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Gender Inequalities in Rural Labour Markets: The Role of Corporate Social Responsibility in Niger Delta, Nigeria

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Abstract

Purpose – The purpose of this paper is to critically examine the multinational oil companies' (MOCs) corporate social responsibility (CSR) initiatives in Nigeria. Its special focus is to investigate the impact of the global memorandum of understanding (GMoU) on women's involvement in rural labour market in the Niger Delta region of Nigeria.

Design/methodology/approach – This paper adopts a survey research technique, aimed at gathering information from a representative sample of the population, as it is essentially cross-sectional, describing and interpreting the current situation. A total of 768 respondents were sampled across the rural areas of the Niger Delta region.

Findings – The results from the use of a combined propensity score matching and logit model indicate that CSR of the MOCs using GMoU model has recorded little but significant success in improving women's participation in the labour market by freeing women's time through labour-saving technologies and the provision of public services, raising women's capital through education, eliminating discriminatory employment practices and capitalizing on public works programmes.

Practical implications –This suggest that the underlining causes of gender inequality in rural labour markets are institutional, including both social norms and the structure of labour market organizations; and can be holistically tackled through corporate social responsibility programmes, government policies, and building the strength of women in labour organizations.

Social implications – This implies that reducing rural poverty requires not just the barriers to women's participation in decent employment but aiming for a policy that helps to change people's perceptions of what is possible, beneficial, and fair; fosters cooperative action; and strengthens women's bargaining power in the workplace, the home, and the marketplace.

Originality/value – This research contributes to the gender debate in agriculture from a CSR perspective in developing countries and rationale for demands for social project by host communities. It concludes that business has an obligation to help in solving problems of public concern.

Keywords Gender, rural labour market, corporate social responsibility, multinational oil companies, sub-Saharan Africa

1. Introduction

Women do supply their labour in the labour market as a part of those who earn wage on farms or as processors cum traders in line with agricultural value chain, but much of what they do is informal or not paid for and does not get recorded (FAO, 2011). Bettering women's involvement in agricultural value chain can aid the flow of quality goods, enhance the proficiency of business, improve on the market openings that women represent as buyers and suppliers, target niche markets like fair trade, see to the sustenance of the dignity of work and economic parity for all, and strive towards all-round economic growth (ILO, 2010). Most of the women in Africa, see labour as their main asset (African Development Report, 2015). Agriculture is of great importance as a means of self as well as wage employment, particularly for women who are not trained or are not employable in other sectors. Taking into consideration on this basis, agriculture also helps in the alleviation of impoverishment. Growth in agricultural encourages demand for labour and helps in mounting pressure on real wages for unskilled labour (IFAD, 2009). These offer something positive for both poor men and women, but especially for the poor women. Taking actions that close the gender gap in rural labour markets may not be very easy, but some level of success could be achieved and modest interventions can sometime be very potent (ILRI, 2008). Cautiously arranged policies, schemes and projects can work within the obtainable cultural norms, via the public and private sectors, in ways that both women and men gain from (UNDP, 2006).

In the meantime, the Nigeria's economy heavily hinges on the oil and gas sector, which makes available 95% of the export revenue, 80-85% of government returns, and about 32% of gross domestic products (GDP). Nigeria, as far as oil production is concerned, is the largest in Africa and among the top 10 worldwide; her recoverable reserves were estimated at 36.2 billion barrels in January 2007. Unfortunately, despite the country's relative oil wealth, GDP per capita is 2,400 USD, meaning that poverty is prevalent since about 50% live on less than $1.25 per day (FGN, 2017; African Development Report, 2015). The Niger Delta where multinational oil companies (MOCs) maintain a notable presence has been negatively affected by ceaseless violent conflicts. The federal government of Nigeria (FGN) is in a sort of joint-venture agreements with the MOCs functioning in the oil and gas sector in Nigeria. The federal government is in charge of and holds the land together with its natural resources in the sub-soil. This is an obvious key source of conflict in the Niger Delta region. Land can be obtained by the government for whatsoever public purposes they deem fit by virtue of the Land Use Act 1978. The negative ways the activities of MOCs in the region affect the region include oil spills, gas flaring, pollution of the environment, negative social impacts, and conflict cum violence amongst others (Francis *et al,* 2011).

Nevertheless, MOCs play a part in a superfluity of corporate social responsibility (CSR) activities in the Niger Delta as well as other parts of Nigeria. Each year, the MOCs invest in social projects and programmes in communities chiefly in the Niger Delta. The earliest of

investments were in programmes connected to agricultural (development programmes) in the sixties and have grown over the years to cut across education, water projects, health care, roads and civil infrastructure, and small businesses which intend to be of gain to the communities (NDDC, 2001). Over the years, MOCs have bettered the way they get themselves involved with local communities to handle these projects. In 2006, MOCs brought into life a new way of working with communities called the global memorandum of understanding (GMoU). The GMoUs represent a vital shift in CSR approach of MOCs. It placed emphasis on more open and responsible (accountable) processes, steady communication with the grassroots, sustainability and the prevention of conflicts (SPDC, 2013). In the agreement, the communities decide where they need development while MOCs make available secure funding for 5 years, guaranteeing that the communities have stable and reliable financing as they carry out the execution of their community development plans (Chevron, 2014). This system is a replacement of the previous CSR method of operation whereby MOCs accept to handle hundreds of distinct development projects with individual communities and accomplish them directly and distinctly. By the end of 2012, MOCs had been able to sign agreements with 33 GMoUs clusters which covers 349 communities. That is about 35% of the local communities existing around their business operations in the Niger Delta (SPDC, 2013; Chevron, 2014).

However, the advent of GMoU model has largely been taken to be a strategy employed by MOCsto refracts public criticism of their performance, and a way of evading government regulation (Slack, 2012; Marchant, 2014; Frynas, 2009). As a model, it has been heavily attacked, generating intense debate over its effectiveness and practical implications. While exponents see GMoU model as a tool for potentially bolstering an old dynamic in business and community relationships, opponents see it as a ground for new roles to be demanded of old establishments. This variance in insights invariably sets the framework for the CSR debate in the region, setting as rivals those in support of stabilizing an already entrenched business-community relationship and those who maintain that MOCs – community relationships must acclimatise to changing community values (Idemudia, 2014; Ite, 2007; Lompo and Trani, 2013; Ekhator, 2014; Eweje, 2006; Renouard and Lado, 2012). Following the former varying points of view of the CSR initiatives, this paper is a plus to gender discourse in rural labour markets and wide-ranging growth literature from the CSR standpoint, by scrutinising empirical facts in four areas that have enjoyed much responsiveness in the literature. The paper is interested in establishing the level of CSR venture that the MOCs have engaged themselves in as it concerns rural labour markets as well as ascertain the level of gains from such investment that accumulate to the rural women. It also looks at how it impacts on their trade. These four areas of emphasis also represent four key questions notably:

- How does the GMoUs interventions affect gender participation of the MOCs in the Niger Delta, Nigeria?
- To what extent has the MOCs' CSR intervention impacted on rural labour markets shift in the Niger Delta, Nigeria?
- Are women encouraged by MOCs' CSR interventions to participate in rural labour market of the Niger Delta, Nigeria?
- What are the resultant effects of closing the gender gaps in rural labour markets in the Niger Delta, Nigeria?

