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EVALUATION OF NEXUS BETWEEN BENEFITS DERIVED AND WELFARE STATUS ATTAINED BY FISH FARMERS FROM IMPLEMENTATION OF FADAMA II PROJECT IN SOUTHWEST, NIGERIA

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Abstract

The scourge of poverty still abounds in Nigeria, in this regard Fadama II project was established to enhance agricultural productivity, stimulate an increase in income, and alleviate poverty. This study evaluated the benefits derived and welfare status attained by fish farmers from the implementation of Fadama II Project in Southwest, Nigeria. Out of one thousand and eighty (1,080) fish farmers, five hundred and forty (540) Fadama beneficiaries (FB), Non-Beneficiaries Living Within Fadama areas (NBLWF), and Non-Beneficiaries Living Outside Fadama areas (NBLOF) respondents were selected through multistage sampling procedures, which disaggregated to 180 in Lagos, 150 in Ogun and 210 in Oyo states. Frequency, percentages, mean standard deviation and Analysis of variance were used to analyse the data for the test of hypothesis at $p<0.05$ significance level using SPSS version 20. Results from the study indicated that the male gender constituted 57%, while 62% were in the age 41-50 category; 95% were married and had formal education. However, 95% of FB had major benefits and 83.3% of them also attained the 'Better-off' welfare status category in

contrast to the status of NBLWF and NBLOF. There were differences in the level of welfare status attained across the fish farmer groups. In conclusion, a significant relationship existed between the derived benefits and welfare status attained by the fish farmer groups through the implementation of Fadama II project in the study area. It was recommended that agricultural development programmes should emphasise the sustainability of derived benefits and their positive effects on the welfare status of fish farmer groups.

Keywords: *Benefits, Evaluation Fadama II, Fish farmers, Poverty*

INTRODUCTION

Nigeria has not transformed her abundant resource potentials to attain food- sufficiency and economic self-reliance as was the case in pre--and immediate post-independence era when agriculture was the engine of growth and development. As documented by Oyaniran (2020), agricultural practice in Nigeria is predominantly operated by small-scale farmers and they constitute 80% of the entire population of farmers in Nigeria and contribute up to 90% of national agricultural production. The agricultural sector influences the livelihood of many Nigerians by employing more than 36% of the Nigerian's labour force. However, agricultural operations are still largely manual and underdeveloped, with a tractor density of 0.27hp /hectare. Some other constraints are lack of access to finance, climate change, land acquisition, low technology, post-harvest losses, and insecurity, to mention a few. These constraints have retrogressed agricultural production and this has resulted in inadequate agricultural produce, a shortage in the food supply, and an increase in food importation (Oyaniran, 2020).

Based on the combined information sourced from NBS and PwC Analyst, Oyaniran (2020) submitted that for the period 2016 – 2020, the percentage contribution of the Agricultural sector to the nation's GDP grew slowly as follows: 24.5% (2016); 25.1% (2017); 25.1% (2018); 25.2% (2019); and 22.0% (2020). Before the recent emergence of the Telecommunication sector, agriculture undoubtedly was the largest GDP contributor to the economy. The sizes of each component of the agricultural sector as of 2020 were: crop production 87.6%; livestock, 8.1%; fishery 3.2% and forestry 1.1% (Oyaniran,2020) The

Nigerian Agricultural sector has not been comparatively competitive as it ought to be according to Oyaniran (2020), while in 2019 crude oil constituted 76.5% of the nation's total export, agricultural export was less than 2% of total export. The aspiration of self-sufficiency would remain a mere dream and Nigeria will remain a net importer of food. As stated by Oyaniran, (2020) within 4 years (2016-2019) agricultural imports were to the tune of N3.35 trillion, which was comparatively and disproportionally higher than the agricultural export of N803 billion for the same period.

The Federal Government of Nigeria over the years has embarked on several agricultural programmes to alleviate poverty and attain national food security, unfortunately, most of the programmes failed or were abandoned (Oduwole and Fadeyi, 2013), ineffective and the incidences of poverty and food insecurity remain unabated (Oluwasola and Ajayi, 2013; Benyin and Ugochukwu, 2015). In 1993-1999, Fadama I project was introduced in Borno, Jigawa, Katsina, Kwara, Kogi and Plateau states, to boost agricultural productivity and income to alleviate poverty. The successful implementation of the Fadama I project prompted the introduction of the Fadama II project in 2004, which was meant to alleviate poverty, through the stimulation of an increase in agricultural productivity and sustainable income (National Fadama Development Office, 2008). According to Umar *et al* (2012), because of the Fadama II project implementation, there was an increase in demand for post-harvest handling, agricultural marketing, livestock management practices, crop management practices, and financial management advisory. This in turn culminated in up-scaling agricultural productivity and enhancing the livelihood of farmers who participated in the implementation of Fadama II projects in Nigeria. Extensive studies have been conducted to assess Fadama II projects (Bature, *et al.,* 2013; Tijani, *et al.* 2014). However, little is known about the welfare status of the fish farmers who were involved in the Fadama II project. Therefore, a dearth of knowledge exists in the assessment of the welfare status of the fish farmers in the study area. Thus, the general objective of this study was to evaluate the nexus between the derived benefits and welfare status of Fadama II fish farmers in the Southwest states of Lagos, Ogun, and Oyo, Nigeria.

