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Assessing the financial viability for small scale fish farmers in Namibia

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The aim of this study is to assess the financial viability of small-scale fish farmers in central northern Namibia, namely Oshikoto Region, Oshana Region, Omusati Region and Ohangwena region; who receive fingerlings on a continuously basis from the Ministry of Fishery and Marine Resources Ongwediva extension office. Out of the 76 active farmers, two-third (37) farmers were randomly selected and interviewed for this research. The data was analysed using cost benefit analysis and situational analysis. The situational analysis was carried out to assess the farmer's situation, (that parameters included training opportunity transport and marketing). The cost benefit for this study shows that aquaculture will not be sustainable if not managed and planned well. Therefore, this study is recommended to strengthen the technical and organisational aspect of farmers, and also what is required to support the farmers.

Key words: Small scale fish farming, financial viability and central northern Namibia.

INTRODUCTION

Globally, the number of people who lack access to minimum dietary requirements has risen from 824 million to 1020 million, in between 1990 to 2014 (Food and Agriculture Organization (FAO), 2015b). Furthermore, it is estimated that about 795 million people (world-wide), or one in nine persons, were suffering from chronic undernourishment in the year 2014 to 2016, this phenomena in Sub-Saharan Africa is severe; for example in 15 African countries more than 35% of their population suffer from hunger, with children being the most affected (FAO, 2015a).

Food crises in Africa is attributed to the decline in agricultural productivity; that resulted from water being a major transient resource through space and time (Ryan and Spencer, 2001; Twomlow et al., 2002). In addition to this negative effects of climate change, there is decline in land productivity, insufficient rainfall, soil infertility, inappropriate farming techniques, poor market infrastructure, poor access to farm inputs, and war and conflicts (FAO, 2015a).

Namibia is not an exception from the above-mentioned phenomenon, as about two-thirds of the population (1.5 million people) are living in communal lands dependent on rain-fed agriculture (National Planning Commission, 2008). Despite of the perception of economic growth, Namibia ultimately upgraded to upper-middle income

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status, however, the nation still faces a number of social and economic challenges that includes: High income inequality, with a Gini coefficient of 0.62. High poverty and high cost of living with poverty incidence estimated at 29 % of the population, with an unemployment rate of 27.4%, and about half the population estimated being under severe poverty. Relatively high human immunodeficiency virus (HIV)/AIDS prevalence rate standing at 18.2%. High infant and under-five mortality rates, estimated to be 32 and 42 deaths per 1000 live births, respectively; and a high adult literacy rate of 89% (Namibia Statistics Agent, 2012, 2013). In addition to these, Namibia is lagging behind on achieving better records for the Human Development Index (HDI). In 2011, Namibia's HDI of 0.625 was below the world's HDI average of 0.682. Namibia also ranks 120 out of 187, while the country is classified as an upper middle-income country and the government target was to achieve 0.70 HDI.

To address the earlier complicated challenges the government has embarked on a few number of developmental plans; such as the Harambee Prosperity Plan which complement the long-term goal of the National Development Plans (NDPs) known Vision 2030 (Harambee Prosperity Plan 2016/17 to 2019/20) (Namibia Commission of Panning, 2015).

In the development plan, aquaculture sought as new developmental opportunities to address current challenges. As there are existing aquiculture research centers and Small Scale Fish Farming (SSFF) ventures have been established close to fresh water bodies, such as rivers, lakes and reservoirs, dams, floodplains, wetlands, boreholes and canal. In 2001, the Ministry of Fisheries and Marine Resources (MFMR) – Ongwediva Inland Aquaculture Centre (OIA) registered 568 small scale farmers within the four regions under study. However, over the past five (5) years, only 76 farmers were continously operating and receiving (which accounted only for 13%) as compared to 87% of farming activities been discontinued due to different reasons (Ministry of Fisheries and Marine Resources, 2014).

The government has therefore engaged communities in promoting fish farming, through a pro-poor focus. The fish farming initiative is expected to provide a safety-net to the most vulnerable households, that could be a potential substitute to staple crops such as maize and pearl millet, yet lack nutrients such as iron and proteins.

Therefore, the aim of this study is to assess the financial viability (using Net Present Value and Cost Benefit Analysis (NPV and CBA)) of small-scale fish farming of the rural aquaculture communities in the central north part of Namibia.