The rest of the paper is arranged in the following order: literature and theoretical underpinnings (section 2); describing methods and materials (section 3); presenting the empirical results and corresponding discussion (section 4); conclusion with implications, caveat and future research directions (section 5).

2. Literature and theoretical underpinnings

2.1 Feminist theoretical perspective

According to Pato and Teixeira (2016), entrepreneurship has become a dynamic field of research in last two decades, but rural entrepreneurship has been largely overlooked; and based on 181 articles on rural entrepreneurship published in journals indexed in Scopus, they found that rural entrepreneurship is an essentially European concern, whose most prolific authors are affiliated with institutions in the UK and Spain. However, in elucidating the barriers to the employment of females in the rural labour market and the fundamental reasons for these barriers, we made use of the liberal feminist theory. According to Fischer *et al* (2011), the liberal feminist tradition was active as far as feminism's earliest days and argues for the inevitability of social reform if women are to be given the same status and chances as men. The central basis of liberal theory assumes that men and women are equal and that sagacity, not sex is the grounds for individual right (Unger and Crowford, 1992). It accentuates the presence of discriminatory obstacles (barriers) and systematic biases facing women (for example, limited access to assets, land, education, inputs, labour market, financial services, social capital, business experience, technology) which must be removed (Palacios-Lopez *et al,* 2017; Tajeddini *et al,* 2017). Liberal feminism is an expansion of political views of equal opportunity, entitlement, and individual right. The liberal feminist outlook has been the basis for many legal modifications that have resulted in greater equality for women (Beneria, 2016; Doss, 2018). Liberal feminist theory in the voicing of this study in the background of women in rural labour market posits that if women had equal right of entry as much as men do such as in land, financial services, education, land, work experience, and other resource they would act in the same way (Boonabaana, 2014; Jeeva, 2017; Lenao and Basupi, 2016; Rleiber *et al,* 2014; Slavchevska, 2015).

2.2 CSR in an African context

Carroll (1991) CSR Pyramid is perhaps the most renowned model of CSR, with its four levels showing the relative prominence of economic, legal, ethical and philanthropic responsibilities correspondingly. However, the exploration of CSR in Africa (Visser, 2006) is used to question the exactness and importance of Carroll's CSR Pyramid, and maintain that if Carroll's basic four-part model is recognized, it is put forward that the relative priorities of CSR in Africa are expected to vary from the classic, American ordering; and it is projected that Carroll's CSR Pyramid may not be the most ideal for understanding CSR broadly and, particularly, in Africa. Frynas (2009) observed that the inability of government to provide basic amenities for its citizens puts emphasis on the role of multinationals in CSR and philanthropy which the western world does not consider as CSR. Philanthropic activities as CSR by multinational are rampant in Nigeria (Marchant, 2014). In an African context, Amaeshi *et al* (2006) state that CSR in Nigeria is controlled by socio-cultural influences likes

ethnic religious belief, charitable tradition, and communalism. In like manner, Ekhator (2014) claim that locally developed CSR methods would offer better response to the many social and environmental problems in Africa such as unemployment, deforestations, crime and income inequality. Muthuri (2012), depending on the extant literature on CSR in Africa, projected that the CSR concerns predominant in Africa include reduction of impoverishment, community development, education and training, health and HIV/AIDS, environment, sports, human rights, corruption, economic and enterprise development, community development, as well as governance and accountability. As a result, this study adopts quantitative methodology but sees the result from the standpoint of CRS in African CSR.

2.3 Why gender inequality is a major concern in Niger Delta region

Oil in Nigeria is mostly extracted from the Niger Delta region. The very rich culture and legacy of the region is linkable to the presence of about 40 varied ethnic groups speaking 250 languages and dialects. The numerous ethnic groups includes Kalabaris, Urhobos, Itsekiris, Igbos, Ika-Igbos, Ndonis, Orons, Ibenos, Yorubas, Ibibios, Anangs, Efiks, Bekwarras, Ijaws, Ogonis, Ikwerres, Etches, Ekpeyes, Ogbas, Engennes, Obolos, Isokos, Nembes, Okirikas, Binis, etc. (NDDC, 2001). The tradition of the people is replicated in their modes of dressing, traditional culture, marriages and festivals. The dissimilar ethnic groups existing in the region have a long history of involvement in trade and travel, which has led to the prevalent exchange of ideas and art forms, among the different groups and with the outside nations, the western world. By tradition, the people of the Niger Delta are into farming and fishing, but decades of negatives coming from oil business activities, in addition to a fast-growing population, has made these traditional sources of livelihood either no longer feasible or experience a notable decline. As a result, the rate of unemployment in the region is visibly higher than the national average (PIND, 2018).

Most of the poor ones in Niger Delta live in the rural areas and rely on agriculture as their source of income (Cliffe and Akinrotimi, 2015). While efficiency (in production) in this sector is largely weakened by its low mechanisation, distribution of resources between men and women in this sector has left the region in a pitiable condition in terms of production (PIND, 2019). Disproportions in gender in the region's agriculture sector are mostly characterised by uneven access to agricultural inputs and pervasive disparity, particularly in line with ownership of agricultural land. These continue to limit women's role in providing household food baskets. Actually, most women do not have access to agricultural inputs aside from their own labour (NDDC, 2001).

2.4 Study hypothesis

With all the oil business in Niger Delta, women still struggle with poverty in the region. They are more in the offing to drop out of school than boys; with a lesser chance to be employed in the formal sector and exposed to the risk of maternal mortality in the region. Gender inequality in agriculture in the Niger Delta shows itself in the problem of unequal access to agricultural inputs such as land, finance and fertilizer. Women who earn their living through agriculture in the region and have no land of their own for this purpose are susceptible to domestic violence. Women have an upper hand in vulnerable employment, with most having a job to do in seasonal weeding, harvesting, on-farm processing and marketing of farm produce. Gender variances in agriculture in the region also apply to involvement in labour markets, as the obstacles to female employment in the rural labour markets are mainly within prevailing cultural norms and traditions. Thus, we hypothesize as follows:

- CSR of MOCs using GMoU has not significantly influenced rural women's involvement in labour markets in the Niger Delta, Nigeria
- CSR of MOCs using GMoUs has failed to close the gender gap in rural labour markets in the Niger Delta, Nigeria

3. Method and materials

This work adopts a quantitative methodology as a contribution given the scantiness of quantitative works in the region (Lompo and Trani, 2013). The survey research technique was used with a view to gather cross-sectional information from a demonstrative sample of the population. It is basically cross-sectional that defines and interprets what exists currently in the region. The region is made up of nine of Nigeria's constituent states (Figure 1).

