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## PROMOTING GENDER EQUALITY AND WOMEN'S EMPOWERMENT IN AQUACULTURE VALUE CHAIN: THE ROLE OF CORPORATE SOCIAL RESPONSIBILITY IN NIGERIA'S NIGER DELTA

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## Abstract

**Purpose** – The purpose of this paper is to critically examine the corporate social responsibility (CSR) initiative implemented by multinational oil companies (MOCs) in Nigeria. Its special focus is to investigate the impact of the global memorandum of understanding (GMoU) on mainstreaming gender in aquaculture value chain in the Niger Delta region of Nigeria.

**Design/methodology/approach** – This paper adopted a survey research technique, aimed at gathering information from a representative sample of the population. It was essentially cross-sectional, describing and interpreting the current situation. A total of 800 women respondents were sampled across the rural areas of the Niger Delta region.

**Findings** - The results from the use of a combined logit model and propensity score matching indicate that CSR of the MOCs using the GMoU has recorded little but significant success in improving women's participation in the socio-economic activities of the region. The results also demonstrated that if women had equal access to the opportunities available to men such as finance, training on ponds, extension services, inputs (fingerling, fish feed, cages and pens), and other resources, they would behave similarly.

**Practical implications** – In terms of implications for practice, it is apparent from the findings that productivity of women in aquaculture in Nigeria's Niger Delta region can be enhanced by means of MOCs' CSR via GMoU programmes. Hence, more women in aquaculture (especially those in the informal economic sector) need to leverage on the GMoU programmes in order to benefit from associated rewards, and inclusion in taking on of aquaculture technology (production of fingerling and juveniles, improved feed, better pond management, and technology advancement).

**Social implications** – The result implies that in order to promote gender equality and empower women in the aquaculture value chain, women should be encouraged to participate in GMoU clusters decision-making process, and be provided with access to physical and capital resources for developing their industry and meeting their needs and aspiration. It also indicate the necessity of the GMoUs to provide women with training and formal education to improve the efficiency, profitability and sustainability of their socio-economic activities, ensuring adequate infrastructure, equipment, technologies and access to markets.

**Originality/value** - This research contributes to the gender discourse in aquaculture value chain analysis from a CSR perspective in developing countries and the rationale for host communities' desire for socio-economic projects. It concludes that business must assist in solving public – interest challenges.

**Keywords** Aquaculture value chain, gender equality, women empowerment, corporate social responsibility, sub-Saharan Africa

**Paper type** Research paper

## 1. Introduction

Oil in Nigeria is mostly extracted in the expanse of Niger Delta. The Niger Delta consists of many rivers, seas, and creeks which makes available a strong pattern of marine and inland fish catch. Nevertheless, as a result of the seasonal nature of capture fisheries, combined with the negative effect of oil and other industrial undertakings on the aquatic ecosystem in the Delta, fishermen in the area have been pushed to seek other occupation, outside the fisheries sector to sustain their means of support (Uduji and Okolo-Obasi, 2020). The persistent decline of fish stock in and around the Niger Delta and waning success in the stagnant capture fisheries sector makes it a necessity to help support aquaculture, particularly in the coastal community (PIND, 2011). Extensive adoption of aquaculture makes room for the availability of significant amounts of table fish on a maintainable basis as well as employment opportunities. Yet, the aquaculture sector is often taken to be a male dominated area because of the hugeness of investment and embracement of new technology which it is linked to in the region (Asongu et al, 2019, 2020). Women have been the ones keeping and sustaining the sea food and aquaculture industry in the region, but their participations, as it were, are usually not recognized or valued (Adam and Njogu, 2022). While women are progressively entering the field and leading in aquaculture, openings for them have generally not kept pace with the industry's growth, despite aquaculture being the fastest-growing sector of food production in the region (Ikenga et al, 2023).

For the time being, multinational oil companies (MOCs) participate in a plethora of corporate social responsibility (CSR) undertakings in the Niger Delta and other parts of the nation, Nigeria. Each year, MOCs maintain investments in CSR projects and programmes in communities primarily in the Niger Delta. The investments initially were in the advancement of agricultural programmes in the early sixties but have grown with time to include water projects, healthcare, roads and civil infrastructure, small businesses, as well as education, which benefit the people in the area (SPDC, 2013). MOCs also with time improved on how they get into deals with local communities to provide these CSR projects. In 2006, they brought into functioning a new way of engaging with communities called the global memorandum of understanding (GMOU). Under the terms of the GMOUs, the communities choose what development they want while MOCs make available funding for five years, to ensure that the communities have stable and dependable funding as they carry out the execution of their community advancement plans (Egbon et al, 2018). This method replaces the previous one in which MOCs agreed to hundreds of distinct projects with separate communities and execute them directly and discretely. The GMOUs represents a key shift in CSR approach, laying emphasis on more transparent and responsible processes, communicating steadily with the grassroots, sustainability and prevention of conflicts (Chevron, 2014).

Nevertheless, the development of CSR – GMoU model has to a large extent been taken to be a strategy employed by MOCs to repel public criticism of their behaviour, and a practice that helps them evade government regulations (Uduji et al, 2020). As an ideology, GMoU has really been attacked, and there is now fierce argument over its effectiveness and practical implications. While supporters take it to be a vehicle for possible reinvigoration of an old dynamic in business – community relationships, attackers see it as a basis for new function to be demanded of an old institution. This variance in observation invariably sets the context for the GMoU debate, setting in opposition those for the GMoU idea against those who insist that business – community relationships must get used to changing community values (Okolo-Obasi et al, 2021; Tamuno, 2020; Renouard and Lado, 2012; Uduji et al, 2024; Francis et al, 2011; Mamudu et al, 2021; Asongu et al, 2018; Lompo and Trani, 2013; Amaeshi et al, 2006, and Ekhatior, 2019). Based on this given foundation and apparent gap in the literature, the positioning of this research has three main aims which flow in line with the MOCs' CSR model (GMoUs) relative to sustainable development goals (SDGs) of the United Nations in gender parity:

- i. Critically look at the levels of MOCs' CSR investment in policy dialogue and advocacy in the aquaculture sector to make certain that results are evenhanded gender-wise in Nigeria's Niger Delta.
- ii. Establish the effect of MOCs' GMoUs on women's inclusion in taking on of aquaculture technology (production of fingerlings and juveniles, improved feed, better pond management, and technological advancement) in Nigeria's Niger Delta.
- iii. Evaluate the implications of closing the gender gaps in aquaculture value chain functions (production, reaping, consolidation, and marketing) in Nigeria's Niger Delta.

