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Effect of Socio-Economics Characteristics, Production and Innovation Capabilities on the Performance of Palm Kernel Processing Firms in South-western Nigeria

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Abstract:

The study assessed the impact of production and innovation capability on performance of the firms in this sector. The study covered Osun, Oyo, Ogun and Ondo States in southwestern Nigeria. The sample population of 265 respondents was obtained through respondent driven sampling techniques tools. The research tools used were questionnaire, personal observations, interviews and secondary data collection approach. The questionnaire was administered to palm kernel processor and elicited information on socio-economic characteristics of the respondents, profile of the firms, production capabilities possessed by the palm kernel processors, innovations available in the firms. Both descriptive and inferential statistical techniques were employed for data analysis. The Technologies employed by the processors in each unit operators were mainly indigenous technologies that were fabricated locally in Nigeria. Very few operators made use of imported technologies. Correlation analysis showed that organization innovation (r=0.170, p≤0.05) and market innovation (r=0.689, p≤0.01) significantly influenced the performance of the firms. The regression results showed that only 5 variables significantly impacted on the profitability of the firms. These were size of the employees (β=1.882, p≤0.01), source of information for raw materials (β=1.146, p≤0.05), price competitiveness (β=0.079, p≤0.10), investment in quality control (β=0.417, p≤0.01) and maintenance of machines (β=0.172, p≤0.05). The coefficient of determination R^2= 0.724 indicated that the independent variables contributed between 72.4% and 87.3% to production and innovative capability in palm kernel processing firms. However, price competiveness (β=0.417, p≤0.10) and investment in quality control (β=0.417, p≤0.01) significantly and positively effected on business performance of the industry and sales turnover in year 2013.

Keyword: Palm Kernel Cake, Palm Kernel Oil, Processing Equipment, Palm Oil Industry.

I. INTRODUCTION

Palm kernel is a by-product of the palm oil industry. It constitutes about 45% of the palm nut of the palm oil *Elaeis guineensis* (Rossell, 1985; Goh, 1993 and Kadir *et al.*, 1998). It can be processed into palm kernel oil (PKO) and palm kernel cake (PKC). Palm kernel oil is rich in Lauric acid, G12 (48.3%) but also contains other major fatty acids such as myristic, extracted using screw press with 40-43% (g oil/100g kernel) yield or liexone extracted with 44.5%-46.5% yield (Tang and Teoh, 1985). According to Gbasouzor *et al*., (2012) palm kernel oil is a white to yellowish oil of vegetable origin which is solid at normal temperature and is obtained from the kernel of the oil palm fruit (Elaesis guineensis). It is one of the best oil, which is obtained from the flesh of the fruit Gbasouzor *et al*., 2012). Malaysia produced about 2.4 million metric tonnes of palm kernel and about 1.1 million metric tonnes of crude palm kernel oil in 1998 (Porla, 1998). Hassan *et al.* (1999) emphasized that PKO is a high quality oil for food use and a valuable component of margarine formulation, giving rapid melt down of PKO in the mouth characteristics (Siew and Begger, 1981). Its high solid content at 15–20°C, together with rapid melt down, makes it particularly useful in confectionery products. It is commercially fractionated into liquid olein and solid stearin, the latter being a premium product (Hassan *et al.*, 2000).

However, production of PKO in Nigeria was poor and such vegetable oils are important to meet demands. According to estimates, the total money Nigeria spent to import vegetable oil from Malaysia in 2001 was $186.65 million.

It has been estimated that production-consumption margin is increasing by thousand tonnes naturally because of population growth and rise in per capital income (Vanguard, 2002). In 2003, World production PKO was 3236 metric tons out of which Malaysia produced 1644 metric tonnes of PKO (MPOB, 2003).

