An Assessment of Technological Capability Building in the Informal Nigerian Automobile Sector

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Abstract The automobile industry has been one of the most prominent in Nigeria. This may be as a result of the fact that her economy moves on wheels. The auto-mechanic repairer has acquired a measure of capabilities as a result of learning by doing over the years. The study therefore examined technological capabilities in the auto-mechanic industry in Southwestern Nigeria with a view to determining the types of capabilities possessed by the auto-mechanics. A total of 385 copies of questionnaire were administered on master mechanics across three states by hand delivery. Two states comprising of cluster mechanics were purposively selected, while samples from the third state comprising of stand-alone mechanics were randomly selected. The following capabilities were observed in the industry: investment, marketing, linkage and minor change capabilities. The result showed that there was a significant (F=59.03, p<0.05) difference in the mean ratings of factors that show the abilities of master mechanics; and there was also a significant (F=547.17, p<0.05) difference in the mean ratings of linkages with different institutions.

Keywords: linkage capability, marketing capability, minor change capability, auto-mechanic industry, Nigeria

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1. Introduction

Technological capability is a vital component of technological and economic development of nations. The first nations have realized this long enough and it has put them on the frontiers of technological sophistry. In fact, the newly industrializing economies of the Asia are capitalizing on it to join the league of developed nations.

Technological capability (TC) has been defined as the ability to exploit what modern technology can contribute to the economic development of any country [6]. It has been similarly put [13] as the ability to make effective use of technological knowledge in efforts to assimilate, use, adopt, and change existing technologies. A wider view of technological capability building in relation to developing countries has been captured [2] by the assertion that: "*TC may be regarded as comprising the indigenous accumulated knowledge acquired through the accustomed learning processes and the ability to absorb, adapt and advance a foreign technology through an endogenous process of learning.*"

In another view [15], TC engendered by learning, is perceived as the ability to identify, adapt, and innovate within the spectrum of the available technological capacity and the given environment. It has been seen [3] as consisting of the resources needed to generate and manage technical change, including skills, knowledge, experience, institutional structure and linkages. This is corroborated by other scholars who perceive technology as a collection of equipment, skills, knowledge, aptitudes and attitudes which confer the ability to operate, to understand, to change and to create production processes and products [19]. At the firm level, TCs are the skillstechnical, managerial or organizational-that enable firms to efficiently use equipment and information, and to improve technology thereby [29]. On the other hand, endogenous technological capability is the ability of a given country to choose, acquire, generate and apply technologies which contribute to meeting its development objectives [9]. Technological capabilities (TCs) are at the centre of the new theories of economic growth which focus on technology and human capital as the engines of growth. It confers product leadership, and competitive advantage on individuals, firms and nations [5,15]. Korea's rapid economic progress has been attributed to many economic, social and technical factors, the most important being TCs [12,13]. It has been noted [6] that TC must be grown, like crops, or manufactured, like capital goods. From the foregoing therefore, TC building is a process of assembling or accumulating TCs [19].

1.1. Components of Technological Capability Building

Three fundamental components of TC have been identified [6]. These are (i) the individual constituents (ii) the institution or organization and (iii) purpose. TC resides in individuals with the inclination, training and experience which enable them to cope with certain portion of the overall body of useful knowledge called technology. The institution or organization was described [6] as a body that brings the individuals with different talents and skills together through which they could express their potentials. This integrating institution may be a capitalist firm, a family enterprise, a co-operative, a commune or a state-owned agency. Purpose was seen as the most vital component being the driving force that would propel the skilled individuals in an organization to fully exploit their talents. On the other hand, some indicators of technological capability, among which are percentage group in third level (higher) education, engineering students as percentage of population, telephone lines per 100 etc have been observed in the literature [8].

1.2. Classification of Technological Capabilities

Technological capabilities (TCs) can be categorized by their complexities and their functionalities. It has been observed [16] that the more complex capabilities are innovative and risky while the less complex capabilities are routine, adaptive and replicative. Thus, some scholars group capabilities under three broad categories: physical investment, human capital and technological effort [16]. They suggest that physical investment is a "basic" capability [16].

Another school of thought [5] classifies TCs into three functional groups viz: investment capabilities, production capabilities, and learning mechanisms. Investment and investment capabilities refer to the skills and information needed to identify feasible projects, locate and purchase suitable (embodied and disembodied) technologies, design and engineer the plants, and manage the construction, commission and start up. The skills and knowledge needed for the subsequent operation and improvement of the plant are defined as production capabilities. The learning mechanisms available to firms determine the extent to which they augment their endowments of production and investment capabilities over time.