The specific objectives of this study were to:

(i) Examine the socio-economic characteristics of the fish farmers.

(ii) Ascertain the benefits derived from Fadama II project by the fish farmers from the

implementation of the Fadama II project in the study area; and

(iii) Determine the level of welfare status attained by Fadama beneficiary and non – beneficiary groups through the implementation of the Fadama II project in the study area.

Hypotheses of the study

The following hypotheses were stated in the null form.

$H_0$1**:** There is no significant relationship between the derived benefits and the level of welfare status attained by Fadama beneficiary and non-beneficiary groups through the implementation of Fadama II project in the study area. The Spearman rho correlation analytical tool was used to test this hypothesis.

H_O2: There is no significant difference in the level of welfare status attained by Fadama beneficiary and non – beneficiary groups through the implementation of the Fadama II project in the study area. The hypothesis was tested by Analysis of Variance (ANOVA) and Scheffe's and Games-Howell post hoc analytical tools.

Empirical Studies

According to Tijani *et al.* (2014), the Fadama II project was designed to reduce poverty by improving the living conditions of the rural poor, contributing to food security, and increasing access to rural infrastructure. The authors reported that the poverty index indicated that the percentage of sampled rural households in Kogi and Kwara State, Nigeria below the poverty line was lower among the beneficiaries and they were nutrient, and food secured. As documented by Olaolu, *et al* (2013), Fadama II project was impactful on farmers by causing a reduction in poverty and strengthening food security among rice farming beneficiaries in Kogi and Kwara States. Among the sampled respondent farmers studied by Ahmed and Umeh (2012) in Gombe State, Nigeria, the remarkable impact on the standard of living of respondents, and development of communities, and the accrued profits from farming activities was adduced to the use of the irrigation- farming facilitated through the implementation of Fadama II project. In addition, Grei *et al.* (2013) revealed that Fadama II project made a positive impact on the poverty status of the crop farmers in Adawama State, and about 76.0% of the respondent – crop farmers lived above the poverty – line. In contrast, Adegbite, Oloruntoba, Adubi, Oyekunle, and Sobanke (2008), explained that Fadama II beneficiaries did not experience any increase in

their income, therefore there was no difference between them and non – beneficiaries in Ogun state.

Conceptual and Theoretical Framework

Conceptual model of Welfare Status

Welfare (a state of well-being), is defined in terms of the level of utility reached by a given individual; According to Ademuluyi (2014), this level of utility is a function of goods and services a person consumes is conceptualised as "welfarist" approach to wellbeing; Importance is attached to an individual's perception of what is considered useful to him or her, such as adequate food, improved access to education, health care, housing, clean water, to mention a few.

The welfare status for this study was measured based on the adaptation of combinations and interplay of the following selected concepts, frameworks, and methodologies cited from previous research findings. The National Bureau of Statistics, (NBS, 2008), reported that the under-listed relevant parameters were applied as welfare indicators in the conduct of the National Core Welfare Indicators Survey in 2006: improved agricultural services, electricity supply, income / increased earnings, and access to improved farm inputs, extension services, land/house ownership, healthcare, food and nutrition, safe water supply, sanitation, road infrastructure, farm assets, credit facility, economic status, purchasing power among others.

The Basic needs approach was also adopted in line with Etuk *et al.* (2012), the objectives of the Basic needs approach are to achieve welfare improvement, in particular, to provide access to the minimum goods and services needed to sustain living (such as: 'food, potable water, sanitation, shelter, clothing, basic education, healthcare, and public transportation') and they have strong attributes of welfare and could also best be described as 'generators of development. Hence this justifies their inclusion as important variables in the measurement of welfare status for this study.

As documented by Betti *et al*, (2005) there are material and non–material socio-economic factors that could be considered to exhibit welfare attributes, hence they are referred to as indicators of welfare that were adopted for this present study as follows: "housing/ sanitation, goods of comfort, equipment, and assets, economic and health status and access to basic

infrastructure". Other empirical frameworks adopted for the measurement of welfare status in this present study were these perspectives: the scope and indicators of welfare, capacity building and education, technology adoption, productivity, purchasing power, income, food consumption and livelihoods, and welfare (Alawode *et al*, 2016); higher per capita daily intake of calories and protein, improved living condition and poverty reduction (Tijani *et al.*, (2014); income generating assets and standard of living (Ahmed *et al*, 2012).