The PKC is obtained from two stages of oil extraction from the palm fruit. The first stage is the primary extraction of palm oil from the pericarp portion of the fruit, which also produces the kernel and by-products Palm Oil Sludge and Palm Press Fiber. The extraction of oil from crushed kernel then results in the production of PKC as by-product (MPOB, 2003). The extraction of oil from crushed kernel results in production of PKC as by product (MPOB, 2003.) In 2003, Malaysia produced an annual quantity of 1.4 million tonnes of palm kernel cake (PKC) as a by-product of palm kernel oil mill. Two types of PKC exist, the expeller pressed and the solvent extracted, because of different

methods of kernel oil extraction and difference in their oil content: 5 to 12% in the expeller pressed PKC and 0.5 to 3% in the solvent extracted type (Chin, 1991).

There are three conventional methods used for extracting PKO from palm kernel. These include; Traditional, Solvent extraction and Mechanical extraction. The processing of palm kernel to extract PKO and PKC is done at small, medium and large scales levels in Nigeria. Ilori (2016) reported that this firms process production and some innovation capabilities. This paper is therefore designed to examine the effect of these capabilities on these capabilities on the performance of the firms.

II. METHODOLOGY

The study area consisted of Oyo, Ondo, Osun, and Ogun states. These states were purposively selected because they have abundant supply of palm kernel and large small and medium palm kernel oil processing firms.

The study population consists of all small scale processing enterprises in the four states (Oyo, Osun, Ogun and Ondo States).

Two hundred and sixty five small and medium scale palm kernel oil processing firms was selected purposively from each state was selected made up of a total of 265 respondents for the study. At least one firm, if any, was chosen from each Local government of the states. The sampling procedure involved the initial purposive selection of a palm kernel processing firm in a town or location, through the assistance of a commercial motorcycle rider. The selected firms then gave direction(s) to his/her peers within the location. Through this procedure, 265 respondents were identified for the study. The research tools used for data collection were questionnaire and interview techniques. The questionnaires elicited information from the processors on socio-economics characteristics of the palm kernel processors, production management, investment capability, production scheduling, quality control and repair and maintenance of physical assets, innovation, income and cost of production.

A number of measures was taken to validate the questionnaire that was used in this study. Concerted effort was made to ensure that questionnaire designed was relevant to the research questions, the objectives of the research as well as the conceptual frameworks. The questionnaire items were constructed to be as simple as much as possible while unambiguous expressions were used. The questionnaire was pre-tested on ten palm kernel oil processors in Ekiti state. The comments, suggestions and corrections made by the respondents was collated and used to improve the quality of the questionnaire. Furthermore, a team of three moderated the questionnaire as to the relevance of the questionnaire items.

This was considered under the following variables:

(i) Sales Turnover was measured in Naira and on 5 point Likert scale with Extremely High being 5 and Not at all being 1.
(ii) Volume of production was measured in litres and on 5 point Likert scale with Extremely High being 5 and Not at all being 1.
(iii) Cost of production was measured in Naira and 5 point Likert scale with Extremely High being 5 and Not at all being 1.
(iv) Customers' demand was measured and on 5 point Likert scale with Extremely High being 5 and Not at all being 1.
(v) The overall effect of the production capability and innovation was measured on a likert scale with 5-Very high and 1 no effect.

Model specification

To assess the effect of production capability and innovation on performance of palm kernel processing firms' regression technique was employed.

$$P = \beta_0 + \beta_1 Y_a + \beta_2 Y_b + \beta_3 Y_c + \beta_4 Y_d + \beta_5 Y_e + \beta_6 Y_f + \beta_7 Y_g + \beta_8 Y_h + \beta_9 Y_i + \beta_{10} Y_j$$

Y_a = Socio-economic characteristics
Y_b = Investment capability
Y_c = Production management
Y_d = Marketing Capability
Y_e = Production scheduling
Y_f = Quality control
Y_g = Inventory Management
Y_h = Facility layout
Y_i = Repair and maintenance of physical asset
Y_j = Innovations available for small scale palm kernel processing forms.

Y_a = Socio-economic characteristics
Y_{a1} = Gender i.e. male or female
Y_{a2} = Age of respondents (year)
Y_{a3} = Year of experience on the job
Y_{a4} = Size of the firm by population of employee
Y_{a5} = Age of firm (year).

Y_b = Investment capability
Y_{b1} = Total investment at the start of business
Y_{b2} = Sources) of investment capital.

