SOCIO-ECONOMIC CONTRIBUTIONS OF CHAINSAW MILLING ENTERPRISE TO RURAL DEVELOPMENT IN OGUN STATE, NIGERIA

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Abstract

Despite the prevalence and increasing activities of Chainsaw milling (CSM), its unapproachable nature tends to limit study on its economic and livelihood implications, which could serve as a basis for policy review on the enterprise. This study reports the contributions of CSM to socio-economic development in the cities of Ago-iwoye and Isara Remo, OgunState, Nigeria. Data were obtained from community residents based on proportionate to sample of study sites using Slovin's formula and simple random sampling procedure for questionnaire administration. Results were subjected to descriptive and Chi-square test statistics at $\alpha_{0.05}$. The study was based on responses from 61.5% male respondents with age distribution cutting across those less than 20 years to those above 50 years. Chain saw milling enterprise was positively associated with employment (81.7%), women participation (76.7%), coordinated activities (74.2%) and poverty reduction (85.8%) in the study area. Also, cohesion between associations, designation of key responsibilities to women and revenue generation for the community are identified opportunities that will significantly complement the socio economic contributions of the enterprise to the study area. However, age and occupation of practitioners have the most significant effects on the enterprise while CSM operations were confirmed as negatively impacting the studied environment. Meanwhile, the negative impacts on agricultural production could be abated by ensuring that farmers get their due compensation to crop damage. The study also explicates the prospects of CSM enterprise in the study area provided learning the art of chainsaw machine handling is enforced before issuance of permit for CSM operation.

Keywords*:* Chainsaw Milling; Socio-economic Development; Employment Opportunity; Poverty Reduction; Livelihood Source

Introduction

Chain saw milling is usually unauthorized and illegal in Nigeria; however, in Akwa Ibom, Cross River, Benue, Osun and Taraba States as well as States in eastern parts of the country, regulations have been softened to accommodate it (Popoola, 2010). Operators of CSM in Nigeria mostly illegally gain access into the forest, fell the trees, hurriedly convert them to planks of different dimensions, and hand-carry them to the nearest road, where they are transported to markets. Chainsaw millers seek legal authorization, usually by arguing that their operations can extract logs from difficult terrain where access by truck is impracticable but frequently extend their activities to other areas of the forest (Popoola, 2010).

The CSM has grown over the years, an activity which started with small illegal units and now, includes a large number of participants who have formed themselves into associations and unions and seek recognition from forest authorities. Some states in Nigeria including Ogun still regard the activity as illegal. Chain saw milling or "flitching" as it is commonly called in Nigeria, is a logging activity usually carried out in the forest by Artisanal sawyers' also known as mobile chain operators (Ogunsanwo *et al.,* 2011). Chainsaw millers hire "tree finders" to search for merchantable trees in both forest reserves and free areas (un-constituted forests). They are paid according to the number and species of trees found. The operator then obtains a forest permit for the trees intended for felling. Fixed stumpage rates are paid per tree in accordance with prevalent tariff schedules in the state, which vary with species (Popoola, 2010).

Chainsaw lumber and its associated trades though illegal in many states have been found to contribute to livelihoods of people in rural and urban areas. Indeed, illegal chainsaw lumber production can be described as a key livelihood activity and contributor to the incomes of households of those associated with the practice in rural areas aside farming. Despite the positive contributions, illegal transactions associated with the practice contribute to loss of revenue to the state (Wit *et al*., 2010). The CSM operations, though permitted in Ogun state under certain restrictions (i.e. regulated), its regulations are incomplete or absent because forest laws tend to focus on the industrial timber sector. However, its unapproachable nature tends to limit the search on livelihood implications and for regulating the practice in the country. The impacts of CSM activities on the environment are mixed. The lightweight equipment used in CSM causes less damage than the equipment used in regular logging operations, however, uncontrolled or illegal CSM harvesting can lead to over harvesting, depletion of timber species, intrusion into protected areas and other adverse effects.

Chainsaw milling is a major source of sawn wood in Nigeria. It also provides employment for both families and hired labour, thereby improving household and social well-being. Furthermore, the wages earned compare favorably with those of the average skilled worker, and are far higher than the less than US$1 on which more than 60% of Nigerians subsist. This was reposed by Popoola (2010) as clear indications of the social and economic importance of the chain saw business in Nigeria. The CSM enterprise can also be viewed as a means to addressing poverty and productive employment. This was reposed by Sambe *et al*. (2016) who reposed that the business has positive impact on poverty alleviation since the proceeds are used by respondents for education, health and the well-being of family members and hence poverty alleviation. Thus despite the ban placed on it, the CSM enterprise has persisted.