## 1.1 Study hypothesis

MOCs' CSR interventions towards economic progress in Niger Delta communities in 2014 focused on bringing down the cavity in knowledge and weak agronomic practices that lead to poor yield and lack of competitiveness among small – holder farmers (Chevron, 2014). In aquaculture, GMoU clusters carried out effective demonstration pond pilot projects which ended in 2018. The pilot's project enabled members of the Aquaculture Business Membership Organizations (BMOs) to boost their utilization of fish feed as well as to grow catfish in a more efficient cum profitable way (Uduji et al, 2020). As much as eighty (80) farmers from United Ufuoma Fish Farmers Association (UUFFA) in the Delta State area, gained from the effective pilot demonstration pond project. Based on findings, 87% of them experienced increased sales as a result of the interventions. Aside that, farmers within the UUFFA experienced additional



revenue of N6, 000,000 from sales of their fish (Okolo-Obasi et al, 2021). More money coming into the fish farming business increased the membership for fish farmers' associations. This is evidenced by a growth of UUFFA's members from a low 400 in September, 2013 to a high 3,686 by the end of third quarter of 2018 (Uduji and Okolo-Obasi, 2020). MOCs' CSR, using GMoU model, exposed a pool of local service providers to training so as to deliver both technical and business knowledge to fish farmers. The training was to improve on the quality of service delivery of farmers in States of the Niger Delta expanse. GMoUs also formed a partnership with Grand Cereal which is a fish feed manufacturing company that set up six demonstration ponds in Delta State, Nigeria. This ended up benefitting two fish farming association CAMP 74 Fish Farmers Association (CAFAN) and Liberty Fish Farmers Association (LFFA), each with 40 and 120 members respectively (Uduji et al, 2021, 2025a, 2025b). Marakute, another fish feed company, replicated the GMoU model in the UUFFA cluster by taking advantage of a GMoU trained local service provider to run demonstrations. This act of replication of the model by GMoU is a testament to the effectiveness of the programme. Women's role and the extent of their involvement in aquaculture value chains, for fish, seaweed, crab, and shrimps are extensive – much higher than in capture fisheries. However, while women are more of the victims of the costs of gender disparities, these costs are circulated extensively and are a cause of tenacious impoverishment for all member of the society in the expanse (Uduji et al, 2023, 2024). Thus, we postulate as follows:

- MOCs' CSR via GMoU has not provoked progressive changes on prejudiced laws and social reform that abate women's involvement in aquaculture value chain in the Niger Delta expanse of Nigeria.
- MOCs' CRS via GMoU has failed in addressing the glitches of gender variations in aquaculture value chain in the Niger Delta expanse of Nigeria.

In the light of the above, this research aims to answer the following questions: how does GMoU programmes of MOCs back helping women to have equal access to resources and openings in aquaculture value chain functions in Nigeria's Niger Delta region? The paper adds to the disparity debate in aquaculture value chain and inclusive growth literature from the standpoint of CSR. The study made use of a quantitative approach as well as an applied survey research technique. The positioning of this research moves away from contemporary aquaculture literature, which has *inter alia* focused on: threshold of external flows for inclusive human development (Asongu et al, 2019); women's performance in entrepreneurship development (Okolo-Obasi and Uduji, 2023); gender and aquaculture value chain (Kruijssen et al, 2018); gender action plans in the aquaculture value chain (Bosma et al, 2019); expanding the horizons for women in fisheries and aquaculture (Gopal et al, 2020); contribution by women to fisheries economies (Harper et al, 2017); women and men in small-scale fisheries and aquaculture in Asia (FAO, 2022); women of the water and inclusion in

aquaculture (Morrison et al, 2023); gender sensitivity response to climate change (Uduji and Okolo-Obasi, 2022); fighting African capital flight (Asongu et al, 2022); entrepreneurship development in sub-Saharan Africa (Okolo-Obasi and Uduji, 2021); women's contribution to aquaculture development (St. Louis and Oliveira, 2022), and promoting gender equality in aquaculture (FAO, 2016).

The remaining parts of the paper are organized as follows: section 2, a brief look at the theoretical underpinnings; section 3, describing the method and materials; section 4, presentation of the results and corresponding discussion; then, section 5, conclusion of the work with policy implications and future research directions.

## 2. Theoretical underpinnings

This study utilized quantitative methodology but handled the explanation of the result from a combined liberal feminist theory (Fischer et al, 1993, African CSR perspective (Visser, 2006; Amaeshi et al, 2006; Uduji et al, 2023), and Unger and Crawford, 1992). First, the liberal feminist theory stressed that the liberal feminist tradition goes back to earliest days of feminism, and argues for the need for social reform in order to enable women enjoy the same status and openings as men (Olusegun and Oyelade, 2021). The central basis of the liberal theory assumes that men and women are equal and rationality is to be the basis for individual rights, not sex (Ajala, 2017). It puts emphasis on the existence of discriminatory obstacles and systematic bias facing women (for example limited access to resources, exposure to learning, business experience), which must be got rid of (Okongwu, 2022). Liberal feminism is the expansion of political views of parity, entitlement, and individual rights. The liberal feminist outlook has been the foundation for many legal actions that have helped in bringing about greater equality for women (Ekhatior, 2019). Liberal feminism theory is the articulation of this theory in the context of women's entrepreneurship which postulates that if women were exposed to equal access to the openings available to men such as learning, work experience, and others, they would respond similarly (Fischer et al, 1993; Unger and Crawford, 1992).

Secondly, in line with to Uduji and Okolo-Obasi (2023), the challenge for CSR in evolving countries is outlined by a vision that is distilled into SDGs in 2015 to have a world with less impoverishment, hunger and disease, on the one hand, and greater prospect of survival for members and their offspring, better enlightened children, equal opening for women, and an environment that is healthier. The CSR pyramid of Carroll (1991) is probably the most recognized model of CSR; its four levels showing the relative prominence of economic, legal, ethical and philanthropic duties respectively. However, CRS exploration in Africa is also a basis for challenging the correctness and significance of Carroll's CSR pyramid. To Visser (2006), if Carroll's basic four-part model is accepted, it points to the relative priorities of CSR in Africa likely being dissimilar to the classic American ordering. Uduji and Okolo-Obasi (2022) have argued that Carroll's (1991) CSR pyramid may not be the best model for comprehending CSR in general, particularly in Africa. Amaeshi et al (2006) also have postulated that the Nigerian notion of CSR is remarkably vary from the Western version. Thus, this study takes on quantitative methodology but looks at the result from the liberal feminist theory and African CSR standpoint.