Apart from investment and production capabilities, another functional group is described [29] as linkage capabilities. Linkage capabilities include establishing links among enterprises and with service suppliers or science and technology (S & T) institutes like universities or standards bureaus. This has been observed [4,22] as lacking in Nigerian and sub-Saharan African (SSA) enterprises. The linkage between manufacturing and S & T institutes has been noted [17] to be weak in Zimbabwe. The research institutes do little to establish working relationships with local companies, while the local firms on their part think poorly of institutes' abilities and expect little from them. This attitude, of course, cannot engender a symbiotic relationship between firms and research institutes. On the other hand, six categories of technological capabilities (TCs) required by enterprises to acquire firm level technological capabilities have been identified [7,26]. They are (i) production (ii) investment (iii) minor change (iv) strategic marketing (v) linkage and (vi) major change capabilities. However, it has been observed [1] that the inability of African countries to build production and investment capabilities explains the current failure to progress beyond the import substitution stage. Having failed these stages, African countries were

unable to acquire both the investment and innovation capabilities required to graduate into primary export of labour intensive, light industrial products, while importing capital goods. This study therefore seeks to assess the status of TC building in the informal auto-mechanic industry with a view to providing policy intervention to increase the overall TC within the country.

2. Methodology

The study covered auto-mechanics in Southwestern Nigeria namely, Osun, Ogun and Lagos states. Two states (Lagos and Ogun) comprising of cluster mechanics were purposively selected, while samples from the third state (Osun) comprising of stand-alone mechanics were randomly selected. A total of 385 copies of questionnaire were administered to master mechanics by hand delivery. The questionnaire comprised of both structured and unstructured questions. The questionnaire elicited such information as investment levels, sources of investment, abilities of master mechanics on the one hand, and investment, marketing, linkage and minor change capabilities from the respondents on the other hand.

Data obtained were analyzed using descriptive statistics such as percentages, frequencies, and means on the one hand; and inferential statistics such as analysis of variance (ANOVA) by employing Standard package for Social Scientists (SPSS) on the other hand. Post-hoc tests were carried out using Duncan Multiple Range Test.

3. Results and Discussions

3.1. Investment Capability

1 able 1. 1	nvestment	levels of r	naster mec	namics
			State	
Investment level	Osun	Ogun	Lagos	Total
\$6.5-\$130	46	68	57	171(55.88%)
\$130 - \$260	40	16	17	73(23.86%)
\$260 - \$650	31	9	11	51(16.67%)
\$650 - \$1950	3	0	4	7(2.29%)
\$1950 - \$3250	2	0	2	4(1.31%)
Above \$3250	0	0	0	0
Total	122	93	91	N=306

Legend:

As at 2009, exchange was about 150 Naira to \$1.

The investments of master mechanics ranged between 6.5 US dollars and 3250 US dollars (Table 1) at the start of the business. Majority (55.88%) started work with an amount ranging between \$6.5 and \$130. Of these, majority (39.77%) came from Ogun state. On a general note, 295 (96.41%) had invested amounts not exceeding \$650 for the establishment of their workshops while only 3.59% invested in excess of \$650 but not above \$3250. The above figures indicate that majority of the mechanic workshops fell within the small/medium scale business. According to a study [24], about 40.50% of small scale enterprises studied in Ibadan invested between \$6.5 and \$32.5 initially while those which invested above \$130 were just 5.50%. Thus it can be inferred that low initial capital outlay is characteristic of small scale enterprise in Southwestern Nigeria.

Table 2 presents the sources of investments of master mechanics. Personal savings accounted for 48.48%, while

45.03% of the respondents sourced for fund from family members. The combination of funds sourced from personal savings and family members occurred among 93.51% of the respondents. This may not be unconnected with the African culture of being one's brother's keeper. Similar findings corroborate the above observations [24,25].

Most (64.72%) master mechanics indicated that they did not carry out feasibility study before the commencement of their business while 121 (35.28%) indicated that they did (Table 3). However, for the latter, their feasibility studies were not the detailed business feasibility studies recommended by banks and accounting firms. This, of course, may be due to low level of education and also financial constraints as was obvious

from the low investment levels. It has been observed that only 50.0% of the firms in the footwear industries of Aba and Onitsha, which belong to the informal sector, ever carried out any form of feasibility or pre-investment studies [11]. Table 4 presents the mean ratings of factors that show the abilities of master mechanics. There was a significant difference among these factors (F=59.03, p< 0.05). Factors such as ability to carry out feasibility studies (1.61), ability to recognize and purchase advanced equipment (1.40) and ability to prepare, design and set up modern equipped workshop (1.49) were rated Just Able and significantly the same (F=59.03, p<0.05). The ability to recognize and purchase common tools (2.31) was significantly higher than the other factors.

