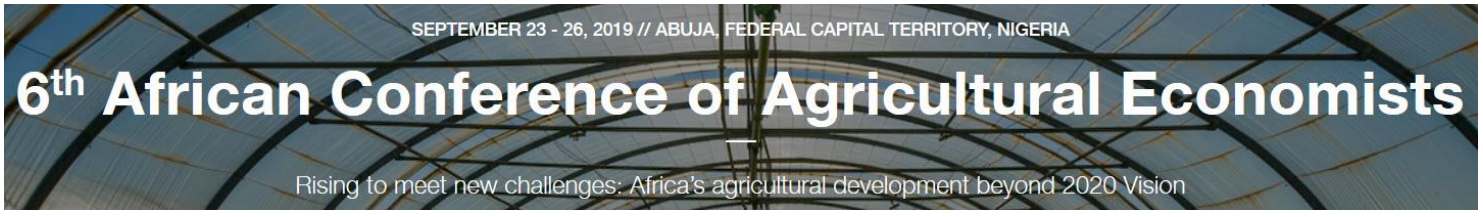

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Analysis of Compensation of Farmers Affected by Crude Oil Spillage in Delta State

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Abstract
This study analysed compensation of farmers affected by crude oil spillage in Delta State. The study evaluated the causes, channel, mode and procedure of compensation; estimated the monetary value of compensation to cassava farmers affected by crude oil spillage; and developed a model for compensation. Data obtained were analysed using net farm income, contingent valuation technique, capitalization of earnings and compounding technique. Findings of the study showed that the prevalent cause of crude oil spill as reported by the oil firms and farmers were third party interference and equipment failure respectively. The channel of compensation was through the community leaders to affected farm families. Compensation was based on tangibles only without considering the intangibles and the future implication of the spills. The developed model of compensation incorporated the tangibles, intangibles and future income stream from the farm land. The study concluded that the procedure for compensation omitted some significant components.

Key words: Compensation; Crude Oil Spill; Capitalization of earnings; farmers

Introduction
Cassava (*Manihot esculenta*) is a major source of carbohydrate in the diet of Nigerians. Its edible leaves are sources of protein. The tuber when processed into forms such as *garri, fufu*, *tapioca*, starch, flour, juice, chips, bread and pudding, serves as food to humans. It also serves as feed to animals and a source of raw materials for some industries (Akinpelu *et al*.2011; Gbadegesin *et al*. 2013). However, it has been observed that environmental problems are posing serious threats to its production particularly in oil producing areas of the Niger Delta region. Environmental problems cut across pollution of air, land degradation, loss of biodiversity, ozone depletion, climate change, loss of natural and cultural resources, and the release of hazardous chemicals and wastes on water and land due to crude oil spillage.

In Nigeria, crude oil spillage is a major environmental problem which the crude oil producing communities in the Niger Delta region has to contend with. The dependence on crude oil by the nation has been marked with intensified exploration, poor quality control, sabotage, oil bunkering, oil siphoning, accidents and natural seepage (Egbe & Thompson 2010). A consequence of these actions has been the continued incidence of oil spills on water and agricultural lands (Inoni *et al.* 2006) rendering them unsuitable for use, and thereby posing serious threat to production of various crops grown in the region. Some of these persons farming on lands affected by oil spillage are compelled to disengage from farming to seek alternative means of livelihood (Ebegbulem *et al*. 2013; Inoni *et al*. 2006). Despite this, Oghifo (2011) reported that the farmers are faced with either an absence of or an inadequate compensation. He emphasized that even when compensation is given; it only covers the value of the crop(s) on the land and fails to account for other tangibles and intangible benefits associated with the land. Also, in compensating the farmers the future income stream associated with the spilled land may be ignored. This lack or inadequate compensation results in political and social tensions (Ghatak & Mookherjee 2013). Also, it aggravates the sufferings of the affected farmers as they are faced with temporary displacement from their farmlands.

This study therefore addressed the following objectives: evaluated the causes, channel, mode and procedure of compensation; estimated the monetary value of compensation to cassava farmers affected by crude oil spillage; and developed a model for compensation.

RESEARCH METHODOLOGY

Area/Scope of Study

The study was conducted in Delta State, the largest on-shore oil producing State among the nine oil producing States in Nigeria. The State is characterized by cases of incessant oil spillages. The State is located within the South-South region of Nigeria and lies approximately between Latitudes 5°00′ North and 6°30′ North of the Equator and Longitudes 5°00′ East and 6°45′ East of the Greenwich Meridian. The State is divided into three agro ecological zones and 25 Local Government Areas.

Majority of the farmers are small scale farmers who engage in traditional farming practices, and practice any of sole cropping, mixed cropping and intercropping. The major food crops grown in the area are cassava, maize, cocoyam, yam, plantain and vegetable.