Extensive discussions have taken place about how to deal with CSM in policy and practice. In order to be able to design adequate policy responses, it is necessary to know the key factors that drive chainsaw milling. Several reviews of the chainsaw ban have shown that enforcement of the ban has not been effective; this was acknowledged by Birikorang *et al.,* (2001). It, seems illogical to ban an activity that economically engages people when there is a clear sector policy commitment on employment creation (Marfo, 2010).

This study, identified the socio-economic contributions of CSM together with its perceived environmental impacts, expected to illuminate livelihood implications and influence policy review to harness its prospects and accommodate the small scale enterprise in conformity with sustainable environmental standards.

Materials and Methods

Study Area

Ogun State has a total land area of 17,084 km^2 extending between Latitudes 6º 30' and 7º 95'N and longitude 2º 80'E and 4º 60'E. It thus, lies in the south-western part of Nigeria (Figure 1). It is bound on the north by Oyo State, on the east by Ondo State and in the south by Lagos State (Figure 1). The state is notable for having a high concentration of industrial estates and being a major manufacturing hub in Nigeria. Ogun State consists of twenty local government areas some of which are: Abeokuta South, Ado-Odo/Ota, Ewekoro, Ijebu East, Ijebu North, Ijebu Ode, Ikenne, Remo North, Sagamu, (Shagamu) and Yewa North. Notable cities and towns in the state include Abeokuta, Ijebu Ode, Sagamu, Ijebu Igbo, Ogere Remo, Ishara and Ago-Iwoye.

The distinct vegetation types in Ogun State are the low land rainforest (found mostly in the southern part of the State) and the drier derived savannah. Other type of vegetation is riparian vegetation, which, where undisturbed, consists of considerably thick forest and swamps. The river basins in the area exhibit a somewhat higher natural fertility and support swamp vegetation. In the riparian forest zone, there are *Chrysophyllum spp. Haleaciliata, Pentaclethra macrophylla,* and *Raphiahookeri* (Ogunsanwo, 2011). The lowland rainforest also consists mainly of species such as *Albbiza zygia, Anthocleista spp, Aubrevillea kerestingii, Milicia excelsa, Cola gingantea* and *Terminalia spp* (Ogunsanwo, 2011).

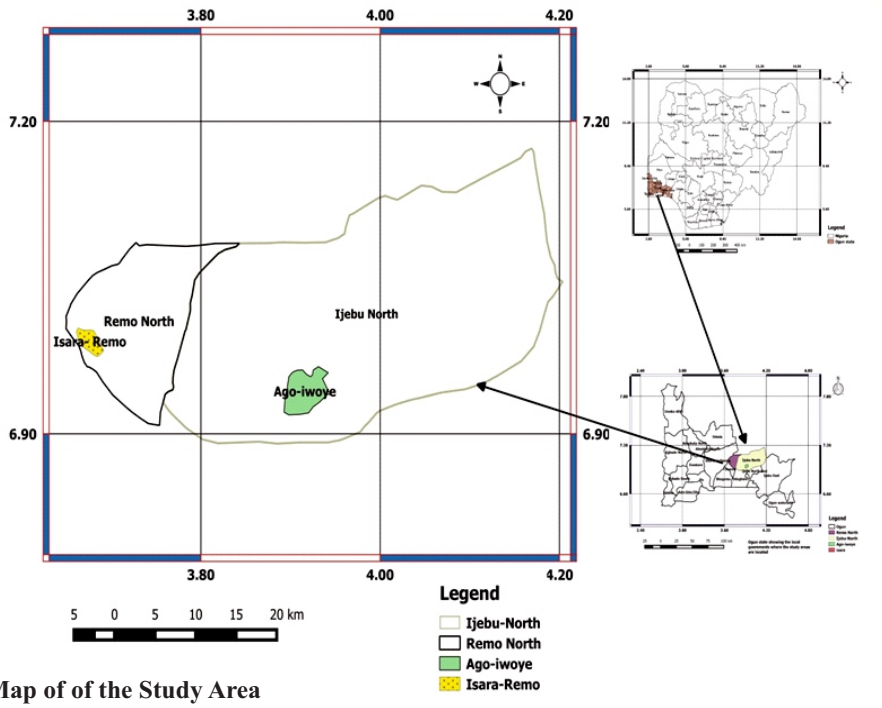

Figure 1: Map of of the Study Area

Study Sites

Ago-Iwoye

Ago-Iwoye is a city in Ijebu North Local Government Area of Ogun State, Nigeria with geographical coordinates 6°57'N and 3°55'E. It is one of the most populous cities in the state. The city is made up of seven strategic districts with every quarter having its own 'oba' known as the king.