MATERIALS AND METHODS

The study area

The study was conducted in central northern regions of Namibia; Oshana, Omusati, Ohangwene and Oshikoto regions. The regions represent high rates of unemployment, poverty and malnutrition. Consequently, the regions have the highest number of fish farmers as per the MFMR database (MFMR, 2014). Although the regions provide a good representative of fish farming activities in Namibia, over the years some of the farmers had to discontinue due to lack of resources, such as water and land availability, which are one of the most constraint factors in aquaculture (Figure 1).

Data source and sampling procedure

The study was conducted from April to August 2014 in the four selected central north regions of Namibia. The choice of the study area was based on the following reasons: firstly, the number of fish farming projects operating in the regions and the high rate of poverty (reported to be 56% of the population). About 76 farmers in the respective regions have been continously farming and receiving fingerlings, over the past six years. Only two-thirds of the 76 fish farmers who were chosen for this study believed sufficient observation and also, considering the limited data available. A systematic random sampling approach was used to select the respondents from each region and the data from the coded questionnaire were transferred into Excel spread-sheet, statistical package for social sciences (SPSS) and analysed using a Cost Benefit Analysis.

METHODOLOGY

The approach that the study took is a "pragmatic approach" that utilizes both qualitative and quantitative analysis (Denzin, 2010). In the quest to improve the success rate of SSF enterprises, one aspect that has to be examined concerns the conditions within which smallholder enterprises are carried out. One way of assessing how promising or successful an aquaculture enterprise might be is conducting a cost-benefit analysis. CBA for an aquaculture enterprise essentially involves comparing initial start-up costs and operational costs with revenue streams that accrue over time, usually at the end of each production cycle (Cobbina, 2010). However, CBA may be subjected to numerous constraints, from the accuracy of the data used in the estimation process to uncertainty about values to be employed in the analysis; furthermore, it is difficult to assess economic and social benefit of the enterprise. The total cost involved in an aquaculture operation is the total sum of money invested in two forms: fixed costs and variables costs. The costs are inherently different both with respect to the cost structure itself and to the timing of accrual. Variable cost is the sum of the quantity of variable inputs used multiplied by the price per input unit as shown in Equation (1):

$$VC(t) = \sum w(j,t) * x(j,t) \tag{1}$$

Where *VC* is the variable cost in period t, *w(j,t)* is the price of inputs j in period t and *x(j,t)* is the quantity of input j in period t. The total cost of investment in any given period and the benefits that are involved in aquaculture operations are attributed to financial gain from selling the finished product at the end of each production cycle (Cobbina, 2010). This could be described as the sum of the quantity of outputs at the end of the period multiplied by the price of the output at that period as shown in Equation 2:

$$B(t) = \sum p(i,t) * q(i,t) \tag{2}$$

Where *B(t)* are the benefits in period t, p(i,t) is the price of output *i* in period *t* and *q(I,t)* is the quantity sold of outputs *i* in period *t* (Cobbina, 2010).

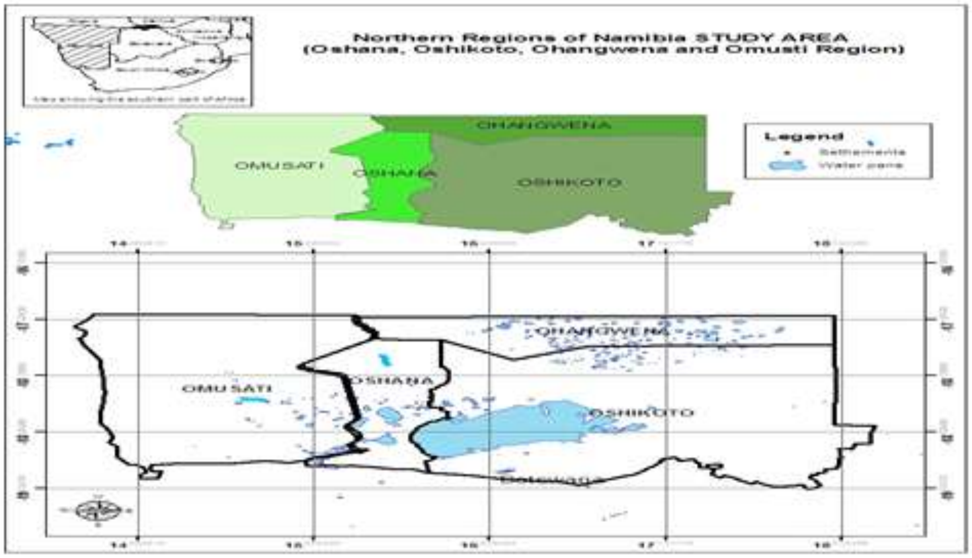

Figure 1. Location of study area (Source: Ministry of Fisheries and Marine Resources (2014)).