Figure 1: Constituent administrative states of the Niger Delta, Nigeria
Source: NDDC, 2004

3.1 Sample size

We put to use the Topman's (2011) formula (which is seen as very apt in circumstances with large populations) in determining the size of the sample utilized in this study. The formula is expressed thus:

$$n = \frac{(Z^2)(pq)}{(e^2)} \qquad \text{Equation 1}$$

Taking a 95% confidence level and ±5% precision, we calculated the sample size as follows:

p = 0.5 and hence q =1-0.5 = 0.5; e = 0.05; z =1.96

$$\mathrm{n} = \frac{(1.96)^2(0.5)(0.5)}{0.05^2} = 384.16 = 384$$

Yet, in other to get a minimal error, we in the end represented two streams of household by multiplying them by two. These streams are: (i) women who live in communities that belong to any cluster development board that have received CSR intervention as individuals. Women in this category are referred to as treatment; (ii) women in communities outside the

circle covered by cluster development board that have also not received any CSR intervention. We referred to such women as control. The sample is presented below:

Table1: Sample size distribution

States	Population	Population of Women	% of Total Population	Sample Per State	Treatment	Control
Abia	3,727,347	1,900,947	14%	107	53	54
Akwalbom	5,482,177	2,795,910	20%	157	78	79
Delta	5,663,362	2,888,315	21%	162	81	81
Rivers	7,303,924	3,725,001	27%	208	104	104
Ondo	4,671,695	2,382,564	17%	134	67	67
Total	**26,848,505**	**13,692,737**	**100%**	**768**	**383**	**385**

Source: FGN, 2017/ Authors' computation

3.2 Sampling procedure

Multi-stage sampling procedure was put to work in picking respondents used in the survey to produce data for the study. In procedure, we engaged stratified, quota and simple random samplings. In the first stage, we stratified Abia and Imo States in forming strata A, while Rivers and Bayelsa States were seen as strata B. Cross River and Akwa Ibom States formed strata C which was followed byDelta and Edo States (strata D); and finally, Ondo State forming strata E. From each of the stratas, we purposively chose one State on the basis of MOCs commitments in the State. We picked Abia from strata A; Rivers from B; Delta from C; Akwa Ibom from strata D, and Ondo, which is the only state in strata E.

In continuation, we used purposive sampling in the second stage to pick two local government Areas (LGAs) from each of the chosen States. This was based on the fact that the LGA is holding at least one MOC facilities. Therefore, ten (10) LGAs were designated for the study. In stage three, we purposefully picked 3 communities from each of the chosen LGAs on the same basis of hosting MOC facilities. Lastly, in ascertaining that there is proper representation in the selections made, we involved the community gate keepers to assist us arbitrarily choose 384 respondents from CDB communities and another 384 respondents from non-CDB communities. To this, we ended up choosing a total of 768 women as the respondents utilized in the study.

3.3 Data collection

Participatory research technique was made use of in the collection of data for the study because it acknowledged that handling of the views and opinion of those being studied is very essential (Renouard and Lado, 2012). Thus, we used semi-structured questionnaire to gather the cross-sectional data used. The data collection was handled using indigenous people as research aides. These aides were chosen because we (the researchers) could not

speak the varied languages and dialects of the local people in the study area. Besides, the territory's hostile and rough nature necessitates the use of assistance of such aides who understand the dialects, languages, and cultures of the people. Scores were allocated to the questionnaire in line with the research objectives.

3.4 SCOTDI model

MOCs operating in the Niger Delta carry on facing the problem of how to regulate the success or failure of their CSR initiatives either in terms of its impact on community development or its influence on corporate-community relations (Chevron, 2014, 2017). To effectively handle this problem, MOCs in 2013 brought into existence the Shell Community Transformation and Development Index (SCOTDI) which represent an innovative structure that incorporates and adapts some international principles into a composite index in a way that is responsive to local context (SPDC, 2013, 2018). In this examination SCOTDI structure will be utilized in accessing and ranking the performance of various GMoU clusters within the MOCs' host communities.

3.5Analysis framework

The work evaluated both the roles and potential roles of MOCs CSR using GMoU in improving rural women's ability to access rural labour market in the host communities in the Niger delta region. To accomplish the research objectives, we used both descriptive and inferential statistics. The first and fourth objectives were actualized using descriptive statistics, while the second and the third were attained using inferential statistics of assessing both propensity score matching (PSM) and logit model. These methods were picked to handle the hitches of selectivity and endogeneity. For the detail of the analytical framework of the study, see appendix.

4. Results and discussion

4.1 Descriptive characteristics

In this examination (Table 2), we began with the description of some of the respondent's social (gender, education, access to health care and such), economic (land ownership, access to money etc.) and demographic (age, experience) features (characteristics). These features are essential in clutching the variations in the socio-economic status of the households who partake in CDBs as compared to their counterparts who do not participate in any.

Table 2: Socio-economic characteristics of the respondents

	Treatment Group			Control Group		
Variables	**Freq**	**%**	**Cum**	**Freq**	**%**	**Cum**
Age of Respondents						
Less than 20 years	15	4	4	20	5	5
21 - 25 years	115	30	34	91	24	29
26 - 30 years	80	21	55	82	21	50
31 - 35 years	59	15	70	70	18	68
35 - 40 years	46	12	82	45	12	80
41 - 45 years	30	8	90	31	8	88
45 - 50 years	22	6	96	28	7	95
Above 50 years	16	4	100	18	5	100
	383	100		**385**	100	
Level of Education						
None	51	13	13	71	18	18
FSLC	138	36	49	158	41	59
WAEC/WASSCE	111	29	78	103	27	86
Degree and above	83	22	100	53	14	100
	383	100		**385**	100	
Household Size						
1-4 Person	178	46	46	149	39	39
5-9 Person	153	40	86	141	37	75
10-14 Person	40	10	97	65	17	92
15 Person and above	12	3	100	30	8	100
	383	100		**385**	100	
Marital Status						
Single	47	12	12	70	18	18
Married	206	54	66	275	71	89
Widow	58	15	81	13	3	93
Divorced/Separated	72	19	100	27	7	100
	383	100		**385**	100	
Primary Occupation						
Fishing	92	24	24	66	17	17
Trading	72	27	51	48	12	30
Farming	102	19	69	169	44	73
Paid Employment	32	8	78	25	6	80
Handicraft	67	17	95	42	11	91
Others	18	5	100	35	9	100
	383	100		**385**	100	
Annual Income						
1000 - 50,000	12	3	3	44	11	11
51,000 - 100,000	39	10	13	93	24	35
101,000 - 150,000	65	17	30	102	26	62
151,000 - 200,000	61	16	46	74	19	81
201,000 - 250,000	81	21	67	43	11	92
251,000 - 300,000	82	21	89	14	4	96
Above 300,000	43	11	100	15	4	100

	383	100	200	**385**	100	199

Source: Authors' compilation based on household survey.