### 3. Materials and Methods

Descriptive research design was utilized in this study via quantitative method. We went for the quantitative method because of its scarcity as well as complexities of effect of MOCs' corporate social responsibilities in the expanse of interest – Nigeria's Niger Delta (Uduji and Okolo-Obasi, 2022, 2024). We put to use survey research techniques to source data from a sample of the female population in the expanse. With the use of participatory appraisal techniques, we gathered cross-sectional data using both survey and key informant interview (KII). The constituents' administrative states of the expanse are as identified in Figure 1.



**Figure 1:** Constituent administrative states of the Niger Delta, Nigeria

**Source:** NDDC, 2004/ Authors' modification

#### 3.1 Sample size

To actualize having a successful survey of the population, a sample size was generated using Yamane (1967) formula for sample size determination from a finite population. The formula is mathematically presented as follows:

$$n = \frac{N}{1+N(\alpha)^2}$$

Equation 1

Where:

$n$  stands for the sample size;

$N$  represents the total population of the study area

$\alpha$  stands for the margin of error at 0.05 for CI at 95%;

Hence, to calculate the sample size, we substituted thus:

$$n = \frac{21,744,914}{1+21,744,914(0.05)^2} = n = \frac{21,744,914}{54363.3} = 399.9 \text{ approximately } 400.$$

To suitably account for both treatment and control, we multiplied the figure by 2 which minimized the possible errors in the sample collected. Hence, 800 respondents was the total sample size put to use.

### 3.2 Sampling Procedure

To pick out the final sample of respondents used in this study, we utilized a multi-staged sampling method. In the opening stage, we recognized the nine states as strata that samples must be chosen from. In stage two, out of the states, we deliberately picked two local government areas (LGAs) based on the existence of MOCs facilities in the areas. In stage 3, from the chosen LGAs, we also intentionally picked two host communities each. This action was on the purpose that MOCs' facilities are present in such communities and that only one of the two communities belong to cluster development board (CDBs). Some of the selected communities belonging to a CDB were called CDB communities and seen as "treatment group", while others belonging to no CDB are regarded as non-CDB communities and used as "control group". From the chosen communities and with the aid of assistants, we arbitrarily picked 400 respondents from the CDB communities in addition to another 400 from the non-CDB communities. Therefore, a total of 800 respondents (Table 1), were put to use in the study and were picked from the constituent states as shown below:

**Table 1.** Sample size determination table

States	Total Population	Female Population	% of total population	State Sample	Treatment	Control
Bayelsa	2,277,961	1,161,760	5	40	20	20
Abia	3,727,347	1,900,947	9	72	36	36
Cross River	3,866,269	1,971,797	9	72	36	36
Edo	4,235,595	2,160,153	10	80	40	40
Ondo	4,671,695	2,382,564	11	88	44	44
Imo	5,408,756	2,758,466	13	104	52	52
Akwaibom	5,482,177	2,795,910	13	104	52	52
Delta	5,663,362	2,888,314	13	104	52	52
Rivers	7,303,924	3,725,001	17	136	68	68
	<b>42,637,086</b>	<b>21,744,914</b>		<b>800</b>	<b>400</b>	<b>400</b>

**Source:** NPC, 2007/Authors' computation

### 3.3 Analytical framework

We thoroughly treated the data gathered from the field after organizing, editing and coding. Both descriptive and inferential statistics were used in evaluating the data so as to actualise the objective and answer the research questions. To attain objectives 1 and 3, we used descriptive statistics and the outcomes from the descriptive statistics were made available in tables, figures and charts. On the other hand, to actualize objective 2 of the study, inferential statistic was employed as we assessed a logit model of receipt and non-receipt of multinational oil companies CSR as functions of chosen socio-economic variables. Following the works of Uduji et al (2022, 2024) embraced with adjustments, we stated the binominal response variables as a natural logarithm of the odds ratios as presented below:

$$\text{Log} \left( \frac{P_i}{1-P_i} \right) = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 + \alpha_3 X_3 + \alpha_4 X_4 + \dots \alpha_n X_n \quad \text{Equation 2}$$

Applying the variables we are interested in in the model, we assessed the effect of multinational oil companies CSR undertakings on gender equity in aquaculture value chain in the expanse of Nigeria's Niger Delta as follow:

$$\text{Logit (WIAAT)} = \alpha_0 + \alpha_1 \text{GCSR} + \alpha_2 X_{1\dots n} + \alpha_3 Y + \mu$$

Where:

WIAAT = Women's Inclusion in Adoption of Aquaculture Technology (which is in changes on prejudiced laws and social reform, production of fingerlings and juveniles, enhanced feed, better pond management, technology advancement).

GCSR stands for: The MOCs' CSR using GMOU

X represents: Other socio economic variables (Age, family size, employment, earnings, etc.)

Y stands for: Other moderating variables,

$\mu$  stands for: Stochastic error term.

\* In this model, the main parameter of interest is  $\alpha_1$  in terms of sign and significance.

## 4. Results and Discussion

### 4.1 Descriptive analysis

Analysis (Table 2) is the reactions from the survey which we commenced with a description of some of the respondents' social (academic), demographic (age, marital status, family size), and economic (job, family earnings) characteristic. The significance of these features is for an easy comprehension of the variances in the socio-economic and demographic difference of the treatment and control groups. The result shows that about 28% of respondent from the treatment group are fishers while, for the control group, it is about 30%. Also, while the treatment group has 12% of the respondents into trading, the control has 8%. As the treatment recorded 37% of farmers, the control recorded about 40 %. In handicraft, the treatment has 7% while the control has 10%. It is also seen that while as much as 10% of the treatment are working for others, about 6% of the control are in a similar condition. For average age, the treatment group has 32 years while the control group has 36 years. On the other hand, in the areas of formal exposure to learning (education), only about 5% of the respondents of the treatment group lack formal education, but the control has as high as 16%. Simply put, on average, only about 10% of the respondents are not formally exposed to learning among the women in the expanse. Conversely, irrespective of being in a treatment group or not, the average annual earnings of both groups members is in the low. While in the treatment group the average revenue is NGN200, 000 (about USD 140) annually, that of the non-CDB communities is an average yearly returns of NGN90, 000 (about USD 60). This shows that the level of impecuniousness is still in the high and out to be tackled with the CSR undertakings.