The net benefits in each period can be found by subtracting total costs from the benefits (Equation (3)), which in terms of financial viability can also be stated as Equation (4).

$$\text{Net benefits} = \text{Benefits} - \text{Total cost} \quad (3)$$

$$\text{Net revenue (Profit)} = \text{Total revenue} - \text{Total cost} \quad (4)$$

Estimated by the total sum of money involved in both fixed and the variable costs. The NPV is given by the difference between the sum of the discounted cash-flow, that is, the net benefits, which is expected from the investment and the amount which was initially invested in the project as shown in Equation (5) (Cobbina, 2010).

$$NPV = -INV + \frac{P_1}{(1+r)^1} + \frac{P_2}{(1+r)^2} + \ldots + \frac{P_n}{(1+r)^n} \quad (5)$$

When NPV is positive (that is, >0) then the rate of return exceeds the defined discount rate and the investment would be viable. If NPV is less than zero (<0), the investment is not viable at the given rate discount rate and if NPV equals zero (NPV = 0) it would be a break even situation where the farmer would be indifferent to investing (Okechi, 2004).

RESULTS AND DISCUSSION

Situational analysis on SSFF

In this study, about 86.5% were male and 10.8% female. This demonstrates that male farmers were dominating the fish farming system; mainly due to the nature of the farming system is more labour instensive. As indicated in Veliu et al. (2009), women are not major players in agricultural production. In terms of households that participated in fish farming, 4 to 9 household members dominated (45.9%), followed by 10 to 12 household members. The result implies that households with more members are more likely to take up fish farming technology, as it diversifies their source of income and have more access to more labour. Educational qualifications in this study found to be primary, secondary and tertiary education were about 27, 46 and 24%, respectively. It is widely believed that education creates a favourable mental attitude for the acceptance of new technology and practices.

Financial viability of SSFF

For this analysis farmers were categorised into two groups; those operating along the river canal and the second group were operating from rain-fed ponds. All calculations were based on the following assumption:

Initial investment costs

Construction of one square pond measurement and less than 400sq metres the construction uses manual labour, whereas pond measuring more than 400sq. meters requires machinery. Construction based on an average labour requirement and raw materials cost USD 200 for pond more than 200 sq. meters and construction requires work of five personnel at a rate of USD2 per day, and it takes 20 days to complete (exchange rate assumed one USD equivalent to N$15 based on April 2016). For bigger pond size, use of machinery is estimated at cost of USD67 per day, with completion period of five days for a 200 sq. meter pond size.

Table 1. Descriptive statistics of profit earned along the river-canal under government market price (in USD).

Mean	**250.6281333**
Standard error	74.38673333
Median	118.45
Mode	46
Standard deviation	297.547
Minimum	46
Maximum	920
Observation	16

Source: own computation from fish farmers data.

Input supplies

Stocking Rate ~ 50 g fingerlings, per square meter =USD0.033 per fingerling

Feeding requirement of 150 kg per 200 square meters (based on research of government institutions) for three months at a feed price of USD 0.23 per kg. The stocking rate per cycle of about 1 000 fingerlings, with a survival rate of 40%.

The price of fish is USD1.00 per kg, based on government research, and also USD2.33 per kg, based on open market prices.

Labour costs is assumed to be zero (as family members involved during the construction), because the labour of family members is not considered in the calculations.

Other considerations

The financial analysis was carried out, considering that the farmers started their operations in 2002 to introduce fishponds. Calculations for NPV were considered from 2002 to 2014, with 4, 6 and 8% being the inflation rate fluctuations in Namibia.

Price and costs were assumed to be constant during the period of evaluation consideration (from 2002 to 2014) in the calculations (USD 1.00 per kg in government price market and USD2.33 per kg in open market prices).

Using the earlier mentioned assumptions and information, partial income statements were compiled within a CBA-framework for each of the two group data sets within two price scenarios (government market price and open market price). To compute NPV, initial investment costs were considered with different possible discounting factors (inflation factors to capture time value of money).