The target population for the study were farmers whose major crop was cassava, in communities that have been affected by oil spill and surrounding communities free of oil spills as counterfactuals. The data collection spanned from year 2015 to 2017.

Sampling Procedure and Data Collection

Sampling Procedure

A list of 232 communities affected by crude oil spills from the period of 2004 to 2014 was obtained from Ecology Department, Ministry of Environment, Delta State. Two stage sampling procedure was used in collecting data for the study. In the first stage, simple random sampling technique was used in selecting 29 (12.5%) communities from the list of communities affected by crude oil spills using the Table of Random Numbers. Also, 21 communities not affected by crude oil spills were selected for this study employing the snow balling technique. There was no available list for the non oil spill communities, the study therefore employed the snowballing technique in identifying only 21 surrounding communities not affected by crude oil spills, but with comparable agro-economic indices with that of the oil spill communities. In the second stage, simple random sampling technique was used in selecting 20 cassava farmers from each of the selected oil spill (OS) communities making a total sample size of 580 farmers. Simple random sampling technique was also employed in selecting 10 cassava farmers from each of the selected communities not affected by crude oil spills. However, in Ogiedi, Aradhe, Oteri and Aviara where more farmers were accessible, 20 cassava farmers were selected from each, making a total sample size of 250 farmers selected from the non oil spill (NOS) communities. This makes a total sample size of 830 cassava farmers used for the study. The selection of 20 cassava farmers from each of the selected OS communities and 10 cassava farmers from each of the selected NOS communities was because there were no differences in the sample frames across the selected OS and NOS communities. A total of 774 (93%) of the 830 sampled cassava farmers provided useful data. The farmers comprised 528 (91%) of the 580 farmers affected by crude oil spills and 246 (98%) of the 250 farmers not affected by oil spills.

Analytical Techniques

Data collected were analysed using both descriptive and inferential statistics. Descriptive statistics such as frequency counts and percentages were used, while, inferential statistics such as net profit (net farm income), compounding technique, capitalization of earnings, and contingent valuation technique were used.

Net profit

π = GM – TFC

GM = TR – TVC

TR = Total revenue (P*Q)

P = price per kg of cassava tuber

Q = cassava yield (kg) per hectare

TVC = Total variable cost (cost of labour, cost of fertilizer, cost of rent, cost of herbicide, cost of harvesting bags and cost of cassava bundle)

π = Net profit

GM = Gross Margin

TVC = Total variable cost

TFC = Total depreciated fixed cost

The method of depreciation employed was the straight line method.

Compensation model for environmental hazards

TP = PW + FW

PW = PVT + PVIT

FW = FVT + FVIT

Where: TP = Total compensation

PW = Present worth of the productive land (value of all the produce on the land, tangible and intangible) = PVT + PVIT

PVT = Present value of tangible goods from the farm (₦)

Tangible goods = monetary value of all crops and animals; firewood; tree crops; and other tangibles from the farm land)/year.

PVIT = Present value of intangible goods from the farm (₦)

Intangible goods = Goods that market can't place value on; such as health and economic benefits of leaving their homes to their farms; employment opportunity; health implication of the spills; vegetation on land serve as erosion control; education services (farms that are used for research purpose, farms that serve as educational centres); Medicinal purpose (plants that are used as herbs); farms that serve as tourist centres; habitat function (productive land serves as homes to several species of animals); and some plants serve as biological pest control.

Estimating intangible goods

This is done using the contingent Valuation Technique**.** This is done by asking the affected individuals/groups how much they are willingly to accept (WTA) as compensation for the environmental hazards on their farmlands. The accepted final monetary bid of each individual/group is subtracted from the estimated monetary value of the tangible goods and the difference paid as the monetary value of the intangible goods. When faced with no positive response, such as the inability of the affected farmers to state how much they are willingly to accept or for individuals/groups that

do not know the value of their farm lands, then 10% of the estimated total monetary value of the tangible goods can be paid.

FW = Future worth of a productive land (present monetary value of a productive land compounded for 15 years taking the interest rate of that particular year) = FVT + FVIT.

FVT is estimated using compounding technique and capitalization of earning

FVT estimation using compounding technique

FVT =Future value of tangible goods from the farm (₦) = estimated present monetary value of the tangible goods compounded for 15 years taking the interest rate of that particular year. 15 years is used based on the remediation study by Kadafa (as cited in Ejiba *et al*. 2016).