Beneficiary Assessment

For the measurement of the derived benefits for the present study, the following empirical findings were adopted as an underlying framework. As reported by Ike (2016), most of the beneficiaries were satisfied with the operation, maintenance, and utilization of the productive assets provided by the FADAMA III/SEEFOR project in selected Local Government Areas of Delta State (except for three of the enterprises were unsatisfied with operation, maintenance and utilization of the productive assets provided to them). In addition, the beneficiaries opined that there was an increase in the average annual income; the respondents adjudged the rural infrastructural (Mini-water schemes, Toilets, acquisition of cargo boat and rehabilitated roads) and market-related subprojects (Market stalls) project to be satisfactory, beneficial, and successful. Also, it critically helped to reduce the cost of delivery of goods, increased sales, reduced the travel time spent waiting by commuters for vehicles, improved accessibility to inter-rural communities' transportation, and reduced post-harvest losses to mention a few. The spectrum of the above achievements of the FADAMA III/SEEFOR project had elevated the respondents' benefit status and it would have possibly resulted in a proportional and direct positive impact on their welfare status; hence this had formed the basis of a decision to include these empirical findings to measure the derived benefits in this present study.

Other empirical findings of relevance to the measurement of derived benefits in this present study are the following: Achoda *et al* (2022), the majority (58.3%) of respondents benefitted from the implementation of the Women's Empowerment programme; it impacted positively on well-being of participants; significant relationship existed between education and women's empowerment programme. Furthermore, in their study of the effects of the Delta–Songhai Centre Agricultural Programmes on beneficiaries in Delta state, Nigeria: Youth Economic Empowerment approaches, Oghenero *et al* (2021) discovered that the satisfactory level of beneficiaries was high, adoption of skills in aquaculture was remarkable, benefit status changed

positively and in totality, the training had a great impact on youth empowerment. As reported by Bature *et al*, (2013) Fadama III project implementation was beneficial in terms of improvement in the income and wealth of participants in the Federal Capital Territory of Nigeria.

. **Millennium Development Goals (MDGs)**

According to the United Nations (2008), the eight MDGs were: "Goal 1: Eradicate extreme poverty and hunger; Goal 2: Achieve universal primary education; Goal 3: Promote gender equality and empower women; Goal 4: Reduce child mortality; Goal 5: Improve maternal health; Goal 6: Combat HIV/AIDS, malaria and other diseases; Goal 7: Ensure environmental sustainability; Goal 8: Develop a global partnership for development'. (Socialist International, 2005 cited in Elekwa, 2008). The eight MDGs listed above coincidentally could be considered as drivers of welfare and this is of relevance to this present study.

Organisation of Economic Community Development Evaluation Criteria

The Tropical Agriculture Platform (TAP, 2016) applied the assessment criteria of the Organisation of Economic Cooperation Development (OECD, 2010), in the assessment of the performance of the common framework on Capacity Development for the Agriculture Innovation System (AIS). According to the OECD – Development Assistance Committee (DAC) the 5 criteria that have been recognised internationally for measuring 'usefulness or value-addition' to development intervention are relevance, effectiveness, efficiency, impact, and sustainability. The OECD – Development Assistance Committee (DAC) in 1991 compiled and defined five evaluation criteria and this has served as an impetus for the development of evaluation internationally in the last three decades. However, in 2019 coherence was added as the 6th criterion (OECD, 2021).

Pareto Optimality

According to Irshad (2016), the Pareto optimum, or Pareto efficient state, is an apprehension of the likely contrary effects of the implementation of a welfare programme on the unintended targets of society. That is if the welfare of a desired target or beneficiaries (intended outcome), is improved, there is the possibility that it would have effects (positive or negative) on the welfare of an unintended target in the community within the same period (unintended outcome), in this regard such transfer of improvement of welfare or reallocation is called Pareto improvement and its associated allocation problem is in two-dimensions.

The idea introduced by Pareto on welfare has been tremendously helpful in the development of modern welfare economics and it has created a pathway and dictated the required conditions for social welfare (Irshad, 2016). Furthermore, a situation where the welfare of at least one person increased without necessarily causing a reduction in the welfare of the other person in the same community, in line with Pareto's criterion, can still be regarded as welfare improvement. However, the optimality and efficiency idea of Pareto would no longer be effectively applicable whenever there is a complex circumstance where one person enjoys an increase in welfare at the same moment the welfare of the second person decreases. Pareto's criterion agrees that social welfare has occurred when because of an increase in welfare, even if at least one person gets better- the utility enjoyed by others remains unchanged or has not decreased. So, based on the above premise, suppose, a policy change leads the welfare level from one point to another point, Irshad (2016), asserted that the scenario is undoubtedly a welfare-increasing condition because both personalities get more satisfaction than their initial positions A and B. However, if the satisfaction of the person in A has increased but the utility of person in B has neither decreased nor increased, this is also a case of welfare. In the same vein, if as the person at point 'B' gets better off and person in A never becomes better off or worse off, in this instance, it is also regarded that social welfare has increased.

METHODOLOGY

The study area was Southwest, Nigeria which comprises of six states out of which only three states were selected namely, Lagos, Ogun, and Oyo. The study area shares boundaries in the north with Kwara and Kogi states, while in the East with Edo and Delta States. The climatic condition of the study area is characterised by the high relative humidity of about 60.0%, with distinct seasonal variations of rain and dry season while the average minimum temperature ranges from 10°C – 25°C and the maximum ranges from 27°C – 37°C (Ologbon, *et al*., 2014).

