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Profitability and consumer preference of pond raised fish among fish farmers and consumers in Northern Malawi

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Abstract

The consumption and demand for fish is on the increase in Africa and Malawi in particular. The supply of fish per person in the country has, however, been steadily decreasing such that the per capita consumption of fish is less than 13-15 kg/year/person recommended by the World Health Organisation (WHO). Aquaculture in Malawi stands as a solution to low per capita consumption. The study was conducted in January 2014 to determine the profitability and consumer preference of pond raised fish at Mpamba in Nkhatabay district. Data was collected from groups of 30 fish farmers, 30 consumers, 1 District Fisheries Officer and 2 World Vision Malawi project staff. Stratified random sampling was used to select male and female fish farmers and consumers. Within the stratified groups, a purposive sampling technique was used to select farmers that had sold fish in the previous growing season to capture costs and revenue. Data was collected using structured questionnaires, focus group discussions and key informant interviews. Gross margin analysis was conducted to determine profitability of fish farming. Gini coefficient was calculated to determine income distribution of fish farmers. Descriptive statistics was done to determine consumer preference of pond raised fish. Results suggest that fish farmers generate gross profits of MK32, 222.00 (USD83.78) and economic profits of –MK13, 978.00 (USD36.34). However, projected costs and net cash flows using NPV over a 10-year period show that farmers will start making positive net profits of MK9,279.81 (USD24.36) in the third year of production with highest net profit of MK28,625.16 (USD75.13) in year 10. Gini coefficient of 0.5 was calculated showing that there is unequal distribution of income among fish farmers. Preference analysis shows that 48% of consumers prefer pond raised fish to wild fish. The study therefore recommends that farmers produce more fish in order to increase profits from fish sales and reduce income inequality.

Key words: Consumption, income, pond fish, profit

Résumé

La consommation et la demande de poisson est en augmentation en Afrique et au Malawi en particulier. L'offre de poisson par personne dans le pays a toutefois cessé de diminuer de telle sorte que la consommation de poisson par habitant est inférieur à 13-15 kg / an /

personne comme recommandée par l'Organisation mondiale de la Santé (OMS). L'aquaculture au Malawi se présente comme une solution à la faible consommation par habitant. L'étude a été réalisée en janvier 2014 afin de déterminer la rentabilité et la préférence des consommateurs de poissons élevés dans les étangs à Mpamba dans le district de Nkhatabay. Les données ont été collectées auprès de groupes de 30 d'éleveurs de poissons, de 30 consommateurs, d'un agent des pêches du district et 2 membres du projet personnel de Vision Mondiale (World Vision) Malawi. L'échantillonnage aléatoire stratifié a été utilisé pour sélectionner les éleveurs de poissons mâles et femelles et les consommateurs. Au sein des groupes stratifiés, une technique d'échantillonnage raisonné a été utilisée pour sélectionner les éleveurs qui avaient vendu du poisson dans la saison précédente pour capturer les coûts et les recettes. Les données ont été recueillies à l'aide de questionnaires structurés, discussions de groupe et des entretiens avec des informateurs clés. L'analyse de la marge brute a été menée afin de déterminer la rentabilité de l'élevage de poissons. Le Coefficient de Gini a été calculé pour déterminer la répartition des revenus des producteurs de poissons. Les statistiques descriptives ont été effectuées afin de déterminer les préférences des consommateurs de poissons d'étang. Les résultats suggèrent que les pisciculteurs génèrent des profits bruts de MK32, 222.00 (USD83.78) et les bénéfices économiques de-MK13, 978.00 (USD36.34). Toutefois, les coûts prévus et les flux de trésorerie net en utilisant VAN sur une période de spectacle de 10 ans que les agriculteurs vont commencer à faire des bénéfices nets positifs de MK9, 279,81 (USD24.36) dans la troisième année de production avec plus de profit net de MK28, 625,16 (USD75 0,13) dans 10 ans. Le Coefficient de Gini de 0,5 a été calculé montrant qu'il existe une répartition inégale des revenus entre les pisciculteurs. L'analyse des préférences montre que 48% des consommateurs préfèrent le poisson élevé dans l'étant que le poisson à l'état sauvage. L'étude recommande donc que les éleveurs produisent plus de poissons dans le but d'augmenter les profits de la vente de poisson et de réduire les inégalités de revenu.