Compounding technique

Compounding: This is the future value of a present amount growing at a certain rate. It is expressed as:

Future value (A) = Present value (P) $(1+ r)^n$

$P = \frac{A}{(1+r)^n}$

Where, compound factor = $(1+ r)^n$

Where:

A = future value

P = Principal invested (present value)

r = rate of interest (Prevailing market interest rate)

n = time in years

FVT estimation using capitalization of earnings

Capitalization of Earnings = $\frac{\text{average Return/earnings}}{\text{Interest rate}}$

FVIT = Future value of intangible goods from the farm (₦) = Present monetary value of intangible goods compounded for 15 years taking the interest rate of that particular year.

Compensation model specific for this study

TP = PW + FW

PW = PVT + PVIT

FW = FVT + FVIT

Where: TP = Total compensation

PW = Present worth of the farm (profit from cassava production and other tangibles from the farm land)/year.

FW = Future worth of the farm (profit from cassava production and other tangibles compounded for 15 years taking the interest rate of 14% as at 2015). This was estimated using compounding technique and capitalization of earnings.

Profit from cassava production**:** This was computed using the net profit (π) model.

PVIT and FVIT were assumed to be 10% of the estimated monetary value of compensation of tangible goods as no positive responses on WTA was gotten from the farmers.

RESULTS AND DISCUSSION

Profitability of Cassava Production among OS and NOS Farmers in Delta State

The result of the profitability analysis of cassava production in OS and NOS communities as presented in Table 1 shows that the output in kg per ha was 11,361.69kg and 17,181.64kg in OS and NOS communities respectively. This implies lower output in OS communities as compared with NOS communities. The total revenue generated per hectare from cassava production in OS and NOS communities were ₦397, 659.15 and ₦601, 357.40 respectively. Total variable cost (TVC) and total depreciated fixed cost (TDFC) of cassava production per hectare per production cycle of one year for OS and NOS communities were ₦308,630.21 and ₦18,081.85; and ₦403,372.90 and ₦23,063.32 respectively, summing up to total cost of ₦ 326,712.06 and ₦ 426,436.22 for OS and NOS communities respectively. The TVC accounted for 94.47% and 94.59% of the total cost (TC) of production for the OS and NOS communities respectively. This indicates that across the two groups, TVC accounted for a larger percentage of the TC of production than the TDFC, but, OS communities had lower TVC of production than NOS communities. The low fixed costs indicate that the farmers were small scale farmers and mainly used crude implements (hoes and cutlasses) for their production. Considering the components of the variable cost of production, labour cost accounted for a larger percentage of the total variable cost of production in both group of communities. It accounted for 80.62% and 80.16% of TVC in OS and NOS communities respectively. This suggests that supply of labour was below demand probably due to immigration of the youths. This could have resulted in the high cost of labour. Also, the use of crude implements and human labour as against the use of machineries could also have contributed to the high cost of labour. However, labour cost was lower in OS communities than NOS communities. This could mean that the negative effect of the crude oil spills on the farmers' output and invariably their income in OS communities might have increased the number of individuals willing to work as labourers to increase their income.

The various component of the total labour cost were cost of preparing the land (clearing, packing, and in some instance stump removal), cost of planting, cost of weeding and cost of harvesting. The cost of harvesting accounted for a larger percentage of the total cost of labour in both OS and NOS communities. It accounted for 34.56 % and 51.81% respectively. The higher cost of harvesting in NOS communities might be attributed to the difficulty in harvesting the bigger cassava tubers as compared to smaller tubers in OS communities as shown in figures 1 and 2 below. Cost of planting accounted for 13.68% and 9.30% in OS and NOS communities respectively. The higher cost of planting in OS communities as compared to NOS communities might be attributed to crude oil spills on the farm lands as the labourers might tend to charge more knowing the farmlands are polluted. In both group of communities, cost of planting was the least total cost of labour, while cost of harvesting was the highest.

The result also shows that gross margin and net profit per hectare (ha) per production cycle in OS and NOS communities were ₦ 89, 028.94 and ₦ 70, 947.09; and ₦ 197, 984.50 and ₦ 174, 921.18 respectively. This indicates that cassava production in the study area was profitable. The return on investment in OS and NOS communities was 22 kobo and 41kobo respectively.