Table 2.	Sources	of inves	stment of	master	mechanics	
						_

					State			
Sources of Investment capital	Osun	%	Ogun	%	Lagos	%	Total	%
Personal savings	93	8.19	78	49.68	68	47.55	239	48.48
Family members	87	45.08	67	42.68	68	47.55	222	45.03
Co-operative society/esusu	12	6.22	11	7.01	5	3.50	28	5.68
Money Leners	1	0.52	0	0	0	0	1	0.20
Bank	0	0	1	0.64	2	1.40	3	0.61
Total	193		157		143		N=493 (100%)	

Table 3. Feasibility study car	Table 3. Feasibility study carried out by master mechanics before start of business									
		State								
Feasibility study before start of business	Osun	Ogun	Lagos	Total						
Carried out feasibility	52	36	33	121(35.28%)						
Did not carry out feasibility	86	70	66	222(64.72%)						
Total	136	106	99	N = 343(100%)						

Table 4. Investment Abilities of master mechanics in Osun, Ogun and Lagos states
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			OSUN				OGUN						
	Rating		3	2		0	Wtd	3	2	1	0	Wtd	
	scale/		v	able		un	avg	v	able	i	un	avg	
	Abilities		able			able		able		able	able		
		F	1	15		29		47	38	9	21		
1	Can carry out feasibility studies	%	0.88	13.16	Just	25.44		40.87	33.04	7.83	18.26		Just
		Fx	3	30	able	0	0.9	141	76	9	0	1.97	able
		F	5	92		4		81	31	4			
2	Can recognize and purchase common tools	%	3.5	64.33		2.80		69.83	26.72	3.45			
			15	184	Able	0	1.69	243	62	4		2.66	Able
	Con recognize and numbers advanced	F	6	49		51		23	41	8	36		
3	can recognize and purchase advanced	%	4.44	36.30	Just	37.78		21.30	37.96	7.41	33.33		Just
	equipment	Fx	18	98	Able	0	1.07	69	82	8	0	1.47	Able
	Can proper design and set up modern	F	2	24		21		25	40	18	29		
4	Can prepare design, and set up modern	%	1.90	22.86	Just	20.0		22.32	35.71	16.07	25.89		Just
	equipped workshop		6	48	Able	0	1.07	75	80	18	0	1.54	Able
]	LAGOS				Overa	all in the	States		
	Rating		3	2	1	0	Wtd	3	2	1	0	Wtd	
	scale/		v	able	i	un	avg	v	able	i	un	avg	
	Abilities		able		able	able		able		able	able		
	Can carry out feasibility studies	F	46	29	6	20		94	82	84	70		
1		%	45.54	28.71	5.94	19.80		28.49	24.85	25.45	21.21		Just
		Fx	138	58	6	0	2.0	282	164	84	0	1.61b	able
	Can recognize and purchase common tools	F	83	15		2		169	138	46	6		
2		%	83.0	15.0		2.0		47.08	38.44	12.81	1.67		
		Fx	249	30		0	2.79	507	276	46	0	2.31a	Able
3	Can recognize and purchase advanced equipment	F	38	25	8	28		69	115	45	115		
5		%	38.38	25.25	8.08	28.28		20.06	33.43	13.08	33.43		Just
		Fx	114	50	8	0	1.74	207	230	45	0	1.40c	Able
4	Can prepare design, and set up modern equipped workshop	F	43	26	8	24		70	90	84	74		
4		%	42.57	25.74	7.92	23.76		22.01	28.30	26.42	23.27		Just
		Fx	129	52	8	0	1.87	201	180	84	0	1.49b	Able

Means with the same letter are not significantly different (F = 59.03, p < 0.05)

Key: Unable = 0, Just able = 1, Able = 2, Very able = 3, Wtd Avg = Weighted Average.

Lagos state exhibited relative (2.0, 2.79, 1.74, and 1.87) advantage over others in abilities to carry out feasibility

studies; recognize, purchase common and advanced tools; as well as in setting up modern workshops respectively.

This may not be unconnected with the cosmopolitan nature of the state, and easier access to technology through the airport and seaport. In essence, it can be inferred that the lower weights in respect of master mechanics' abilities in Osun state compared to Ogun and Lagos states may be due to the stand-alone nature of their workshops as opposed to the Ogun and Lagos ones that operate in clusters.

3.2. Marketing Capability

Table 5A depicts the marketing capability of the master mechanics on a 5-point Likert scale. They exhibited strong linkage with customers in the three states studied, the weighted average being 3.49. A very strong linkage was observed [11] between footwear manufacturers in Aba and Onitsha (an informal sector), and their customers. The auto-mechanics' mode of contact with customers was majorly (56.39%) through phones and personal visits (28.88%) (Table 6). This is similar to their mode of contact with spare parts sellers.