Isara-Remo

Isara-Remo is an ancient town in the present-day Remo North Local Government Area in Ogun State, Nigeria. Its geographical coordinates are 7°0'N and 3°40'E. It is the headquarters of the Remo North LGA and the 6th largest town in Ogun state following Abeokuta, Ijebu Ode, Ijebu Igbo, Sagamu and Ago Iwoye. Inhabitants of this town are predominantly farmers and hunters.

Sampling Procedure

The data for this study were obtained from community residents based on proportionate to sample size of the study sites. Here, the population sizes of Ago-Iwoye and Isara Remo communities, which were purposively selected for this study based on CSM activities were collected from the Nigeria Population commission site. Then respondents were randomly selected based on proportion to their site population using the Slovin's(Statistics How To, 2017) model $\{N/1+N(\alpha^2)\}$ Where: N is the total population and α is the error probability (0.05). The projected population sizes of Ishara Remo and Ijebu North (where Ago Iwoye is) in 2016 were 83,394 and 390,194, respectively. Therefore the projected total population of the study sites is 473,428.

But, for this study, the sampled population will be based on the formula $\left(\frac{N}{1+N(\alpha^2)}\right)$

Where: N = 473,428; and α = 0.05

Thus, the proposed sampled population for this study was $473,428/1+473,428(0.05)^2$

= $473,428/1+473,428(0.0025)$

= $473,428/1+1,183.57$

= 399.6

= 400.

However, the study did not cover the entire Ishara Remo and Ijebu North, but the population figure of the communities sampled were not available. Thus, only one hundred and twenty questionnaire sets were administered in the communities identified for CSM activities in the study area using simple random sampling method.

Measurement of Variables

Information was sought on the demographic and social status of there spondents, socioeconomic contributions of CSM operations and perception of its environmental impacts.

Statistical Analysis

The data collected were subjected to both descriptive and inferential statistics. Descriptive statistics, which involve the collation, simplifying and giving the properties of data, such as frequency counts; percentages and mean were used to describe variables and their occurrences among the population. Tables were used to present the results. The chi-square statistics were also used for inferring the dependence or otherwise of the demographic characteristics of the community residents on their perception of the contributions of CSM enterprise to the study area socioeconomics.

Results

Table 1: Frequency Distribution of the Demographic Characteristics of Respondents'

Variables	Option	Frequency	Percentage	Mode
Sex	Male	72	61.5	
	Female	45	38.5	Male
Age	< 20years	3	2.6	
	> 20 – 30 years	46	39.3	
	> 30 - 40 years	45	38.5	> 20 – 30 years
	> 40 – 50 years	20	17.1	
	> 50 years	3	2.6	
Marital status	Single	31	26.5	
	Married	86	73.5	Married
Religion	Christianity	46	38.3	
	Islam	66	55.0	Islam
	African Traditional Religion	10	6.7	
Major Occupation	Plank seller	6	5.0	
	Artisan	23	19.2	
	Student	18	15.0	
	Teacher	6	5.0	
	Trader	37	30.8	
	Driver	6	5.0	Trader

	Farmer	15	12.5	
	Civil servant	3	2.5	
	Surveyor	3	2.5	
	casual	3	2.5	
Any other source of	Yes	33	28.9	
livelihood?	No	81	71.1	No
What language(s) do you	Yoruba	71	59.2	
speak?	English	12	10.0	
	Hausa	11	9.2	Yoruba
	Igbo	17	14.2	
	Others	9	7.5	
Academic qualification	Secondary school certificate	64	56.1	Secondary
	OND/HND/NCE	38	33.3	school
	University degree	12	10.5	certificate
A native of the	Yes	45	38.5	
community?	No	72	61.5	No
Aware of chainsaw	Yes	59	49.2	
logging activity in the	No	6	5.0	Yes
forest near you?	Don't Know	55	45.8	

Source: Field Survey 2018

The respondent for this study (Table 1) were mostly males (61.5%) with the modal age group of greater than 20 but less than 30 years (39.3%). Respondents within the age group of > 30 - 40 years were also high in the frequency of occurrence (38.5%). Also, a substantial 73.5% of the respondents are married (Table 1) while 55.0% of them were of the Islamic faith.