The combined methodologies and sampling procedures previously used by the Oyo State Fadama Development Office (OYSFDO, 2007), Bature, *et al.* (2013), and Tijani, *et al.* (2014) and Fish farmer group structures of the Agricultural Development Projects (ADPs) in each of the selected states were adopted in this present study. A multistage sampling procedure was used to select fish farmers from the study area, to obtain a sample size of 540. Firstly, there was a purposive sampling of 3 states out of the 6 states in Southwest, Nigeria, resulting

in the selection of Lagos, Ogun, and Oyo states.

The second stage was the purposive sampling of all the ten (10) Local Government Areas (LGAs) that participated in the Fadama II project in each of the 3 selected States (Lagos, Ogun, and Oyo) and thereafter referred to as Fadama II LGAs (FLGAs). This resulted in the selection of the following nine (9) FLGAs: Lagos State (Badagry, Alimosho, and Epe); Ogun State (Abeokuta North, Ipokia, and Odogbolu) and Oyo State (Akinyele, Egbeda and Ido) respectively.

The third stage was the purposive sampling of ten (10) Local Government Areas (LGAs) that did not participate in the Fadama II project in each of the 3 states (Lagos, Ogun and Oyo) and are thereafter referred to as Non - Fadama II LGAs (NFLGAs), hence the selection of the following thirteen (13) NFLGAs: Lagos state (Araromi, Ifako-Ijaye, and Amuwo-Odofin); Ogun State (Yewa South; Abeokuta south and Ikenne) and Oyo State (Oluyole, Lagelu, Ibarapa East, Afijio, Ona-ara, Ibarapa Central and Ogo-Oluwa). However, this NFLGAs frame was added to measure and compare the indirect impact (unintended outcome or spill–over effects) of the project to enhance reliable analysis of the full impact of the Fadama II project,

The fourth stage was the purposive sampling of the fish farmers because not all the people in the study area that were members of Fadama Users Group (FUG) were into fish farming-related projects and not all farmers in the study area were fish farmers. Therefore, the purposive sampling focused on selection among the fish farmer target population in the study area, based on the Fadama II project operational structure and the fish farmer group structures of the ADPs in each of the selected states (OYSFDO, 2007; Bature, *et al.* 2013; and Tijani, *et al.* 2014). To ensure accurate measurement of the total direct impact (intended outcome) and indirect impact (unintended outcome) of Fadama II project implementation on the fish farmers in the study area, the sampling frame was finally stratified into three strata: Fadama II project Beneficiaries (FB), Non – Beneficiaries Living Within Fadama II benefitting LGAs (NBLWF) and Non – Beneficiaries Living Outside Fadama II benefitting LGAs (NBLOF) and this culminated into the final selection of the following:

i) 180 fish farmer respondents selected from Lagos State comprising 60 FB; 60 NBLWF; and 60 NBLOF; ii) 150 fish farmer respondents selected from Ogun State which consist of 50 FB; 50 NBLWF; and 50 NBLOF; iii) Lastly 210 fish farmer respondents selected from

Oyo State comprising of 70 FB; 70 NBLWF; and 70 NBLOF respectively.

Version 20 of the Statistical Package for Social Sciences (SPSS) was used to analyse the data while applying tools such as descriptive statistics (frequency distribution, percentages and mean) and inferential statistics (Analysis of Variance and Spearman's Rho correlation of relationship analysis) to test the significance level at $p<0.05$.

Lagos state was chosen because it is endowed with abundant aquatic splendor and a naturally enriched environment that is sustainable for fishing and fish farming activities. There is an assured market of high consumption of fish and cottage industries. Furthermore, the state participated in the first and second Fadama projects with a proven record of success. Ogun state was selected because of her traditional record of fish farming as a thriving vocation, though her potential has not been fully utilised. Her proximity to Lagos state provides economic and marketing opportunities for fish processing and stable patronage from the hospitality industries. Ogun State participated in the first and second Fadama projects with impressive performance records. Oyo state has traditional, cultural, and historical precedence and records of fish farming vocation. The Mud- catfish (or Clarias gariepinus) was said to be first officially discovered in a brook in Igbo–Ora, Oyo state in 1923, and it was derogatively called the Nigerian Mud-catfish (Anonymous, 2019). Also, the state has good potential and a sustainable environment for aquaculture. The state had success in the implementation of the first and second Fadama projects.

Data Collection

The method of data collection that was adopted involved visitation for consultative meetings with respective Fadama State Coordinators, Director of Fisheries, Agricultural Development Project - Extension agents, Fadama group leaders, and Apex fish farmer groups in the selected States for technical assistance, basic information and to solicit for their cooperation. Data for the study was collected from both primary and secondary sources; Primary data was collected from fish farmer respondents across the study area using structured questionnaires, while secondary data related to Fadama II project was obtained from academic research journals, publications, magazines, fliers, newspapers, bulletins and textbooks. Interpreters were used to assist those who could not communicate in the English language. Fish farmers were able to recall the required information on derived benefits and the state of their welfare because there have not been many changes in their fish farm operational activities and other livelihoods

compared to the trend in the past.

