

Investment Efficiency of The Machinery Fishing Boats in North Sinai Governorate

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ABSTRACT

The study aims to measure the feasibility of investment in the hand machinery boats in North Sinai Governorate, according to its investment capacity, measuring impact of the possible changes in the key economic variables, which were represented in (increasing operating costs, low return, and a combination of both) on the efficiency of investment. In addition to identifying the critical levels for the most important variables affecting the efficiency of investment, and estimating the added value of those units. The study showed several results and the most important results are:

(1) the feasibility of investment in two categories of machinery fishing boats in north Sinai, which achieved a positive rate for standard of the net present value ranged between 1114 - 1917 thousand pounds in an average attained about 1515.5 thousand pounds. As for the standard of benefit /cost ratio, its average attained about 1.45 year. The average of internal rate of return attained about 48%, which is higher than the opportunity cost of available capital to invest in the community. And for the standard of pay back period of invested capital, its average attained about 2.13 years. (2) in the case of raising the annual operating costs by 10% shows that the values of standards used are good command which emphasizes safety, the investment feasibility in this activity in light of this change.

(3) in the case of reducing the return rate by 10% shows that the two categories of fishing boats still achieve high efficiency of investment and the second investment capacity was the least affected. (4) in the case of reducing the return rate by 10% and increasing the operating costs by 10% as well (ie occurrence together) show that boats of the first investment category (less than 500 thousand pounds) are the most sensitive to occurring this change where they have reached the break-even point, while the second investment category achieved (more than 500 thousand pounds) IRR attained about 19%, as pay back period of invested capital increased for the two categories, although the two categories are affected by this change, average of the evaluation standards are good command confirms the feasibility of investing in this activity. (5) the hand machinery boats achieved in the North Sinai Governorate added value amounted to about 1.3 million pounds for the seasonal average of fishing season 2011/2012 boats of the second investing category contributed in about 88.76%, while boats of the first investing category contributed in about 11.24%.

Key words: investment efficiency, machinery fishing boats, North Sinai, the internal rate of return, benefit /cost ratio, pay back period.

INTRODUCTION

The provision of protein in various ways is one of priorities of the world countries to satisfy wants of the consumers. Due to the continuous increase of population increased the attention of fish resources and work on its development as one of the most important substitutes to red meat and poultry meat to contribute in achieving the food security, and improving the level of food in increasing the protein content of it, where Fish have a high proportion of protein estimated in about 19.7%, while this portion in red meat attains about 18.7%, 13.8% in eggs, and 3.3% in Milk.

The fish resources sector is one of the main pillars in the national economy as the value of fish production attained about 14.5 billion Egyptian pounds, which represents about 6.9% of the value of agricultural production, representing about 18.73% of the value of animal production attained about 77.4 billion pounds for the year 2011. And the

North Sinai Governorate enjoys great potentials to double the fish production from its coasts where it includes large water bodies can contribute in developing the Fish Resources, it overlooks about 26% of the total length of the Egyptian coast on the Mediterranean Sea which attains about 1140 km from Salloum to Rafah.

The research problem:

The study problem lies in answering the following questions: Does the investment in the machinery fishing boats operating in the North Sinai Governorate have economic feasibility or not? What are the potential impacts of the expected changes in key economic variables?

Objectives of the research: In light of the previous questions, the objectives of the study are:

- (1) Measuring of the feasibility of investing in the fishing activity for the machinery fishing boats in north Sinai in light of the current situations, and the expected prospects for changing in investment conditions.

- (2) Identifying the critical levels for the most important variables affecting the efficiency of investment.
- (3) Estimating the added value of the machinery fishing boats in north Sinai.

Research method: To achieve the objectives of the researches the study calculated the following measures: internal rate of return (IRR), net present value of cash flows (NPV), and Benefit / Cost Ratio (B/C) at a discount rate of 10%, as well as Capital Pay Back Period (CPBP) as standards for evaluating the investment in the machinery fishing boats according to the mathematical formulation of the discounted measures for the value of the project. On the other hand the method of Sensitivity Analysis has been applied whereas the study assumed an increase in costs by 10%, decrease in returns by 10% rate, and a combination of both. On the third side the study used a method of the break even point analysis to determine the critical levels of the studied variables.

Data sources and research hypotheses:

The study relied mainly on primary data related to the machinery fishing boats operating in North Sinai Governorate, which up to about 51 boat belonging to cooperatives of fishermen in Northern Sinai (6 associations enrolled in them approximately 1241 members) through the two fishing seasons 2011/2012, it has been collected in manner of the comprehensive inventory through a comprehensive questionnaire during fishing seasons (2011, 2012) for all variables required to achieve the objectives of the study, it is divided into two investment categories, the investment Average of the first category is less than 500 thousand pounds and its number attained about 29 boat while the investment average of the second category is 500 thousand pounds or more, and it contains 22 boat. The published and unpublished secondary data related to the subject was collected from the concerned authorities such as the Center of Information and decision Support in El-Arish, the General Authority for Fish Resources Development in El-Arish, the Central Agency for Public Mobilization and Statistics, and sector of the Economic Affairs in Agriculture Ministry.