Scenario one (Government market price)

Profit earned along the river-canal

As indicated in Table 1, the descriptive statistics for farmers operating along the canal, the mean profit calculated was about USD2531.62 per year, with the minimum profit of USD 46.00 and maximum profit of USD 920.00. This indicates that lowest SSFF profitability average would be USD3.87 per month, and the highest earnings would be USD77.00.

Figure 2 shows that only four farmers are earning more than USD 340 per year, whereas the remaining are earning below USD 340 per year. This shows clearly that farmers require much more support to make SSFF sustainable.

Profit earned by farmers dependent on rain-fed

As indicated in Table 2, the rain-fed SSFF are incurring losses, on average, at around USD132 with the extreme highest recorded of loss around USD 1420. As indicated in Figure 3, those farmers depending on the rain fed and incurring massive loss, it is estimated to be around USD 4500; when this is compared to the per capita income in sub Saharan Africa is much higher to different income categorisation of Africa. For example, high income categories nations where oil is sufficiently important as an export commodity (like Angola) their average income is estimated to be US$ 4,000; middle-income countries and World Bank classified this group based on their per capita income level and institutional quality (such as Botswana, Cape Verde, Lesotho, Mauritius, Namibia) record of 2010 average per capita income estimated to be at US$ 1,500 and the third category is known as low and fragile countries classified on the basis of a relatively low rating of their institutional quality; their per capita income estimated to be between U.S.$400 and U.S.$500 (IMF, 2015).

Table 3 shows the NPVs for SSFF systems (rain-fed and along canal fish farming), when this was discounted in between 2002 to 2014 (13 years) at discount rates of 4, 6 and 8% of inflation. The figures show that canal-SSFF records shows at about $572 , $324.00 and $122, respectively, which implies that profits per annum would be at about $44.00, $25.00 and $10.00. This means that the canal-fed SSF system is not encouraging for continuation.

On the other hand, rain fed-farming system is found be the worst, and with time value of money taken into consideration, it is estimated that about $33592.00, $3389.00 and $3208.00 losses are incurred, respectively.

Scenario two (Open market price)

Profit earned by farmers dependent on river-canal

As with the analysis indicated in Table 4, similarly with scenario two, the mean average profit is estimated to be at about $483, with minimum and maximum profits earned estimation about $87 and $1773 per year,

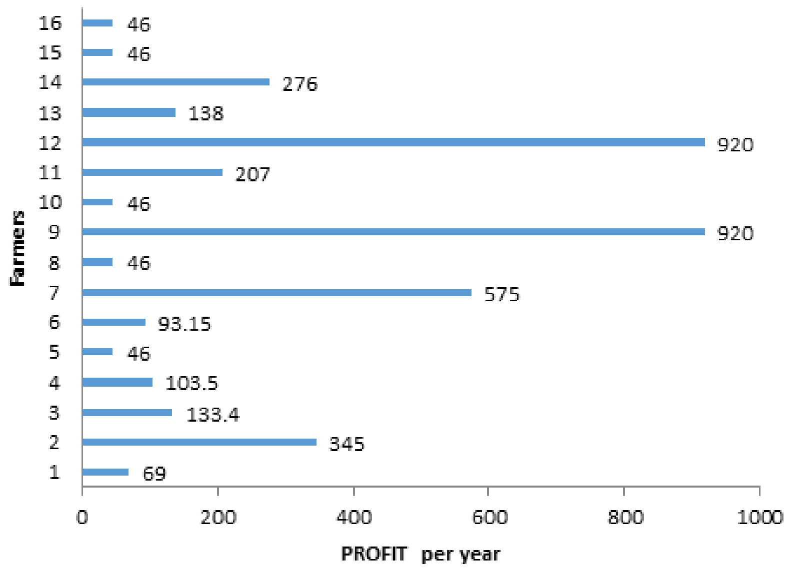

Figure 2. Profit of farmers earned for the year 2014 along the river-canal (in USD) (Source: own computation from fish farmers data).

Table 2. Descriptive statistics of profit earned along the rain-fed ponds under government market price (in USD).

Mean	**-131.65**
Standard error	110.01
Standard deviation	504.13
Minimum	2206.17
Maximum	-1419.5
Observation	21

Source: Own computation from fish farmers data.