Mots clés: consommation, le revenu, les poissons de l'étang, le bénéfice

Background

Fish is a valuable and nutritious food, and an essential, often irreplaceable source of high quality and cheap animal protein crucial to the balance of diets in marginally food secure communities, it provides over 60% of the dietary animal protein intake and 40% of the total protein supply in Malawi (Yoyola *et al*., 2013). Globally, the consumption and demand for fish as a cheap source of protein is on the increase particularly in Africa, because of the level of poverty (Gabriel *et al*., 2007). The vast majority of the fish supply in most cases comes from the rivers and lakes in the continent of Africa (Gabriel *et al.*, 2007). While capture fisheries based on species that are presently exploited seem to be under pressure and to have reached their natural limits (Nagoli *et al*., 2013) there is a need therefore to increase and improve fish production from aquaculture in Malawi. However, the supply of fish in the country is not quite matching the demand. The supply of fish from the wild has noticeably declined from over 9,400tonnes in 1985 to 2,350tonnes in 2011 (GoM, 2011), such that it is not enough to cater for the population. Production of fish from the aquaculture sector has however been steadily increasing. Aquaculture therefore stands as the greatest

potential for restoration and enhancement of fish supplies (Banda *et al*., 2012) in Malawi. This study however, focused on determining profitability of fish farming and consumer preference of pond raised fish. Low fish production prevents farmers from getting greater returns. This depresses their pockets and lowers their standard of living. It also affects a country's entire fish output.

Literature summary

The assessment of profitability of an enterprise, farming in particular is an important component of any enterprise. It enables the entrepreneur find out whether positive profits are being made or not. Determination of profitability makes use of different types of tools, and each tool is dependent on a number of factors such as; size of investment, time period of investment and the objectives to be achieved. According to Jolly and Clonts (1993), the tools which are used to determine profitability or viability of different technologies in aquaculture can be classified as static indicators i.e. gross margin and net revenue and capital budgeting indicators i.e. Cost benefit analysis (CBA), Net present value (NPV) and Internal rate of return (IRR). Static indicators are those which do not require discounting while capital budgeting methods require discounting of future cash flows (Asmah, 2008).

The gross margin analysis is an example of a static indicator of viability, and according to Adeyeye and Dittoh (1982) Gross margin is a good measure of profitability. As such it has been used by different researchers. For example, Olagunju (2008) used the gross margin analysis to examine the costs and returns of fish farming and the results indicated that fish production was highly profitable. Asmah (2008), in assessing the development potential and financial viability of fish farming, based the gross margin estimates on four different groups of farmers according to their relative scale of production. The results varied among the different groups of farmers. The gross profit margin for farm types 1, 2 and 3 were quite similar, their values were high. The ratios for the commercial farms on the other hand were much higher. Attrill (2003) argues that high gross profit margins are beneficial in limiting the effects of price volatility. This is in agreement with Salia (2008), who showed that prices greatly affect profitability of the aquaculture enterprise.

The net present value is the value of future net cash flows discounted at a given interest rate compared to the initial investment. Ottawa (1998) showed that the net present value tells whether an investment is worthwhile and whether one investment is better than another. The NPV is a good tool for determining profitability of an enterprise and it has been used widely. Wieland and Kasperski (2008) estimated the net present value of the oyster fishery in the northern Chesapeake Bay Oyster Fishery. The results showed that a higher average NPV was attained when a lower percentage of oyster harvest was used. Abdallah (2004) in determining the fishing effort that will bring the fishery into optimal level, there by managing the commercial prawn fishery employed the net present value analysis. The results also showed that a maximum NPV was attained when the fishing effort was reduced from what was being practiced. A reduction in effort not only maximized returns, but also ensured sustainable biomass growth. NPV worth considering is that it is best used where the major interest is on the magnitude of profit.