The study was based on the following hypotheses:

- (1) The total investment costs of machinery fishing boats were estimated according to the values of their capital assets and those costs included: the cost of license, value of the boat (structure), and Winch, motor, network, cords, power generator, anchor, boat, tanks of fuel, equipment, tools and equipment (wireless, television, lighting equipment and instruments, refrigerator, and kitchen utensils) according to its presence in boats under study, as is shown in table No. (1) in appendixes.

- (2) The average of total costs and total revenue for the machinery fishing boats was estimated for the average production in two seasons (2011, 2012) and was assumed their steadfastness through the old production of the boat, which starts after a year of construction where manufacturing the boat and installation of equipment and other tools (Zero Year) the annual maintenance costs was added.
- (3) The analysis based on the basis of the production life which was estimated in the study by 20 years old.
- (4) Using a discount rate of 11% which represents the expense of the best available opportunity cost for capital investment in the community during average of two years (2011, 2012) and this estimates present value for each of the revenue and costs
- (5) The analysis relied on getting a loan (with finance) equals to the structure cost, the motor, generator, and the license fees according to each category, at an interest rate of 11% repayable in equal installments on five years and an allowance year, the loan interest is only paid through this year.
- (6) The scrap value was calculated for the whole sailboats based on that it is equal to 20% of the current value.
- (7) The schedule of cash inflows, outflows, and net flows is designed throughout the life of the project, which starts in a zero year and ends Year 20. Outflows included all project expenses (investment and fixed costs, operating costs) and inflows included all the returns of the project (return on the sale of fish, the scrap value of the whole boat).
- (8) In the light of the risks encountered the fishing boats, both in the field of fishing or marketing such lower rate fishing, rising prices of fishing appliances, and low prices for the product, so study used a method of sensitivity analysis to confront those risks which may haunt fishing boats, whereas the study assumed that an increase of 10% for operating costs, low return by 10%, and increased costs and reduced return by 10%.

First: feasibility of the investment in the machinery fishing boats according to the current situation:

Table No. (1) illustrates results of the evaluation of investment for the machinery fishing boats in North Sinai according to the current situation and it turns out that: for the standard of net present value shows that the two categories of fishing units have achieved a positive rate ranged between 1114 to 1917 thousand pounds in average attained about 1515.5 thousand pounds, the command assures the feasibility of investing in fishing boats.

Table 1: Evaluation results of the investment of machinery fishing boats in North Sinai according to the current situation during the fishing season (2011/2012)

| Investment categories | Statement | Criteria of evaluation investment | | | |
|-----------------------|-------------|---------------------------------------|--------------------|-----------------------------|-----------------------|
| | | Net present value (Thousand pound) | Benefit cost ratio | Internal Rate of Return (%) | Payback period (Year) |
| | The first | 1114 | 1.39 | 42 | 2.4 |
| | The second | 1917 | 1.51 | 54 | 1.86 |
| | The average | 1515.5 | 1.45 | 48 | 2.13 |

Source: Computer results from the field survey data

And it is noticed that whenever the investment category increased, the fishing unit achieved a higher present value. As for the standard of return to cost ratio achieved its highest value around 1.51 for the second category has overtaken its first counterparts, which has achieved about 1.39 with a general average attained about 1.45. With respect to the internal rate of return, the second category has achieved the highest rate was about 54%, followed by the first category in rate of 42% in an average attained about 48%. Any it is higher than the opportunity cost available to capital investment in the community which is represented by the commercial interest rate prevailing at the moment and of 11%, which assures the high profitability of fishing boats. For a standard of payback period of invested capital has achieved the second category. The lowest rate for the payback period of capital by 1.86 years, and the first category achieved about 2.4 and the average of payback period of capital for fishing boats in north Sinai attained about 2.13 years.

Second: Results of the evaluation of investment in the case of increasing operating costs by 10%:

Data of Table (2) refers to the results of evaluation of investment in the case of increased operating costs by 10% and it is clear that the two categories of investment for the machinery fishing boats has achieved positive values for the net present value in an average attained about 932.9 thousand pounds represented about 61.56% to the average of the present value of the current situation in a decline rate attained about 38.44%. The second category occupied the first rank, followed by the first category in rates reached about 39%, 27% respectively. For the internal rate of return which

averaged about 33% represents about 68.75% from the average of the current situation in a decline rate attained about 31.25%, and for the Benefit cost ratio, its average attained about 80.84% to average of the current situation in a decline rate attained about 19.66% from the current situation. As payback period of capital has increased by 47.89% from the current situation. This means that boats of the used criteria are good command which assure integrity of the feasibility of investing in this activity in the light of this change occurs.