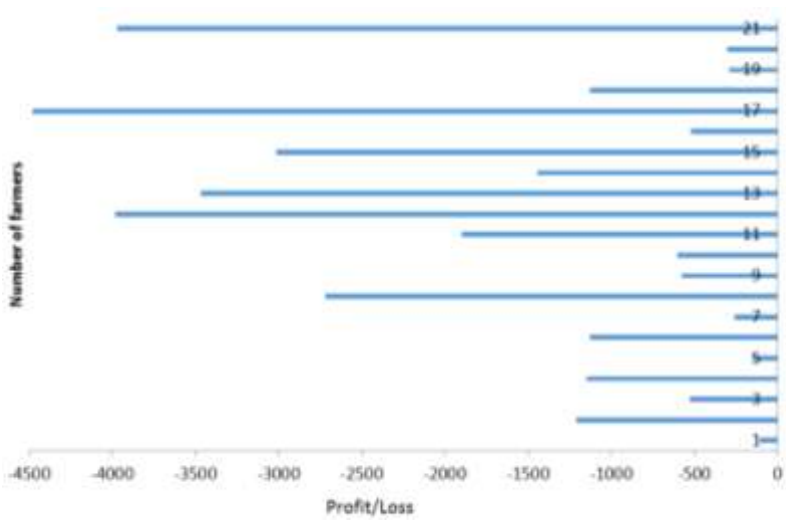

Figure 3. Individual SSFF profit earned for rain-fed ponds under government market price (Source: Own computation from fish farmers data).

Table 3. NPV for river-canal and rain-fed SSFF under Government market price.

Variable	4 %	6 %	8 %
NPV-canal ($1 equivalent to N$15)	$572	$324. 20	$121.4
NPV –rain-fed	($3592.00)	($3389.00)	($3208.00)

Source: own computation from fish farmers data.

Table 4. Descriptive statistics along the river-canal.

Mean	483.07
Standard error	143.40
Median	228.33
Mode	88.67
Standard deviation	573.53
Minimum	88.67
Maximum	1773.33
Observation	16

Source: own computation from fish farmers data.

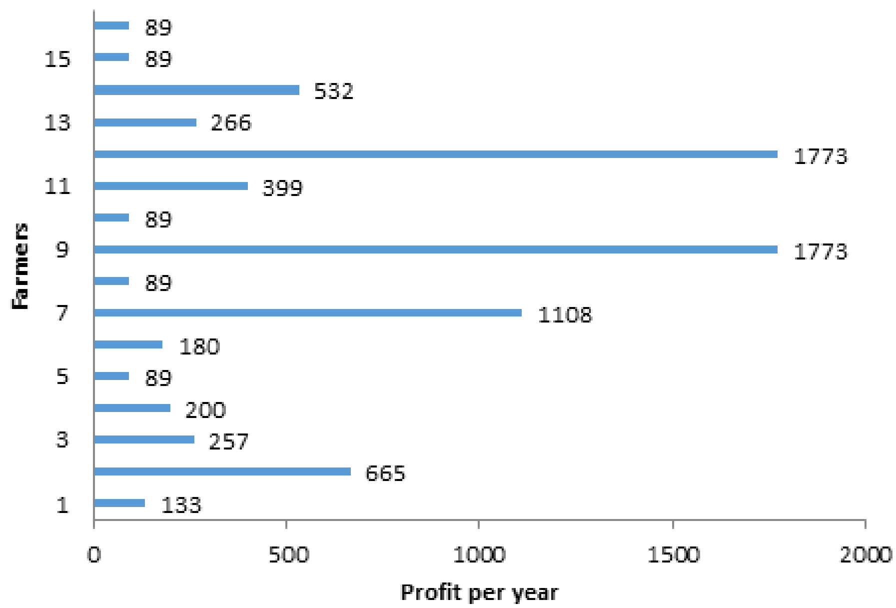

Figure 4. Profit of farmers earned for the year 2014 along the canal (Source: Own computation from fish farmers data).

respectively.

As shown in Figure 4, only three farmers managed to earn profit of more than $1 0000, and the remaining farmers below $700. This shows clearly that there is capacity, and that other support systems such as government technical and direct support and or financial assistance from the funding systems would have changed the situation.

Profit earned by farmers dependent on rain-fed

Although assuming an open market, it has been observed that not every farmer would have that access to have operations running at a loss (Table 5).