Analysis (Table 2) expresses that 768women were tried out with about 383 from CDB communities and 385 from the non CDB communities. Result makes it clear that only about 13% and 18% of the women in treatment and control respectively are stack illiterates. This suggests that formal education is not really a major problem among the women. Also, the result reveals that only 33% of the women in the treatment group participate in traditional industries (Farming and Fishing) while the control has 61% in the same category. This implies that most of the women partake in agriculture or fishing value chains as aides to their husbands, regrettably majority of their labour are not paid for. Because of the development of human capital entrenched in CSR, the variance has shown that more women are involved in paid labour among the CDB communities. About 27% of the women in the treatment group participate in trading. 8% are involved in other paid employment (private or public) while about 17% are in other artisanal set ups. For the control group, it is 12%, 6%, and 11% respectively.

In terms of earnings, about 30% of the women in treatment group make between ₦1000 to ₦150, 000 ($1.8 – 272.7) annually. For the control group, it is 62%. This implies that only about 38% of the women in control group make more than ₦150, 000($272.7) annually, while about 70% of the women in treatment group earn that much. Worthy of note is the fact that while about 11% of the treatment earn above ₦300, 000($545.5), only about 4% could earn such among the control. This may be ascribed to human capital development that have prepared women in the treatment group to pursue careers with reduced multiple trade-offs, obtainability of public works programme and reinforced right and voices. However, even with the significant variance between the treatment and control groups, the average earnings of all (both the treatment and the control groups) is still poor (low). Impoverishment still abounds among the women in the Niger Delta region of Nigeria. This finding sees things in the same light with Beneria (2016) in that women face multiple trade-offs in the distribution of their time and, without plan of action and investments in labour-saving technologies, labour market involvement is often not an option – even when the chances are existing.

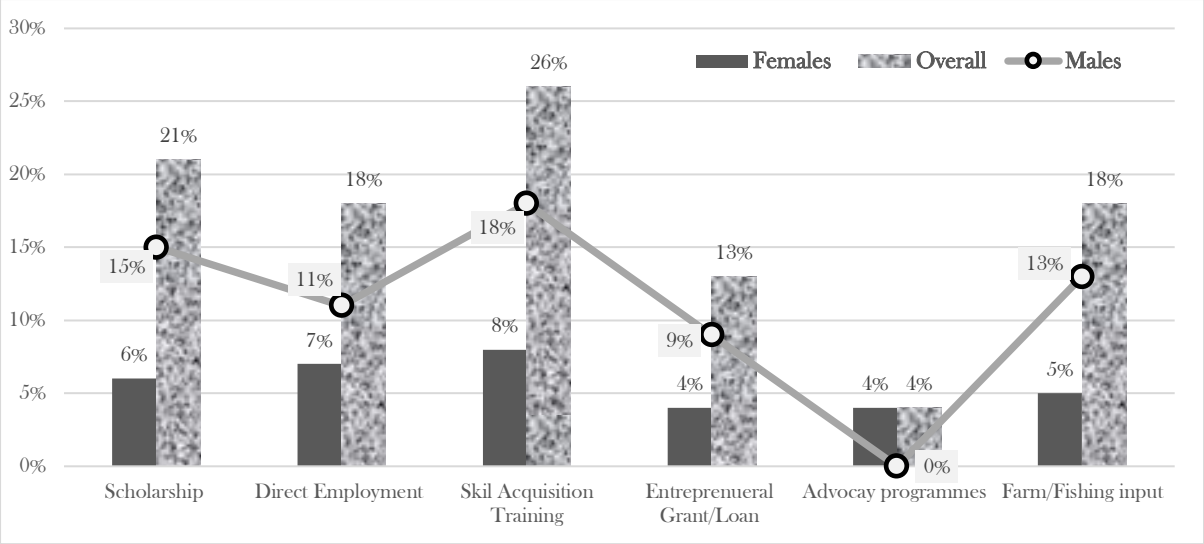

Figure 2. Percentage distribution of CSR intervention of MOCs Using GMoU by nature of empowerment received by Households in the Niger Delta

Source: PIND, 2015/Authors' modification based on household survey.

Analysis (Figure 2) expresses the natures of enablement received by women in treatment group compared to men. Looking at scholarship which got as much as 21% of the empowerment intervention, women enjoyed 6% leaving men with 15%. Others are 18% for direct employment, men got 11% leaving 7% for women. For the 26% that went to skill acquisition and training, 18% went to men while the remaining 8% went to women. For the 13% that went into soft loan and grant for entrepreneurship development, men took 9% while women got 4%. 18% was set aside for farmers and fishers input subsidy. Out of this, men got 13% while women took 5%. Finally, about 4% of the CSR intervention went into advocacy; women accounted for all of them. This shows that substantial inputs are being made and any increase in the noted areas above will go a long way in affecting the participation of women in the labour force of the host communities. The findings agree with IFAD (2019) in that women, when educated, remain significantly over represented, and any enhanced access to education and probably better – quality education will help bridge the wage gap and, more importantly, allow women to broaden their horizons by flaring the opportunities presented to them. This suggests that in Niger Delta where agriculture is a key source of employment for women, improvement of skill via GMoU interventions should make women better and reduce the knowledge gaps while focusing on extension services cum vocational training.

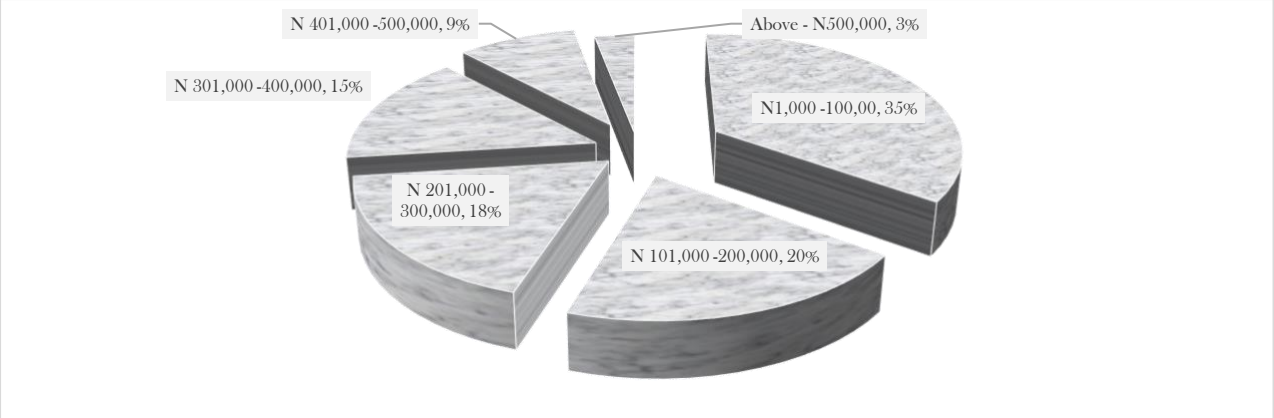

Figure 3. Average value of CSR receipts from the GMoUs by respondents
Source: Authors' compilation based on Field Survey.