**Table 2 Socio - Economic Characteristics of the Respondents.**

Variables	Treatment Group			Control Group		
	Freq	%	Cum	Freq	%	Cum
<b>Primary Occupation</b>						
Fishing	112	28	28	120	30	30
Trading	48	12	40	32	8	37
Farming	148	37	77	160	40	78
Paid Employment	40	10	87	24	6	84
Handicraft	28	7	94	40	10	94
Others	24	6	100	24	6	100
	<b>400</b>	<b>100</b>		<b>400</b>	<b>100</b>	
<b>Age of Respondents</b>						
Less than 20 years	8	2	2	16	4	4
21-25 years	76	19	20	56	14	18
26-30 years	92	23	43	76	19	37
31 - 35 years	72	18	61	80	20	57
35 - 40 years	64	16	77	68	17	74

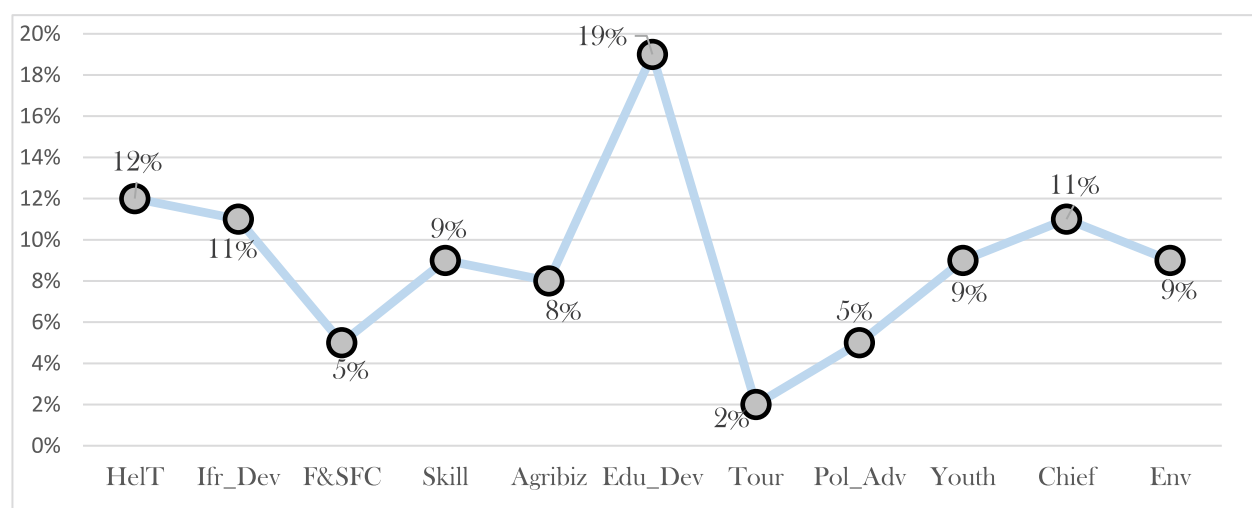
41 - 45 years	40	10	88	48	12	86
45 - 50 years	32	8	96	36	9	95
Above 50 years	16	4	100	20	5	100
	<b>400</b>	<b>100</b>		<b>400</b>	<b>100</b>	
<b>Level of Education</b>						
None	20	5	5	64	16	16
FSLC	180	45	50	188	47	63
WAEC/WASSCE	148	37	87	96	24	87
Degree and above	52	13	100	52	13	100
	<b>400</b>			<b>400</b>	<b>100</b>	<b>266</b>
<b>Marital Status</b>						
Single	68	17	17	72	18	18
Married	228	57	75	280	70	88
Widow	44	11	86	16	4	92
Divorced/Separated	60	15	100	32	8	100
	<b>400</b>	<b>100</b>		<b>400</b>	<b>100</b>	
<b>Household Size</b>						
1-4 Person	208	52	53	192	48	49
5-9 Person	132	33	86	144	36	84
10-14 Person	52	13	98	48	12	96
15 Person and above	8	2	100	16	4	100
	<b>400</b>	<b>100</b>		<b>400</b>	<b>100</b>	
<b>Annual Income</b>						
1000 - 50,000	12	3	3	60	15	15
51,000 - 100,000	56	14	17	72	18	33
101,000 - 150,000	84	21	38	104	26	59
151,000 - 200,000	84	21	60	64	16	75
201,000 - 250,000	80	20	79	48	12	87
251,000 - 300,000	56	14	93	36	9	96
Above 300,000	28	7	100	16	4	100
	<b>400</b>	<b>100</b>		<b>400</b>	<b>100</b>	
<b>Value of receipts Through CG</b>						
1000 - 50,000	20	5	5			
51,000 - 100,000	36	9	14			
101,000 - 150,000	52	13	27			
151,000 - 200,000	60	15	42			
201,000 - 250,000	64	16	58			
251,000 - 300,000	140	35	93			
Above 300,000	28	7	100			
	<b>400</b>	<b>100</b>		-		

**Source:** Computed from the field data by authors

The analysis (Figure 2) makes it known that MOCs have carried out CSR activities in many sectors of livelihood, and development of the people of Niger Delta. From the figure, it is obvious that while improvement of tourism has got only about 2% of the CSR undertakings, educational development in relation to making available teaching and learning materials,



library and laboratory equipment, exposure of teachers to training, provision of scholarship and bursary, as well as others accounts for about 19% of the CSR undertakings. Intervention in the advancement of health services took about 12%, while the development of infrastructures in housing, roads and rural electrification was up to 11%. Agribusiness and rural farming took roughly 8%, but fishing and sea foods collection as well as policy advocacy and dialogues got about 5% each. Furthermore, direct employment of youths and skill acquisition took 9% each. Captivatingly, a matter like chieftaincy matters took 11%, then, environmental control and management took 9%. Agriculture and rural farming is about the only undertaking that is mainly rural based as most of other CSR activities are urban-based. Yet, the intervention targeted at this sensitive area is less than what goes into conciliation and management of chiefs and gatekeepers of the several kingdoms and tribes. On the basis of this finding, this work opines that directing cautious efforts of the CSR at bettering the means of survival of the rural women partaking or dreaming to partake in aquaculture value chain will be of great help in making productivity better for the rural women.