Y_c = Production management
Y_{c1} = Quantity of raw materials required for production per month
Y_{c2} = Quantity of palm kernel oil produced per month
Y_{c3} = Quantity of palm kernel cake produced
Y_{c4} = Availability of processing equipment
Y_{c5} = Source of equipment for palm kernel processing.

Y_d = Marketing capability
Y_{d1} = Source of raw materials
Y_{d2} = Source(s) of information for raw materials
Y_{d3} = Price competitive
Y_{d4} = Modes of contact with customers
Y_{d5} = Modes of contact with raw materials suppliers
Y_{d6} = Knowledge of price charge by fellow palm kernel processors.

Y_e = Production scheduling
Y_{e1} = Rate of production per month
Y_{e2} = Level of capacity utilization
Y_{e3} = Does firm schedule production
Y_{e4} = Method used to schedule production.

Y_f = Quality control
Y_{f1} = Withdrawal of product from the market
Y_{f2} = Implement any quality control measure
Y_{f3} = Type of quality control measure in place
Y_{f4} = Investment in quality control.

Y_g = Inventory management
Y_{g1} = Type of inventory management practice
Y_{g2} = Existence of warehouse for palm kernel nuts
Y_{g3} = Capacity of the warehouse.

Y_h = Facility layout
Y_{h1} = Use of layout facilities in sequence
Y_{h2} = Distance between each production facility
Y_{h3} = Type of production process

Y_i = Repair and maintenance of physical asset
Y_{i1} = Type of maintenance strategy employed
Y_{i2} = Effectiveness of maintenance strategy
Y_{i3} = Staff capability in maintenance of machines

Y_j = Innovations available for small scale palm kernel processing firms
Y_{j1} = Market innovation capacity
Y_{j2} = Customers demand for improved products
Y_{j3} = Natures of innovation.

The other factors in the log linear function in equation 1 above are expressed as:
β_o = Constant term/intercept
β_n = Regression coefficient of the variables (where n = 1, 2, 3, …, 10).

III. RESULT AND DISCUSSION

Table 1 shows the Sales Turnover of the palm kernel processing firms between in 2011 and 2013 in the study area. About 12% of the firms had Sales Turnover N1m – ₦10m in year 2011. While 49% and 35.5% had Sales Turnover of ₦10.1m - ₦20m and ₦20.1m - ₦30m respectively in the same year. Furthermore, 5.8%, 1.9%, and 2.6% of them had Sales Turnover of ₦30.1m - ₦40m and ₦55.1m and above respectively in the year. The result further revealed that in year 2012, 7.1% had Sales Turnover of ₦1m – ₦10m, while 49%, 35% and 5.8% of them had Sales Turnover of ₦10.1m - ₦20m, ₦20.1m - ₦30m and ₦30.1m - ₦40m respectively in the same year. Only 1.9% of them were able to realize Sales Turnover of ₦55m. Similarly, in year 2013, about 3.8% of the firms had Sales Turnover below ₦1m - ₦10m.

Furthermore 3%, 34.3%, 50.0% had Sales Turnover of ₦1m - ₦10m, ₦10.1m - ₦20m and ₦20.1m - ₦30m respectively in year 2013. Approximately 6.9% and 3.4% of the firms realized Sales Turnover of ₦30.1m - ₦40m. These results indicated that locally palm kernel processing locally is a Sales Turnover able venture which has created wealth, jobs and alleviate poverty for many people in the study area. Similar observations have been reported by Yesufu *et al*. (2013) and Ibitoye and Onje (2013) that palm oil processing is Sales Turnover able in Ogun and Kogi States respectively. Earlier, Fellow *et al*. (1992) has posited that small scale oilseed processing is a potential on-farm or community business in the rural areas. The small scale medium enterprise sector is strategically positioned to generate employment, create wealth, reduce the prevalence poverty and sustain economic growth and development. The sub-sector can absorb up to 85% of jobs, improve per capita income, increase value addition to raw materials supply, improve export earnings and improve capacity utilization in key industries (FGN, 2009).

