Partial Budget Analysis of a Diversified Small Scale Oil Palm Farms in a Changing Climate in Imo and Delta State, Nigeria

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KEYWORDS

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Partial budget,

ABSTRACT

Small scale oil palm farmers and /or households, business owners must often make decisions about changes they are either contemplating making or that have to be made. The partial budget is a useful tool for farm managers when these situations arise. There is dearth of information on whether the small change farmers make will decrease, increase or not change net income. A partial budget helps farm owners/managers evaluate the financial effect of incremental changes. Data were analyzed using Partial budget Analysis. Results showed that Net benefit from diversification (N268, 800) is higher than that from oil palm farmers who adopted monoculture technology (N128, 100). Results show that the Rate of return of switching and/or changing from monoculture to diversification is 1.26. Since the alternative change is more economical and greater than one (1), it was recommended that the change to diversification which can reduce financial risk associated with climate change should be accepted and put into practice by farmers in the study area.

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INTRODUCTION

Many changes proposed by a manager on a farm affect only part of the business. Therefore, a complete farm budget in not needed to determine the profitability of these specific changes in the operation of the farm. The farmer analyzes only those costs and incomes that change with a proposed business adjustment. He can accomplish this in an organized fashion by using the partial budget, which means that only the relevant costs and incomes are included in the analysis. He can use the partial budget to analyze many practical farm management problems, such as substituting crop and livestock enterprises, changing input levels or types of inputs, changing the size of enterprises in the business and buying new or used machinery, equipment, buildings and facilities (Lessley *et al*,1991).

Farmers are constantly making adjustments in their farms for smooth operations and profitability. Many times, these choices involve actions to enhance the financial return of the farm, while other times these decisions are taken out of necessity to minimize the effects of unfavorable conditions or events such as drought or changes in the market conditions.(Soha El Deep,2014; Ojemade *et al*, 2022)

The partial budgeting is a planning and decision-making framework used to compare the costs and benefits of alternatives faced by a farm business. It focuses only on the changes in income and expenses that would result from implementing a specific alternative. Thus, all aspects of farm profits that are unchanged by the decision can be safely ignored. In a nutshell, partial budgeting allows you to get a better handle on how a decision will affect the profitability of the enterprise, and ultimately the profitability of the farm itself. In using the partial budget only those costs and incomes that change with a proposed business adjustment need to be considered (Hyde, 2023).

Before changing from one production method to another, the farmer considers many factors such as agro-ecological requirements, availability of required production resources (labour, credit, skill, farmland, equipment, etc), additional cost and additional income resulting from the change. (Alimi and Manyong, 2000).

There are possibilities that Agricultural growth requires continuous improvement of crop production technology at the farm level. Agricultural research and extension help develop and transfer appropriate new technologies to farmers. Some new technologies developed on experiment stations are not adopted by farmers because of lack of economic advantage over current production methods.

Farm diversification is an attempt to diversify crops and/or livestock or other efforts by farmers. This is an activity of farmers or households that are often found in agricultural areas in Indonesia, especially crop farming and horticulture. The purpose of this farm diversification is to minimize the risk of loss in certain farm management can even maximize profits (Debertin, 1986; Luat, 2001; Battacharyya 2008 and Kanyua *et al*., 2013).

Luat (2001) states that diversification is a strategy shift of the plant that is not profitable to more profitable crops, from planting system and its variations, increase exports and Competitiveness of the domestic and international markets, safeguarding the environment and create the best combination for Agriculture-Livestock-Forestry and Fisheries. In another sense diversification can also be defined as a shift in farming resources (on-farm resources) to non-farming activities (off-farm resources) or a mixture of both activities are complementary in agriculture (Battacharyya, 2008). Then Kanyua *et al*. (2013) define agricultural diversification as an effort to adjust the pattern of farming that aims to increase farmers' income, reduce income vulnerability and risk.

Loison (2015) exposing classification for diversified livelihoods household by sector (non-agricultural farm), by function (wages-employee and wage own-business), and location (on-off farm). Loison find that diversification not yet benefitted the smallholders in rural, because of asset constraints. As an effort to diversify sources of income, the diversification of activities can be a source of active and passive income.

Many researchers highlight the need for more diversified oil-palm landscapes to mitigate the negative environmental consequences of this recent development (Fitzherbert *et al*., 2008, Foster *et al*., 2011, Koh, 2008, Koh *et al*., 2009). Enterprise diversification is a self-insuring strategy used by farmers to protect against risk (Ashok *et al*, 2004).

Evidence exists that larger farms are more specialized. It aims to minimize losses by investing in different areas that would each react differently to the same event. Most investment professionals agree that, although it does not guarantee against loss, diversification is the most important component of reaching long-range financial goals while minimizing risk. (Ashok and Mishra, 2002).

For decades, rural households are diversifying their sources of income for various socioeconomic and socio-cultural reasons (Atuoye *et al*, 2019). In its current trajectory, diversification of sources of income can lead to food security, income security and rural sustainable livelihood. Nigeria, like many other countries, is exposed to climate change-induced dangers of desertification, erosion, flooding and other ecological problems. Considering the strong nexus between climate change and development, Nigeria is highly at risk in the area of food and nutrition, poverty and hunger reduction, and most importantly, economic development (Ann *et al*, 2013). One of the risk management strategies and/or alternatives that is needed and can enable oil palm farmers build resilience against climate change effects include diversification (Ojemade,2022).

Driven by increased global demand for vegetable oil in the food and biofuel sectors, oil palm plantations based on monoculture technology have expanded into lowland tropical forests. Interest in diversified, mixed oil palm systems is increasing as these might increase efficiency of the use of land and other resources, reduce farmer risk, and decrease greenhouse gas (GHG) emissions per unit product (Khasanah *et al*, 2020).