Study description

This study was carried out at Mpamba in Nkhatabay district, Northern Malawi. It is an area naturally endowed with abundant water whose source is either groundwater or free flowing rivers. The area has more than 500 fish farmers, and several fish farming activities are carried out (Jere *et al*., 2009). Besides fish farming they are also involved in crop production. The study was conducted in January 2014 to determine the profitability and consumer preference of pond raised fish. Data was collected from groups of 30 fish farmers, 30 consumers, 1 District Fisheries Officer and 2 World Vision Malawi project staff who have closely worked with the fish farmers. Stratified random sampling was used to select male and female fish farmers and consumers. Within the stratified groups, a purposive sampling technique was used to select farmers that had sold fish in the previous growing season in order to capture costs and revenue. Data was collected through household interviews and key informant interviews using structured and semi structured questionnaires for both quantitative and qualitative data. Data was also collected using a checklist through focus group discussions with different groups of fish farmers, with each focus group discussion comprising of 8 participants. These groups included: Makwezo, Goneka, Mlumbengi, Tombolombo, Kapalapata, Limbanazo, and Katekete fish farmers clubs. Data was analysed using SPSS version 16 and Gross margin analysis was conducted to determine profitability of fish farming. Gini coefficient was calculated to determine income distribution of fish farmers. Descriptive statistics was done to determine consumer preference of pond raised fish.

Research application

The results of the study showed that on average fish production at Mpamba is at 83kg/pond/year which is 88% lower than the national annual production of 700Kg/year (Chirwa 2008). In addition to low production, the total output is divided into 18% given away or used to pay for labour and 34% for home consumption. Farmers end up with 48% on average which they sell at farm gate or at the local market. This lowers the farmers total output thus lowering their total revenue. Low levels of total output in turn affect net revenue. Due to low production output, the fish is usually sold at farm gate, or at the local market and farmers sell the fish at low prices of MK625/kg (USD1.64) against commercial price of MK2600/kg (USD6.82). In terms of costs, on average each farmer spends MK44, 383.00 (USD115.40) on variable inputs and MK46, 200.00 (USD120.12) on fixed inputs, making a total of MK90,583.00 (USD235.52) in a single growing season. High levels of fixed inputs are associated with the early stages of production where the enterprise has not yet paid off the initial investment costs (Jolly and Clonts, 1993). At the end of the growing season farmers realize MK76,605.00 (USD199.17) as total revenue. Farmers are able to realize gross profits of MK32, 222.33 (USD83.78) and economic profits of -13,978.00 (USD36.34) (Table 1). This indicates that after sale, farmers are able to recover running costs and remain with surplus but are unable to recover on fixed costs.

The study results in Table 1show that currently farmers at Mpamba are not realizing net profits. However, projected costs and net cash flows using NPV over a 10-year period at

Table 1. Profitability of fish farming at Mpamba.

Category	Amount (MK)	Percent (%)
Fixed costs		
Farm equipment	24,486.00 (USD63.67)	53
Pond construction	21,714.00 (USD56.46)	47
Land (cost)	-	-
Total fixed costs	46,200.00 (USD120.12)	100
Variable costs		
Feed	9,320.36 (USD24.23)	21
Fingerlings	8,432.71 (USD16.87)	19
Organic and inorganic manure	9,764.19 (USD25.39)	22
Labour	10,208.01 (USD26.54)	23
Transport	6,657.40 (USD17.31)	15
Total variable costs	44,382.67 (USD115.40)	100
Total costs	90,583.00 (USD235.52)	-
Gross income	32,222.33 (USD83.78)	-
Net income	-13,978.00 (USD36.34)	-
Total income	76,605.00 (USD199.17)	-

Table 2. The net present value of future costs and net cash flows discounted at 30% interest rate.

Year	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
TFC	46,200	32,500	22,849	16,414	11,554	8,278	6,002	4,279	3,012	2,127.00
TVC	44,383	44,427	44,253.90	44,854	44,366	44,493	44,987	44,559	43,445	42,359
TC	90,583	76,927	67,103.00	61,268	55,920	52,771	50,990	48,838	46,458	44,487
GR	32,222	32,255	32,128	32,564	32,210	32,302	32,661	32,350	31,541	30,753
NR	-13,978	-245.85	9,279	16,150	20,656	24,023	26,658	28,071	28,528	28,625
TR	76,605	76,681	76,383	77,419	76,577	76,796	77,649	76,909	74,986	73,112.00

Note: TFC is total fixed cost, TVC is total variable cost, TC is total cost, GR is gross revenue, NR is net revenue and TR is total revenue.