Measurement of Variables

To examine the socio-economic characteristics of the fish farmer respondents (objective i). Fourteen (14) statements were framed, and respondents were asked to indicate the appropriate answers by ticking any of the listed options. Responses were measured on nominal and interval scales respectively and percentages were used to describe their distribution.

To enhance the accurate measure of benefits derived by fish farmer respondents from Fadama II project (objective ii), Nine (9) benefit statements were framed based on both primary and secondary data, and questionnaires were administered to respondents to evaluate each fish farmer's opinion on the benefit statements. Responses obtained were scored on these five-point Likert-scales with values of: very great = 4; great = 3; average = 2; little= 1; none = 0. The minimum and maximum obtainable benefits scores were 0 and 36 respectively. The mean benefit was considered as the cut-off mark to distinguish statements that were major and minor benefits to respondents respectively. The derived benefits score that is above or equal to the mean value is categorised as major benefits while the benefits score below the mean value is categorised as minor benefits.

To determine the level of welfare status attained by Fadama beneficiary and non – non-beneficiary groups through the implementation of Fadama II project in the study area. (Objective iii). Fourteen (14) welfare status statements were framed based on both primary and secondary data and questionnaires were administered to respondents to evaluate opinions. Responses obtained were scored on these five-point Likert scales with values of Strongly Agree = 5; Agree = 4; Undecided = 3; Strongly Disagree = 2 ; Disagree = 1 respectively. The minimum and maximum obtainable welfare scores were 1 and 70, while the mean welfare status (2.56) was chosen as the decisive factor to categorise welfare status scores. The welfare status score that is above the mean welfare status is categorised as Better -off**;** the mean score that is equal to the mean welfare status is categorised as Average; while the welfare status score that is below the mean welfare status is categorised as Poor welfare status. The differences in the obtained mean welfare status values across the Fadama beneficiary and non–beneficiary groups were used as the basis for deducing the impact on welfare status.

Data Analysis

The Spearman rho correlation analytical tool was used to test the hypothesis for a significant

relationship between the derived benefits and the level of welfare status attained by Fadama beneficiary and non-beneficiary groups through the implementation of Fadama II project in the study area. The Analysis of Variance (ANOVA) and Scheffe's and Games-Howell post hoc analytical tools were used to test the hypothesis for significant differences between the level of welfare status attained across the fish farmer groups.

RESULTS AND DISCUSSION

Socio-economic characteristics of fish farmers

As shown in Table 1, the gender distribution analysis indicates that 61%, 52%, 58%, and 57% of FB, NBLWF, and NBLOF in the three states and the aggregate for the Southwest, Nigeria, fish farmers were males. This portends that fish farming operations require physical strength and agility; hence this seemingly restricted the female gender to specific functional areas (Khan,2020). Furthermore, the result shows that ages 41 and above constitute 86% of the fish farmers across the study area (Lagos, Ogun, and Oyo States), while 95% of them across the study area were married and formally educated, this implies that they would have demonstrated matured, better attitude towards public health awareness, accelerated diffusion of adoption of technology, improved the households' welfare and capable of handling contractual agreements (Oghenero *et al*, 2021)

Table 1: Distribution of Socioeconomic characteristics of Fish farmers across the Study area

Socio-economic characteristic		Fadama beneficiaries (n=180)	Non-Beneficiaries Living within Fadama Areas n = 180	Non-Beneficiaries Living Outside Fadama Areas n = 180	Total (n -= 540)
		F (%)	F (%)	F (%)	F (%)
Sex	Male	110(61.1)	94(52)	104(57.8)	308(57)

	Female	70(38.9)	86(47.8)	76(42.2)	232(43)
Age	Below 30	1(0.6)	0.0	2(1)	3(0.6)
	31-40	21(11.7)	16(8.9)	37(20.6)	74(13.7)
	41-50	99(55)	14(81.1)	91(50.6)	336(62)
	51 and above	59(32.8)	18(10)	50(27.8)	127(23.5)
Marital status	Single	8(4.4)	0	5(2.8)	13(2.4)
	Married	165(91.7)	179(99)	167(92.8)	511(95)
	Divorced	4(2.2)	1(0.6)	8(4.4)	13(2.4)
	Widowed	3(1.7)	0	0	3(1.7)
Educational level	No formal education	9(5)	4(2.2)	15(8.3)	28(5.2)
	Primary	38(21)	32(17.8)	45(25)	115(21)
	Secondary	104(57.8)	78(43.3)	75(41.7)	257(47.6)
	Tertiary	26(14.5)	37(20.6)	22(12.2)	85(15.8)

Source: Field survey,2019 Note: Result indicates multiple responses

Benefits Derived from the Fadama II project to Fish farmers.