Table I Sales Turnover Of The Palm Kernel Nut Processing Firms In 2011, 2012 And 2013

Sales ₦'10^6	**Year**					
	2011		**2012**		**2013**	
	Frequency	**% (%)**	**Frequency**	**% (%)**	**Frequency**	**% (%)**
< 1.0	-	-	-	-	-	-
1.0 – 5.0	2	0.80	1	0.40	1	0.40
5.1 – 10.0	10	3.80	9	3.40	9	3.40
10.1 – 15.0	20	7.50	19	7.20	13	4.90
15.1 – 20.0	65	24.50	49	18.50	31	11.70
20.1 – 25.0	79	29.80	85	32.00	79	29.80
25.1 – 30.0	38	14.30	49	18.50	44	16.60
30.1 – 35.0	28	10.60	28	10.60	40	15.10
35.1 – 40.0	9	3.40	11	4.20	31	11.70
40.1 – 45.0	8	3.00	3	1.10	4	1.50
45.1 – 50.0	-	-	4	1.50	6	2.30
50.1 – 55.0	1	0.40	-	-	-	-
55.1 – 60.0	-	-	-	-	-	-
60.1 & above	5	1.90	7	2.60	7	2.60
Total	**265**	**100.00**	**265**	**100.00**	**265**	**100.00**

Field Survey, 2014.

Table 2 shows that in 2011, 21.10%, 34.70%, 16.9% and 10.9% of the respondents incurred on production between ₦10,100,000 – ₦15,000,000; ₦15,100,000 – ₦20,000,000; ₦20,100,000 – ₦25,000,000; and ₦25,100,000 – ₦30,000,000 respectively; while the remaining 4.2%, 7.2%, 0.8%, 2.3%, 0.4% and 1.5% spent between ₦1,000,000 – ₦5,000,000; ₦5,100,000 – ₦10,000,000; ₦30,100,000 – ₦35,000,000; ₦35,100,000 – ₦40,000,000; ₦55,100,000 – ₦60,000,000; and above ₦60,100,000 respectively.

In 2012, Table 4.38 shows 15.50%, 33.90%, 20.40% and 15.10% incurred on production between ₦10,100,000 – ₦15,000,000; ₦15,100,000 – ₦20,000,000; ₦20,100,000 – ₦25,000,000; and ₦25,100,000 – ₦30,000,000 respectively while 1.10%, 3.40%, 2.30%, 0.40% and 1.90% spent between ₦1,000,000 – ₦5,000,000; ₦5,100,000 – ₦10,000,000; ₦30,100,000 – ₦35,000,000; ₦35,100,000 – ₦40,000,000; ₦55,100,000 – ₦60,000,000; and ₦60,100,000 above on their businesses in year 2012 as shown in Table 4.38. This revealed that cost of production in year 2012 was more than 2011.

Table 2 also shows that majority (32.0%) of the firms incurred ₦20,100,000 - ₦25,000,000 on their businesses in year 2013. About 25.6% spent ₦15,100,000 – ₦20,000,000; 18.5% spent ₦25,100,000 – ₦30,000,000; 8.7% incurred ₦10,100,000 – ₦15,000,000, and 5.7% spent ₦30,100,000 – ₦35,000,000. The remaining 0.8%, 3.0%, 1.1%, 1.9%, 0.4% and 1.9% respectively incurred ₦1,100,000 – ₦5,000,000; ₦5,100,000 – ₦10,000,000; ₦35,100,000 – ₦40,000,000; ₦40,100,000 – ₦45,000,000; ₦45,100,000 – ₦50,000,000, and ₦60,000,000 above on their businesses in year 2013 while 0.4% of the respondents spent less than ₦1,000,000 on their businesses.

Responses from oral interview revealed that firms spent more on their businesses in year 2013 than year 2012. The results also showed that cost of production increased from year 2011 – 2013.