				USUN			UGUN						
		V.strong linkage	Strong linkage	Weak link	V. weak linkage	No link	Wtd Avg.	V.str link	Strong link	Weak link	V. weak link	No link	Wtd Avg.
а		4	3	2	1	0		4	3	2	1	0	
1 Linkage with	F	90	46	2	4	2		60	53	-	-	1	
1. Linkage with	%	62.5	31.94	1.39	2.78	1.39		52.63	46.49	-	-	0.88	
customers	F _x	360	138	4	4	0	3.51	240	159	-	-	0	3.50
2. Linkage with	F	75	45	7	12	2		59	43	7	1	4	
spare parts	%	53.19	31.91	4.96	8.51	1.42		51.75	37.72	6.14	0.88	3.51	
sellers	Fx	300	135	14	12	0	3.27	236	129	14	1	0	3.33
				LAGO	S			OVERALL IN THE STATES					
		V.str link	Strong link	Weak link	V. weak linK	No link	Wtd Avg.	V.str link	Strong link	Weak link	v. weak ling	No link	Wtd Avg.
а		4	3	2	1	0		4	3	2	1	0	
1 Linkaga with	F	51	47	1	-	2		201	146	3	4	5	
1. Linkage with	%	50.50	46.53	0.99	-	1.98		55.99	40.67	0.84	1.11	1.39	3.49
customers	F _x	204	141	2	0	0	3.44	804	438	6	4	0	
2. Linkage with	F	50	39	5	3	3		184	127	19	16	9	
-								T 1 0 0					
spare parts	%	50.0	39.0	5.0	3.0	3.0		51.83	35.77	5.35	4.51	2.54	3.30

Table 5A. Marketing capability parameters of master mechanics in Osun, Ogun and Lagos states

Table 5B. Marketing capability parameters of master mechanics in Osun, Ogun and Lagos state

В		V.	Usually	Occas	Rarely	None	Wtd	V.	Usually	Occas	Rarely	None	Wtd
	г	often	21	()	25	at all	AV.	often		(0)	10	at all	AV.
1. New ideas on	F 0/	11	21	62 12.26	25	24		3	6.00	60 52.17	16.52	20	
vehicles from customers	% Ev	7.09	62	45.50	17.40	10.78	1 70	2.01	0.09	120	10.52	22.01	1.50
2 Information on now	ГА	12	27	124	23	27	1.79	12	21	120	19	20	1.50
2. Information on new	Г 0%	8 30	25.87	45	24 16.78	18.88		8.04	18 75	45	8.04	26 79	
customers	70 Ev	/18	111	86	24	10.00	1.88	36	63	86	0.04	20.79	1 73
3 New ideas on	F	10	41	70	10	2	1.00	11	8	61	20	13	1.75
vehicles from local	1 %	7.04	28.87	49 30	13 38	1 4 1		9.73	7.08	53.98	17 70	11 50	
spare parts sellers	Fx	40	123	140	19.50	0	2 27	44	24	122	20	0	1.86
4 New ideas from	F	4	11	27	19	44	2.27	4	7	40	17	13	1.00
foreign spare parts	%	3.81	10.48	25.71	18.10	41.90		4.94	8.64	49.38	20.99	16.05	
sellers	Fx	16	33	54	19	0	1.16	16	21	80	17	0	1.65
5. Information on new	_												
models of vehicles from	F	8	27	25	19	27		7	18	28	15	12	
foreign spare parts	%	7.55	25.47	23.58	17.92	25.47	1 50	8.75	22.50	35.0	18.75	15.0	
sellers.	Fx	32	81	50	19	0	1.72	28	54	56	15	0	1.91
(Marlast information	F	37	42	49	8	5		16	20	62	10	5	
6.Market information	%	26.24	29.79	34.75	5.67	3.55		14.16	17.70	54.87	8.85	4.42	
about spare parts prices.	Fx	148	126	98	8	0	2.70	64	60	124	10	0	2.28
7. Information on new	F	9	58	44	13	18		12	22	49	12	16	
models of vehicles from	%	6.34	40.85	30.99	9.15	12.68		10.81	19.82	44.14	10.81	14.41	
local spare parts sellers.	Fx	36	174	88	13	0	2.19	48	66	98	12	0	2.02
В		V.	Henelly	Occas	Daroly	None	Wtd	V.	Hen	Occas	Parely	None	Wtd
В		often	Osually	Occas	Kalely	at all	Av.	often	Usu	Occas	Kalefy	at all	Av.
1 New ideas on	F	1	-	51	17	32		15	28	173	61	82	
vehicles from customers	%	0.99	-	50.50	16.83	31.68		4.18	7.80	48.19	16.99	22.84	
venicies from customers	Fx	4	0	102	17	0	1.22	60	84	346	61	0	1.53d
2. Information on new	F	8	2	44	21	24		29	60	130	54	81	
models of vehicles from	%	8.08	2.02	44.44	21.21	24.24		8.19	16.95	36.72	15.25	22.88	
customers	Fx	32	6	88	21	0	1.49	116	180	260	54	0	1.72c
3. New ideas on	F	9	1	62	18	11		30	50	193	57	26	
vehicles from local	%	8.91	0.99	61.39	17.82	10.89		8.43	14.04	54.21	16.01	7.30	
spare parts sellers	Fx	36	3	124	18	0	1.79	120	150	386	57	0	2.00b
4.New ideas from	F	4	1	28	16	13		12	19	95	52	70	
foreign spare parts	%	6.45	1.61	45.16	25.81	20.97		4.84	7.66	38.31	20.97	28.23	
sellers	Fx	16	3	56	16	0	1.47	48	57	190	52	70	1.68d
Information on new	F	5	10	36	15	6		20	55	89	49	45	