As indicated in Figure 5, for farmers depending on rain-fed with the second scenario, the individual profitability shows that half of the farmers are making marginal

Table 5. Descriptive statistics along the rain-fed operations.

Mean	**-131.67**
Standard error	110.00
Median	-91.33
Standard deviation	504.13
Minimum	-1419.53
Maximum	786.67
Observation	21

Source: own computation from fish farmers data.

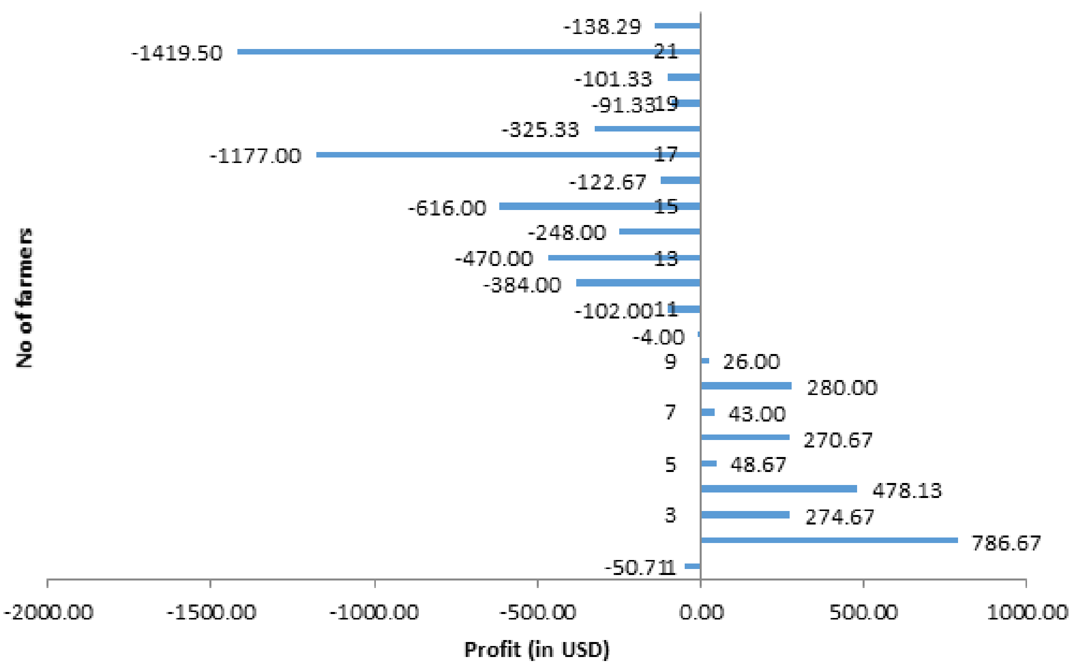

Figure 5. Profit of farmers earned for the year 2014 along the rain-fed operations (Source: own computation from fish farmers data).

profits, with a maximum of about $787, while the other half of the farmers (11 farmers) are making losses, with the biggest loss made at about $1420.

Table 6 shows that when the time value of money is considered in the calculation, discounted over 13 years, the NPV for the canal site area are relatively low, with earnings for example at 4 % of about $3718.40 (on average, around N$318.25 per annum). However, the picture of the farming system for the rain-fed operations continues to incur loss.

Similar to this, Ahmed (2004), Carney (1998), Devereux and Maxwell (2001), Martinez-Espinosa (1995), Edwards et al. (2002) and Muir (1999) have found the major constraints of small-scale aquaculture in third world countries:

Table 6. NPV for river-canal and rain-fed SSFF (in USD).

Variable	**4 %**	**6 %**	**8 %**
NPV-Canal	$3 718.40	$3 082.14	$2 554.61
NPV –Rain-fed	($1 273.42)	($1 256.02)	($1 238.66)

Source: own computation from fish farmers data.

The need to have stable access to water and/or land for cages or ponds, implying that a lack of stable access to water and/or land is a widespread feature of poverty in many rural areas.

Possible market limitations – seasonal gluts/high prices in other circumstances.

Wealth creation dynamics may be disadvantage to poorest sectors. A frequently encountered feature of poverty is the difficulty that the poor have in maintaining control of assets that acquire value. For example, open or underutilised water bodies may be of no interest to wealthier groups until their value is demonstrated, in which case the poor may have great difficulty in maintaining control.

The need to address potential resource access conflicts; the poor are able to exert little influence over decision-making and conflict resolution mechanisms because of their lack of political capital.