Table II Cost Of Production In Palm Kernel Nut Processing Firms In 2011, 2012 And 2013

Sales ₦'10^6	**Year**					
	2011		**2012**		**2013**	
	Frequency	**% (%)**	**Frequency**	**% (%)**	**Frequency**	**% (%)**
< 1.0	-	-	-	-	1	0.40
1.0 – 5.0	11	4.20	3	1.10	2	0.80
5.1 – 10.0	19	7.20	16	6.00	8	3.00
10.1 – 15.0	56	21.10	41	15.50	23	8.70

15.1 – 20.0	92	34.70	90	33.90	68	25.60
20.1 – 25.0	45	16.90	54	20.40	85	32.00
25.1 – 30.0	29	10.90	40	15.10	49	18.50
30.1 – 35.0	2	0.80	9	3.40	15	5.70
35.1 – 40.0	6	2.30	6	2.30	3	1.10
40.1 – 45.0	-	-	1	0.40	5	1.90
45.1 – 50.0	-	-	-	-	1	0.40
50.1 – 55.0	-	-	-	-	-	-
55.1 – 60.0	1	0.40	-	-	-	-
60.1 & above	4	1.50	5	1.90	5	1.90
Total	**265**	**100.00**	**265**	**100.00**	**265**	**100.00**

Source: Field Survey, 2014.

Table 3 showed the effect of production and innovation capability on the performance of palm kernel processing firms. A level of significant ($F = 87.02$, $p \leq 0.05$) difference exists among the ratings of the performance indicators on a 5-point Likert scale. Increase in customers' demand (4.42) was rated high and significantly different from other indicators. Increase in volume of production (3.85), reduction in cost of production (4.09) and increase in Sales Turnover (3.55) were also rated very high but significantly ($p \leq 0.05$) different from each other.

The results from simple regression analysis showed that age (X_2), educational qualification (X_3), age of firm (X_7), total investment at the start of the business (X_8), quantity of raw material (X_{10}), quantity of palm kernel oil produced (X_{11}), quantity of palm kernel cake (X_{12}), availability of equipment (X_{13}), source of equipment for palm kernel processing (X_{14}), price competitiveness (X_{17}), knowledge of price charge by fellow palm kernel processors (X_{20}), production scheduling (X_{23}), withdrawal of low quality product from the market (X_{25}), type of quality control measure (X_{27}), investment in quality control (X_{28}), capacity of the warehouse (X_{31}), production facility (X_{33}), type of production process employed (X_{34}) and maintenance strategy (X_{36}) had positive effects on the profitability of palm kernel processing.

However, gender (X_1), marital status (X_4), years of experience of the operator on the job (X_5), size of firm by employee (X_6), source(s) of investment capital (X_9), source of raw materials (X_{15}), source(s) of information for raw materials (X_{16}), modes of contact with customer (X_{18}), modes of contact with raw materials suppliers (X_{19}), rate of production per month (X_{21}), capacity utilization (X_{22}), method use to schedule production (X_{24}), implementation of quality control measure (X_{26}), types of inventory management practiced by the firm (X_{29}), existence of warehouse for palm kernel nuts (X_{30}), layout facilities in sequence (X_{32}), types of maintenance strategy employed (X_{35}), staff capability of maintenance of machines (X_{37}), market innovation capability (X_{38}), customers demand for improved products (X_{39}) and nature of innovation (X_{40}) had negative effects on the profitability of palm kernel processing.

The coefficient (β=-1.882) of X_6 that is size of employee was significant at 1% probability level as presented in Table 4.40. This shows that a unit increase in the size of the firm or number of employees in the firms decreases the profitability of palm kernel processing by 1.882 units. This is expected since the major unit operations are done by machines. Similarly, unit increase in the source of information for raw materials (X_{16}) for processing firms decreases the performance of palm kernel processing by 1.146 units. This implies that additional cost incurred on sourcing information like phone calls, visiting does not improve the profitability of the enterprise. This also indicated that information available to the palm kernel processors does not add value to the performance of the firm. On the contrary, a unit increase in the palm kernel nut processed increases the profitability by 0.079 units. This reveals that if the processing equipment are engaged the more, the profitability increases which suggest that the processing equipment are under-utilized. Furthermore, a unit increase in the level of investment in quality control (X_{28}) increases the profitability of palm kernel processing by 0.417 units indicating a better performance with investment in quality control. Similarly, the coefficient (β=0.172) of X_{37} was significant at 5%.this implies that a unit increase in the staff capability in the maintenance of machines in the firms decreases the performance of palm kernel processing by 0.172 units.