**Figure 2.** Percentage distribution of GMOUs intervention of MOCs by sectors in the Niger Delta<sup>1</sup>.

**Source:** Adopted with modification from Uduji and Okolo-obasi (2022).

In evaluating table 3, we took cognizance of areas of undertaking and percentage rating of CSR spending made by major MOCs in the host communities in helping women to fully take part in aquaculture value chain in the Niger Delta communities. From the responses, the

<sup>1</sup> HeIT = Health service development, Ifr\_Dev = Infrastructure development (road, electricity and housing), F&SFC = Fishing and sea food collection, Skill = Skill Acquisition, Agribiz = Agribusiness and rural farming, Edu\_Dev = Educational Development, Tour = Tourism Development, Pol\_Adv = Policy advocacies and Dialogues, Youth = Direct employments of the youths, Chief = Chieftaincy matters, Env - Environmental control

women were of the opinion that production of high producing fingerlings and juveniles for women took about 15% of the CSR undertakings aimed at women in aquaculture. The same rating of 15% was given to skill training for women in bringing down dependency on men and bettering their social freedom. Also about 14% of the undertakings went into provision of better fish feed and other fishing inputs for the rural women. Others includes provision of seed grant for women entrepreneurs (11%), training of women on better management of ponds for (8%), encouraging eco-friendly farming and fishing (9%), making available low skilled job for the local women (8%), inclusive advancement of business aimed at women (7%), advocacies to bring down socio-cultural inhibitions against women (3%), and provision of better seafood preservation and storage method (11%). The effect of this finding is that the multinational oil companies have been engaged in some valuable intervention in many sectors that will assist the women (especially the rural ones) in being involved fully in the value chain of aquaculture in the study area.

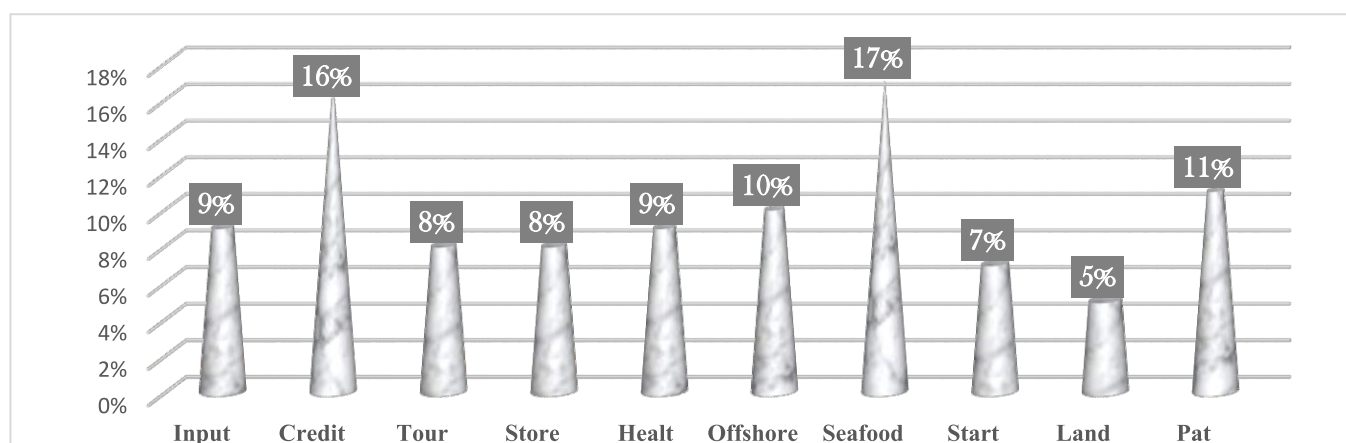
**Table 3.** Percentage rating of MOCs' CSR in helping to participate in aquaculture value chain in Niger Delta.

Activities	Total E&P	Exxon Mobil	Chevron	Shell	Agip	Others	Average
Production of high yielding fingerlings and juveniles	13	15	18	13	17	14	15
Provision of seed grant for women entrepreneurs	10	12	11	12	9	9	11
Training on better pond management for women	12	9	9	8	7	5	8
Encouraging eco-friendly farming and fishing	9	10	9	8	11	9	9
Skill training for women to reduce dependency on men	14	15	15	17	13	16	15
Provision of low skilled job for the local women	10	9	9	8	7	5	8
Inclusive business development targeting women	7	5	4	5	7	11	7
Provision of better fish feed and other fishing inputs	12	14	16	15	11	13	14
Advocacies to decrease socio-cultural barriers against women	4	3	2	2	2	2	3
Provision of improved seafood preservation and storage method	9	8	7	12	16	16	11
	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>

**Source:** Computed from the field data by authors

Analysis (Figure 3) shows the main hitches before women in their attempt to be involved in aquaculture value chain considering that most fishing and sea food collection site have been ruined by oil explorations. This, got 17% of the women's rating as a challenge while destruction

of farmland got 5%. Poor access to credit by the women for investment in aquaculture value chain accounted for 16%. Other challenges identified are: destroyed sites for tourism (8%), poor access to health care (9%), insufficient fishing inputs (9%), inability to access fishing equipment for offshore fishing (10%), poor patronage from the MOCs (11%), inability to provide startup capital (7%), and storage cum preservation facilities being in poor state (8%).