The result in Table 2, shows the mean benefits total as FB ($\bar{x}$ = 2.23), NBLWF ($\bar{x}$ = 1.02), NBLOF ($\bar{x}$ = 0.29), and Study area ($\bar{x}$ = 1.15), which depicts that comparatively the FB derived the greatest benefits even more than the average benefits for the study area (Lagos, Ogun, and Oyo States). This may be adduced to the fact that the FB were eligible to access the components of the Fadama II project hence they were empowered better than the Non-beneficiaries (OYSFDO, 2007; Ike, 2016; Oghenero *et al*, 2021; Ovharhe *et al*, 2020; Achoda *et al*, 2022). As stated in Table 2, the findings of this study on the benefits derived by FB were an increase in the overall fish productivity ($\bar{x}$= 3.62), which aligns with the previous findings of Olaolu *et al* (2013) on the impact of Fadama II project on the productivity of Fadama beneficiaries; while the finding on decreased post-harvest losses ($\bar{x}$= 3.03) and increased income/profit ($\bar{x}$= 2.85) benefits are in support of the earlier study of Ike (2016) and enhanced technical capacity ($\bar{x}$=2.27) is a pointer of high capacity building rating of the respondents, which was a by-product of the extent of utilisation, adoption and diffusion of improved technology. Notably, the benefits variables are inter-related hence the increase in overall fish productivity ($\bar{x}$= 3.62) reflects the increase in the efficient utilisation of the installed fish production capacity was facilitated by enhanced technical capacity (adoption

and diffusion of fish technology) that was brought about by the implementation of Fadama II project (Oghenero et al, 2021; Achoda *et al*, 2022). In this regard the benefits derived by NBLWF ($\bar{x}$=2.28) could be considered as 'spillover effects' and that of NBLOF ($\bar{x}$ = 0.59) as unintended outcomes such as diffusion and adoption of technology and spillover effects. This finding agrees with OYSFDO, (2007), Kudi *et al*, *(*2008), Ahmed *et al*, (2012) and Oghenero *et al*, (2021); Achoda *et al*, (2022). The finding also revealed the decrease in post-harvest losses of fish was $\bar{x}$= 3.03 for FB; $\bar{x}$= 1.70 for NBLWF and $\bar{x}$= 0.16 for NBLOF respectively and this could be adduced to the exposure of respondents to capacity building, and that is traceable to enhanced technical capacity. This implies that there was a decrease in fish wastage, an improvement in the quality of fish products, an increase in productivity, and savings in the cost of production, which would have culminated into income and profit margin, especially for FB and partly for NBLWF respectively; thereby fulfilling the set objectives of Fadama II project, which was meant to stimulate an increase in income, boost food and agricultural productivity (Umar *et al*, 2012; Ovharhe *et al*, 2020). As stated in Table 2, the comparative evaluation of income /profits mean values for beneficiary groups depicts that FB ($\bar{x}$= 2.85), had the highest income /profit benefit across the group, better than NBLWF ($\bar{x}$= 1.37), NBLOF ($\bar{x}$= 0.16) and Study area ($\bar{x}$= 1.45). As documented in the earlier research works of Oluwasola *et al* (2013), Grei *et al* (2013), Olaolu *et al* (2013), and Khan (2020), the above performance of the project may therefore be explained by the fact that FB had direct access to all the components of the Fadama II project, which would have empowered them to build capacity, better attitude towards the improvement of fish production capacity, strengthen their financial capabilities, reduced poverty and ultimately improve their welfare status,

Table 2: Benefits Derived from Fadama II project by Fish Farmer Groups

	Benefit parameters	**FB** (n = 180) Mean	**NBLWF** (n = 180) Mean	**NBLOF** (n = 180) Mean	**Study Area** (n = 540) Mean Total
1	Increase in overall fish productivity	3.62	2.28	0.59	2.16
2	Decreased post-harvest losses	3.03	1.70	0.16	1.62

3	Increased income /profit	2.85	1.37	0.16	1.45
4	Enhanced Technical capacity	2.27	1.51	0.57	1.44
5	Quality of life has improved	2.24	0.94	0.45	1.21
6	Increase in income-generating. asset base	1.88	0.23	0..21	0.77
7	Enhanced financial inclusion. and savings	1.64	0.23	0.03	0.63
8	Enhanced access to market Facilities	1.03	0.65	0.00	0.56
9	Social capital	1.50	0.30	0.36	0.52
	Mean Benefits Total	**2.23**	**1.02**	**0.29**	**1.15**

Source: Field survey,2019 Note: Result indicate multiple responses

Level of Benefits Derived from Fadama II Project

Table 3 depicts the levels of benefits derived from participation in Fadama II by fish farmers, 95.0% and 74% of FB and NBLWF derived major benefits, however on the aggregate 76% of total sampled fish farmers in the study area derived major benefits. In addition, comparative analysis shows that 5%, 26%, and 100% of FB, NBLWF, and NBLOF derived minor benefits respectively, and 24% of total sampled fish farmers representing the aggregate for the Study area (Lagos, Ogun, and Oyo States), derived minor benefits. The derived benefit variables facilitated the increase in productivity and stimulated income, which would have caused a marked reduction in poverty and phenomenal improvement in the welfare of sampled fish farmers across the study area. Therefore, it could be inferred that Fadama II project was a pro-poor, productivity, income, and welfare-enhancing value-driven intervention programme. In addition, Ike (2016) reported that beneficiaries were satisfied and with an increase in income, productivity operation, maintenance, and utilisation of the productive assets and social and rural infrastructure subprojects provided by the FADAMA III/SEEFOR project implementation. Other empirical findings of studies to support the findings of the present study are Ahmed *et al.* (2012), Olaolu *et al.* (2013), Ademiluyi (2014), Khan (2020), and Achoda *et al*, (2022).

