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An Extrapolation of Credit Needs for Fish Production in North East India

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ABSTRACT
North East (NE) India produced about 0.338 milliontonnes of fish from 0.563 millionha of water area during 2012-13 registering a productivity of about 600 kg per ha. There is substantial gap between potential and current fish production in NE India. This study analyses the economic and credit requirement for fisheries development in NE India. The study found that the average amortized annual fixed cost for fish farms was highest in case of marginal fish farmers. Institutional credit for fisheries in NE India has been increasing over time, from INR 8.1 millions in 2004-05 to INR 1096.4 millionsin 2012-13 (1 USD = 67.14 INR).
Keywords:*Economics analysis, Credit requirement andHolt- Forecasting Method.*

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INTRODUCTION

Fisheries sector occupies a very important place in the socio-economic development of the country. Fish is also the source of livelihoods for large sections of economically backward population of the country. While the growth rate of inland fish production registered an impressive 4.41 per cent during 2004-05 to 2012-13, the growth rate of fisheries in NE India was 5.10 per cent during the same year. Though vast resources are available to boost the inland fisheries production of the NE India, one or more constraints act as a hurdle to achieving the potential. One of the most vital and limiting factor is the credit availability for the fish farmers [18]. In fact, the lack of adequate, accessible, and affordable credit is among major factors responsible for the systemic decline in the contribution of agriculture to Nigerian economy [17]. Every segment of agricultural production requires the availability of adequate capital since capital determines access to all other resources on which farmers depend [3]. Adekanya [1] stated that: it is a common knowledge that present farmers and artisans who the back of the rural population do not get adequate and timely loans from financial institutions and they have no collateral and equally they do not get supplies of raw materials of standard quality even at the market place as they come under the ditches of rich farmers and sellers in the urban areas. While the large farmers may not find it difficult to obtain credit required for improving their bottom line, the small and the medium scale farmers may face lot of problems in availing credit [8]. Also, Awoke [2] reported that high rate of default arising from poor management procedures, loan diversion and unwillingness to repay loans has been threatening the sustainability of most public agricultural credit schemes.So in this study we are also suggesting some encapsulated policies for streamlining institutional credit.

MATERIAL AND METHODS

Though this study attempts to estimate the credit requirement for fish farming in NE India, Manipur has been selected purposefully as the study area.

Fish culture in Bishnupur district, Manipur is the focus of attention in this study. A sample size of 150 fish farmers were selected out of which 50 fish farmers each in Marginal (< 1 ha), Small (1 ha - < 2 ha) and Medium & Large (2 ha -> 2 ha) fish farmers were selected.

Estimation of Credit Requirements

The estimation of credit requirement was defined as the money value of the quantity of fish deficit in supply estimated by multiplying the cost of fish production (INR/kg) and the quantity of fish that is needed to fill the gap between demand and supply.

Holt- Forecasting Method

Exponential smoothing technique is the simplest and widely used among the forecasting techniques. Forecasting involves making projections about future performance on the basis of historical and current data [6]. Exponential smoothing model uses a single parameter to forecast the series (y_i) assuming no trend or seasonality [13]. The forecast function is simply equal to the sum of forecast of the level ($\hat{y}_i$) during the preceding period and a proportion of the forecasting or prediction error of the preceding period($y_i - \hat{y}_i$) [5].

$\hat{y}_{i+1} = \hat{y}_i - \alpha(y_i - \hat{y}_i)$given that $0 \leq \alpha \leq 1$

This can be rewritten as $S_t = \alpha y_i - (1-\alpha)S_{t-1}$

Where $S_t = \hat{y}_{i+1}$ which captures the level component of the model.

However, in time series data, where trend is present, Holt- model, which is a two-parameter model, fits well and could generate more meaning forecasts. In the present study, the holt- model was fitted to the data to generate forecasts.

$$S_t = \alpha y_{t-1} + (1-\alpha)(S_{t-1} + b_{t-1}), 0 \leq \alpha \leq 1$$
$$b_{t-1} = \gamma(S_t - S_{t-1}) + (1-\gamma)b_{t-1}, 0 \leq \gamma \ll 1$$

While S_t captures the level component of the model b_t captures the trend component.