The technical skills involved may be relatively complex; because the poor are almost entirely engaged in ensuring their day-to-day survival, they have little time to invest in education and often lack the skills required for activities that are more complex. Similarly, access to information, including technical information on how to conduct aquaculture, may represent a significant challenge for the poor.

The risks involved in adopting a new activity may be perceived as (and on occasions actually are) high. The poor tend to be, of necessity, risk averse as any increase in risk can have disastrous implications for those already living on the borderline of destitution.

Another study from West Africa by Sofoluwe et al. (2011), and that by Nzeadibe et al. (2011), record how the authors applied multinomial logit model and descriptive statistics to show evidence on the linkage between perceptions, and factors determining farmers' adoption. Furthermore, gender, age of farmer, years of farming experience, household size, years of education, access to credit facilities, access to extension services, and off-farm income activities are among the significant determinants for adaptation of aquaculture in the context of Africa.

The major question that comes with this result is that if farmers continue to incur loss, why do the farmers continue to farm? As a result, about 87% of the farmers have decided to stop farming system operations before incurring further damage. However, when a query was made as to why those 13% of the original registered farmers under MFMR have continued to farm, the following reasons were given as their motivation to continue:

Farmers believe fish farming is more of a personal choice than a requirement. The driving force for fish farming is more of a status symbol than of economic benefit.

During times of severe drought, fish resources are exploited. Therefore, farming is undertaken for nutritional benefits or as a supplement to their diets.

Farmers are engaged in fish farming as a result of cultural development; the farmers want to promote the consumption of fish to curb the high rates of cholesterol and gout.

Government intervention in the development of the region (or rural communities) profoundly influences the way in which farmers respond to new technologies. In this case, the farmers are motivated to continue because of the benefits associated with fish farming, e.g. subsidised fish feed and fingerlings, technical assistance, and for some farmers, the benefit of gaining donor aid through government programmes to assist them.

Government of Namibia and freshwater aquaculture development in Namibia has been shortlisted as a viable means for food security and poverty alleviation in rural areas by the post-independence government of Namibia. As a result, a comprehensive and detailed framework to achieve this goal has since been developed and currently, the Namibian Aquaculture Act (2002) is in place and readily available to interested parties who wish to become a participant in this sector (Ministry of Fisheries and Marine Resources, 2014).

However, the weakest link of freshwater aquaculture in the Northern Namibia fails to integrate fresh water to crop and poultry production. Poultry manure can be used to fertilise the fish pond water to encourage natural production which aids in the maintenance of water quality, oxygenation and natural food supplement. In turn, nutrient rich effluent water from freshwater aquaculture systems has been proven beneficial in all types of crop production which eliminates the use of artificial fertilisers; however, due to the missing link in majority of Northern part of Namibia the aquaculture initiative either from rain-fed or along the cannel could not be sustainable as indicated in the financial viability of the project.

The Northern part of Namibia fresh water projects could not be sustainable due to semi-arid and possess no perennial rivers, natural lakes or man-made reservoirs. The only viable source of freshwater should have been by means of underground water extraction. In addition to the extreme climatic conditions (0 to 40°C temperatures are commonly experienced in winter and summer respectively), it is deemed environmentally unsustainable to have an aquaculture setup in open air for reasons of high evaporation rates and unsuitable water conditions to grow tropical food fish such as *Oreochromis mossambicus* species that possibly can adapt the hot Northern Namibia. Therefore, the aquaculture should have been constructed in an indoor greenhouse environment to curb the high evaporation rates and maintain suitable environmental conditions for the fish, which could have been possible only through sustainability with it being thoroughly research for environmental impact assessment in collaboration with research institution; and also government and NGOs could have support financially.

Recirculating systems are deemed economically unsustainable due to the high capital input required for start-up and maintenance as well as the high feed costs and high demand for technical expertise. Open air earthen ponds on the other hand will not be suitable due to the relative high water requirements (loss through evaporation) and extreme climate conditions. Therefore, ponds constructed in greenhouses will be best suited for Namibian weather conditions.