Table 1: Profitability of Cassava Production per Hectare per Production Cycle in OS and NOS Communities of Delta State

	OS Communities	**NOS Communities**
Output (kg)	11,361.69	17,181.64
Items	**Value (₦)**	**Value (₦)**
Average unit price (₦ 35.00)		
Total Revenue	**397,659.15**	**601,357.40**
Costs		
Variable cost		
Land preparation	70,192.93	71,493.76
Planting	34,044.85	30,073.93
Weeding	58,586.62	54,254.57
Harvesting	85999.89	167,517.80
Total Labour Cost	**248,824.29**	**323,340.06**
Cost of fertilizer	Negligible	Negligible
Cost of rent	26,432.23	23,107.45
Cost of herbicide	13767.07	13,695.17
Cost of bags	4606.62	1,353.52
Cost of cassava bundle	15,000.00	42,000.00
Total Variable cost	**308,630.21**	**403,372.90**
Fixed cost (Depreciated Values)		
Cutlass	2,466.89	2,354.65
Hoe	672.08	595.88
Shovel	1,127.38	1,005.29
Basin	557.35	1,373.16
Files	415.06	428.58
Wheel barrow	1,522.64	1,466.27
Sprayer	584.78	565.04
Bicycle	1,357.54	2,337.00
Motor bike	9,378.13	8,013.46
Truck	0	4923.99
Total fixed cost (Depreciated value)	**18,081.85**	**23,063.32**
Total Cost	**326,712.06**	**426,436.22**
Gross Margin	89,028.94	197,984.50
Net Profit	70,947.09	174,921.18
ROI	0.22 Kobo	0.41 Kobo

Source: Field survey, 2015, 2016

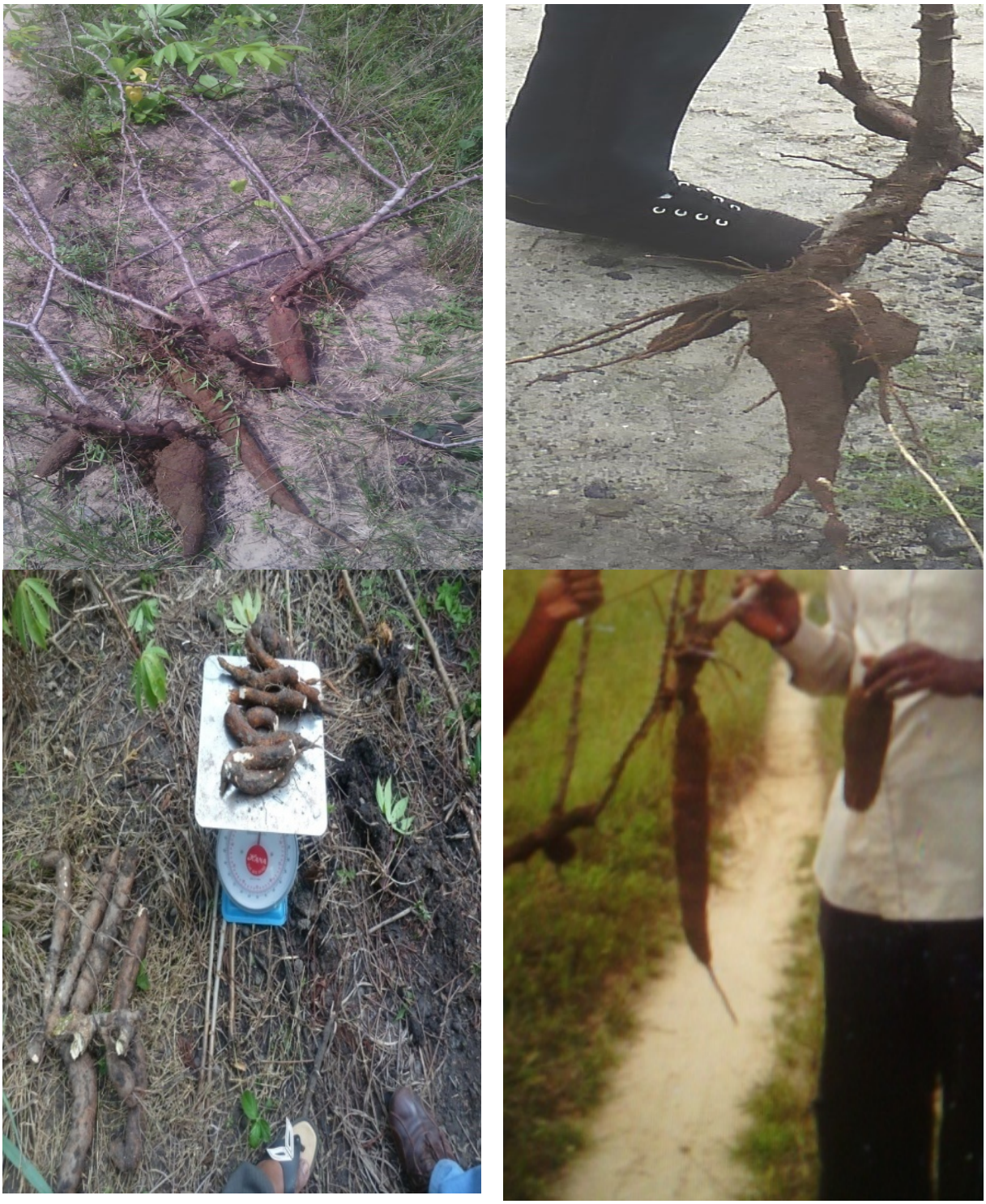

Figure 1: Pictures of Harvested Matured Cassava in Some Selected Oil Spill Communities (Local variety - *Kariemu*)

