teachers and Instructors on the capacity of machines expected to scale-up skills acquisition and production capacities of mechanical trade in technical college in Rivers State.
3. There is no significant difference in the mean response of Technical Teachers and Instructors on the factors to enhance high student enrolment in mechanical craft practice in technical college in Rivers State.

### **Methods**

The study adopted descriptive survey design. The population of the study consists of 37 respondents. It comprised 22 teachers and 15 Instructors drawn from the three Rivers State owned technical colleges that offered courses in Mechanical Craft Practice (Government Technical College, Port Harcourt, Government Technical College, Tombia and Government Technical College, Ahoada and Government Craft Development Centre Port Harcourt). No sampling was taken considering the small and manageable size of the population. The instrument titled "Scaling-up Mechanical Craft Practice Trade facilities in Technical College for Sustainable National Development (SMETFCSND) was developed for the study. The instrument was designed and patterned on five point Likert rating scale of Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D) and Strongly Disagree (SD) with numerical values of 5, 4, 3, 2 and 1 respectively. Copies of the instrument were given to three experts. Two in the Department of Vocational and Technology Education, Rivers State University, Port Harcourt one from the Department of Measurement and Evaluation, Rivers State University, Port Harcourt for face validity. These experts vetted the instrument in terms of appropriateness, relevance and language level. Relevant observations made were incorporated into the work. Test-retest method was used to determine the reliability of the instrument. Cluster sampling techniques was used to draw a sample of 5 electrical installation and maintenance works teachers and 5 Instructors which are not part of the population from Boys Technical College, Aba, Abia State. The instrument was administered, retrieved and analysed. Within an interval of three weeks, the same instrument was administered, retrieved and analysed. The results were correlated using Pearson Product Moment to determine the reliability coefficient of the entire instrument

which yielded 0.90. The instrument was administered to the respondents alongside two assistants who were trained by the researchers. Thirty five (35) copies of the questionnaire was printed and distributed. However, 30 copies were retrieved and used for the study. The research questions were analysed using mean and standard deviation. The hypotheses were tested at 0.05 level of significance with Z-test statistical tool. Any item with a mean value equal to or greater than 3.50 was accepted while item with mean value less than 3.50 was rejected. For the null hypotheses, if the value of Z-calculated is less than the value of Z-critical, the hypothesis was accepted. While if the value of the Z-calculated is greater than or equal to the value of the Z-critical, the hypothesis was rejected.

## II. RESULTS

**Table 1 Mean and Standard Deviation of Respondents on the Modern Mechanical Equipment Expected to Scale-up Skills Acquisition and Production in Mechanical Craft Practice**

S/N	Modern Mechanical Equipment Expected to scaling up Production in Mechanical craft practice	Technical Teachers			Instructors		
		X <sub>1</sub>	S.D <sub>1</sub>	Remark	X <sub>2</sub>	S.D <sub>2</sub>	Remark
1	Oxygen sensor, catalytic converter.	4.01	0.94	Accepted	3.69	1.17	Accepted
2	Oscilloscope multi-meter.	3.62	1.19	Accepted	3.96	0.99	Accepted
3	Digital multi-meter.	3.79	1.14	Accepted	3.66	1.19	Accepted
4	Diagnostic scan tool	3.69	1.10	Accepted	3.95	0.93	Accepted
5	Standard real hammers, pliers, bolts and nuts should be used	3.58	1.21	Accepted	3.71	1.17	Accepted
6	Diagnostic trouble code chart.	3.98	0.95	Accepted	3.74	1.12	Accepted
7	Standard modern tool boxes.	3.85	1.19	Accepted	3.68	1.10	Accepted
8	Wheel speed sensor pulsers.	3.78	1.15	Accepted	3.75	1.15	Accepted
9	Crank position sensor.	3.61	1.18	Accepted	3.94	0.87	Accepted
10	Diagnostic tool.	3.86	1.08	Accepted	4.02	0.93	Accepted
<b>Grand Means and Standard Deviation</b>		<b>3.78</b>	<b>1.10</b>		<b>3.81</b>	<b>1.06</b>	

Table 1 displays the mean values ranging from 3.78 to 3.81 which are all greater than the criterion mean of 3.50. This shows that the 10-items listed are accepted as modern mechanical equipment expected in scaling-up skills acquisition and production in mechanical craft practice in technical college in Rivers State. The table further displays that the standard deviations of the respective items are within the ranges of 1.09 to 1.06, signifies that the mean values are not distant from each other. The results in Table 1 also indicate that the respondents accepted all the factors as indicated on the table.