The study (Table 1) also sought information from respondents with diversed occupational background viz: plank selling (5.0%), trading (30.8%), driving (5.0%), farming (12.5%), surveying (2.5%) and civil service (2.5%). However, modal occupation identified by the study was trading (30.8%) while 28.9% of the respondents are engaged in extra activities to supplement their income. The major ethnic group and language of dwellers in the study area was Yoruba (59.2%). Other identified ethnic groups and languages were Igbo, Hausa, Igede, Tiv. Meanwhile, only 38.5% of the total respondents were natives to the community, those who constitute the larger percentage (61.5%) were non-indigenous to the community while awareness of CSM activities was affirmed by 49.2% of the respondents in forests near them. Academic qualification ranged from Secondary school certificate to University degree. Most of the respondents (56.1%) only have secondary school certificate, 33.3% have OND, HND or NCE degree while 10.5% respondents had a University degree.

Table 2: Frequency Distribution of Respondents' Perception of the Social and Economic Impact of CSM Operation in the Study Area

Statements	SD	D	U	A	SA
Chain sawmilling operations contribute to employment in the community	-	6 (5.0)	16 (13.3)	98 (81.7)	-
Chain sawmilling operations contributes significantly to livelihood in the community	-	10 (8.3)	59 (49.2)	51 (42.5)	-
There is an association for chain saw milling operators in the community	-	-	31 (25.8)	83 (69.2)	6 (5.0)
Those who violate chain saw milling operators association's rules get punished	-	-	68 (56.7)	46 (38.3)	6 (5.0)
Chain sawmilling operators association contributes significantly to the community	-	12 (10)	84 (70)	24 (20)	-
Cohesion exists between chainsaw milling operators association and other associations in the community	11 (9.2)	20 (16.7)	78 (65.0)	9 (7.5)	2 (1.7)
Women are allowed into the chain saw milling operators association	7 (5.8)	11 (9.2)	54 (45.0)	45 (37.5)	3 (2.5)
Women can participate in chainsaw milling activities	2 (1.7)	3 (2.5)	23 (19.2)	78 (65.0)	14 (11.7)
Women are assigned key responsibilities in chainsaw milling operations	22 (18.3)	30 (25.0)	47 (39.2)	18 (15.)	3 (2.5)

There are serious health challenges associated with chainsaw milling operations	20 (16.7)	35 (29.2)	33 (27.5)	24 (20)	8 (6.7)
There are minor health challenges associated with Chainsaw milling operations	-	3 (2.6)	8 (6.8)	69 (59.0)	37 (31.6)
Chainsaw milling operations is highly technical	-	-	25 (20.8)	59 (49.2)	36 (30.0)
Chain saw milling operators contributes significantly to Poverty reduction	-	2 (1.7)	15 (12.5)	64 (53.3)	39 (32.5)
Chain saw milling operators generates revenue for community development	4 (3.3)	28 (23.3)	56 (46.7)	20 (16.7)	12 (10.0)
Proceeds from chain saw milling operation can only meet basic needs of clothing, shelter and food	7 (5.8)	12 (10.0)	52 (43.3)	41 (34.2)	8 (6.7)
Chain sawmilling operators contribute to food security in the community	2 (1.7)	11 (9.2)	71 (59.)	27 (22.5)	9 (7.5)
Proceeds from chain sawmilling operation contributes significantly to offsetting education bills	2 (1.7)	3 (2.5)	63 (52.5)	43 (35.8)	9 (7.5)
Chainsaw operations negatively impact agricultural production	3 (2.5)	18 (15.0)	76 (63.3)	21 (17.5)	2 (1.7)
Chainsaw operations impact on agricultural production brings about conflict	6 (5.0)	24 (20.0)	73 (60.8)	15 (12.5)	2 (1.7)

NB* SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree, Percentages are in Parentheses

Source: (Field Survey 2018)

The study (Table 2) analysed the perception of respondents on the social and economic impact of CSM operations in the study area. Majority (81.7%) of the respondents agree that chainsaw milling operations contribute significantly to employment in the community. The significant contributions of CSM to livelihood in the study area was also acknowledged by 42.5% (Table 2). The existence of CSM operator's association in the study area was validated by 74.2% of respondents while 43.3% supported the probability of members' who violate the association rules getting punished (Table 2). Though 56.7% of the respondents are Undecided on the assertion that those who violate the association rules get punished, a larger percentage (65.0%) were also irresolute on the existence of cohesion between the chain saw milling operators association and other associations in the community.