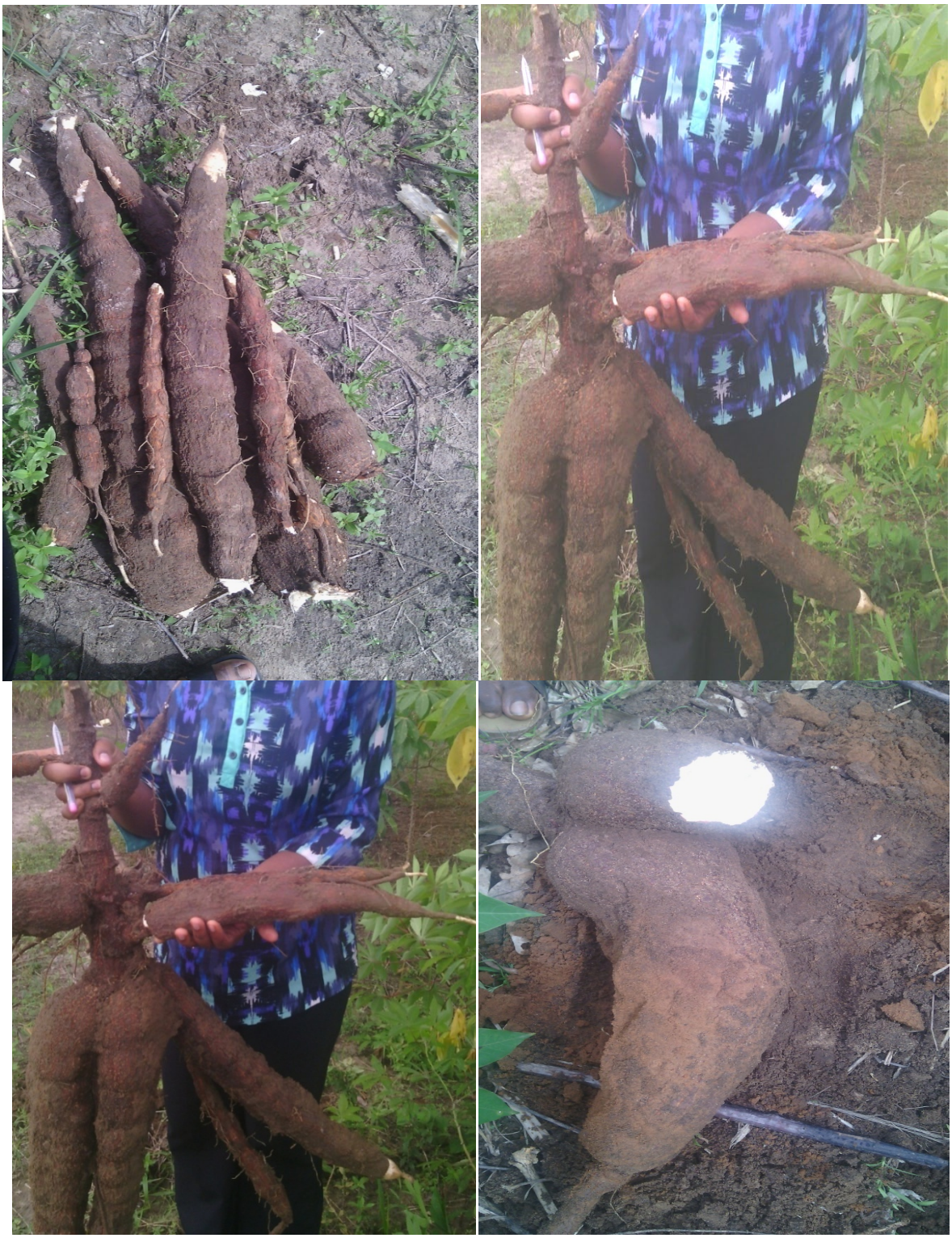

Figure 2: Pictures of Harvested Matured Cassava in Some Selected Non Oil Spill Communities (Local variety - *Kariemu*)

Estimated Value of Compensation to Farmers affected by Crude Oil Spills per Hectare of Polluted Cassava Farm.