models of vehicles from foreign spare parts sellers.	% Fx	6.94 20	13.89 30	50.0 72	20.83 15	8.33 0	1.90	7.75 80	21.32 165	34.50 178	18.99 49	17.44 0	1.83c
6.Market information about spare parts prices.	F % Fx	9 9.47 36	16 16.84 48	66 69.47 132	3 3.16 3	1 1.05 0	2.31	62 17.77 248	78 22.35 234	177 50.72 354	21 6.02 21	11 3.15 0	2.46a
7. Information on new models of vehicles from local spare parts sellers.	F % Fx	9 9.09 36	14 14.14 42	59 59.59 118	13 13.13 13	$\begin{array}{c} 4\\ 4.04\\ 0\end{array}$	2.11	30 8.62 120	94 27.01 282	152 43.68 304	38 10.92 38	34 9.77 0	2.14b

Table 5C. Marketing of	capability	parameters of maste	r mechanics in	Osun, Ogu	in and Lagos states
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С		V. Adeq	Adeq.	Little	None	Wtd Avg	V. Adeq	Adeq.	Little	None	Wtd Avg
	F	4	15	51	68	0	2	2	46	61	U
1. Knowledge of prices charged by other	%	2.90	10.87	36.96	49.28		1.80	1.80	41.44	54.95	
worksnops	Fx	12	30	51	0	0.67	6	4	1	0	0.10
2. Knowledge of prices shareed by private	F	1	1	29	86		2	5	28	71	
2. Knowledge of prices charged by private	%	0.85	0.85	24.79	73.50		1.89	4.72	26.42	66.98	
established workshops	Fx	3	2	29	0	0.29	6	10	28	0	0.42
2 Knowledge of prices sharged by legal	F	1	1	6	15		-	3	19	61	
3. Knowledge of prices charged by local automechanics (for private workshops)	%	4.35	4.35	26.09	65.22		0	3.61	22.89	73.49	
automechanics (for private workshops)	Fx	3	2	6	0	0.48	0	6	19	0	0.30
C		V.	Adag	Little	Nona	Wtd	V.	Adag	Little	None	Wtd
		Adeq	Aueq.	Little	None	Avg	Adeq	Aueq.	Little	None	Avg
1. Knowledge of prices charged by other	F	2	10	26	62		8	27	123	191	
workshops	%	2.0	10.0	26.0	62.0		2.29	7.74	35.24	54.73	
workshops	Fx	6	20	26	0	0.52	24	54	123	0	0.58a
2 Knowledge of prices charged by private	F	1	11	21	65		4	17	78	222	
2. Knowledge of prices charged by private	%	1.02	11.22	21.42	66.33		1.25	5.30	24.30	69.16	
established workshops	Fx	3	22	21	0	0.47	12	34	78	0	0.39b
3 Knowledge of prices charged by local	F	-	7	11	37		0	4	36	113	
automechanics (for private workshops)	%	0	12.73	20.0	67.27		0	2.61	23.53	73.86	
automeenames (for private workshops)	Fx	0	14	11	0	0.46	0	8	36	0	0.29c

Means with the same letter are not significantly different (F = 36.47 (Table 5B); F = 33.33 (Table 5C), p < 0.05)

Key: No Linkage = 0, Very Weak linkage = 1, Weak linkage = 2, Strong linkage = 3, Very strong linkage = 4. None at all = 0, Rarely = 1, Occasionally = 2, Usually = 3, Very often = 4. None = 0, Little = 1, Adequate = 2, Very Adequate = 3.

Table	6.	Mode	of	linkage	with	customers
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			State	
Linkage mode	Osun	Ogun	Lagos	Total
Phones	123(62.80%)	86(54.78%)	78(50.00%)	287(56.39%)
Personal visits	50(25.51%)	42(26.75%)	55(35.26%)	147(28.88%)
E-mail	6(3.06%)	7(4.46%)	2(1.28%)	15(2.95%)
Road Transport	17(8.67%)	22(14.01%)	21(13.46%)	60(11.79%)
Total	196	157	156	N=509(100%)

The relatively higher occurrence of usage of cell phones by auto-mechanics as a means of contact may not be unconnected with its portability [14], and cheaper cost compared with travelling [21,23]. However, the lower level of contact (28.88%) with customers through personal visits (Table 6) may be attributable to the fear among the mechanics that irrespective of relationship with customers, negative incidents such as car stealing, robbery etc may be traced back to them. Their linkage with spare parts sellers was equally strong with a weighted average of 3.30.