For a series $y_1, y_2, \ldots, y_n$, the forecast function, which gives an estimate of the series msteps ahead can be written as:

$$\hat{y}_t(m) = S_t + mb_t$$

$$\hat{Y}_t(h) = S_t + hT_t$$

where$\hat{y}_t(m)$stands for m^{th} period ahead forecasting value of Y_t.

Since there are two terms in the Holt's exponential smoothing model, two separate smoothing constants are used, α for the level and $\gamma$for the slope.

Various starting values for initializing the models as specified in Makridakis *et al*. [14] was used in the study to fit the models.

RESULTS AND DISCUSSION

The average landholding size of the fish farmer was 1.87 ha, which ranged from 4.03 ha on medium & large farms to 1.08 ha on small farms and 0.51 ha on marginal farms (Table 1). The average amortized annual fixed cost for fish farm was INR 34,218 per ha, which ranged from INR 15,518 per ha on medium & large farms to INR 38,634 per ha on small farms and INR 55,881per ha on marginal farms. The average amortized annual fixed cost for fish farm was higher in case of marginal fish farmers than small fish farmers and medium & large fish farmers. This is because the capital cost is generally low for large farms because the uses of capital assets such as boats, nets, pumps, etc. are spread over a large farm area. So, when we calculate the per unit area the cost of assets is found to be less in case of large farms.

The average variable cost for fish farm was INR 93,488 per ha, which ranged from INR 91,274per ha on medium & large farms to INR 135,513 per ha on small farms and INR 138,406 per ha on marginal farms. This variation in variable cost shows that the management practices across size group of farms does not appear to be consistent with the size of their operational water spread area. The cost of cultivation of fish was INR 127,707 per ha, which ranged from INR 106,792 per ha on medium & large farms to INR 174,148 per ha on small farms and INR 194,287 per ha on marginal farms. It was higher in marginal fish farms than small fish farms and medium & large fish farms due to increased cost of capital assets such as imputed leased value of land, amortized annual cost of farm machinery, nets, traps, etc. The overall net return was INR 144,483 per ha, which ranged from INR 122,308 per ha on medium & large farms to INR 186,842 per ha on small farms and INR 229,633 per ha on marginal farms. The B:C ratio was 2.13, which ranged from 2.15 on medium & large farms to 2.07 on small farms and 2.18 on marginal farms. This shows that the fish farms were being profitably operated.

Financial and credit requirement

The cost of fish production in Bishnupur district, Manipur was INR 77.83 per kg of fish (Table 1). The total fish consumption in NE India during 2009-10 was estimated from the NSS 66th round report. Considering the total fish consumption as the total fish demand in NE India, we worked out the shortfall in supply of fish in NE India. By taking the cost of fish production in Bishnupur as base, the cumulative capital requirement in order to produce the shortfall of fish production for NE India was worked out (Table 2). Therefore the cumulative capital requirement during 2009-10, 2014-15, 2019-20 and 2024-25 were found to be INR 2700, INR 9930, INR 19050 and INR 30350 million respectively.

This investment to bridge the gap between the demand and supply of fish in NE India at the farm level will be met by private demand of owned capital and loans. It is assumed in this study, that 25 % of total capital requirements at the farm level will be met from owned funds (margins) and the rest (75%) may be borrowed from financial institutions. However, this capital requirement does not include investment at the institutional (companies or government) level which are essential to bridge supply gap. It is beyond the scope of study to estimate the investment requirements from private and government institutions involved in seed production (hatcheries), feed, farm equipment, gears, vaccines, medicines, market infrastructure, cold storage, cold chain transportation, etc. However it is inevitable to bridge the supply gaps unless these investments are made simultaneously along with farm-level investments.

Further, this incremental investment by private fish farmers will happen only if, besides the incremental investment in direct inputs from the private sector, it is supplemented by government investment in terms of subsidy to fish farming, which acts as an incentive and encouragement for increasing fish production and investment in research and extension, creation of market infrastructure, etc [18].