The result on the estimated value of compensation using the compounding technique is presented in Table 2. The OS communities based on their current level of profit of ₦ 70,947.09 as shown in Table 1, and ₦ 23,728.57 from income from other farm benefits will amount to ₦ 675,789.03 per hectare

after 15years ceteris paribus, while, the NOS communities based on their current level of profit (₦ 174,921.00) from cassava farm and income from other farm benefits (₦ 13,272.73) will in 15 years amount to ₦ 1,343,316.92 per hectare ceteris paribus. Profit from the farm compounded over 15 years was employed based on remediation study by Kadafa (as cited in Ejiba *et al*. 2006)

Compensation for health hazards and other intangibles should also be paid to the farmers. This study assumes 10% of the computed value of compensation for the tangibles. This amounts to ₦ 134, 331.69.

The capitalization of earning presents similar results

$$\text{Capitalization of Earnings} = \frac{\text{Return}}{\text{Interest rate}}$$

Return of oil spill communities = Average profit from cassava production + average profit from other farm benefits = ₦ 70,947.09 + ₦ 23,728.57 = ₦ 94,675.66.

Interest rate as at 2015 = 14% (0.14).

Capitalization of earnings for OS communities = $\frac{₦\,94,675.66}{0.14}$ = ₦ 676,254.714 per hectare of cassava farm.

Capitalization of earnings for NOS communities = $\frac{₦\,188,193.93}{0.14}$ = ₦ 1,344,242.357 per hectare of cassava farm

Difference in profit between NOS and OS communities = ₦ 1,344,242.357 - ₦ 676,254.714 = ₦ 667,987.643. In the event of crude oil spillage on cassava farmlands, this study estimates a value of ₦ 667,987.643 per hectare to be paid to the farmers as compensation if land is in use after remediation or ₦ 1,344,242.357 per hectare if land cannot be used for production activities.

Table 2: Estimated Value of Compensation

	Oil Spill Communities			**Non Oil Spill Communities**		
Years	**Profit from Cassava production (₦)**	**Other farm benefits (₦)**	**Total Income (₦)**	**Profit from Cassava production (₦)**	**Other farm benefits (₦)**	**Total Income (₦)**
0	70,947.09	23,728.57	94,675.66	174,921.20	13,272.73	188,193.93
1	80,879.68	27,050.57	107,930.25	199,410.10	15,130.91	214,541.01
2	92,202.84	30,837.65	123,040.49	227,327.60	17,249.24	244,576.84
3	105,111.24	35,154.92	140,266.16	259153.40	19,664.13	278,817.53
4	119,826.81	40,076.61	159,903.42	295,434.90	22,417.11	317,852.01
5	136,602.56	45,687.33	182,289.89	336,795.80	25,555.51	362,351.31
6	155,726.92	52,083.56	207,810.48	383,947.20	29,133.28	413,080.48
7	177,528.69	59,375.26	236,903.95	437,699.80	33,211.94	470,911.74
8	202,382.71	67,687.80	270,070.51	498,977.80	37,861.61	536,839.41
9	230,716.28	77,164.09	307,880.37	568,834.70	43,162.23	611,996.93
10	263,016.56	87,967.06	350,983.62	648,471.50	49,204.95	697,676.45
11	299,838.88	100,282.40	400,121.28	739,257.50	56,093.64	795,351.14
12	341,816.33	114,322.00	456,138.33	842,753.60	63,946.75	906,700.35
13	389,670.61	130,327.10	519,997.71	960,739.10	72,899.29	1,033,638.39
14	444,224.50	148,572.90	592,797.40	1,095,243.00	83,105.20	1,178,348.20
15	**506,415.93**	**169,373.10**	**675,789.03**	**1,248,577.00**	**94,739.92**	**1,343,316.92**

Source: Field Survey, 2015, 2016

Ranges of the Value of Compensation the Farmers were WTA and WTP

The result on willingness to accept (WTA) in Table 3 shows that only 60 farmers reported that they will accept compensation ranging from ₦ 5000 to over ₦ 10 million naira of which more than 50% of the farmers said they will receive compensation from ₦ 5000 to ₦ 400,000 per hectare. The remaining 47% said they will receive compensation of over ₦ 400,000 per hectare. This shows that more than 50% of the farmers did not know the value of their farmlands and the extent of damage caused by crude oil spills. This is so because the estimated value of compensation as shown in Table 2 is far larger than what the farmers would accept as compensation. This could affect the actual value of compensation they will receive, as they will be willing to receive anything as compensation.

Only 9 of the farmers as shown in Table 4 reported that they were willing to pay (WTP) to prevent crude oil spills on their farm lands, while others said they will never pay to prevent crude oil spills. This suggests that their awareness on the importance of environmental protection is low and further shows that they do not know the worth of their farmlands.