Table 5B shows the weighted averages of the factors that were considered for analyzing the marketing capabilities of master mechanics. There was a significant difference among the factors (F= 36.47, p<0.05). The factors included frequency of obtaining new ideas from customers (1.53), frequency of getting information on new models of vehicles from customers (1.72) and frequency of getting new ideas from foreign spare parts sellers (1.68) which were rated as rarely, and were the same (F=36.47, p<0.05).

3.3. Linkage Capability

Table 7 shows the levels of linkage of master mechanics with various institutions. There was a significant difference in the linkages with different institutions (F=545.17, p<0.05). The linkage levels of the institutions with their associated ratings were linkage with technical schools (0.48), linkage with polytechnics (0.40), linkage with universities (0.31), linkage with research institutes (0.23), linkage with motor vehicle companies (0.27) and linkage with foreign institutions (0.52). These ratings are below 1.0, which indicates poor linkage. This agrees with earlier findings [22] that entrepreneurs in Southwestern Nigeria have a very low level of linkage with higher institutions and research institutes. But the linkages with local mechanics (3.14) and national mechanic associations (3.26) were rated strong and significantly higher (F=545.17, p<0.05) than the aforementioned linkages with the six institutions. The strong linkages exhibited with both the local and national mechanical associations may be due to the fact that these are the organizations that represent their interests especially when it has to do with law enforcement agencies.

Table 7. Linkage levels of master mechanics with various institutions

		OSUN				OGUN							
		V.str link	Strong link	Weak link	V. weak link	No link	Wtd Avg.	V.str link	Strong link	Weak link	V. weak link	No link	Wtd Avg.
		4	3	2	1	0		4	3	2	1	0	
1. Linkage with Technical Schools	F % Fx	7 4.93 28	10 7.04 30	6 4.23 12	$\begin{array}{c}1\\0.70\\1\end{array}$	118 83.10 0	0.42	$\begin{array}{c}1\\0.87\\4\end{array}$	10 8.70 30	5 4.35 10	2 1.74 2	97 84.35 0	0.40
2. Linkage with polytechnic	F % Fx	3 2.10 12	6 4.20 18	$\begin{array}{c}1\\0.70\\2\end{array}$	- -	133 93.01 0	0.22	$\begin{array}{c}1\\0.87\\4\end{array}$	10 8.70 30	5 4.35 10	2 1.74 2	97 84.35 0	0.40
3. Linkage with Universities	F % Fx	$\begin{array}{c}1\\0.70\\4\end{array}$	5 3.52 15	2 1.41 4	1 0.70 1	133 93.66 0	0.17	$\begin{array}{c}1\\0.87\\4\end{array}$	13 11.30 39	4 3.48 8	1 0.87 1	96 83.48 0	0.45
4. Linkage with Research Institutes	F % Fx	$\begin{array}{c}1\\0.72\\4\end{array}$	2 1.44 6	3 2.16 6	- -	133 95.68 0	0.12	- 0 -	9 7.83 27	5 4.35 10	1 0.87 1	100 86.96 0	0.33
5. Linkage with motor vehicle companies	F % Fx	3 2.14 12	3 2.14 9	3 2.14 6	1 0.71 1	130 92.86 0	0.20	$\begin{array}{c}1\\0.88\\4\end{array}$	2 1.75 6	- - -	1 1.75 1	110 96.49 0	0.10
6. Linkage with Local Mechanic Association	F % Fx	108 75.52 432	14 9.80 42	$\begin{array}{c}1\\0.70\\2\end{array}$		20 13.99 0	3.33	81 70.43 324	17 14.78 51	3 2.61 6	1 0.87 1	13 11.30 0	3.32
7. Linkage with National Mechanic Association	F % Fx	91 63.64 364	8 5.59 24		2 1.40 2	42 29.37 0	2.73	87 75.65 348	15 13.04 45	5 4.35 10	1 0.87 1	7 6.10 0	3.51
8. Linkage with foreign institutions	F % Fx	5 3.57 20	- -	$\begin{array}{c}1\\0.71\\2\end{array}$	6 4.29 6	128 91.43 0	0.20	$\begin{array}{c}1\\0.87\\4\end{array}$	1 0.87 3	- - -	- -	113 98.26 0	0.06
				LAG	OS				OVI	ERALL IN	THE STA	TES	
		V.str link	Strong link	Weak link	V. weak link	No link	Wtd Avg.	V.str link	Strong link	Weak link	V. weak link	No link	Wtd Avg.
		4	3	2	1	0		4	3	2	1	0	
1. Linkage with Technical Schools	F % Fx	2 3.33 8	4 6.66 12	4 6.66 8	7 11.67 7	43 71.67 0	0.58	10 3.15 40	24 7.57 72	15 4.73 30	10 3.15 10	258 81.39 0	0.48cd
2. Linkage with polytechnic	F % Fx	5 7.81 20	2 3.13 6	5 7.81 10	6 9.38 6	46 71.88 0	0.66	9 2.80 36	18 5.59 54	11 3.42 30	8 2.48 10	276 85.71 0	0.40cde
3. Linkage with Universities	F % Fx	$1\\1.82\\4$	2 3.64 6	4 7.27 8	4 7.27 4	44 80.0 0	0.40	3 0.96 12	20 6.41 60	10 3.21 20	6 1.92 6	273 87.5 0	0.31de
4. Linkage with Research Institutes	F % Fx		2 4.76 6	3 7.14 6	3 7.14 3	34 80.95 0	0.36	1 0.34 4	13 4.39 39	11 3.72 22	4 1.35 4	267 90.20 0	0.23e
5. Linkage with motor vehicle companies	F % Fx	6 14.29 24	3 7.14 9	3 7.14 6	2 4.76 2	28 66.67 0	0.98	10 3.38 40	8 2.70 24	6 2.03 12	4 1.35 4	268 90.54 0	0.27e
6. Linkage with Local Mechanic Association	F % Fx	74 83.15 296	14 15.73 42		- -	1 1.12 0	3.80	263 75.79 944	45 12.97 135	4 1.15 8	1 0.29 1	34 9.80 0	3.14a
7. Linkage with National Mechanic Association	F % Fx	74 83.15 296	13 14.61 39	1 1.12 2	- -	1 1.12 0	3.79	252 72.62 1008	36 10.37 108	6 1.73 12	3 0.86 3	50 0.14 0	3.26b
8. Linkage with foreign institutions	F % Fx	$ \begin{array}{r} 10 \\ 58.82 \\ 40 \end{array} $	5 29.41 15	- -	- - -	2 11.76 0	3.24	16 9.30 64	6 3.49 18	1 0.58 2	6 3.49 6	143 83.14 0	0.52c