**Table 2 Mean and Standard Deviation of Respondents on the Capacity of Machines Expected to Scaling-up Skills Acquisition and Production Capacities of Mechanical craft Practice.**

S/N	Capacity of Machines expected to scaling up production	Technical Teachers			Instructors		
		Mean	S.D	Remark	Mean	S.D	Remark
11	Distributorless ignition system (DIS).	3.97	0.92	Accepted	3.85	1.17	Accepted
12	Power sensor, reductor sensor	3.54	1.30	Accepted	3.99	0.99	Accepted
13	Power control module (PCM)	3.74	1.14	Accepted	3.76	1.19	Accepted
14	Standard of machines used in the workplaces should be applied in teaching.	3.84	1.10	Accepted	3.96	0.93	Accepted
15	Standard real hammers, pliers, bolts and nuts should be used.	3.70	1.21	Accepted	3.76	1.17	Accepted
16	Windmill software for reading on board diagnostic data.	3.95	0.95	Accepted	3.79	1.12	Accepted
17	Standard modern tool boxes.	3.85	1.06	Accepted	3.85	1.10	Accepted
18	Tools and equipment that met up international standard.	3.83	1.09	Accepted	3.85	1.15	Accepted
19	Standby generating sets.	3.78	1.18	Accepted	4.04	0.87	Accepted
20	Anti-lock braking system.	3.86	1.06	Accepted	3.96	0.93	Accepted
<b>Grand Means and Standard Deviation</b>		<b>3.81</b>	<b>1.09</b>		<b>3.58</b>	<b>1.06</b>	

Table 2 reveals the mean values ranging from 3.81 to 3.58 which are all greater than the criteria mean of 3.50. This shows that all the items listed are accepted as Capacity of Machines Expected to Scale-up skills

acquisition and Production Capacities of Mechanical craft Practice in technical college in Rivers State. The table further displays that the standard deviations of the respective items are within the range of 1.09 to 1.06, signifies that the mean values are not distance from each other. The results in Table 2 also indicate that the respondents accepted all the factors as indicated on the table.

**Table 3 Mean and Standard Deviation of Respondents on the Factors to Enhance High Student Enrolment in Mechanical Craft Practice.**

s/n	Factors to Enhances Student Enrolment in Mechanical Craft Practice	Technical Teachers			Instructors		
		X <sub>1</sub>	S.D <sub>1</sub>	Remark	x <sub>2</sub>	S.D <sub>2</sub>	Remark
31	Well-equipped staff offices fixed with safety devices.	3.66	1.23	Accepted	3.90	1.09	Accepted
32	Change the name technical college to school of technology	3.84	1.09	Accepted	3.81	1.14	Accepted
33	Increase media publication	3.54	1.30	Accepted	3.64	1.26	Accepted
34	Increase networking system among the public	3.76	1.15	Accepted	3.89	1.15	Accepted
35	Rumenuration of staff should be attractive	3.66	1.16	Accepted	3.94	1.02	Accepted
36	Automatic employment should be given to graduate of technical in the local council, state and federal government.	3.63	1.22	Accepted	3.67	0.96	Accepted
37	Scholarship award should be given to technical college students.	3.53	1.31	Accepted	3.85	1.15	Accepted
38	Technical college students should be given industrial training in multinational oil industries	3.97	0.96	Accepted	3.89	1.06	Accepted
39	Only B.sc/B.Techdegree holders should be employed to teach in technical college.	3.77	1.12	Accepted	3.64	1.13	Accepted
40	Regular inter-house competition should be allowed in technical college to boost students interest	3.59	1.17	Accepted	3.84	1.07	Accepted
<b>Grand Means and Standard Deviation</b>		<b>3.70</b>	<b>1.17</b>		<b>3.81</b>	<b>1.10</b>	

The data on table 3 displays the mean values ranging from 3.70 to 3.81 which are all above the criterion mean of 3.50. This shows that all the items are accepted as Factors to enhance high student enrolment in mechanical craft practice in technical colleges in Rivers State. The table also displays that the standard deviation ranges from 0.96 to 1.31, indicates that the mean values are not far from each other. The results also showed that the respondents accepted the facts concerning the factors to enhance high student enrolment in technical colleges.

**Table 4 Z-test Analysis of Response of Technical Teachers and Instructors on Modern Mechanical Equipment Expected to Scale-up Production in Mechanical Craft Practice.**

Respondents	X	S.D	N	Df	α	Z-cal	Z <sub>cri</sub>	Remark
Teachers	3.78	1.09	22	35	0.05	-0.073	+1.96	Accepted
Technical Instructors	3.81	1.06	15					

Results from Table 4 show that the value of Z-calculated is -0.073 while Z-critical is 1.96. This implies that Z-calculated is less than the Z-critical. Therefore, the null hypothesis is accepted. Hence, the researchers concluded that there is no significant difference in the response of Teachers and instructors on the modern mechanical equipment expected to scaling-up production in mechanical craft practice in technical college in Rivers State.

**Table 5 Z-test Analysis on the Responses of Technical Teachers and Instructors Capacity of Machines Expected to Scale-up Production Capacities of Mechanical craft Practice**

Respondents	X	S.D	N	df	α	Z-cal	Z <sub>cri</sub>	Remark
Teachers	3.81	1.09	22	35	0.05	-0.622	+1.96	Accepted
Technical	3.58	1.06	15					

Results from Table 5 shows that z-calculated is -0.622 while z-critical is 1.96. Based on the analysis, the value of z-calculated is less than the value of z-critical. This indicates that there is no significant difference on the response of teachers and technical instructors on capacity of machines expected to scaling –up production capacities of mechanical craft practice in technical college in Rivers State.