Third: Results of investment evaluation in case of decline return in portion of 10%:

Data of Table (3) refers to the results of evaluation of investment for the machinery fishing boats in North Sinai, according to the sensitivity analysis (lower annual yield 10%), and it turns out that fishing boats still achieve satisfactory rates in criteria of economic evaluation, as it achieved positive values for net present value in an average attained about 668.965 thousand pounds represented about 44% for the average of present value of the current situation in a decline rate attained about 55.86%. The second category boats were less affected for a criterion of benefit to cost ratio which was estimated at about 1.25 versus 1.17 for the first category, in an average attained about 1.21 represents about 83.45% of the current situation and in a decline rate attained about 16.55% from the current situation. With regard to the internal rate of return criterion has attained about 21%, 32% for the first and second categories, respectively, in an average attained about 26.5% represents about 55.21% to the average of the current situation and in a decline rate attained about 44.79%.

Table 2: results of investment evaluation for the machinery fishing boats in North Sinai according to the sensitivity analysis (costs increase in portion of 10%) during the fishing season (2011/2012)

| Component units | statement | Criteria of evaluating the investment | | | |
|-----------------|----------------------------|---------------------------------------|--------------------|-----------------------------|-----------------------|
| | | Net present value (Thousand pound) | Benefit cost ratio | Internal Rate of Return (%) | Payback period (Year) |
| | The first | 567.64 | 1.1 | 27 | 3.76 |
| | The second | 1298.16 | 1.23 | 39 | 2.54 |
| | The average | 932.9 | 1.165 | 33 | 3.15 |
| | % Of the current situation | 61.56 | 80.34 | 68.75 | 147.89 |
| | % Rate of change | (-) 38.44 | (-) 19.66 | (-) 31.25 | (+) 47.89 |

Source: Computer results from the field survey data

Table 3: results of investment evaluation for the machinery fishing boats in North Sinai according to the sensitivity analysis (returns decrease in portion of 10%) during the fishing season (2011/2012)

| Statement Component units | Criteria of investment evaluation | | | |
|------------------------------|---------------------------------------|-----------------------|--------------------------------|--------------------------|
| | Net present value (Thousand pound) | Benefit cost ratio | Internal Rate of Return (%) | Payback period (Year) |
| The first | 354.95 | 1.17 | 21 | 4.81 |
| The second | 982.98 | 1.25 | 32 | 3.09 |
| The average | 688.965 | 1.21 | 26.5 | 3.95 |
| % Of the current situation | 44.14 | 83.45 | 55.21 | 185.45 |
| % Rate of change | (-) 55.86 | (-) 16.55 | (-) 44.79 | (+) 85.45 |

Source: Computer results from the field survey data

As the average payback period of capital attained about 3.95 years represents approximately 185% of the current situation average and in an increase rate attained about 85%. In a maximum limit attained about 4.8 years for the first category and a minimum frontier attained about 3 years for the second category. Although, the average internal rate of return for these boats remains higher than the discount rate prevailing in the community which assures integrity the feasibility of investment in this activity.

Fourth: Results of investment evaluation in case of increasing the operation costs in portion of 10% and returns decrease in the same portion:

Data of table (4) refers to results of the investment evaluation and it turns out that boats of the first investment category (less than 500 thousand pounds) are the most sensitive to this change occurs where the net present value dropped to 0.191 thousand pounds, the internal rate of return decreased to 11%, and the benefit to cost ratio declined to 1.07, meaning they reached the breakeven point. While a second investment category achieved (more than 500 thousand pounds) internal rate of return attained about 19%, 35%, and as payback period of capital increased up to a maximum frontier attained about 9.11 for the first year and a minimum frontier attained about 5.31 for the second year. Although the two categories are affected by this change, the average evaluation criteria, which attained about 182.25, 1.12, 15%, 7.21 years for each of net present value, benefit to cost ratio, internal rate of return, and payback period of capital, respectively, assures the feasibility of investment in the activity of fishing fish by using machinery fishing vessels in North Sinai.