Means with the same letter are not significantly different (F = 545.17, p < 0.05) Key: No linkage = 0, Very weak linkage = 1, Weak linkage = 2, Strong linkage = 3, Very strong linkage = 4

The reasons adduced for weak linkage with institutions and research institutes are shown in Table 8. About 94.69% indicated that lack of financial assistance from these institutes was responsible, 77.87% indicated irrelevance of institutions' research to auto-mechanic work, while as many as 78.21% claimed that weak linkage was due to the fact that the higher institutions offered them no business management training. However, 54.47% of the respondents felt the research institutes had nothing to teach them, 60.89% indicated that the institutions did not offer them technical training, while 58.10% claimed that they were far from them. Many of the auto-mechanics, when interviewed,

expressed willingness to partner with the higher institutions and research institutes if they were invited and recognized. The partnership could bring about the advantage of improving auto-mechanic repair industry-academic relation which will definitely bring about a symbiotic relationship between the two groups with the inherent advantage of enriching academic curriculum. On the other hand, the reasons given for having a strong linkage with mechanic associations included learning new things (43.53%), closeness to members (41.90%), receiving technical (39.11%) and business management trainings (21.79%) informally from members (Table 9).

Table 0. Reasons for wear minage of auto-meenames with institution	Table 8.	Reasons fo	r weak l	linkage of	' auto-mecha	nics with	institutions
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			State				
	Osun n	Ogun n	Lagos n	Total	% of Respondents		
1. Their research not relevant to auto-mechanic	104 139	90 115	84 103	278 357	77.87		
2. They have nothing new to teach us	62 141	69 114	64 103	195 358	54.47		
4. They offer no business management training	84 141	88 114	46 103	218 358	78.21		
They offer no business management training	118 141	95 114	67 103	280 358	78.21		
5. They offer no financial assistance	130 140	111 115	98 103	339 358	94.69		
6. They are far from us	89 140	71 115	48 103	208 358	58.10		

Table 9. Reasons for strong linkage of auto-mechanics with institutions

			State				
	Osun	Ogun	Lagos	Total	% of Respondents		
1. They teach us new things	14	144	103	358	45.53		
2. They give us technical training	141	114	103	358	39.11		
3. They offer us financial assistance	141	114	103	358	5.31		
4. They give us business management training	140	115	103	358	21.79		
5. They are close to us	140	115	103	358	41.90		

3.4. Minor Change Capability

It has been observed [27] that companies aim to achieve their strategic objectives with both incremental and radical innovations. A total of 349 (99.15%) of the master mechanics indicated that apart from repairs, they were engaged in improvement, adaptation or modification of vehicles (Table10). This is in line with a previous study [11] which also reported a prevalence of 87% of the respondents which carried out incremental adaptation in the informal footwear sector in Nigeria.