Table 3: Ranges of the Value of Compensation the Farmers were WTA and WTP

Ranges compensation per hectare	**WTA (60)**	**Percentage (%)**	**WTP (9)**
001 - 200,000	21	35.00	8
200,001 - 400,000	11	18.33	0
400,001- 600,000	5	8.33	1
600,001 - 800,000	4	6.67	0
800,001 - 1,000,000	4	6.67	0
1,000,001- 2,000,000	6	10.00	0
2,000,001 - 4,000,000	3	5.00	
4,000,001 - 6,000,000	3	5.00	
6,000,001 - 8,000,000	1	1.67	
8,000,001 – 10,000,000	1	1.67	
>10,000,001	1	1.67	

Source: Field survey, 2015, 2016

Table 4 Value of Compensation the Farmers were WTP

WTP(₦)	PLOT HA
100,000	2.43
3000	0.14
10000	0.12
1000000	0.3
5000	0.5
5000	0.1
5000	0.5
50000	0.1
15000	0.23

Source: Field survey, 2015, 2016

The Causes, Channel, Mode and Procedure of Compensation Reported by SPDC, NPDC and Farmers

The causes, channel, mode and procedure of compensation reported by SPDC, NPDC and farmers are presented in Table 5. Some of the causes of crude oil spills as reported by NPDC were third party interference, vandalism or sabotage and equipment failure (rupture of pipes), however, the prevalent (about 80%) cause was third party interference. This is usually confirmed by the JIV (Joint Investigation) team comprising the representative of the community affected by crude oil spills, National Oil Spill Detection and Response Agency (NOSDRA), Department of Petroleum Resources (DPR) and Nigerian Petroleum Development Company (NPDC). The method of compensation by NPDC as presented in Table 5 shows that NPDC pays the value of compensation to the community leaders and the community leaders pay the affected individuals only if the spill is due to equipment failure and is out of the right of way. Right of way is 20 meters to the left and 20 meters to the right of the pipes. The method of payment by NPDC is financial payment per barrel of spill in some cases and in some other cases by the bargaining power of the community leaders. Other important components of compensation such as compensation based on farm size, valuation of the crops affected, fire woods, tree crops, herbs, the future income that could have gotten from the farm land, health implications of the spills, the health and economic benefits of leaving their homes to their farms daily and other intangible benefits were not considered. However, the crude oil spilled lands were cleaned up irrespective of the cause of the spill and post impact assessments were carried out to ensure the lands were fit for production.

The report of SPDC also presented in Table 5 shows that the prevalent (90%) cause of crude oil spills was third party interference, vandalism or sabotage. This is usually confirmed by a Joint Investigation Visit (JIV) to the affected land. The JIV team consists of representatives of the oil spill communities, NOSDRA, DPR and representative of SPDC. They ascertain the cause of the spill and categorize the spill. This is based on the impact and not necessarily the volume of oil spill. For land, the length and breadth of the land is taken and only damaged crops are mainly paid for. Estate evaluators are employed to cost the value of the damage. Remediation is carried out immediately, and for spills of about 3-20 barrels the soil surface is scraped and the land remediated within a year. However, on lands with heavy oil spill, desorption is carried out on the land. After the procedure plants that will help re-enrich the soil are planted. SPDC pays the value of compensation to the community leaders and the community leaders pay the affected individuals only if the spill is due to equipment failure and is out of the right of way. However, SPDC reported that sometimes they pay the affected individuals directly depending on the leadership structure in the community.

The method of compensation by SPDC is financial payment on value of produce from farm only, compensation per stand of cassava plant on the affected farm land(s), compensation based on farm size, and in some cases compensation based on bargaining power of community leaders. Also, they were compensated for the period the farmlands were remediated. They reported that the compensation rates are reviewed by experts every 4 to 5 years. The communities are compensated for surface right and loss of use. Surface right is the compensation paid to those who rent to cultivate on the oil spill affected land, while the loss of use is the compensation paid to the owners of the land. There is also acquisition of oil spilled land in perpetuity. Other aspects compensated are graves, animal traps and trees. In compensating for the trees, the age and type of the tree is considered such as young, medium and old trees, economic trees or arable trees. Counting of the crops is also carried out and where counting is impossible a random sampling is done. Also, loss of use for non productive lands is taken into consideration. Other methods of compensation such as valuation of fired woods, herbs, the future income that could have been gotten from the farm land up to the point where the land is brought back to original state, health implications of the spills, health and economic benefits of leaving their homes to their farms daily and other intangible benefits were not considered. Their argument was that in the Nigerian constitution, environmental law says if you destroy a land, payment is made only on tangibles and not on the intangibles. The law is outdated. What the people are suffering is a consequence of the law that is supposed to protect them.

