

## Economic Evaluation of Fishery on the Coasts of Miankale Wildlife Refuge

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**Abstract:** We have evaluated the economic activities of Osteichthyes fish cooperatives on the coasts of Miankale Wildlife Refuge. In order to carry out the research, we used common techniques in engineering economy such as net present value (NPV) and cost-benefit ratios. At first, the financial balance sheet of the four cooperatives active in the utilization year of 2009. Among the 15 active cooperatives of the region were randomly selected and cost rates (including fixed and current costs) and also the benefit rate that was made on fish sale were calculated. Then, the net present value of the cooperatives was calculated using the bank interest rate of 13 percent (of a five year long-term bank deposit). Results showed the net present value ratio of cooperatives to be over zero ( $NPV > 0$ ) which showed economical activities of the cooperatives. On the other hand, the average cost-benefit ratios of the four involved cooperatives were calculated to be 2.18 ( $B/C > 1$ ) which showed the justifiability of the activities of the mentioned cooperatives.

**Key words:** Net present value, Cost-benefit rate, Fish catching cooperative, Miankale wildlife refuge

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### INTRODUCTION

One of the most important issues raised in economic projects and plans today is the justifiability of activities from economic viewpoint; otherwise, it will lead to interruption or stoppage in the process of plans or projects [1]. Net catching cooperatives are in such conditions like companies and enterprises as they start fishing in the beginning of the fishing season by spending money and utilizing human resources and fishing equipments and naturally earn the income from selling fish. The question posed here concerns the performance of fishing activities of cooperatives i.e. whether cooperatives earn expected capital or benefit in spite of spending money and utilizing production factors or not. To answer this question, we decided to study the performance of fishing cooperatives in the southern coasts of the Caspian Sea which were involved in catch

and fishing activities inside Miankale Wildlife Refuge. In order to conduct this research, common techniques in engineering economy such as net present value (NPV) and cost-benefit ratio are used.

**Net Present Value Ratio:** As it was mentioned in the previous section, calculating the present value of a financial process is the conversion of the future value of total earnings and spending into present value at the present time of a productive-industrial process in a way that if the NPV was below zero with the minimum interest rate for a project ( $NPV < 0$ ), that project would not be economical. When  $NPV < 0$  shows the fact that the present value of expenses is more than the present value of earnings and if  $NPV > 0$ , the present value of expenses is less than the present value of earnings and that given activity is economical[6]. The following equation is used to calculate NPV in this research:

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$$NPV = \sum_{t=1}^{t=10} B_t(1+r)^t - \sum_{t=1}^{t=10} C_t(1+r)^t \quad (1)$$

**Cost- Benefit Ratio:** Another technique in engineering economy for economic calculation of plans is the benefits-expenses or benefit-expense ratio. In addition to studying private investment plans economically, this method is a famous applicable one in evaluating state plans.

$$\frac{B}{C} = \frac{PV_B}{PV_C} = \frac{\sum_{t=1}^{t=10} B_t/(1+r)^t}{\sum_{t=1}^{t=10} C_t/(1+r)^t} = \frac{B_{2009}/(1+r)^1 + B_{2008}/(1+r)^2 + \dots + B_{1999}/(1+r)^{10}}{C_{2009}/(1+r)^1 + C_{2008}/(1+r)^2 + \dots + C_{1999}/(1+r)^{10}} \quad (2)$$

If  $BC > 1$ , a plan will be economically justifiable and if  $BC = 1$ , it will be at the tangent point, but if  $BC < 1$ , implementing the plan is not economically justifiable and will finally lead to stoppage in activity [1]. The following equation is used to calculate benefit-expense ratio:

$$\frac{B}{C} = \frac{\sum B_t/(1+r)^t}{\sum C_t/(1+r)^t} \quad (3)$$

**Review of the Related Literature:** Smith (1996) calculated the net benefit and financial benefit of fishing ships on the coasts of New Zealand. By calculating the internal revenue rate (IRR) and net present value (NPV), he noted that the financial benefit of fishing ships is influenced by fishing effort [3].

In his master's thesis entitled "the economic evaluation of the performance of fishing sardine by blanket method in Iran", Mr. Saber Ghahremani assessed this fishing method in Iran by calculating NPV and ratios method including average revenue rate, income present value and benefit-expense ratio [4].

In his research entitled "evaluating economic expense-benefit of fishing tuna in Chabahar", Ramin Pashayee evaluated fishing in that region in 1995 in cooperation with Iranian Fishery Organization. He calculated benefits and expenses of fishing tuna in that region separately and estimated the total benefit after subtracting total expense from total income [7].

$$Max \mu = TR - TC \quad (4)$$

We have studied used vessels, staff characteristics and physical features of vessels, the capital value of vessels, fishing status, revenue sharing or catch distribution system among production factors and repair and maintenance costs in this research separately. Finally, after calculating the income from sale and expenses which vessels or fishers sustain, the benefit from this fishing effort was calculated and evaluated.