All the respondents in Lagos and Ogun states were engaged in various improvements, adaptation or modification of vehicles while 97.86% of the automechanics undertook these activities in Osun state. Majority (47.62%) of the master auto-mechanics carried out adaptations or modifications 1-10 times per year. A few (20.54%) of them carried out adaptations or modifications above 20 times per year; while 41.79% performed adaptations or modifications 1-5 times in Osun state (Table 11). It has been observed [16] that in the early stages, industrial development needs basic human capital (literacy and numeracy, with some vocational skills). In its present state, vocational skill is the hallmark of the automechanic industry in Nigeria. But the literacy and numeracy can be added through linkage with the academia. Adaptations or modifications carried out by the automechanics may appear simplistic in comparison to advanced technologies, but they have helped tremendously in transporting goods and services across the country. Research has shown that the social and institutional framework which is hospitable to one set of technology may not be suitable to another [28]. Whereas incremental innovations can be easily accommodated in the auto-mechanic industry in Nigeria, this may not be so with radical innovations which by definition involve an element of creative destruction [28].

State

Та	ble	10.	Engagement	in ada	ptation	or mo	odifica	tion ()f ve	ehicle	es
						~					~~~

				State	
	Osun	Ogun	Lagos	Total	%
Engagement in adaptation or modification of vehicles	137	113	99	349	99.15
Not engaged in adaptation	3	0	0	3	0.85
Total	140	113	99	352	100

Table 11. Frequency of adaptation or modification per year							
				State			
Frequency of times	Osun	Ogun	Lagos	Total	%		
1-5	56 (41.79%)	13	11	80	23.81		
6 - 10	18 (13.43%)	30	32	80	23.81		
11-15	11(8.21%)	28	4	43	12.80		
16 - 20	24 (17.91%)	15	25	64	19.05		
Above 20	25 (18.66%)	19	25	69	20.54		
Total (%) per state	(92.41%)	(76.64%)	(94.17%)	(87.27%)			
Total	134	105	97	N = 336	100		

4. Conclusion

The study concluded that the investment capability of the auto-mechanics was weak. This corroborates previous studies which observed that less developed countries (LDCs) may be poor in terms of capabilities and resources, but they are rich in terms of unresolved problems and unfilled needs [18]. Upon this premise, they can use their home market to initiate innovations.

On the other hand, marketing capability was found to be strong, especially with customers and spare parts suppliers. But there was a weak linkage capability with technical schools, polytechnics, universities, research institutes and motor vehicle companies though strong linkages were recorded with both local and national mechanic associations. The weak linkages with educational institutions and research institutes were attributed to lack of financial assistance from the institutions and poor relevance of institutions' researches to auto-mechanic work. Minor change capability was found to be strong among the auto-mechanics.

5. Implications of the Study

It has been observed [30] that Africa has been plagued by "resource curse". This malady is the paradox of rich access to raw materials hampering effort to develop industrial activities necessary for industrial growth [18]. Nigeria, especially, is a victim of this malady, unlike the Nordic countries of Denmark, Finland, Iceland, Norway and Sweden which have used availability of raw materials as springboards for sustained economic growth.

According to a report [20], Nigerian auto-mechanic industry is an informal sector which can be grouped under "other services". It amounted to 0.93% and 0.94% of national GDP in 2009 and 2010 respectively, while contributing 1.27% and 1.15% to GDP growth respectively within the two years. Its sectoral growth was about 10% for 3 consecutive years 2010, 2011 and 2012, with about 1.25% contribution to GDP each year for the years. The above is an indication that this informal sector is a potential source of employment for the teeming unemployed youth in Nigeria. Entry into the sector is highly unrestricted and it accommodates both the Western-educated literates and the illiterates. It is thus a veritable tool for achieving the Millenium Development Goal (MDG) of employment for the youth.

6. Policy Recommendations

In view of the findings in this study, the following policy recommendations are made.

(i) It is particularly important for vehicle manufacturers to set up training institutes for auto-mechanics within the country. This way, innovations can be brought down to the auto-mechanic workshop level by automobile manufacturers. There is therefore the need for policy intervention from government to make this possible. This has the dual advantage of reducing tinkering and guess work by the auto-mechanics as well as broadening their own knowledge base.

(ii) There is need for higher educational institutions such as the Universities and Polytechnics to foster stronger linkages with the auto-mechanics especially by way of training workshops; conferences etc where practical knowledge can be traded/exchanged with theoretical knowledge.

(iii) Diagnostic tools which could aid the capabilities of the mechanics are as yet unaffordable to individuals. Association units or zones can start purchasing at that level for members' use since this would increase precision of solving problems.

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