Table 3: Levels of Benefits Derived from the Fadama II Project across the Study Area

Levels of Benefits	Fadama Beneficiaries (FB) n=180			Non-Beneficiaries Living Within Fadama Areas (NBLWF) n =180			Non-Beneficiaries Living Outside Fadama Areas (NBLOF) n=180			Study Area Total n = 540		
	Score	F	%	Score	F	%	Score	F	%	score	F	%
Major	1.50-3.62	171	95	1.37-2.28	134	74	0.0	0	15	1.21-2.16	410	76
Minor	1.03	9	5	0.94-0.23	46	26	0.0-.59	180		0.52-0.77	130	24
Mean		2.2			1.02	1.02		0.29			1.15	

Source: Field survey, 2019

Welfare Status of Fish Farmers

As shown in Table 4, the empowerment functions of the Fadama II project implementation reflected more in the health status and nutrition of Fadama beneficiaries ($\bar{x}$ = 1.62) than in the Non – beneficiaries (NBLWF $\bar{x}$ = 2.56; NBLOF $\bar{x}$ = 2.66) whose attainment was low and varied. This result portends significant implications for the welfare status of fish farmers, and it depicts the extent to which the Fadama II project attained its set objectives simultaneously with goals 5 (Improve maternal health) and Goal 6 (Combat HIV/AIDS, malaria, and other diseases) of Millennium Development Goals (MDGs). This finding is in support of Ellis, (2001), Umar *et al.* (2012), and Ahmed (2017). Improved sanitation, infrastructural development, and living standards were three important generators of welfare as stated in result Table 4, FB gained more empowerment than the non-beneficiaries in the improvement of sanitation (installation of VIP toilets ($\bar{x}$ = 1.46), infrastructural development (increased number of rehabilitated rural roads, ($\bar{x}$ = 3.93) and access to potable water ($\bar{x}$ = 1.68); whereas there was an improvement in Living standards (reduced conflicts and enhanced use of shared-natural resources ($\bar{x}$ = 4.13) and improved living standards ($\bar{x}$ = 3.87), through the implementation of Fadama II project. It is important to mention that these 3 key variables of living standards were functionally interwoven and synergetic; in addition, reduced conflicts signify peaceful co-existence upon which development and welfare could thrive. This finding corroborates the empirical findings Kudi *et al*, (2008) and Bature (2013).

Economic sustainability, income, and livelihoods, as shown in Table 4, FB ($\bar{x}$ = 4.33 NBLWF ($\bar{x}$ = 2.52), NBLOF ($\bar{x}$ = 1.73), the FB were empowered better than Non - beneficiaries, and FB had the highest improvement in the purchasing power for household consumption. The interactive relationship between improved productivity increased.

Livelihoods and income, credit facilities, and purchasing power for household consumption. would have culminated in the improvement of the welfare status of fish farmers in a sustainable manner (Umeh and Asogwa, 2012; Oluwasola *et al.* 2013; Filli *et al.* 2015 and Alawode *et a*l. 2016; Khan, 2020 and Achoda *et al*, 2022). By inference increase in income earnings and purchasing power (household consumption expenditure as a proxy of welfare) would have reduced poverty and improved the welfare status of sampled fish farmers (Ike, 2016). In addition, the welfare status of FB was highly improved while 83.3% of them were in the better-off' welfare status category.

Table 4: Distribution of the Welfare Status of fish Farmers

	Welfare parameters		FB ($\bar{x}$)	NBLW ($\bar{x}$)	NBLO ($\bar{x}$)	South-west ($\bar{x}$)
1	Health status and Nutrition	Health status and nutrition have not improved	1.62	2.56	2.66	2.24
2	Improved Sanitation, Infrastructure and Living standard.	Improved living standard	3.87	2.33	1.57	2.59
		Hygiene status not improved.	1.46	2.67	2.49	2.20
		No Improvement in water supply	1.68	2.57	2.55	2.26
		No of rural roads has increased.	3.93	2.19	1.57	2.56
		Reduced conflicts	4.13	2.41	1.68	2.74
3	Education and Capacity building	Positively led to adoption of fisheries technologies	3.97	2.56	1.72	2.75
		Access to Extension not improved	1.62	2.65	2.72	2.33
4	Economic sustainability, Income& Livelihoods	Improved purchasing power for household consumption	4.33 1.06	2.52	1.73	2.86
		Impacted negatively on my livelihood & income.	4.23	1.08	1.58	1.24
		Access to Credit facilities has improved my life		2.65	1.66	2.85
5	Productive asset base and Productivity	Opportunity to increase fish production capacity.	4.25	2.65 2.16	1.62 1.62	2.84 2.59
		Access to fishery Inputs	3.98	2.16	1.55	2.57
		My productive asset base has increased	4.0			
	Group Mean		**3.26**	**2.37**	1.90	**2.47**