The analysis (Figure 3) reveals the level of CSR that the women have enjoyed among the treatment group. While about 55% of women in the treatment group have enjoyed CSR interventions of as much as₦1,000 to 200,000 ($1.8 – 364), only about 3% of them have been given above ₦500,000 ($ 1,000). Moreover, while about 18% have been given between ₦201,000 to NGN 300,000 ($ 401 - 600), only about 15% have enjoyed between ₦ 301,000 to ₦ 400,00 ($ 601 - 800). Furthermore, only about 9% have received between ₦401, 000to 500,000 ($ 801 - 1000). This reveals that there may be a substantial effect of CSR intervention on women's access to credit, yet it is still very poor (small). This conclusion agrees with ILO (2010) in that women's access to monetary services is highly important in closing the gap in rural labour markets. This is, though, conditioned by their social, economic and legal, social positions within their homes and communities. This indicates that some of the intervention needed to close the gender gap in rural labour market are comparable to those needed for other asset categories like giving women equal rights in obtaining financial contracts, taking loans or procuring insurance policies in their own rights.

4.2 Level of Gender Participation in the CSR Intervention of the MOCs

To ascertain the level of women's involvement in the CSR activities and the labour market due to the utilization of the GMoU, their feelings and acuities were evaluated using SCOTDI, a structure of innovation to draw the outlooks of respondents on the matter of which the respondents are being appraised.

Table 3: Gender involvement in CSR interventions in the coastal communities of Niger Delta

Criteria	Variables	Low	Mod	High	Overall
Governance:					
	Election or selection of CDB member	26			18.4

	Tenure limit well defined		31	Low
	Succession processes well outlined and adhered to	15		
	Rule of law upholds	7		
	Freedom of aspiring to represent	13		
Inclusiveness:	Sensitive to gender	28		18.5
	Sensitive to people living with disabilities	10		Low
	Sensitive to sectors (especially Farming and fishery)	7		
	Sensitive to residence location (rural/urban area)	3		
	Sensitive to Age (young rural women)	29		
	Sensitive to culture and social norms		34	
Transparency	Openness of the commercial process	18		15
	Openness of financial management process	16		Low
	Openness of the decision making process	20		
	Fight against corruption	14		
	Free flow of information (even to the rural women)	7		
Participation	Equality in the distribution of benefits	9		9.4
	Extent of participation in GMoU process	10		Low
	Sense of ownership of project	12		
	Freedom to generate or suggest projects	5		
	Level of bottom top approach in project designing	11		
Continuity	Self-sustainability of the project	18		16
	Capacity building ability of project		38	Low
	Future centeredness of the project	15		
	Alignment between GMoU projects and community priority	4		
	Diversity of sources of funding	5		
Outcome	Grievance management	14		12
	Rural women gainfully employed	5		Low
	Community and MOCs relationship harmonized	10		
	Business environment enhanced	14		
	Enhanced gender advocacy by GMoU	18		

Source: Authors' compilation based on Field Survey.

The opinions of the women were sought on the issue of involvement of females in the CDBs as body running the CSR via the use of GMoUs, governance of the cluster development boards, openness in the management, inclusiveness in the decision making, as well as the steadiness of the CDBs after MOCs' CSR intervention, and the result of the GMoUs in the Niger Delta region. The outlooks of the women of the rural communities were very essential because the views of companies or even the men for the women are not very reliable.

Analysis (Table 3) reveals how the rural women rated the CDBs as it concerns their (women's) involvement in the GMoUs. For pellucidity of the activities of the CDBs, the women rated it very low with a score of 15 out of 100 points. In terms of involvement, the women rated it an

average of 9.4% showing that their contribution is very low. The implication is obvious: men dominate the governance and will always take decision that is gender biased. Inclusiveness was rated 18.5% while governance got a rating of 18.4%. This endorses the feeling of the women, especially the rural women, about not being fully included like their male counterpart. The analysis indicates that while men took 32% rating in inclusiveness, the women rated themselves 6% which is very poor.

In rating their involvement at an average of 18.4%, the women believe that men's involvement is as high as 54% meaning that men of the communities habitually see their women as their responsibilities that they must represent everywhere. According to the women's rating, men are generally being highly empowered by the MOCs via the use of GMoU which is also handled by male controlled cluster development boards. Yet, further analysis show that these women are willing to take part in any CSR activities that will improve their chances of being involved in the labour market through human capital development aimed at them (women), reduction in multiple trade-offs that take major part of the man-hour of the women folks, availability of public work programmes for them and reinforcement of their rights and voices. This result tally with ILRI (2008) in that the lack of voice women suffers, especially in rural communities, is caused by and a consequence of the gender variances observed in rural labour markets. This entails that GMoU interventions can help realize decent work opportunities and economic cum social enablement through labour markets. It will, at the same time, reduce gender disparities in the area of informal employment in agriculture.

Table 4. Percentage rating of MOCs' CSR in helping women with labour market in the Niger Delta.

Activities	Total E&P	Exxon Mobil	Chevron	Shell	Agip	Others	Average: Field Survey	Average: Data from MOCs	Diff.
Provision of subsidised Farm inputs for women	20%	18%	20%	16%	17%	18%	18.20%	21.80%	3.60 %
Skill acquisition and business training	8%	21%	17%	18%	17%	19%	15.80%	16.70%	0.90 %

Advocacy visits to relevant stakeholder	5%	4%	3%	8%	6%	5%	5.20%	7.60%	2.40 %
Strengthening the right and voice of women	7%	5%	9%	6%	9%	10%	7.70%	8.90%	1.20 %
Provision of short loans targeting only women	7%	4%	5%	7%	6%	9%	6.30%	7.90%	1.60 %
Provision of subsidised Fishing input for women	18%	15%	13%	19%	16%	14%	15.80%	19.20%	3.40 %
Provision of seed grant for women entrepreneurs	13%	11%	12%	14%	14%	14%	13.00%	16.30%	3.30 %
Training on managemen t of multiple trade-offs	12%	15%	10%	8%	9%	6%	10.00%	13.40%	3.40 %
Provision of public works programme	10%	7%	11%	4%	6%	5%	7.20%	8.50%	1.30 %

Source: Authors' compilation based on Field Survey.