The permeability of women into the association and their participation in chainsaw milling activities was strongly acknowledged by an average of 58.9% respondents. However the allotment of key responsibilities in chain sawmilling activities to women took a downward trend, 43.3% disagree with the statement while 39.2% were indeterminate (Table 2). Moreso, respondents did not associate any serious health challenges with the CSM activities. However, minor health challenges such as fever, catarrh, headache, fatigue and itching may be frequently attributed to the operations (attested to by 90.6% of respondents), most epecially among newcomers in the business. The CSM operations was also perceived as highly technical by 79.2% of the respondents. was also reposed by Pasiecznik (2006) and Eckelmann *et al.*(2010) who acknowledged the need for training to increase operators' health and safety and improve quality and efficiency. The results (Table 2) further revealed that 75.8% and 26.7% of respondents perceived CSM operations as contributing significantly to poverty reduction and generation of revenue for community development in the study area, respectively. The study (Table 2) also found that 33.4% of respondents, percieved CSM operations as negatively affecting agricultural production and that the impacts bring about conflict. Also, 42.5% of the respondents were of opposing view that the operation neither has negative impact nor provoke conflict with agriculural productivity in the study area. However, judging from the percentage of farmers in this study (12.5%) and the 33.4% percieving the negtive impact of the operation on agricuture, it will be imperative to take such impact serious will be the view to putting policy instrument in place to address it.

Table 3: Frequency Distribution of Respondents' Perception of the Environmental Impact of CSM Operation in the Study Area

Statements	SD	D	U	A	SA
Chain saw milling operations have effect on household air quality	34 (28.3)	29 (24.2)	40 (33.3)	14 (11.7)	3 (2.5)
Chain saw milling operations have adverse effect on the environment	28 (23.3)	41 (34.2)	35 (29.2)	13 (10.8)	3 (2.5)
Chain saw milling operations contributes to atmospheric pollution	23 (19.2)	27 (22.5)	51 (42.5)	14 (11.7)	5 (4.2)
Chain saw milling operations have effect on water bodies	14 (11.7)	20 (16.7)	62 (51.7)	24 (20.0)	-
Chain sawmilling operations affects drinking water quality	23 (19.2)	24 (20.0)	58 (48.3)	15 (12.5)	-
Chain saw milling operations activities affects aquatic lives	11 (9.2)	30 (25.0)	52 (43.3)	27 (22.5)	-
Chain saw milling operations activities affects terrestrial lives	13 (10.8)	18 (15.0)	51 (42.5)	35 (29.2)	3 (2.5)
Chain sawmilling operations affect local wind behaviour	46 (38.3)	29 (24.2)	40 (33.3)	5 (4.2)	-
Chain saw milling operations contributes to environmental temperature	41 (35.0)	29 (24.8)	39 (33.3)	5 (4.3)	3 (2.6)

NB* SD = Strongly Disagree, D = Disagree, U = Undecided, A = Agree, SA = Strongly Agree, Percentages are in Parentheses

Source: (Field Survey 2018)

The Perception of respondents on Environmental Impact of CSM Operations in their community is presented in Table 3. It can be deducedthat despite the 49.2% of the respondents (Table 1) being aware of CSM operations in forests near their community, an average of one-third of them were undecided on their level of agreement with the statements on its environmental impact.Examining the level of perception of the environmentalimpact statements, the study found that the negative impacts of CSM operations on wind behaviour, environmental temperature and air quality were strongly aversed to by 38.3%, 35.0% and 28.3% of the respondents', respectively. Also, that the CSM operaations negatively affest terrestial and aquatic lives as well as water bodies was aagreed upon by 29.2%, 22.5% and 20.0% of the respondents, respectively,

Generally, CSM operations was percieved to adversely impact the environment, affect household air quality,and contributed to atmospheric pollution by 13.3%, 14.2%, 15.9% of the respondents', respectively. However, 57.5%, 52.5% and 41.7% of the respondents', respectively percieved the same issue in opposite direction *i.e.* that CSM operation did not adversly impact the environmnet, household air quality and atmospheric pollution.