**Table 6 Z-test Analysis on the Responses of Technical Teachers and Instructors on factors enhance high student enrolment in Mechanical craft Practice**

Respondents	X	S.D	N	df	$\alpha$	Z-cal	Z-cri	Remark
Teachers	3.70	1.17	22	35	0.05	-0.283	+1.96	Accepted
Technical Instructors	3.81	1.10	15					

Results from Table 6 shows that z-calculated is -0.283 while z-critical is 1.96. Based on the analysis, the value of z-calculated is less than the value of z-critical. This indicates that there is no significant difference on the response of teachers and technical instructors on the factor enhance high student enrolment in mechanical craft practice in technical college in Rivers State.

### III. DISCUSSION

The finding of this study revealed all the items on modern mechanical equipment expected to scaling-up production capacity in technical college for sustainable national development in Rivers State. The findings include oxygen sensor, oscilloscope multimeter, on-board diagnostic scan tool. The finding consented with the opinion of Usman (2012) who stated that standard of equipment useful in modern mechanical workshops of technical colleges for sustainable national development include oscilloscope multimeter, on-board diagnostic scan tool. These are needed for teaching and learning at the technical college workshops and should be made available to technical college workshops These instructional materials will aid both teachers and technical instructors to achieve their desired goals and objectives. The finding also is in line with Thomas (2013) stated that school workshops accommodate instructional materials such as tools, equipment, machines and consumables for practical activities. These are instrumentalities needed to perform a service and required regularly assessment and upgrading to meet up contemporary issues in mechanical craft practice trade. The result of the study further found that there is no significant difference in the mean responses of Teachers and technical Instructors on the modern mechanical equipment expected to scaling-up production capacity of mechanical craft practice trade in technical college for sustainable national development in Rivers State. This signifies that modern equipment helps to easily aid teaching and learning in a technical college and that available equipment as instructional materials encourages skills development among graduates of the school in various occupations, so as to be useful and relevance in the world of work.

The finding further revealed capacity of machines expected to scale-up production capacities in mechanical craft practice trade in technical college for sustainable national development in Rivers State. These findings include distributorless ignition system (DIS), anti-lock braking system among others are modern machines expected to boost production capacity in mechanical craft practice trade of technical college for sustainable national development in Rivers State. This finding agreed with the opinion of Olaitan and Ikeh (2015) which stated that modern machines expected in the technical college should met international standards to enhance competency, expertness and efficiency in term of acquiring practical knowledge needful and requires in place of work. The finding also is in line with the view of Wilcox (2013) who stated that machines used in multinational oil industries and other place of work would help the students to easily adapt and mastery practical works at the various technical college workshops. The finding further revealed that there is no significant difference in the mean responses of teachers and technical instructors on the modern machines expected to boost production capacity in mechanical craft practice trade of technical college for sustainable national development in Rivers State. This signifies that skills acquisition in mechanical craft practice trade basically required quality modern machines that help in fasting-up production process, providing training and other services to trainees in order to acquire practical knowledge and requisite skills.

The findings further revealed that all the items are accepted as factors to enhance high student enrolment in mechanical craft practice in technical colleges in Rivers State. The findings include change the school name technical college to school of technology, well-equipment staff offices fixed with safety devices, automatic employment should be given be to graduate of technical in the local council, state and federal Government among others. The findings consented with the opinion of Ibeneme and Okorieocha, Beako and Ojotule (2018) which opined that change the name of the school ‘technical college’ to school of technology,

well-equipment staff offices fixed with safety devices, automatic employment to graduate of technical college in the local council, state and federal Government will help to enlarge or scaling-up the scope of the institution and enhance high student enrolment. The findings further indicates that there is no significant difference on the response of teachers and technical instructors on the factors enhance high student enrolment in mechanical craft practice in technical college in Rivers State. Hence, the Government need to invest heavily in mechanical craft practice with the view to boost capacity and improve entrepreneurial for sustainable national development. The findings also agreed with Ibeneme and Okwelle (2018) which stated that there are varieties of ways where public relations can tailor activities towards improving student enrolment in technical colleges. These may include; media, open house and networking.

#### **IV. CONCLUSION**

Scaling-up teaching and learning materials in the technical college workshops really are another factor that will increase student enrolment into the institution. It is a mechanism that will attract and improve economical activities as modern mechanical equipment and instruments would be used in repairing and maintaining mechanical devices in the technical college workshops and the multinational oil industries. Scaling up process of mechanical equipment in the technical college will rebrand the structures forwards sustainable growth in the technological institution as it enhances entrepreneurial exercise in mechanical craft practice in Rivers State.

#### **V. RECOMMENDATIONS**

Based on the findings, the researchers recommend as follow:

- 1 That the government should provide mechanical equipment and machines into mechanical craft practice section in technical college workshops for effective practical teaching and learning in the school.
- 2 That the government as a matter of urgency should change the name of 'technical college' to school of technology through a legislative process to attract high student enrolment into the institution.
- 3 That, the student of mechanical craft practice should be allowed to embark in industrial training in multinational oil industries to pave way for a universal learning in the institution.

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