Analysis (Table 4) reveals the percentage distribution of CSR intervention of MOCs in authorization of rural women in involvement in labour force. We observed the investments made by the MOCs in the areas of setting up of short loans directed at women only, setting up of seed grant for women entrepreneurs, advocacy visits to significant stakeholder to boost women labour force contribution and consolidating the rights and voices of women. We also evaluated establishment of subsidised farm inputs for women, setting up of subsidised fishing input for women, skill procurement and business training, training on management of multiple trade-offs, and establishment of public works programme. The analysis shows thatsetting up of subsidised farm inputs for women by the major MOCs made up for 18.20% of women empowerment investment while investment in skill procurement and business training accounted for 15.80%. Others are investment in advocacy visits to significant stakeholder- 5.20%; consolidating the rights and voices of women - 7.70%; setting up of short loans aiming only at women -6.30%. Making available subsidised fishing input for women made up for 15.80%, while setting up of seed grant for women entrepreneurs took 13.00%. Training on management of multiple trade-offs got 10.0% while setting up of public works programme took 7.20%.

With all these, it is obvious that even though the level of investment is poor (low), the MOCs are making thoughtful and noteworthy efforts to ensure that the women are enabled and

included fully in labour market of the region. This may be ascribed to human capital development that have fortified women in the treatment group to pursue careers with discount in multiple trade-offs availability of public work programmes and reinforced women rights and voices. So, this proposes that if the MOCs will intensify intervention in CDBs, directed at enablement of the rural women in the labour market by 1%, the effect will be much. This result is line with FAO (2011) in that policy interventions should aim at school enrolment for girls, health interventions such as nutritional interventions and immunization that are directed at women's particular needs throughout their life circle; as informal labour is a main source of revenue for unskilled women in general, but mainly so in times of crisis.

4.3 Econometric estimations for participating in GMoU and access to CSR intervention

Table 5. Comparison of mean score and observable characteristics across Treatment and control for financial inclusion (N = 768)

Score in Percentage of maximum score	Treatment	Control	Difference
Scores on women's human capital development	44.87	21.56	23.31**
Scores on women's reduction in multiple trade-offs	48.09	26.26	21.83**
Scores on strengthening rights and voices of women	51.35	30.33	21.02**
Scores on provision of public works programme	32.44	20.56	11.88**
Socio-Economic Characteristics			
Education	25.24	24.43	0.81**
Age	24.45	24.24	0.21
Marital Status	27.24	26.02	1.22**
Income of other household members	32.54	24.32	8.22***
Household Size	19.76	19.21	0.55
Annual Income	36.56	19.35	17.21*
Primary Occupation	29.21	24.35	4.86**
Household Characteristics			
Socio-economic activities participation	24.66	21.45	3.21*
Access to Shelter	26.86	22.13	4.73**
Access to medical care	16.65	12.54	4.11***
Access to portable water	24.57	21.85	2.72*
Access to land	27.43	27.15	0.28**
Access to road and other civic infrastructure	21.78	19.63	2.15**
Observation	**383**	**385**	

Source: Authors' compilation based on household survey

In analysis of (Table 5), we display the summation of the average variances in the basic scores and independent observable characteristics between the treatment group and the control group. The means variance indicates that scores on women's human capital development, scores on their reduction in multiple trade-offs, scores on consolidation of their rights and voices, and scores on setting up of public works programme are considerably high

for the women in the CDB communities in comparison to the women in the non-CDB communities. The differences are, 23.31%, 21.83%, 20.02% and 11.88% respectively. With this variance as shown by the PS, we were able to ascertain that the MOCs' CSR using the GMOUs has a substantial positive effect in rural women's involvement in the labour market. These variances have triggered positive changes on the rural women's involvement in labour market among the treatment group as many women were vested with power to shift from the traditional labour forces to other non-farming cum fishing labour force.

Table 6. Logit model to predict the probability of receiving CSR conditional on selected observables

Variables[1]	**Coefficient**	**Odd Ratio**	**Marginal Effect**	**Std. Error**
Constant	8.124	2.842	.00231	.652
GMoU Perception	1. 123	6. 831	.123*	.031
Age	.103	. 313	.0021	.013
M_Sta	.034	1.321	.0203	. 123
Pri_Occ	. 251	. 352	.0120*	. 124
Anu_Inc	.024	.521	.028	.032
Inc_OHhM	-234	.321	.042	.032
CDB_Mgt	.012	. 328	.110	.034
Edu	.278	. 342	.041**	.016
Part_Ben	.739	1. 451	.0012***	.021
Observation	800			
Likelihood Ratio - LR test (ρ=0)		□□2 (1) =1374.421*		
Pseudo R^2	0.39			

*= significant at 1% level; ** = significant at 5% level; and * * * = significant at 10% level

Source: Authors' compilation based on household survey.

When we put to use the model in equation 2 above, our characteristics were such that captured relatable observable variances of both the treatment and control groups and projected the prospect of treatment for the rural women. The marginal effect, standard error, as well as the likely coefficients and the odd ratio conveyed in terms of odds of Z=1 are shown in Table 6. Looking at the single observation, we observed that the view of GMoUs by the rural women, primary employment, CDBs management system, highest educational level, and involvement benefits were the factors that had positive influence on the rural woman seeking direct CSR in the GMoU programmes. In addition, age of the women, annual revenue and earnings of other member of the rural women household has a negative effect on their seeking CSR of the multinational oil companies.

[1]Age = age of respondent, Sex = sex of respondent (Male =1 female = 0), Pri_Occ = primary occupation of respondent, Edu = Highest level of education of respondent, Anu_Inc = Income of the respondent, CDB_Mgt = management system of the CDB leaders, M_Sta = Marital status of respondent, Part_Ben = evidence of benefit of participants and Inc_OHhM = income of other household members

Table 7. Estimated impacts of CSR activities of MOCs using GMoU on women Labour market participation via different matching algorithms

	Access and Knowledge Score in Percentage of Maximum Score		**Average Treatment effect on the treated**
	Treatment	Control	Difference
Nearest neighbour matching	Using single nearest or closest neighbour		
Scores on women's human capital development	44.87	21.56	23.31**
Scores on women's reduction in multiple trade-offs	48.09	26.26	21.83**
Scores on strengthening rights and voices of women	51.35	30.33	21.02 **
Scores on provision of public works programme	32.44	20.56	11.88**
Observations	**365**	**365**	
Radius matching	Using all neighbours within a caliper of 0.01		
Scores on women's human capital development	37.24	11.84	17.4**
Scores on women's reduction in multiple trade-offs	31.21	22.25	8.96**
Scores on strengthening rights and voices of women	33.41	23.38	10.03**
Scores on provision of public works programme	26.84	14.51	13.90**
Observations	**383**	**385**	
Kernel-based matching	Using a bi-weight kernel function and a smoothing parameter of 0.06		
Scores on women's human capital development	30.55	17.43	13.12**
Scores on women's reduction in multiple trade-offs	29.26	13.82	15.44**
Scores on strengthening rights and voices of women	35.62	25.412	10.28**
Scores on provision of public works programme	21.32	14.52	6.80**
	325	365	

*= significant at 1% level; ** = significant at 5% level

Source: Authors' compilation based on household survey.