Table 4: Summary of the Chi-square Statistics of theEffect of Some Selected Demographic Characteristics of Respondents on Perceived Socio-Economic Impact of CSM Operations

Research statements	Sex	Age	Occupation	Academic qualification
Chain sawmilling operations contribute to employment in the community	12.18**	11.733ns	105.692**	2.967ns
There is an association for chain saw milling operators in the community	.754ns	31.628**	58.397**	5.509ns
Cohesion exists between chainsaw milling operators association and other associations in the community	7.042ns	23.247ns	128.118**	10.254ns
Women can participate in chainsaw milling activities	6.711ns	21.544ns	87.306**	35.053**
There are serious health challenges associated with chainsaw milling operations	10.897**	48.970**	107.128**	37.726**
Chain sawmilling operators contributes significantly to Poverty reduction	8.233**	14.332ns	41.044**	5.026ns
Chain sawmilling operators generates revenue for community development	6.829ns	61.757**	114.877**	12.991ns
Chain sawmilling operators contribute to food security in the community	11.934**	34.286**	86.778**	13.804*
Proceeds from chain sawmilling operation contributes significantly to offsetting education bills	5.668ns	17.642ns	91.064**	34.447**
Chainsaw operations impact on agricultural production brings about conflict	13.970*	34.255**	114.320**	23.421**

NB* ^{ns} – Not significant; * - Significant at $\alpha = 0.1$; ** - Significant at $\alpha = 0.05$

The study (Table 4) revealed that respondents' perception of CSM operation contributing to employment in the study area is dependent on the sex (χ^2 = 12.18) and occupation (χ^2 = 105.69) of the respondents'. So also, respondents' perceptions on associating health challenges with CSM operation as well as CSM operations contributing to food security and impacting agricultural production in the study area are all dependent on respondents' sex, age, occupation and academic qualifications (Table 4).

Discussion

Respondents Background

Implication of age distribution pattern documented by this study is that the survey is youth-dominated because the Nigerian national youth policy (2009) defines youth as those between ages 18 and 35 years. This did not depart much from the findings of Tesfaye (2017) who reported 67% of the respondents from a survey in a similar setting in Oromia, Ethiopia as falling between 30 and 60 years of age, which according to Ostrom (2009) represents the most productive age group. The marital status and religious background of respondents also did not depart sharply from that of The Nigeria Demographics Profile (2018). The larger percentage of non-indigenes in the communities under study is a pointer to the love for peace and unity noted among the Yoruba tribes while the level of awareness of CSM activities is an affirmation of CSM activities in forests around the communities under study.

Perceptions on the Social and Economic Impact of CSM Operations in the Study Area

The agreement by majority of the respondents to CSM operations contributing significantly to employment in their community implies that CSM puts food on their table. This assertion agrees with Popoola's (2010) report, which linked the provision of employment for both families and hired labour by CSM operations with the improvement of household and social well-being. This he viewed as a clear indication of the social and economic importance of the chainsaw business in Nigeria. Marfo (2010) also reposed CSM business as also a source of employment that supports the livelihood of the operatives, from the loading boys to the lumber dealers who finance the activity. Further, Marfo (2010) observed the demand for chainsaw lumber in the rural forested areas as providing economic opportunities for young people who are unemployed or who want to supplement livelihood activities such as farming. He submitted that chainsaw operations may directly and indirectly, support the livelihoods of about 705,000 people (Marfo, 2010).

The study documented the existence of CSM business associationby majority of the respondents while close to average asserted that members of the association who violate the association rules get punished. This implies that the activities of CSM operations in the study area to a relatively significant level is coordinated and there is an avenue for cohesiveness with other community based associations. This howeverdeparts from Adam *et al*. (2007a) observation that80% of CSM operators do not belong to a trade association; one of the strongest weakness of CSM activity. Marfo (2010) also linked lack of pronounced cohesiveness among CSM operators to poor organisation and lack of access to official policy consultation forums.