30% interest rate show that farmers will start making positive net profits of MK9,279.81 (USD24.36) in year 3 of production with highest net profit of MK28,625.16 (USD75.13) in year 10 (Table 2). According to Salia (2008)'s sensitivity analysis, the aquaculture enterprise is rather sensitive to market and market conditions particularly, profitability of the Tilapia production is most sensitive to variations in the sales price.

Income distribution. Income distribution in Mpamba among fish farmers is varied as shown in Figure 1. A Lorenz curve was derived from the farmers' incomes and it showed

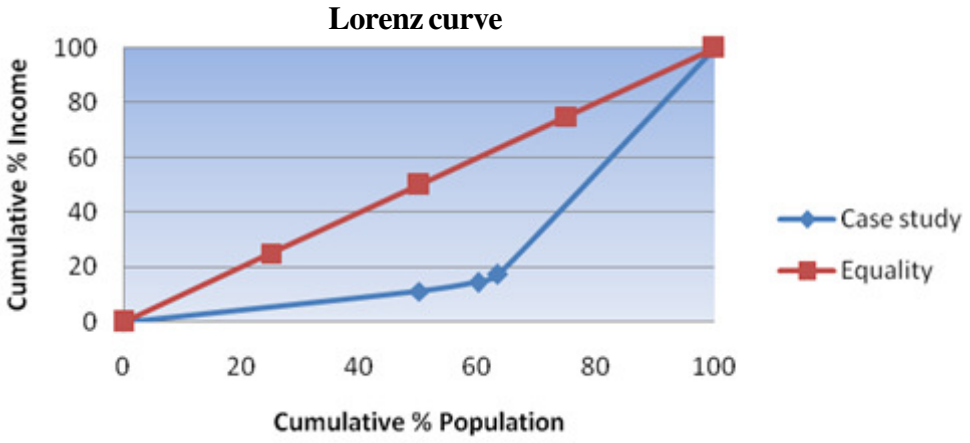

Figure 1. Lorenz Curve showing distribution of income among farmers at Mpamba.

that income is unequally distributed among farmers (Fig. 1) as indicated by the curve's convex shape (FAO, 2005). The value which gave the true level of income inequality as compared to the visual indicator (the Lorenz curve) was the Gini coefficient. The Gini index calculated for fish farmers at Mpamba is 0.5; this shows that income is unequally distributed among fish farmers at Mpamba.

Consumers' preference. When the preference of pond fish was compared with that from the wild, 52% of the consumers showed preference for wild fish, while 48% showed preference for pond raised fish (Fig. 2).

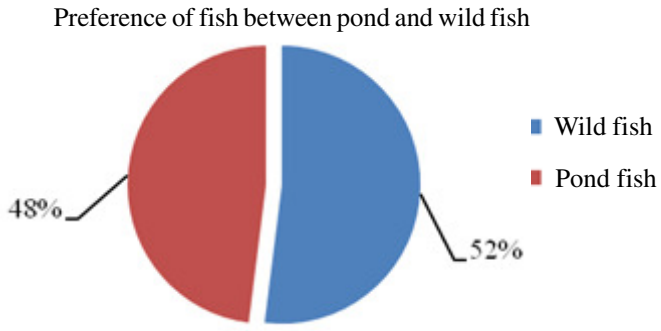

Figure 2. Consumers' preference between pond fish and wild fish.

Consumers preferring pond raised fish indicated that pond fish are tender and tasty, prices of pond fish are more affordable and that pond fish are well taken care of by the fish farmers and are well fed as compared to wild fish. Consumers preferring wild fish to pond fish attributed preference to mere familiarity; that they are simply used to wild fish, secondly they find fish from the wild to be tasty. The similarity in the reasons for preference for the different types of fish satisfies the varied tastes and preferences in consumers which in turn affects demand. This will have an influence on the quantity of pond fish demanded and the revenue.

The study's results will serve as a source of information for fish farmers in Mpamba, Mzuzu University which works with the farmers in terms of production decisions. It will also provide information for other stakeholders such as World Vision International who have been assisting farmers in production and marketing of fish at Mpamba.

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