**Figure 3:** Percentage distribution of women according to their major challenge in the Niger Delta<sup>2</sup>

**Source:** Computed from the field data by authors

## 4.2 Econometric analysis

In this study, we projected the average variances in the basic propensity scores and independent observable features between respondents from the treatment group and the control groups. We noted that the dissimilarity in means shows that the score on the side of the treatment and scores on the side of the control are significantly dissimilar at 5% significant level. The variance in scores are: scores on production of high producing fingerlings and juveniles, an 11% increment; access to better fish feed, a 15% increment, and reduction in environmental degradation, a change of 8% in favour of the treatment group. Others include access to improved fresh food storage system (with an increment of 12%); reduced tendency of migration by rural young women (the treatment reducing it by 13% more than the control); better management of pond (with an increment of about 14%), and advancement in the technology of fishing (surging in the treatment group by 12%). Ownership of fishing engine boats got raised by 6%, access to health care services as well as reduction in maternal

<sup>2</sup> Land = Destroyed Farm Land, Credit = Lack of Access to credit, Seafood = Destroyed Fishing and Sea Food collection site, Tour = Destroyed Tourism sites, Healt = Poor Access to health care, input = Lack of farm input, Offshore = Lack of access to fishing equipment for offshore fishing, Pat = Poor patronage, Start = Lack of startup capital, Store = Lack of storage facilities

mortality increased by 12%, and improved seafood preservation methods increased by 11%. We also noted that drop in socio-cultural inhibitions against women recorded an improvement of 27%, while the overall economic capability of women in the region got raised by 15%. These changes were linkable to the treatment which received CSR from the MOCs making use of the GMoU. Hence, in this study, we are of the opinion that the CSR of the MOCs has substantial impact in the CDB communities who have taken advantage of CSR interventions using the GMoUs.

**Table 4** Comparison of mean score and observable characteristics across Treatment and Control (N = 800)

Score in Percentage of maximum score	Treatment	Control	Difference
Scores on production of high yielding fingerlings and juveniles	30.57	19.34	11.23 **
Scores on access to better fish feed	37.39	22.78	14.61 **
Score on reduction in environmental degradation	35.65	27.82	7.83 **
Scores on access to enhanced fresh food storage system	36.28	24.22	12.06**
Score on reduced tendency for rural young women migration	25.22	38.48	-13.26**
Scores on better pond management	43.31	29.42	13.89**
Scores on technology improvements in fishing	36.72	24.31	12.41**
Scores on ownership of fishing engine boats	20.27	14.18	6.09**
Score on access to health care services and reduced maternal mortality	34.25	22.48	11.77**
Scores on enhanced seafood preservation methods	32.43	21.67	10.76**
Scores on reduction of socio-cultural barriers against women	21.39	48.45	-27.06**
Score on Economic capability of women in the region	35.12	19.87	15.25**
<b>Observation</b>	<b>400</b>	<b>400</b>	

**Source:** Authors' compilation based on field survey

#### 4.2.1 Effects of MOCs' CSR investment using GMoU on changes in prejudiced laws and social reform.

**Table 5: Projected effects of multinational oil firms' CSR investment using GMoU on reducing socio-cultural barriers against women participations in aquaculture value chain in the Niger Delta region**

		B	S.E.	Wald	Df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Step 1(a)	MS	0.092	0.135	0.291	1	0.038	1.930	0.713	1.212
	PriOcc	0.224	0.212	0.033	1	0.856	0.962	0.635	1.459
	HHco	-	0.312	0.033	1	0.456	0.562	0.435	1.459
	m	0.139							

<i>Edu</i>	0.053	0.021	0.652	1	0.419	1.017	0.977	1.059
<i>AY</i>	0.068	0.114	0.715	1	0.398	0.908	0.727	1.135
<i>HHSIZE</i>	0.431	0.021	0.492	1	0.483	0.986	0.947	1.026
<i>Age</i>	0.216	0.009	3.205	1	0.073	0.983	0.966	1.002
<i>EXP</i>	0.027	0.115	0.171	1	0.679	0.954	0.761	1.194
<i>CSR</i>	1.712	0.061	4.236	1	0.003	8.619	1.045	1.443
Constant	3.163	0.567	1.140	1	0.064	3.331		

a Variable(s) entered on step 1: *PriOcc*, *MS*, *Age*, *Edu*, *AY*, *HHCom*, *CSR*, *HHSIZE*, *EXP*, *YOMH*.

**Source:** Computed from the field data by authors.

Logit (Barr) = 3.163 + 0.092MS + 1.712CSR + 0.216 Age + 0.224 PriOcc + 0.431HHSIZE + 0.053Edu + 0.068 AY + 0.073HHcom + (0.139) Exp

Examination of (Table 5) shows that the CSR activities of the MOCs has a substantial effect on changes in prejudiced laws and social reform. The finding makes it obvious that the MOCs have made reasonable investment in advocacies that will bring down socio-cultural hindrances against women's involvement in aquaculture value chain in Niger Delta. A logistic regression analysis was carried out to predict the influence of the CSR of MOCs using GMOU on bringing down socio-cultural inhibitions against women's involvement in aquaculture value chain using the variables in the equation below as the predictors. A test of the full model against a constant only model was statistically noteworthy, showing that the predictors as a set reliably differentiated between the "Yes" and "No" impact of CSR (chi square = 45.230,  $p < .000$  with  $df = 8$ ). Nagelkerke's  $R^2$  of .826 showing a strong relationship between prediction and grouping. Prediction success overall was 89% (92% for "Yes" and 86% for the "No"). The Z-value for CSR is 4.236, with a related p-value of .0032. Based on the set 5% significant level, the study settled that CSRs of the MOCs under GMOU have had substantial effect on *bringing down socio-cultural obstacles against women's involvement in aquaculture value chain in Niger Delta*. Nonetheless, the EXP (B) value of the Predictor – CSR is 8.619, this entails that if the MOCs bring up their CSR Program aimed at lessening socio-cultural inhibitions against women's involvement in aquaculture value chain in the Niger Delta by one unit, the odds ratio is roughly 8.619 times as large. This means that the women would be about 9 times in the offing to be empowered by lowering every socio-cultural inhibition to facilitate the functioning of women in its full capacity, thus, improving on productivity.