The coefficient (β=0.006) of the level of education (X_3) as earlier mentioned was positive but not significant (β=0.006). The positive relationship implies that education plays some role in palm kernel processing. It could facilitate skill acquisition and adoption of innovations that would improve production process. Formal education enables the processors to obtain information from bulletins, newsletters, internet and other services that could lead them to accept new processing technologies (Ibitoye and Onje, 2013). A positive and significant relationship between marketing margin and level of education of oil palm processors has also been reported. As the level of education increases, net margin to the processors also increases (Yusuf *et al.*, 2012).

Table III Effects Of Production And Innovation Capability On Performance Of Palm Kernel Processing Firms

S/No.	Effects	Ratings: Frequency (%)					Mean rating
		5	4	3	2	1	
(a)	Increase in Sales Turnover ability	26(9.80)	99(37.40)	130(49.10)	19(3.80)	-	3.53[d]
(b)	Increase in volume of	39(14.70)	159(60.00)	61(23.00)	6(2.30)	-	3.87[c]

	production						
(c)	Reduction in cost of production	58(21.90)	178(67.20)	25(9.400)	4(1.50)	-	4.09[b]
(d)	Increase in customers' demand	122(46.00)	132(49.80)	10(3.80)	1(0.40)	-	4.42[a]

Field Survey, 2014.

F = 1.921, ρ = 0.05.

Key: 5 Point Likert Scale Extremely high = 5; High = 4; Fairly high = 3; Low = 2; None = 1.

Table IV Result of Regression Analysis

S/No.	Variables		Co-efficient	Standard error	P-value
	Constant		3.436	1.423	0.021
1.	Gender	X_1	-0.050	0.051	0.335
2.	Age	X_2	0.003	0.024	0.901
3.	Highest educational qualification	X_3	0.006	0.023	0.782
4.	Marital Status	X_4	-0.051	-0.061	0.542
5.	Years of experience on the job	X_5	-0.024	-0.114	0.567
6.	Size of employee	X_6	-1.882	-1.134	0.001***
7.	Age of firm	X_7	0.021	0.055	0.778
8.	Total investment	X_8	0.017	0.116	0.331
9.	Source of investment capital	X_9	-0.004	-0.009	0.930
10.	Quality of raw materials	X_{10}	0.002	0.013	0.936
11.	Quality of palm kernel oil product	X_{11}	0.003	0.010	0.945
12.	Quality of palm kernel oil produced	X_{12}	0.017	0.081	0.584
13.	Availability of equipment	X_{13}	0.026	0.069	0.539
14.	Sources of equipment for palm kernel processing	X_{14}	0.015	0.032	0.827
15.	Source of raw materials	X_{15}	-0.044	-0.107	0.245
16.	Sources of information for raw materials	X_{16}	-1.146	-0.691	0.043**
17.	Price competitive	X_{17}	0.079	0.167	0.058*
18.	Modes of contact with customers	X_{18}	-0.047	0.072	0.513
19.	Modes of contact with raw material suppliers	X_{19}	-0.005	0.036	0.882
20.	Knowledge of price change by fellow palm kernel processor	X_{20}	0.045	0.030	0.143
21.	Rate of production per month	X_{21}	-0.024	0.033	0.482
22.	Capacity utilization	X_{22}	-0.027	0.027	0.318
23.	Production Scheduling	X_{23}	0.014	0.259	0.957
24.	Method used to schedule production	X_{24}	-0.033	0.022	0.147
25.	Withdrawal of product from market	X_{25}	0.066	0.178	0.711
26.	Implement any quality control measure	X_{26}	-0.034	0.146	0.816
27.	Type of quality control measure	X_{27}	0.157	0.170	0.363
28.	Investment in quality control	X_{28}	0.417	0.116	0.001***
29.	Type of inventory management practice	X_{29}	-0.035	0.044	0.432
30.	Existence of warehouse for palm kernel	X_{30}	-0.046	0.085	0.588
31.	Capacity of the warehouse	X_{31}	0.012	0.023	0.619
32.	Layout facilities	X_{32}	-0.141	0.146	0.340
33.	Distance between each production facility	X_{33}	0.056	0.053	0.290
34.	Type of production process	X_{34}	0.015	0.045	0.747
35.	Type of maintenance strategy adopted	X_{35}	-0.010	0.029	0.723
36.	Effectiveness of maintenance strategy	X_{36}	0.066	0.043	0.133
37.	Staff capability of maintenance of machines	X_{37}	-0.172	0.063	0.010**
38.	Market innovation capability	X_{38}	-0.015	0.020	0.463
39.	Customers demand for improved production	X_{39}	0.015	0.048	0.762
40.	Nature of innovation	X_{40}	-0.020	0.88	0.826