Current trends and projected forecast of credit supply

Institutional credit for fisheries in NE India has been increasing over time. It has increased from INR8.1 million in 2004-05 to INR 1096.4 millionin 2012-13 (Table 3). This table gives the credit supply by State Bank of India (SBI) in NE India for the fisheries sector. Using Holt's forecasting model, credit supply for fisheries in NE India is estimated to rise from INR 1096.4 millionin 2012-13 to INR 1389.6 millionin 2016-17. This shows a positive trend in the flow of credit for the fisheries sector in NE India. Credit flow increased by INR82.1 millionover 2012-13 to 2013-14 representing a 6.97 % increased credit flow. SBI Credit to fisheries sector would increase by another INR 83.6 millionover 2013-14 and 2014-15 respectively indicating a 6.62 % increase in credit flow during that year. Credit flow from 2014-15 to 2015-16 would decline to INR 49.4 millionrepresenting a decline in credit availability to fisheries sector by -4.07 %. Credit flow over the year 2015-16 to 2016-17 is projected to increase by INR7.68 million or 5.96 %.

The Holt model assumes that past behaviour holds true in the future. This assumption though looks unrealistic, is basic assumption to all univariate forecasting models including the advanced ones such as ARIMA and ANN. As in real world situation, any exponential growth does not hold well in the long run, similarly in this study, the forecast of a decline (downward bend) towards the end of short term forecast looks practical and plausible.

Suggest suitable policy framework for streamlining institutional credit for fisheries sector in Manipur

Table 4gives the constraints expressed by fish farmers for obtaining institutional credit. Thirty nine per cent of all the fish farmers across size groups and 38 %, 44% and 59% of the marginal, small, and medium & large farmers expressed that obtaining institutional credit for fish farming is a complicated and time consuming procedure. Nineteen per cent of the total sampled farmers and 18% of small and 36% of medium & large farmers expressed the need for paying a commission to the patwari, agents and officials in obtaining institutional credit. Thirdly 15% of the total sampled farmers and 18 % of the marginal farmers and 14% of the medium & large farmers are illiterates and had poor links with banks which acts as a major constraint for obtaining loans from institutional agencies. Other constraints included poor spread of bank branches in the region need for providing collateral security, high transaction cost and lack of personal rapport with bank officials.

Strategies for improving the performance of institutional credit delivery system

Table 5 gives the suggestion and strategies for improving the performance of institutional credit delivery system among fish farmers of Manipur. It may be noted that 33% of the total sampled farmers felt that it is necessary to simplify the loan procedures so that the stakeholders can avail institutional finance on a regular basis. Procedural formalities appear to be a major stumbling block to fish famers from availing institutional finance for their economic activities. Thirteen per cent of the sampled fish farmers felt that enabling sanction of loans on the spot through panchayat would also enable the farmers to avail more institutional finance on a regular basis. Other suggestion included reduction in paper work for availing

institutional finance, reduction in transaction cost, improving branch banking, increasing subsidy for small farmers and increasing credit limits and making institutional finance available to tenants/leasee of the farm.

Encapsulated policy for fisheries finance in NE India

The earlier discussions reveal that there is enormous scope for fish farming in NE India. The discussion also shows that there is enough scope for an increasing role for institutional finance in fish farming in NE India. The annual growth rate of fish production in NE India has registered a positive growth over the years indicating a healthy trend [4]. The following specific policy measures though not directly derived from the above discussion are relevant to the overall penetration and performance of institutional finance in NE India.

1. The substantial scope for increasing the availability of production credit in fish farming needs to be exploited. It may be noted in the discussion that fish farming is essentially driven by own capital and the role of borrowed institutional funds is very limited.
2. Suitable financial instruments that ensure availability of institutional credit for fish production needs to be developed for making funds available timely, sufficient and at minimum cost of funds. Instruments such as a Kissan credit card would be a good idea.
3. On site participation of institutional financial agencies on a periodical basis would help in enhancing the visibility and reach of institutional finance.
4. Institutional production credit can also be networked with development agencies involved in fish farming. If a network model of development of fisheries in NE India is established, like for instance the seaweed farming model in Tamil Nadu it would enhance the role of institutional credit in fish farming in NE India.
5. Institutional finance also can involve in development of private interest in fish marketing with appropriate financial products aimed at private sector investments in fish marketing. This would attract entrepreneurs in fish marketing which would have a multiplier effect on fish production leading to enhanced investments.
6. It is also important for institutional finance to be involved in developing indirect benefits and indirect investment for the growth of fisheries sector in the NE India. Investment in institutions delivering information to the fisheries sector, engaged in inputs supply, involved in marketing etc. would enhance the role of fisheries finance in fisheries development in NE India.
7. It is also important for the technical officers in commercial banks to come out with package of financial products for specific niche areas like ornamental fisheries, fish processing etc. similar to the NABARD bankable projects.