In line with the probability of treatment expected in the model, the effect of CSR of the MOCs using the GMoU on enablement of rural women in the labour market in the host communities, we proposed the average treatment test (ATT). This was carried out after we have fully certified that the observations were ordered haphazardly and that there were no large discrepancies in the distribution of propensity scores. The nearest neighbour matching (NNM) was the matching method that produced the highest and most substantial treatment effect. These effects were assessed in line with the following outcome categories: women's human capital development, their reduction in multiple trade-offs, consolidation of their rights and voices and setting up of public works programme. Analysis of Table 7 indicates the NNM evaluation of women's human capital development is about 23%. Having seen this, we turned over to other ways (Kernel-based and Radius matching) because we believe that the NNM method's result was poor maybe due to insufficiency of information. On the contrary, using radius matching algorithm, the projected effect of women's human capital development was seen as approximately 17% while Kernel-based matching algorithm produced an average treatment effect of 13%. To this, we say that CSR of MOCs have made

available substantial gains in rural women's labour market enablement in Niger Delta region of Nigeria.

Table 8. Imbalance test results of observable covariates for three different matching algorithms via standardized difference in percent

Covariates *X*	**Standardized differences in % after**		
	Nearest neighbour matching	**Radius matching**	**Kernel-based matching**
Constant	4.8	33.7	21.4
GMoU Perception	4.5	39.8	21.9
M_Sta	4.7	36.4	8.3
Pri_Occ	5.7	32.8	25.8
Age	3.6	16.4	11.4
Anu_Inc	2.1	11.8	14.6
Inc_OHhM	4.1	21.6	16.3
Edu	3.8	18.5	15.7
CDB_Mgt	2.7	46.7	19.8
Part_Ben	3.7	25.4	17.4
Mean absolute standardized difference	4.2	27.8	16.2
Median absolute standardized difference	4.7	36.4	8.3

Source: Authors' compilation based on household survey

In examination of (Table 8), we express the overall balance of all covariates between the women in the CDB communities and their counterpart. This endorses that the nearest neighbour matching is of higher quality and produced a better result when in comparison to others. The nearest neighbour matching is rationally below the threshold of 5% while the kernel-based matching and radius in both the mean and the median of the absolute standardized variance after matching are far above the threshold of 5%.

Table 9. Sensitivity analysis with Rosenbaum's bounds on probability values

	Upper bounds on the significance level for different values of e^{γ}				
	e^{γ}= 1	**e^{γ}= 1.25**	**e^{γ}= 1.5**	**e^{γ}= 1.75**	**e^{γ}= 2**
Nearest neighbor matching	Using single nearest or closest neighbor				
Scores on women's human capital development	0.0001	0.0021	0.0315	0.022	0.0125
Scores on women's reduction in multiple trade-	0.0001	0.0042	0.0018	0.082	0.053

offs					
Scores on strengthening rights and voices of women	0.0002	0.0241	0.1462	0.623	0.062
Scores on provision of public works programme	0.0001	0.0021	0.0043	0.014	0.0745
Radius matching	Using all neighbors within a caliper of 0.01				
Scores on women's human capital development	0.0002	0.0033	0.0021	0.141	0.0271
Scores on women's reduction in multiple trade-offs	0.0001	0.0013	0.0031	0.0512	0.123
Scores on strengthening rights and voices of women	0.0001	0.0051	0.0016	0.031	0.023
Scores on provision of public works programme	0.0001	0.0041	0.0213	0.311	0.421
Kernel-based matching	Using a bi-weight kernel function and a smoothing parameter of 0.06				
Scores on women's human capital development	0.0001	0.0171	0.0243	0.132	0.0016
Scores on women's reduction in multiple trade-offs	0.0001	0.00170	0.0022	0.021	0.0227
Scores on strengthening rights and voices of women	0.0001	0.00143	0.0017	0.012	0.0121
Scores on provision of public works programme	0.0001	0.00213	0.0020	0.015	0.0322

Source: Computed from the field data by authors

Analysis (Table 9) indicates that KM generated more vigorous treatment effect compared to NNM and RM in line with assessments to hidden bias in women's ability to obtain credits, their tendency to save, their access to insurance, and their ability to enjoy expanded economic opportunities. This is why there is a possibility that matched pairs may be different by up to 100% in unobservable characteristics, while the impact of CSR of the MOCs using the GMoU as scrutinised by the CDBs on women's ability to obtain credits, their tendency to save, their access to insurance, and their ability to enjoy expanded economic opportunities, would still be significant at a level of 5% (*p*-value = 0.0016, *p*-value = 0.0227, p-value = 0.0121, and *p*-value 0.0322 respectively). Same classes of knowledge score are robust to hidden bias up to an influence of e^{γ}= 2at a significance level of 10% following the radius matching approach. These finding advocates that, The CSR of the MOCs via GMoU activities are making some efforts in enablement of rural women to actively play a part in the labour market of the Niger Delta region.

Overall, the results of this study propose that the relative priorities of MOCs' CSR interventions should not be the same with the classic, American ordering, as suggested by Carroll (1991). Making cultural context key in the determination of suitable CSR priorities and programmes, as suggested by Visser (2006), is essential in the context of the rural Niger Delta. But taking it further and adding more to the effort as a contributing to how CSR interventions have helped advance gender equality in rural labour market in the Niger Delta, we would argue that MOCs' CSR can be vital in bridging the gap through investments aimed at women's multiple trade-offs, reducing gender inequalities in human capital, capitalizing on public

works programmes, solidifying women's right and designing a voice for the intricacies of real life. Admitting the web of problems within families, communities as well as policy level that forms a woman's experience is critical to executing real CSR program. We are of the opinion that the private sector, generally, is well placed to address some of the logistical and cultural problems that face women's participation in rural labour markets in the Niger Delta. MOCs, specifically, are well suited for bettering women's involvement in rural labour markets via GMoU programmes. They help free women's time through labour-saving technologies and making public services available, making women's human capital to go higher through education, removing discriminatory employment practices, and exploiting public works programme. Thus, achieving gender equality in rural labour markets should be the priority of CSR activities in the Niger Delta because such will be a plus towards making the environment safe for business in the region.