Greenhouse constructed with heavy duty transparent plastic will cover the pond. This will ensure elevated water temperatures during winter and reduced evaporation rates during the summer. Furthermore, the transparent plastic will allow natural sunlight to penetrate the water which will ensure natural food production (phyto- and zooplankton). The pond will be lined with a heavy duty and chemically inert plastic to prevent drainage. The pond water will be continuously agitated by means of electrical air blowers and water circulation will be achieved by means of single two phase electrical water pump to aid water quality maintenance. Drainage of the pond will be achieved by means of a single outlet connected to a series of valves inline to the pump used for water circulation. Electrical components in this system will depend on solar generated electricity and will run 24 h daily.

As indicated in MFMR (2004), in the Namibia aquaculture strategic plan, Current policy for this developing sector is laid out in the policy paper: Towards the Responsible Development of Aquaculture (2001). Under this policy, Namibia is committed to observe the principle of optimum sustainable yield in the exploitation of living natural resources and ecosystems. The Government therefore has an obligation to promote and regulate responsible and sustainable development and management of aquaculture within national water bodies of all types.

The main objective of Namibia's aquaculture policy is the responsible and sustainable development of aquaculture to achieve socio-economic benefits for all Namibians and to secure environmental sustainability. The policy rests on four strategies:

- Establishing an appropriate legal and administrative framework for aquaculture, including establishing systems of tenure for commercial aquaculture;
- Establishing appropriate institutional arrangements for aquaculture;
- Maintaining genetic diversity and the integrity of the aquatic ecosystem; and
- Ensuring responsible aquaculture production practices.

However, the economic support to the industry should also be incorporated as an objective to ensure that seed money to stimulate the industry is made available.

In 2002, the Aquaculture Act was passed by Parliament and came into force in June 2003. This prescribes, *inter alia*, the procedure for obtaining aquaculture licences, monitoring, regulation, processing, marketing, environmental safety measures and consumer health and safety issues

While the aquaculture industry continues its strong growth overseas, Africa in general and Namibia in particular continues to lag far behind in the development of its industry. To remedy this, the Government will endeavour to provide this fledgling industry with opportunities for start-up capital, research and development funds, marketing and promotion support, and education and training. These efforts must take an approach whereby the State uses industry expertise and experience to help it identify germane areas of applied research that will actively promote the development of the national aquaculture industry. Likewise, the industry can help guide and develop useful financing programs, appropriate education programs, and effective marketing and promotion efforts.

CONCLUSION AND RECOMMENDATIONS

The study shows that out of 568 registered farmers, only 76 farmers continued farming, which is clearly attributable to the continued financial losses due to drought (specifically in rain-fed areas) rendering the majority unable to farm. As this study indicates, the poor support systems in terms of farming infrastructure, training opportunity, transport and marketing means that aquaculture will not be sustainable, if not managed well. This includes management incorporating production, processing, storage and distribution. Production, marketing and infrastructure include cold-chain storage, the lack of which has hampered the SSFF production system.

In conclusion, small-scale farming systems require a total reform, for all actors in the sector. It is very important to assess the small-scale farming system in Namibia, and to make it more sustainable. Government should assist farmers so that they can make a real contribution to the sector. Furthermore, it is very important to assess the social, economic and environmental components before approving SSFF operations.

As indicated in the discussion, the missing link on the aquaculture initiative, depending on the rain fed or depending on the cannel, due to high extreme climatic conditions up to 40°C temperatures are commonly experienced during summer, it is deemed environmentally unsustainable to have an aquaculture setup in open air due to high evaporation; as a result using underground water recycling integrating with crop and poultry; which is the only viable source of freshwater; in addition to the extreme climatic conditions. It is deemed environmentally unsustainable to have an aquaculture setup in open air for reasons of high evaporation rates and unsuitable water conditions to grow tropical food fish such as *O. mossambicus* species that possibly can adapt the hot Northern Namibia; in doing so research institution is required to support with skill and knowledge; whereas, government and NGOs with financing could make the fish farming viable.

With the policy implication of this study, networks and social capital related policy are important; thus networks of community groups are also important for those already operating SSFFs, therefore, government needs to assist through policy instruments to configure the problem (for example, climate risk). Local savings scheme policies are also important, that is, providing useful financial 'stores', to be drawn down during times of stress.

Commercialisation of SSFF is important and involves the government designing a framework that is not focused on a "pro-poor" angle, but rather on a bigger scale. Therefore, designing an economically viable model should be more focused on commercialising the sector than on small-scale operations, so that the government might reach their objectives of food production, income generation and job creation.

Conflict of interests

The authors have not declared any conflict of interests.

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