The challenges to compensation faced by SPDC were that no amount of money was enough, the challenge of who has the authority to collect money most especially when it is communally owned, security challenges, lack of access to affected areas in the communities, flood or bad terrain, and no standard rate for compensation for oil companies.

Farmers

The channels of compensation identified by farmers were through their community leaders/representatives. Over 90% of the farmers queried the channel of compensation as they do not receive the money at all or receive very little. Also, they reported that the mode of compensation does not include environmental valuers on their farmlands. This suggests that the valuers of the damaged farm lands only provide an estimate of the value of damage and not the actual value. However, this could be linked to one of the constraint faced by SPDC of no access to affected areas either by the community, flood or bad terrain. About 10% said that they are compensated considering only the value of crops damaged by crude oil spills, that other items are not considered such as fired woods, tree crops, herbs, the future income that could have gotten from the farm land, health implications of the spill, the health and economic benefits of leaving their homes to their farms daily and other intangible benefits.

The Focus Group Discussion (FGD) was conducted to elicit information on how farmers feel they should be compensated and the best channel of compensation. Majority (80%) of the farmers were above middle age. The farmers reported that they should be compensated based on the size of their farmlands and extent of damage. They reported that the best way of compensation is to compensate the farmers directly with no intermediaries; valuers should estimate the extent of damage and they should be compensated appropriately. They suggested that if their land is damaged by crude oil spills, they should be paid ₦ 60,000 per plot per year of 50ft by 100ft. Most of the women complained that the compensation is given to the men who are considered household heads, and they in return receive very little from their spouses.

SPDC and NPDC stated that the compensation given to the farmers were sufficient, but the farmers and community leaders interviewed reported that the compensation were not sufficient. The reasons given by the farmers and community leaders were that the SPDC valuers do not do a proper valuation, as some valuers do not go into the farmlands to value the damage, and that the naira value per crop stand damaged is very small. They also reported that when they use their valuers, SPDC do not pay the amount estimated by the valuers. They reported that when it results to bargaining, they are always compelled to take a value that is far below the damage done.

Table 5: The Causes, Channels, Mode and Procedures of Compensation Reported by SPDC, NPDC and Farmers

Items	Farmers	NPDC	SPDC

Payment Channels	Oil firms to community leaders to affected persons	Oil firms to community leaders to affected persons	Oil firms to community leaders to affected persons Oil firms to affected persons
Method of compensation			
Compensation based on value of produce from farm only	Yes	No	Yes
Compensate per stand of cassava plant on the affected farm	No	No	Yes
Compensation based on valuation of produce from farm + other tangible + intangible benefits/produce only	No	No	No
Compensation based on valuation of produce from farm + other tangible + intangible benefits/produce + health hazards only	No	No	No
Compensation based on valuation of produce from farm + other tangible + intangible benefits/produce + health hazards + other environmental hazards only	No	No	No
Compensation based on valuation of produce from farm + future stream of income only Table 4.11.2. Continued	No	No	No
Compensation based on valuation of produce from farm + other tangible + intangible benefits/produce + future stream of income only	No	No	No
Compensation based on valuation of produce from farm + other tangible + intangible benefits/produce + health hazards + future stream of income only	No	No	No
Compensation based on valuation of produce from farm + other tangible + intangible benefits/produce + health hazards + other environmental hazards + future stream of income only	No	No	No
Compensation based on farm size	No	No	Yes
Compensation based on bargaining power of community leaders	Not aware	Yes	Yes
Compensation based on bargaining power of cassava farmers	No	No	No
Compensate per barrel of spill	No	Yes	No
Reasons for method of compensation	Our community leaders are not transparent	-	Payment for intangible benefits is not in the constitution
Compensation sufficient?	No	Yes	Yes

Source: Field survey, 2016

Conclusion and Recommendation

This study concluded that crude oil spills affected the output and profitability of cassava production in Delta State. The estimated value of compensation using the discounting technique was ₦ 1,343,316.92 per hectare; and with the capitalization of earning was ₦ 1,344,242.357 per hectare. The channel of compensation by compensating bodies to farmers was from compensating bodies to community leaders and to farmers in most cases, and the procedure for compensation omitted some significant components. Also, the affected farmers were not part of the JIV team.

The study recommended that the best channel of payment of compensation for the damaged farm lands should be directly to the affected farmers in the presence of the community leaders/representative; some of the farmers affected by oil spillage should be included in the JIV team that determines extent and value of damage. This would enable the farmers to be aware of the money coming in and be involved in itemizing the tangibles and the intangibles goods damaged on their farmlands. This would prevent the problems of inadequate compensation and also to avoid the community leaders taking the money and giving just a little or nothing to the farmers. A standard computation method for compensation that would include the intangibles and future income stream from the farm lands should be done by the oil firms involved.

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