Oil palm is cultivated as a monoculture or intercropped with other food crops such as cassava, pineapple, yam, plantain, tomato, pepper etc. (Ekhator *et al*., 2013). The only way to increase agricultural production in the small or marginal units of farming is to increase the productivity per unit time and area (Obianefo *et al*., 2020).

Little is known about the small changes oil palm farmers make on their farm businesses and /or enterprises, using climate change adaptation strategies and whether assumptions about the anticipated change by farmers has been initiated, or whether the small change will decrease, increase or not change net income, or if there will be changes in income and expenses that would result from implementing a specific alternative. Consequently, not much is known about which type of analysis aids farm managers, scientist in deciding which type of technology to recommend to farmers .This limits policy making and decision making in the oil palm industry. The objective of the study is to analyze oil palm farmer’s business changes on their farms from monoculture to diversification in other to ascertain whether the proposed change from oil palm monoculture to diversification will increase or decrease incomes.

METHODOLOGY

Multistage sampling procedure was adopted to select oil palm farmers for this study. Firstly, was the random selections of two states (Delta and Imo) from the nine states that make up the Niger Delta Area. Secondly, was the random selection of two local government

areas (LGA) from each of these 2 States. Thirdly were the random selections of two communities from each of the local government areas, making it up to 8 communities. Finally, ten small scale oil palm farmers were randomly selected from each of the sampled communities, making it up to 80 farmers. The data for this study were obtained with the aid of structured questionnaire survey. Out of the 80 respondents, 52 were utilized for this study. This was due to low response rates, careless responses, obvious misunderstandings, or outright confusions. Also most of the questionnaires were found to be unusable.

For this study, only oil palm farmers who practice oil palm monoculture and have devoted or substituted the same farm land, changed and / or switched to diversification were selected for the study. The unit of measurement in this study was in monetary terms i.e. N/Ha as partial budgets are based on a unit. For this study farmers who engaged or used diversification refer to those who mixed oil palm with other food crops, also engaging in livestock and poultry activities.

Partial budget analysis was used (as in Soha El Deep, 2014, Alimi and Manyong, 2000) i.e. to achieve the objective of the study. Only variable input cost are used in a partial budget (Alimi and Manyong (2000), and not fixed costs. This is because the fixed input does not change from one technology to another. It remains constant regardless of the quantity of output and quantities of other categories of inputs. The price you pay for one hectare for one technology is not going to be different per hectare for another technology.

A partial budget can evaluate changes in resource uses that are not fixed (Dairexnet, 2019).

RESULTS AND DISCUSSION

Table 1. Partial budget of revenue and cost per hectare, for oil palm farmers, who are engaged in and/or using diversification, and those who are not.

Items	**Unit price (₦)**	**Qty (Nos)**	**Total- Not engaged in diversification**	**Total –engaged in diversification**
Revenue (SALES)	-Bags (palm kernel) -Tin-palm oil. -poultry (Broilers, chicks) -livestock (goat) -food crops eg. maize, cassava, okra.		N256,900	N508,800
VARIABLE COST				
Labour	MAN DAYS N1450-N2,500	14	N20,000	35,000
Seedings	-stands (N145-N250)	140	N21,600	N34,000
Planting	-	-	N15,000	N28,000
Harvesting	-	-	N20,000	N29,000
Fertilizer	-	-	N15,000	N39,000
Herbicides	-	-	N12,500	N17,600
Processing	-	-	N6,000	N15,000
Other cost	-	-	N17,900	N111,400
TVC	--	--		
Total variable cost	-	-	N128,000	N240,000
Net Benefit			N128,100	N268,800

Source: Field Survey, 2022

Change in net benefit between oil palm monoculture and diversification is N140, 700, that is N268, 800-N128, 100.

Change in total variable cost between monoculture and diversification is N240, 000- N128, 800 = N111, 200.

Fixed costs were negligible and most of the farmers were the owners of their land. Costs may not change proportionately when you are changing the size of an existing enterprise. Fixed costs, in particular, may not change much, if any, if the change in size of the enterprise is relatively small.

In addition to change in net income, another criterion, the rate of return (R) is useful for evaluating the economics of adopting a new technology. R measures the increase in net income.ie.

$R = NI \Delta / \Delta VC$ (as in Soha El Deep, 2014)

Results show that the Rate of return of switching and/or changing from monoculture to diversification is 1.26 **that is N140, 700 / N111, 200.** This also means diversification is better than oil palm farmers engaged in monoculture in the study area. Results show that diversification is profitable and can increase net income for oil palm farmers in the study area. The rate of return is higher than 1.0, therefore diversification is economically superior. These results are consistent with earlier studies (Soha El Deep, 2014 and Tegegne *et al*, 2021) who observed that the rate of return of changing from one treatment to another was greater than one (1).

CONCLUSION AND RECOMMENDATIONS

The study has shown that a different option can allow farmers to overcome an environmental effect of climate change which is diversification. Diversification can increase smallholder incomes. Based on partial budget results, oil palm farmers in Imo and Delta states should consider change to diversification. Results also revealed that diversification is economically superior and socially accepted by farmers in the study area than monoculture. Diversification can spread production and economic risk over a broader range of crops, reducing financial risk associated with climate change. Alternative choices within an individual enterprise can have a positive effect on farm profitability. Making the best decision may make the difference between profit and loss for that enterprise. The study therefore recommends that oil palm farmers should make the change to diversification. Training is required to ensure that oil palm sole cropping and /or monoculture is planned and implemented as an organized system, which can lead to increased benefits.

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