#### 4.2.2 Effects of MOCs' CSR investment using GMOU on production of high yielding fingerlings and juveniles

**Table 6: Projected effects of MOCs' CSR investment using GMOU on production of high yielding fingerlings and juveniles for women in the Niger Delta region**

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
		Lower	Upper	Lower	Upper	Lower	Upper	Lower	Upper
Step 1(a)	AY	-0.036	0.114	0.715	1	.398	0.908	0.727	1.135
	PriOcc	-0.517	0.212	0.033	1	.856	0.962	0.635	1.459
	HHcom	-0.169	0.312	0.033	1	.456	0.562	0.435	1.459
	Edu	0.064	0.021	0.652	1	.419	1.017	0.977	1.059
	Age	0.078	0.009	3.205	1	.073	0.983	0.966	1.002
	Exp	0.452	0.124	2.895	1	.029	1.810	0.635	1.033
	MS	-0.113	0.135	0.291	1	.038	1.930	0.713	1.212
	HHSIZE	0.351	0.021	0.492	1	.483	0.986	0.947	1.026
	GCSR	2.415	0.061	5.724	1	.003	9.583	1.045	1.443
	Constant	1.826	0.667	1.940	1	.164	5.131		

a Variable(s) entered on step 1: *PriOcc*, *MS*, *Age*, *Edu*, *AY*, *HHCom*, *Ychild*, *CSR*, *HHSIZE*, *EXP*.

**Source:** Computed from the field data by authors.

Logit (FJ) = 1.826 + 2.415CSR + 0.078Age + (0.517) PriOcc + 0.351HHSIZE + 0.064 Edu + (0.036) AY + (0.169) HHcom + 0.452Exp + (0.113) MS

Analysis (Table 6) estimates the influence of MOCs' CSR undertakings using GMOU on production of high producing fingerlings and juveniles for women in the Niger Delta expanse. This finding confirms that the MOCs' CSR have had some effect on production of high yielding fingerlings and juveniles. A logistic regression analysis was carried out to forecast the effect of CSR of MOCs undertakings using GMOU on production of high producing fingerlings and juveniles in the communities in Niger Delta making use of the variables in equation above as predictors. A test of the full model against a constant only model was statistically substantial, showing that the predictors as a set dependably differentiated between the "yes" and "no" effect of CSR (chi square = 41.321,  $p < .0001$  with  $df = 8$ ). Nagelkerke's  $R^2$  of .796 showed a strong relationship between forecasting (prediction) and grouping. Prediction success overall was 90%. (94% for "Yes" and 86% for the "No"). The Z- value for CSR is 5.724, with a related p-value of .0022. Based on the set 5% significant level, the study came to the conclusion that CSRs of the MOCs under GMOU have had a substantial effect on production of high yielding fingerlings and juveniles for women in the Niger Delta expanse. However, the EXP (B) value of the Predictor – GMOU is 9.583. It implies that if the MOCs bring up their CSR Program aimed at bettering the production of high yielding fingerlings and juveniles for women in the Niger Delta expanse by one unit, the odds ratio is 9.583 times as large; thus, rural women are about 10

times in the offing to be empowered via production of high yielding fingerlings and juveniles to better their productivity in aquaculture.

#### 4.2.3 Effects of MOCs' CSR investment using GMOU on better feed and pond management

Analysis of (Table 7) shows that the CSR activities of the MOCs has a noteworthy effect on better feed and pond management. The finding reveals that the MOCs have rationally invested in training women on feed production and effective pond management in Niger Delta. An examination of logistic regression was carried out to predict the effect of the CSR of MOCs using GMOU on better feed and pond management putting to use the variables in equation below as the predictors. A test of the full model against a constant only model was statistically significant, showing that the predictors as a set dependably differentiated between the "Yes" and "No" effect of CSR (chi square = 41.214,  $p < .000$  with  $df = 8$ ). Nagelkerke's  $R^2$  of .821 showed a strong relationship between forecasting (prediction) and grouping. Prediction success overall was 91%. (92% for "Yes" and 90% for the "No").

**Table 7: Projected effects of multinational oil firms' CSR investment using GMOU on better feed and pond management in the Niger Delta region**

		B	S.E.	Wald	df	Sig.	Exp(B)	95.0% C.I. for EXP(B)	
		Lower Upper	Lower Upper	Lower Upper	Lower Upper	Lower Upper	Lower Upper	Lower Upper	Lower Upper
Step 1(a)	CSR	1.212	0.016	4.127	1	0.003	8.231	1.045	1.443
	PriOcc	0.413	0.221	0.023	1	0.456	1.017	0.761	1.459
	HHcom	- 0.324	0.321	0.033	1	0.398	0.562	0.435	1.459
	Edu	0.067	0.012	0.652	1	0.419	0.954	0.977	1.059
	AY	0.362	0.141	0.715	1	0.856	0.908	0.761	1.135
	HHSIZE	0.343	0.012	0.492	1	0.483	0.986	0.947	1.026
	Age	0.214	0.090	0.205	1	0.769	0.983	0.966	1.194
	EXP	0.073	0.115	0.171	1	0.679	0.962	0.727	1.194
	MS	0.074	0.153	0.291	1	0.038	1.930	0.713	1.212
	Constant	2.132	0.617	1.140	1	0.064	3.331		

a Variable(s) entered on step 1: CSR, MS, Age, Edu, PriOcc, AY, HHCom, EXP, HHSIZE.

**Source:** Computed from the field data by authors.

Logit (BFPM) = 2.132 + 1.212CSR + 0.214Age + 0.413 PriOcc + 0.343HHSIZE + 0.067 Edu + 0.362AY + (0.324) HHcom + 0.074Exp + 0.074MS

The Z- value for CSR is 4.127, with a related p-value of .0010. Based on the set 5% significant level, the study came to the conclusion that CSRs of the MOCs under GMOU have had a

noteworthy effect on enhancing feed and pond management in the Niger Delta expanse. However, the EXP (B) value of the Predictor – CSR is 8.321. It implies that if the MOCs bring up their CSR Program directed at betterment of feed and pond management in the Niger Delta expanse by one unit, the odds ratio is about 8.321 times as large. Thus, the rural women are 8 times more in the offing to be empowered with better feed and pond management.