## MATERIALS AND METHODS

**Miankale Wildlife Refuge:** It is located 12 km farther north of Behshahr which is about 68,800 hectares. It lies at altitude 50:36' north and at longitude 17:53' east and is 21-26m above sea level at the southeastern coast of the Caspian Sea. Miankale Wildlife Refuge was at first selected as a protected area and was later selected as wildlife Refuge with regard to its ecological features and importance as the home of a host of endangered species and also scientific and educational applications; subsequently, it was introduced to UNESCO's committee of resident man and globe plan (MAB) as the reservoir of heaven life in [6]. Miankale Refuge is visible on maps as a narrow coastal strip which separates southeastern coasts of the Caspian Sea from Miankale Wetland and Gorgan Bay. Involved cooperatives are located along the coastal strip and with certain distances. It should be also mentioned that the activities of those cooperatives are conducted under the supervision of Iranian Fishery Organization despite being located in Miankale Wildlife Refuge.

**Research Methodology:** In order to conduct the research, the statistical population was first selected and four samples were randomly selected from them. From 15 cooperatives within the range of the Refuge, Taleghani, Khaje Nafas, Chargholi and Kamine cooperatives were selected and their annual financial balance sheet and monthly bills were collected and studied. At first, the total expense of the cooperatives in 2009 including fixed and current expenses and their debts due to equipping and renewing fishing equipments plus capital and fishing equipment depreciation were calculated. Legal, precautionary and depreciatory reserves were regarded in calculating the total expenses of the cooperatives. On the other hand, using the annual catch data of the cooperatives, their annual revenue was calculated

according to different species of fish [7]. Then, the net present value and cost-benefit ratios of the cooperatives were calculated using the bank interest rate of 13 percent (of a five year long-term bank deposit).

## RESULTS

**Net Present Value:** The results of studying the balance sheets of 4 cooperatives which were selected alternatively in different involved sections were analyzed and following results were obtained:

### Taleghani Cooperative:

$$NPV_{2009} = 2,224,663(1+13) - 898,610(1+13) = \$18,564,740$$

As results show, Taleghani Net Cooperative earned \$ 22,246,634 in 2009 with 78,716 tons of catch from selling fish. On the other hand, this cooperative spent about \$ 898,610 in the same year which included fixed and current expenses and capital depreciation cost. Therefore, the NPV of Taleghani Net Cooperative was calculated to be \$ 18,564,740 using the above equation and inserting the annual determined interest rate of the Central Bank (13 percent in 2008). Given the above results, fishing activity in this cooperative in 2009 was economically justifiable.

### Khaje Nafas Cooperative:

$$NPV_{2009} = 1,651,046(1+13) - 770,250(1+13) = \$13,331,146$$

This cooperative caught about 53,055 tons of different kinds of fish in 2009 which made it earn \$ 1,651,046. On the other hand, its expenses were equal to \$ 770,250 last year. The NPV calculated for this company was \$ 12,331,146.

### Chargholi Cooperative:

$$NPV_{2009} = 1,018,298(1+13) - 520,853(1+13) = \$6,964,217$$

Chargholi Net Cooperative earned about \$ 1,018,298 through catching about 67,239 tons of fish. The total expenses of this company which included fixed, current and capital depreciation ones was about \$ 520,853. The NPV of this cooperative was estimated to be about \$ 6,964,217 in 2009.

### Kamine Cooperative:

$$NPV_{2009} = 1,648,297(1+13) - 765,531(1+13) = \$12,358,725$$

Kamine Cooperative earned \$ 1,648,297 from selling 52,610 tons of caught fish. On the other hand, this cooperative spent about \$ 765,531 in 2009 which raised its NPV to \$ 1,235,872. Finally and after studying the balance sheets of some cooperatives, we concluded that all cooperatives are economically justifiable with positive NPVs.

### Cast- Benefit Ratio

#### Taleghani Cooperative:

$$\frac{B}{C} = \frac{2224663/(1+13)}{898610/(1+13)} = \frac{158904.7}{64186.2} = 2.47$$

#### Khaje Nafas Cooperative:

$$\frac{B}{C} = \frac{1651046/(1+13)}{770250/(1+13)} = \frac{117931.2}{55017.6} = 2.14$$

#### Chargholi Cooperative:

$$\frac{B}{C} = \frac{1018298/(1+13)}{520853/(1+13)} = \frac{72735.4}{37203.1} = 1.95$$

#### Kamine Cooperative:

$$\frac{B}{C} = \frac{1648297/(1+13)}{765531/(1+13)} = \frac{117735.7}{54680.1} = 2.15$$

**As it Was Mentioned in Previous Sections:** If  $BC > 1$ , a plan will be economically justifiable and if  $BC = 1$ , it will be at the tangent point, but if  $BC < 1$ , implementing the plan is not economically justifiable. The benefit-expense ratios in Taleghani, Khaje Nafas, Chargholi and Kamine cooperatives were 2.247, 2.14, 1.96 and 2.15 respectively which shows the economical activities of these cooperatives with regard to existing benefits and expenses. However, it should be noted that NPV which was calculated in the previous section implies that.

## CONCLUSION

As it was said, engineering economy methods like NPV and benefit-expense ratio were used to evaluate the fishing performance of cooperatives economically.

Results showed that the economic performances of involved cooperatives are at optimum point and positive status. Both ratios (NPV and benefit-expense) confirm the above findings according to their defined criteria as the NPVs of all cooperatives are above zero ( $NPV > 0$ ) and the benefit-expense ratios of all cooperatives are bigger than 1 ( $B/C > 1$ ).

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