5. Concluding Remarks, Caveats, and Future Research Directions

This paper aims to critically look at the multinational oil companies' (MOCs) corporate social responsibility (CSR) initiatives in Nigeria. Its main focus is to investigate the effect of the global memorandum of understanding (GMoU) on the participation of women in rural labour market in the Niger Delta region of Nigeria. This paper embraces a survey research technique which gathers information from a representative sample of the population, as it is basically cross-sectional, defining and construing the current situation. Several respondents (768) were sampled across the rural areas of the Niger Delta region. The outcomes from the use of a combined propensity score matching and logit model show that CSR of the MOCs using GMoU model achieved little, yet, significantly affecting women's involvement in the labour market positively by freeing women's time via labour-saving technologies and making available public services, increasing women's capital through education, abolishing discriminatory employment practices and exploiting public works programmes. This brings to light that the causes of gender inequality in rural labour markets are institutional, in the form of social norms and the structure of labour market organizations. This can be tackled as a whole via corporate social responsibility programmes, government plans of action (policies), and making women stronger in labour organizations. The implication for policy largely surrounds the relevance of how CSR can be consolidated by MOC in cutting rural impoverishment which requires not just the barriers to women's involvement in decent employment but going for a policy that will change people's awareness of what is probable, valuable, and reasonable; fosters supportive action; and braces women's negotiating power at home, in the workplace, and even at the marketplace. In terms of implication for practice it is apparent from the finding that gender equality in rural labour market in Niger Delta, Nigeria can be enhanced by MOC's CSR using GMoUs. Hence, more rural women (especially those in the informal economic sector) need to leverage on the GMoUs to benefit from associated rewards, *inter alia:* insurance of women farmers receiving farm input subsidy support from the GMoU intervention through agro-dealers, provision of vital agro-information, availability of an agricultural extension system, and participation in micro-lending schemes.

Achieving the bridging of gender gap in agriculture is not an easy task, but it is possible to make headway and simple interventions can sometimes be very powerful. Cautiously designed policies, schemes and projects can work with prevailing cultural norms, via the public and private sectors, in ways that both men and women gain. This research adds to the gender debate in agriculture from a CSR standpoint in developing countries and foundation for demands for social project by host communities. It states strongly that business has a responsibility to help in solving problems that affect the public. The main limitation of the study is that it only concerns the oil host communities in Nigeria. Therefore, the results cannot be widespread to other rural communities of African nations with the same policy problems. Based on this inadequacy, reproducing the analysis in other countries will be

valuable in examining whether the established nexuses survive empirical study in diverse rural context of Africa.

Disclosure statement

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Appendix

Study Analytical Framework

In the PSM, two sets of respondents utilized were respondents from communities drawn from the CDBs (the treatment group) and otherwise (control group). According to Rosenbaum and Rubin (1983), propensity score matching is simply conjecturing the probability of a treatment based on perceived covariates relating to both group (treatment and control). PSM encapsulates the pre-treatment features of each subject into a single index variable and is then put into use in matching similar individuals (Ravallion, 2001). Stating it another way, an ideal comparison group is selected from a larger survey and then matched to the treatment group on the basis of a set of observed features on the predicted probability of a definite treatment given observed characteristics (propensity score). This is the reason we adopted the methodology.

Our assumption here is that, treatment decision (Participating in a CDB), although not arbitrary, in the end hinges on the variables observed. Being able to match variable X means that one is capable of matching probability of X as posited by Rosenbaum and Rubin (1983). As a result, the treatment group is denoted as R_i =1 for rural woman$_1$, and R_i = 0 for control group. We went on to match the treatment group to the control group on the grounds of the propensity score: (Probability of Participating in a CDB given observed characteristics).

Hence:

$$P(X_1) = Prob(R_2 = \frac{1}{X_2})(0 < P(X_2) < 1) \qquad (2)$$

Here, X_1 is a vector of pre intervention control variables, if R_1's is independent over all $_1$'s and the results are independent of intervention given X_1, then results are also independent of intervention given $P(X_1)$, that will also be the case if intervention is received arbitrarily. To draw specific conclusions about the effect of the intervention activities on labour market, we evaded choosing bias on observables by matching on the probability of the treatment (covariates *X)*. Therefore, we defined the propensity score of Vector X as:

$$P(x) = P_r\left(Z = \frac{1}{X}\right) \qquad (3)$$

Where the Z represents the treatment indicator =1 if the carefully chosen rural woman is drawn from a CDB community and zero otherwise. Nevertheless, for the fact that propensity score is a balancing score, the observables *X* was dispersed in the same way for both treatment and control and the dissimilarities are seen as the feature of treatment.

We tried getting this unbiased impact estimates by working in line with four steps adapted with modification from Lompo and Trani (2013). Firstly, we acknowledged that the treatment is projected by a binary response model, with suitable observable characteristics. For this, we assessed the logistic model of CDB involvement or not as a function of some socio-

economic features including such variables as individual, household and community represented in this equation as follows:

$$P_x = log\ \frac{P_i}{1-P_1} = log0_i = \alpha_i + \beta_i x_i \ldots\ldots\ldots + \ldots \beta_n x_n \quad (4)$$

We produced value for the probability of partaking in CDBs from the logit regression allocating each rural women a propensity score. The control groups with very low propensity score outside the range found for being involved were dropped at this point. For each woman playing a part in a CBD, another woman not partaking that has the closest low propensity score was acquired. We used the nearest five neighbours to make the assessment more severe. The mean values of the result of indicators for the nearest five neighbours were calculated and the variance between the mean and actual value for treatment is the evaluation of the gain due to CSR intervention undertakings of the MOCs. This variance between treatment and control groups is appraised by the average treatment effect on the treated (ATT) expressed as:

$$ATT_{PSM} = \sum_{P(X)}\{\sum(\frac{y_i}{Z} = 1, P(x) - \sum \frac{y_0}{Z} = 0, P(x)\} \quad (5)$$

Where EP(X) = expectation in relation with the spreading of propensity score in the population. The ATT shows the mean variance in labour market access.

We checked the matching estimators' feature by standardized variances in observables' means between treatment group and the control group. Representing variance in percent after matching as $\acute{X}_1$ for the dissimilarity in sample for treatment and $\acute{X}_0$ for the matched control. We followed Uduji et al 2020 and indicated the sub-samples as a percentage of the square root of the average sample variance as: $(\int_1^2 and \int_0^2.)$

Hence:

$$|SD = 100 * \frac{(\acute{X}1 - \acute{X}0)}{\left(.05\ \int_1^2 and \int_0^2.)1/2\right)} \quad (6)$$

We acknowledged that the enduring bias after matching is 5% or below, though, there is no clear threshold of effective or failed matching, we assumed that the balance among the varied observable characteristics between the matched groups is adequate. The problem of hidden bias was abutted by the vaulting tactic. So, in equation 4, we made up for the logit model to evaluate PS by a vector *U* encompassing all unobservable variables and their impacts on the possibility of treatment as captured by γ:

$P(x) = Pr(Z= 1/X) = F(Xa + U\gamma) = e^{XaU\gamma}$ (7)

Finally, we looked at the strength of the influence of γ on treatment with the use of sensitivity analysis. This was for us to weaken the effect of treatment on potential outcomes. This is to say, we anticipated that the unobservable variable is a binary variable taking values 1 or 0.

To this, the treatment possibility is applied in line with the bounds on the odds ratio as stated thus:

$$\frac{1}{e\gamma} \leq \frac{P(Xm)(1-P(Xn))}{P(Xn)(1-P(Xm))} \leq e\gamma \qquad (8)$$

Same probability of involvement in CDBs exist for each woman as long as they are identical in X, and only if $e\gamma = 1$ (Rosenbaum and Rubin, 1983).