The pervieved minor health risk associate with CSM operations as well as the acknowledgement of its high technicality by the respondents' may be why Pasiecznik (2006) and Eckelmann *et al.*(2010) acknowledged the need for training to increase operators' health and safety as well as improve the quality and efficiency of the operation. Opposing minor health risk, the study identified community benefits from CSM operations in the study area to include the donation of sawn lumber (planks) to community schools for rehabilitation and gathering of firewood for domestic use by dwellers, from off-cuts at the operation sites. These are expected to positively impact spendings at domestic level. Sambe *etal*., (2016) also reposed that the business has a positive impacton poverty alleviation since the proceeds are used by respondents for education, health and the well-being of family members. Obiri and Damnyag (2009a) also reported CSM as contributing in six major ways to the rural economy of Ghanaviz: employment, community benefits, supply of services, lumber, firewood and taxes. In their studies, Obiri and Damnyag (2009a) further analyzed community benefits of CSM to include infrastructure support provided by operators. Marfo, (2010) also reposed CSM operations as generating income for local people through sales of trees on their farm apart from supplying them with lumber. Further, supporting the indirect contribution of CSM operation to reduction in crime rate, Obiri and Damnyag (2009b) reported that about half of those involved in chain saw activities in the communities earn their main income from CSM business.

Perception of Respondents on Environmental Impact of CSM Operations in the Study Area

Findings here may back the assumptions of Popoola, (2010), that CSM operations could be less harmful to the environment as it ensures that off-cuts and other wood wastes are recycled in-situ. In their work, Wit *et al*., (2010) also reported that CSM operations as having relatively slight environmental impacts in Merauke, Indonesia. Considering respondents' support for and against CSM operations adverse impacts on terrestial (31.7% vs 25.8%) and aquatic life (25.5% vs 34.2%) as well as water bodies (20.0% vs 27.4%) for example, this study will also asume a mild impact of CSM operations on the study area environment. This is because these are the most closely contested of the nine perceptional statemnets. Responses to the remaining six were skewed in favour of the CSM operations.

This however does not imply that response on the

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Perceptions on the Social and Economic Impact of CSM Operations in the Study Area

The agreement by majority of the respondents to CSM operations contributing significantly to employment in their community implies that CSM puts food on their table. This assertion agrees with Popoola's (2010) report, which linked the provision of employment for both families and hired labour by CSM operations with the improvement of household and social well-being. This he viewed as a clear indication of the social and economic importance of the chainsaw business in Nigeria. Marfo (2010) also reposed CSM business as also a source of employment that supports the livelihood of the operatives, from the loading boys to the lumber dealers who finance the activity. Further, Marfo (2010) observed the demand for chainsaw lumber in the rural forested areas as providing economic opportunities for young people who are unemployed or who want to supplement livelihood activities such as farming. He submitted that chainsaw operations may directly and indirectly, support the livelihoods of about 705,000 people (Marfo, 2010).

The study documented the existence of CSM business associationby majority of the respondents while close to average asserted that members of the association who violate the association rules get punished. This implies that the activities of CSM operations in the study area to a relatively significant level is coordinated and there is an avenue for cohesiveness with other community based associations. This howeverdeparts from Adam *et al*. (2007a) observation that80% of CSM operators do not belong to a trade association; one of the strongest weakness of CSM activity. Marfo (2010) also linked lack of pronounced cohesiveness among CSM operators to poor organisation and lack of access to official policy consultation forums.

The pervieved minor health risk associate with CSM operations as well as the acknowledgement of its high technicality by the respondents' may be why Pasiecznik (2006) and Eckelmann *et al.*(2010) acknowledged the need for training to increase operators' health and safety as well as improve the quality and efficiency of the operation. Opposing minor health risk, the study identified community benefits from CSM operations in the study area to include the donation of sawn lumber (planks) to community schools for rehabilitation and gathering of firewood for domestic use by dwellers, from off-cuts at the operation sites. These are expected to positively impact spendings at domestic level. Sambe *etal*., (2016) also reposed that the business has a positive impacton poverty alleviation since the proceeds are used by respondents for education, health and the well-being of family members. Obiri and Damnyag (2009a) also reported CSM as contributing in six major ways to the rural economy of Ghanaviz: employment, community benefits, supply of services, lumber, firewood and taxes. In their studies, Obiri and Damnyag (2009a) further analyzed community benefits of CSM to include infrastructure support provided by operators. Marfo, (2010) also reposed CSM operations as generating income for local people through sales of trees on their farm apart from supplying them with lumber. Further, supporting the indirect contribution of CSM operation to reduction in crime rate, Obiri and Damnyag (2009b) reported that about half of those involved in chain saw activities in the communities earn their main income from CSM business.