Table 1 Economics of fish farming in Bishnupur district, Manipur

Particular	Marginal	Small	Medium & Large	Total / Average
Total FF area (Ha.)	25.63	54	201.5	281.13
Average Fish farm area (ha/farmer)	0.51	1.08	4.03	1.87
Fish production (Kg/Ha)	2599	2187	1373	1641
Price realization (INR/Kg)	163	165	167	166
Cost of production (INR/Ha.)	194,287	174,148	106,792	127,707
Fixed Cost (INR/Ha)	55,881	38,635	15,518	34,218
Variable Cost (INR/Ha)	1,38,406	1,35,513	91,274	93,488
Gross Income (INR/Ha)	423,921	360,994	229,096	272,193
Cost of production (INR/Kg.)	74.75	79.62	77.81	77.83
Net returns (INR/Ha.)	229,633	186,842	122,308	144,483
Profit (INR/Kg.)	88.34	85.43	89.11	88.06
B:C ratio	2.18	2.07	2.15	2.13

Table 2 Projected cumulative credit requirement in NE India

Particulars	2009-10	2014-15	2019-20	2024-25
Projected population	43732000	46503000	49047000	51216000
Population rate of change in last 5 years		0.06	0.05	0.04
Rate of change in income (%)		5	5	5
Elasticity	0.84	0.84	0.84	0.84
Total Demand (tonnes)	405189	529144	685393	878957
Supply as on 2009-10 (tonnes)	358900	358900	358900	358900
Shortfall in supply (tonnes)	46289	170244	326493	520057
Cumulative Capital Requirement (INR in Millions)	3600	13250	25410	40480
Cumulative Credit Requirement (75%)	2700	9940	19060	30360

Source: NSS 66th round & projected population from Census of India, 2001

Table 3 Trends and forecasted credit supply to fisheries sector in NE India by SBI (2005-2017) INR in Millions

Year	Actual	Forecast
2004-05	8.1	
2005-06	110.1	
2006-07	156.3	
2007-08	538.7	
2008-09	658.1	
2009-10	819.5	
2010-11	929.4	
2011-12	1087.4	
2012-13	1096.4	1096.4
2013-14		1178.5
2014-15		1262.1
2015-16		1212.7
2016-17		1289.6

Note: Calculated based on data collected from SBI, Guwahati, Assam. The data pertains only to the loan disbursed from State Bank group of banks which is the major source of institutional credit to fish farmers in NE India.

Table 4 Constraints in availing Institutional Credit for fish farmer in Manipur

Constraints in availing Institutional Credit	Marginal (%)	Small (%)	Medium and Large (%)	Total (%)	Ranks
Complicated and time-consuming procedure	38	44	36	39	I
Commission to Patwari, agents and officials	4	18	36	19	II
Illiteracy and poor linkages	18	12	14	15	III
Poor branch banking	8	14	6	9	IV
Untimely availability and poor quality of information	0	0	8	3	VI
Collateral security	8	0	0	3	VI
High transaction costs	10	8	0	6	V
Low rapports of banks with clients	14	4	0	6	V

Table 5 Strategies for improving the performance of institutional credit delivery system

Farmers suggestions for improving the performance of Institutional credit delivery system	Marginal	%	Small	%	Medium and Large	%	Total	%	Ranks
Simplified loan procedure	12	24	21	42	17	34	50	33	I
On the spot sanction (through Panchayat)	4	8	5	10	10	20	19	13	II
Subsidized loans for small farmers	9	18	2	4	1	2	12	8	VI
Reducing paper works	4	8	8	16	6	12	18	12	III
Reducing transaction costs	6	12	4	8	6	12	16	11	IV
Improving branch banking	4	8	7	14	2	4	13	9	V
Provision of loans to tenants/lease	10	20	2	4	0	0	12	8	VI