Data Analysis, 2014.

The correlation matrix (Table 4.41) shows the relationship between dependent variables (Sales Turnover Y1) and each of the independent variables of innovation (Product (Y1), Process (Y2), Organizational (Y3) and Market (Y4)) innovation (Oslo Manual, 2005). The Table also showed correlation among the independent variables. There were

positive but not significant correlation between Sales Turnover and product (r=0.559, p≤0.01), process (r=0.155, p≤0.01) and organizational (r=0.289, p≤0.01) innovations. However, there was positive and significant relationship between Sales Turnover and marketing (0.363, p≤0.01). The positive and significant correlations implied that innovation enhanced the performance of the palm kernel processing industry. As a result, product innovation, process innovation, organizational innovation and marketing innovation directly influenced and improved the performance of the enterprises.

Table V Correlation Matrix For Sales Turnover, Product, Process, Organizational And Market Innovations

Variables	**Y_o**	X_1	X_2	X_3	X_4
Y_0	1.000	-	-	-	-
Y_1	0.559	1.000	-	-	-
Y_2	0.155	0.426	1.000	-	-
Y_3	0.289	0.839	0.170*	1.000	-
Y_4	0.363**	0.761	0.689**	0.280**	1.000

Key: * Correlation is significant at 99% confidence level
** Correlation is significant at 95% confidence level
Y = Sales Turnover
Y_1 = Product innovation
Y_2 = Process innovation
Y_3 = Organizational innovation
Y_4 = Market innovation
Data Analysis, 2014.

Product innovation had a weak but positive and non-significant (r=0.426, p≤0.05) correlation with process innovation. The Table also shows that organizational innovation and product innovation had positive and strong relationship, but the correlation was not significant (r=0.839, p≤0.05). There was also strong but positive significant (r=0.170, p≤0.05) correlation between organization innovation and process innovation. This implies that as organization innovation increases, process innovation would also increase.

Product innovation and Market innovation had strong, positive and significant correlation (r=0.761). Process innovation also had a very strong but positive and significant (r=0.689, p≤0.01) correlation with market innovation. This implies that market innovation can influence both product and processing innovations in the palm kernel processing firms. White and Bruton (2007) reported that process innovation offers the organization and its personnel opportunities to improve value of the organization and to continue the organization's viability. There were weak but positive and significant (r=0.280, p≤0.01) correlation between market innovation and organization innovation.

IV. CONCLUSION

The study concluded that the palm kernel processing firms experienced high investment capability, marketing and production capability but low innovation capability which could be due to their weak interactions with the knowledge institutions. The challenges faced by the operators of the firms include seasonal variation in the supply of 146 palm kernel nuts, incessant outages of electricity for operation and price dictation by the large scale oil processors who further refined the crude oil.

V. RECOMMENDATIONS

The following recommendations will improve production and innovative capabilities as well as enhancing the profitability of palm kernel processing firms:

(i) Government and private finance organization should make funds available to stakeholders in palm kernel processing firms in form of loans and incentives to enhance the production capability of the industry. Such financial institutions include Bank of Agriculture, Bank of Industry and Micro finance banks.
(ii) Government should be consistent in its policy formulation especially in the area of agriculture. The policy should encourage production of more palm produce in the country.
(iii) Government should provide of infrastructural facilities such as stable and regular supply of power and water, road network for enhancement of palm kernel nuts transportation from the rural areas to the processing centres.

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