Source: Field survey (2019) Note: Result indicates multiple responses

HYPOTHESES TESTING

The Spearman's Rho correlation test results in Table 5, reveal that a significant relationship existed between the derived benefits and welfare status attained by Fadama beneficiary and non-Fadama beneficiary groups, through the implementation of the Fadama II project in the study area.

Table 5: Spearman's Ranked Correlation of relationship between the Derived Benefits and Welfare

Parameters	r-values	p-values	Decision
Increase in overall fish yield	0.67**	0.00	Sig
Expansion of fishery business	0.60**	0.00	Sig
Enhanced access to market infrastructure	0.19	0.35	Not Sig
Improved access to healthcare	0.51**	0.01	Sig
Quality of life has improved	0.72**	0.00	Sig
Access to fish inputs	0.73**	0.00	Sig
Decreased post-harvest losses	0.59**	0.00	Sig
Increased Infrastructural development	0.52**	0.01	Sig
Increased revenue /profit	0.59**	0.00	Sig
Increase in income-generating assets	0.60**	0.00	Sig
Enhanced technical capacity/ fisheries technologies	0.69**	0.00	Sig
Enhanced financial inclusion and savings	0.60**	0.00	

Source: Field survey (2019) *The mean differences are significant at P≤0.05 level

In Table 6, using One - way ANOVA reveals that fish farmers' welfare status improved (FB $\bar{x}$=70.75, NBLWF $\bar{x}$ = 55.35, and NBLOF $\bar{x}$ = 51.29) due to the implementation of the Fadama II project and significant differences existed among the fish farmer group means (F=879.83; p≤0.05). The findings of the present study align with the earlier documented research works of Adeoye *et al.* (2011), Olaolu *et al.* (2013), Ademiluyi (2014), and Ike (2016).

Table 6: One One-way analysis of Variance of difference in the welfare status

	Sum of Squares	df	Mean Square	F	Sig
Between Groups	37950.81	2	18975.40	879.83	0.00
Within Groups	11581.59	537	21.57		
Total	49532.40	539			

Source: Field survey, 2019

The inter-relationship between the derived benefits and welfare status is functionally complex; an increase in income-generating assets base would have influenced productivity improvement (increase in overall fish yield, decreased post-harvest losses, and enhanced technical capacity) and invariably boosted income/profit and the multiplier effect of these interactive processes would have resulted in reduction in poverty and justify the improvement in welfare status of fish farmers in these three states of Southwest, Nigeria in the obtained result of this present study. This result finding is supported by earlier submissions of Ukoha *et al*.2007; OYSFDO, 2007; Ahmed *et al*. 2012; Khan, 2020 and Achoda et *al*, 2022). The above explanation gives credence firstly, to the result of the test of the hypothesis that significant relationship existed between the derived benefits and welfare status attained through Fadama II project implementation in the study area and secondly, the relationship between derived benefits and welfare could be said to be significant, direct, and proportional.

Although the non-beneficiaries who hitherto were not participants were still impacted upon to attain welfare status level (though at varying degrees); probably as a result of the 'split-over effects' of the implementation of the Fadama II project in these three states in Southwest, Nigeria, therefore social inequality gap would not have been created or widened among sampled fish farmer groups, rather welfare improvements have occurred (according to the doctrine of Pareto Optimality theory of welfare as documented by Irshad, (2016) because comparatively the level of welfare status of Non – beneficiaries (NBLWF and NBLOF) actually changed and improved positively along with the FB.. In addition, despite the likely challenges of the sustainability of the derived benefits and attained welfare status, the findings of this present study suggest that the implementation of the Fadama II project could be said to have partially fulfilled the five development assistance criteria (DAC) for evaluation of intervention programmes, set by Organisation for Economic Co-operation and Development (OECD, 2010).

CONCLUSIONS AND RECOMMENDATIONS

Majorly of the fish farmers were males, married, educated, and in the mature adult age group. Nearly all Fadama II beneficiaries and non-beneficiaries living within Fadama areas had major benefits. A significant relationship existed between the derived benefits and the welfare status attained by fish farmer groups from the implementation of the Fadama II project in these three states of Southwest, Nigeria. Also, significant differences existed across Fadama beneficiary

and non-beneficiary groups in the three states of Southwest, Nigeria. The study recommended that agricultural development programmes should focus on how to sustain the derived benefits and their overall impacts on the welfare status of fish farmer groups. Furthermore, there should be a workable structure for the implementation of agricultural progrommes and equitable distribution of the derived benefits among participants.

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