Overall, the outcomes of this study share the same view with Uduji and Okolo-Obasi (2020), in that in aquaculture in the Niger Delta, both men and women should be given equal rights and equally allowed to take part in the advancement process, so as to make sure that their interest and needs are satisfactorily protected and fulfilled. International human right law recognizes equal rights, yet women are disregarded, while their work loads and duties have gone up. In view of the outcomes, women should be given the space to partake in the policy processes. They should also be provided with access to physical as well as capital resources for improving on their industry and meeting their needs cum aspirations. The outcomes also show that it is crucial to provide women with training and formal learning so as to better the effectiveness, profitability and sustainability of their actions; to bring about satisfaction in supply of infrastructure, equipment, technologies and access to market. This will support their enterprises, raise their potential of earnings and lower their marginalization. The results also suggest that it is essential to give women equal control in the value chain and profit margins. This is mainly relevant as women in the Niger Delta still operate in the low – status, skill and pay-wise as well as on informal, casual and short-term contracts that rule them out from getting social benefits. The results also coincide with Fischer et al (1993) and Unger and Crawford (1992) in that if women had equal access to the openings before men such as funding, more exposure to keeping of ponds, extension services, inputs (fingerling, fish feed, cages and pens), plus other resources, they would behave just like men. As a result, the outcomes suggest that the relative priorities of MOCs' CSR economic advancement activities in the Niger Delta should vary from the classic, American ordering, which is proposed by Carroll (1991). Importance, rather, should be placed on a cultural context in the determination of apposite CSR priorities and programmes, as suggested by Visser (2006), in the context of the Niger Delta. Flexibility is also needful, as suggested by Amaeshi et al (2006), in addressing the distinctiveness of the socio-economic problems of the expanse, which takes in closing the gender cavity in aquaculture. Uduji and Okolo-Obasi (2022) also consented in that it is vital for CSR undertakings in sub-Saharan Africa to take in peace building, capacity development, economic advancement and bringing down of poverty. But in extension and input, if we are to have a voice on how CSR interventions can encourage gender equality in aquaculture development in the Niger Delta, we would promote the view that MOCs' CSR can play a vital role in advancing gender fairness when investment in aquaculture value chain deliveries is designed for the intricacies of real life. Acknowledging the web of glitches within families, communities and at the policy



level shaping a woman's experience is critical in bringing about effective CSR programming. These power dynamics are complex and puzzling to navigate, but through building gender equity, MOCs would better results for all in the region. It is our contention that the private sector, generally, is well suited to address some of the logistical and cultural issues that face women's participation in the GMoUs clusters in the Niger Delta. MOCs, specifically, are well placed for the transfer of liable business practices and standards as well as technologies and infrastructure that expedite knowledge creation as it encourages gender diversity; in addition to equal access to economic openings and advancement in human capital. Hence, going for gender parity in aquaculture value chain deliveries ought to be prioritized in CSR practices in the Niger Delta so as to help better the environment of the region for businesses.

## 5. Conclusion and policy implications

Oil in Nigeria is mostly extracted in the expanse of Niger Delta. Traditionally, the dwellers in the region were farmers and fishermen. Years upon years of oil spillage and gas flaring, however, as well as quick rising population, has meant such traditional means of support are either no longer workable or got subjected to significant decline. The enduring depletion of fish stock in and around the region and waning success in the stagnant capture fisheries sector makes it necessary to help support aquaculture, particularly in the coastal community. Extensive adoption of aquaculture has the promise to bring about substantial amounts of table fish on a sustainable basis and make jobs available. MOCs' CSR undertakings towards economic development in the expanse had been directed at tackling the cavity in information and poor agronomic practices that led to low output and want of competitiveness among small-holder farmers. In aquaculture, GMoU clusters engaged in a successful demonstration pond pilot projects which ended in 2018. Yet, the aquaculture sector is usually seen as a male dominated sector because of the high levels of investment and embracing of new technology linked to its development in the region. Thus, we looked at the effect of MOCs' CSR using GMoU on mainstreaming gender in aquaculture value chain in the Niger Delta. The outcomes from the use of a combined logit model and propensity score matching shows that CSR of the MOCs using the GMoU has recorded small but noteworthy success in bettering the participation of women in the socio-economic undertakings in the region. The findings also demonstrated that if women had the same access to the openings available to men in finance, training on management of ponds, extension services, inputs (fingerling, fish feed, pens and cages), and other resources, they would respond in a similar way. Based on the outcome, it is believed that an upsurge in CSR economic development undertakings directed at mainstreaming gender in the aquaculture value chain would lift many women out of destitution by bettering their production, productivity and welfare. In what follows, we discuss implications for practice, policy, and research.

In terms of implications for practice, it is apparent from the findings that productivity of women in aquaculture in Nigeria's Niger Delta region can be enhanced by means of MOCs' CSR via GMoU programmes. Hence, more women in aquaculture (especially those in the informal economic sector) need to leverage on the GMoU programmes in order to benefit from associated rewards, and inclusion in taking on of aquaculture technology (production of fingerling and juveniles, improved feed, better pond management, and technology advancement).

The implications for policy largely surround the relevance of how GMoU can be consolidated by policy makers in oil industry to act as an agricultural enhancement interface between the multinational oil companies and farmers in aquaculture development in host communities.

Such consolidation can be made by designing and implementing GMoU policies, such that could limit the gender gaps in the aquaculture value chains functions (production, reaping, consolidation, and marketing) in Nigeria's Niger Delta.

On the implications for research, although this study shows that GMoUs of MOCs' CSR play an important role in addressing gender – specific constraints on improving production and productivity, for aquaculture development, it is imperative to extend this research with a study that determine whether GMoUs can be a substitute for federal government and state government interventions in agriculture and rural development in sub-Saharan Africa. The main caveat of the study is that it is limited to the scope of oil producing communities in Nigeria. Hence, the findings cannot be generalised to other developing countries with the same policy challenges. In the light of this shortcomings, replicating the analysis in other developing countries is worthwhile in order to examine whether the established nexuses withstand empirical scrutiny in different rural context of developing economies.

The study is an addition to the literature on gender equality in access to aquaculture value chain openings in five notable ways. Firstly, we recognized the key gender cavities in accessing aquaculture value chain openings made available by MOCs in the Nigeria's Niger Delta expanse. Secondly, the research provide acuities into how CSR undertakings can better gender equity in rural areas of Nigeria's Niger Delta expanse. Thirdly, moving away from previous studies, in executing the research quantitative methodology was employed to tackle the sparse quantitative works on the significance of CSR in the expanse. Fourthly, the investigation is interested in exploring the nature of an African CSR model in the development of rural women in aquaculture value chains deliveries. Fifthly, we made available policy suggestions that would assist MOCs to effectively tackle the glitches of economic development programmes in Nigeria's Niger Delta expanse.

#### **Declaration of conflicting interests**

The authors declared no potential conflicts of interest with respect to the research, authorship and/ or publication of this article.

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