SUMMARY AND CONCLUSION

As financing institutions, several banks (commercial and rural) are engaged in investing or lending money for development oriented but commercially viable aquaculture projects which form part of agriculture sector [7]. Traditionally Indian fish farmers have been in the clutches of private money lenders, who had impoverished them to the extent that they could not put back any capital for developing their socio-economic status. The real interest and exchange rates should be properly managed and periodically received so as to promote the growth of the Agricultural sector [15]. Therefore suitable financial instruments that ensure availability of institutional credit for fish production needs to be developed for making available timely, sufficient and at minimum cost of funds. Instruments such as a modified Kissan credit card would be a good idea.

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REFERENCES

1. Adekanya, F. (1986).The Elements of Banking in Nigeria:3rd Edition. Lagos; F and A Publishers.
2. Awoke, M. U. (2004).Factors affecting loan acquisition and repayment patterns of small holder farmers in Ika North West of Delta State, Nigeria.J. Sustain. Trop. Agric. Res., Vol. 9, pp 61-64.
3. Ayoola, G. B.&Oboh, V. U. (2000).A model of public expenditure to reveal the preference for agriculture in the budget.J. Rural Econ. Dev. Vol. 14, No. 1, pp 56 –73.
4. Baik, L.,Ajit, K. P., Kumar, Ng.& Basavaraja, N.(2009). Status of Aquaculture and Fisheries in Manipur States.Fishing Chimes, Vol. 29, No. 1.
5. Chatfield, C.&Yar, M. (1988). Holt-Winters forecasting: some practical issues. *The Statistician*, pp 129-140.
6. Gardner, E. S.&Dannenbring, D. G. (1980).Forecasting with exponential smoothing: Someguidelines for model selection. Decision Sci. Vol. 11, No. 2, pp 370-383.
7. Gosh, P. K. (2008). Role of commercial banks in aquaculture development.Fishing Chimes,Vol. 28, No. 5, pp 43-45.
8. Hamlish, R. (1979). Credit for aquaculture In T. V. R. Pillay and Nm. D. Dill (eds). Advances in aquaculture.Fishing news books ltd. Farnham, England, pp77-84.
9. http://databank.nedfi.com/content/general-information accessed on 18 February 2014
10. http://en.wikipedia.org/wiki/Exponential_smoothing accessed on 21st April, 2014.
11. http://en.wikipedia.org/wiki/Northeast_Indiaaccessed on 6 April 2014
12. http://www.ons.gov.uk/ons/guide-method/user-guidance/index-of-services/indexof-services-annex-b--the-holt-winters-forecasting-method.pdf. accessed on 21st April, 2014.
13. Kendall, M. G. &Ord, J. K. (1990).Forecasting.Time-series: 3rd Edition, London: Edward Arnold, Vol. 296, pp 122-141.
14. Makridakis, S., Steven C. W.& Rob J. H. (1998). Forecasting: Methods and Applications.Published by John Wiley & Sons,pp 642.
15. OnyinyechukwuO. (2012). The role of commercial banks in agricultural development in Nigeria: 1986-2010.A project submitted in partial fulfilment of the requirement for the award of bachelor of science (B.Sc) Degree in Economics, Department of economics, Faculty of management and social sciences, Caritas University, Amorji-Nike, Emene, Enugu.
16. Osuntogu, A. (1989). Agricultural Credit Strategies for Nigerian Farmers.Nigerian Agric. Econ. J. Vol. 1, No. 3.
17. Rhaji, M. A. Y. (2000). An analysis of the determinants of agricultural credit approval/loan size by commercial banks in south-western Nigeria.Nigerian Agric. Dev. Stud.Vol. 1, No. 1, pp 17-26.
18. Singh, Naorem Dinesh (2014). Economic and Institutional Arrangements for Financing Fisheries Development in North East India.Unpublished thesis, Master of Fisheries Science in Fisheries Economics, Fisheries Economics, Extension and Statistics Division, Central Institute of Fisheries Education, Mumbai, India.