Perception of Respondents on Environmental Impact of CSM Operations in the Study Area

Findings here may back the assumptions of Popoola, (2010), that CSM operations could be less harmful to the environment as it ensures that off-cuts and other wood wastes are recycled in-situ. In their work, Wit *et al*., (2010) also reported that CSM operations as having relatively slight environmental impacts in Merauke, Indonesia. Considering respondents' support for and against CSM operations adverse impacts on terrestial (31.7% vs 25.8%) and aquatic life (25.5% vs 34.2%) as well as water bodies (20.0% vs 27.4%) for example, this study will also asume a mild impact of CSM operations on the study area environment. This is because these are the most closely contested of the nine perceptional statemnets. Responses to the remaining six were skewed in favour of the CSM operations.

This however does not imply that response on the adverse impact of CSM operation be jetisioned. No

matter how mild, these responses are statistically valid. Implicitly, CSM operations if not directly affecting the environment, may have indirectly impact on the long run. For example, it will impact tree regeneration in the long run. Marfo (2010) observed that reduction in seed supply and a subsequent decline in natural regeneration of popular timber species when seed trees are removed constitutes concerned impacts. Also, further opening of the canopy by removal of large trees retained for structure will significantly modify the micro climatic conditions, which may increase the seedling mortality of non-pioneer species and cause a shift in species composition, possibly in favour of low-value pioneer species. The destruction of animals habitat resulting from the total land area covered during CSM operation or scaring off terrestial animals with machine noise during operation and large amount of wastes deposited on the conversion site are other indirect likely environmental impact.

Impact of Respondents' Background on their Perception

The study found that sex and occupation of respondents significantly affect their perception of CSM business contributing or otherwise to employment in the study area. Gender was also fingered in a similar setting by Tesfaye (2017) as favourably impacting the conservation ofChilimo-Gaji Forest in Dendi District, West Shewa Zone, Oromia, Ethiopia. Agrawal and Ostrom (2001) had earlier reported similar finding and hinged their finding on the fact that women perceived the forest mainly as a source of raw material for handicrafts and consumption, while men see the forest as an important source of their livelihood. This invariably explained the link between gender and occupation as an important determinant of perception of development initiatives in forest fringe communities.

Age and occupation of respondents also significantly influenced their level of agreement or otherwise with the existence of CSM business association in the study area. However from the result in Table 2, majority (65%) of the respondents were undecided on the existence of cohesiveness between artisanal sawyers association and other associations, 16.7% disagree while 7.5% agree, this may imply that relationships between the associations exist but not pronounced, or not acknowledged to an extent that could make respondents synchronize activities of their association with that of the chainsaw millers. Furthermore, the involvement of women participation is also influenced by respondents' occupation and their academic qualification. A substantive 76.7% of them agree and strongly agree that women can participate in chain saw milling activities. Information from FGDs revealed that the involvement of women in chainsaw activities doesn't directly imply their handling of chainsaw or pushing of logs, they may however be engaged in the marketing, tree identification and coordinating association activities aspects of the job among others.

Sex, age, occupation and academic qualification of respondents', all significantly affect their perception of health challenges associated with CSM activities as well as their contribution to food security and impact on agricultural production. Aside from gender, Tesfaye (2017) reported age and the education level of the local people as intricately associated with their support for forest conservation (A development initiative) project. Older farmers had also been reported by Zalkuwi (2013) to be more prompt in their perception and response to risk management than younger ones. Ekpa (2019) also submitted formal education as playing a major role in the adoption of climate smart agricultural practice in northern Nigeria.

However, only occupation and academic qualification have a pronounced impact on respondents' perception of CSM activities contributing to the offset of education bills in households in the study area. Only 35.8% of the respondents agreed and 7.5% strongly agreed to proceeds from CSM activities significantly contributing to the offset of education bills in the study area. The reason for this cannot be divested from the fact that knowledge will inform perception and by extension action. Those who lack the requisite knowledge may not be able to make inferences in this direction.

Conclusion

There is considerable scope for benefits from CSM operations due to its perceived contributions to the rural economy, strong demand for lumber, revenue implications and percieved enjoyable socio-economic contributions. Positive trends observed in this research work reveal and advocates for proper and appropriate developmental procedures to absorb the prospects of this enterprise, conformed to being practised in a more sustainable and acceptable manner to harnessing its socio-economic potentials to address the inefficiencies of log conversion system and fulfil the obligations of quality lumber supply to rural markets. Thus, learning the art of chainsaw machine handling is germane and should be enforced, issuance of a permit for CSM operation should go with proven certificate of