Table 4: results of investment evaluation in the machinery fishing boats in North Sinai, according to the sensitivity analysis (increased costs and reduced returns in portion of 10%) during the fishing season (2011/2012)

| Statement Component units | Criteria of investment evaluation | | | |
|------------------------------|---------------------------------------|--------------------|--------------------------------|--------------------------|
| | Net present value (Thousand pound) | Benefit cost ratio | Internal Rate of Return (%) | Payback period (Year) |
| The first | 0.191 | 1.07 | 11 | 9.11 |
| The second | 364.31 | 1.16 | 19 | 5.31 |
| The average | 182.251 | 1.12 | 15 | 7.21 |
| % Of the current situation | 12.03 | 76.90 | 31.25 | 338.50 |
| % Rate of change | (-) 87.97 | (-) 23.10 | (-) 68.75 | (+) 238.50 |

Source: Computer results from the field survey data

Fifth: the breakeven point for machinery fishing boats in North Sinai

Data of table (5) shows the critical level for annual months of fishing, fishing quantity, and the selling price per unit (Box capacity of 20 kg) for the machinery fishing vessel in North Sinai, and it turns out that the critical level for the number of annual months of fishing attained about 6.321, 5.189 month for the two investment categories, the first and the second represent about 70.23%, 57.66% for the current situation, respectively. And then decrease of fishing months from this level makes the investment in this activity is not feasible, and for the average amount of fishing fish t per year for the two categories of boats units attained about 3659.12, 4120 box (board) representing about 85.29%, 78.03%, for the current situation of the two categories, respectively. Thus, the decline amount of fishing fish from this level makes the investment in this activity is not feasible. As it is shown that the critical level for the sales price of Unit (box) attained about 210.679, 195.131 pounds per unit for the two categories, respectively, representing approximately 84.27%, 78.05% of the sales price of the current situation.

Sixth: the added value generated by the machinery fishing boats in North Sinai:

Data of table (6) shows the added value generated by the machinery fishing boats in north Sinai in the production season during season of (2011 and 2012) and it turns out that those units have achieved an added value amounted to about 1.03 million pounds in a maximum frontier attained about 1.14 million pounds for the second investment category and in a minimum frontier attained about 0.9 million pounds for the first investment category.

Table 5: The critical level for a number of the annual fishing months and the annual average of the fishing quantity and price of a unit in the North Sinai during fishing seasons (2011 and 2012)

| The investment categories | | |
|---|---------------------------|----------------------------|
| The statement | The first category | The second category |
| The annual number of fishing months (one month) | 6.321 | 5.189 |
| % of the current situation | 70.23 | 57.66 |
| Annual average of fishing Quantity (Box / year) | 3659.121 | 4120 |
| % of the current situation | 85.29 | 78.03 |
| Price per Unit (Pounds / Box) | 210.679 | 195.131 |
| % of the current situation | 84.27 | 78.05 |

Source: Collected and calculated from data of the field study during the two fishing seasons (2011/2012).

Table 6: Added value of the machinery fishing boats in North Sinai during fishing seasons (2011 and 2012)

(value: thousand pound)

| (value: thousand pound) | | | | | | |
|-------------------------|----------------------------|-----------------------|--------------|---------|-------------|---------|
| The statement | Total Fishing requirements | | | Returns | added value | |
| | goods requirements | Services requirements | Depreciation | Returns | Added value | |
| The first category | 60 | 69.63 | 30 | 159.63 | 1072.5 | 912.87 |
| The second category | 75 | 71 | 30 | 176 | 1320 | 1144 |
| average | 67.5 | 70.32 | 30 | 167.82 | 1196.25 | 1028.44 |

The added value = Returns - Total requirements

Source: Collected and calculated from data of the field study during the two fishing seasons (2011 and 2012).

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الملخص العربي

كفاءة الاستثمار لمراكب صيد الأسماك الآلية في محافظة سيناء

أشرف شبل يونس^١، عمرو عبد الحميد رفعت^٢^١ قسم التنمية البشرية والاقتصادية كلية الثروة السمكية - جامعة السويس^٢ قسم الاقتصاد الزراعي - شعبة الدراسات الاجتماعية والاقتصادية - مركز بحوث الصحراء والتنمية الاقتصادية

تستهدف الدراسة قياس جدوى الاستثمار لمراكب الصيد الآلية في محافظة شمال سيناء وفقاً لسعتها الاستثمارية. وقياس أثر التغيرات المحتملة في أهم المتغيرات الاقتصادية والتي تمثلت في (زيادة تكاليف التشغيل، انخفاض العائد، و حدوث الاثنين معاً) على كفاءة الاستثمار. بالإضافة إلى تحديد المستويات الحرجة Critical level لأهم المتغيرات المؤثرة على كفاءة الاستثمار. وتقدير القيمة المضافة لتلك الوحدات.

وتوصلت الدراسة إلى عدة نتائج من أهمها: (١) جدوى الاستثمار في فئتي مراكب الصيد الآلية في شمال سيناء، حيث حققت معدلاً موجباً لمعيار صافي القيمة الحالية تراوح بين ١١١٤ - ١٩١٧ ألف جنيه بمتوسط بلغ نحو ١٥١٥,٥ ألف جنيه. أما بالنسبة لمعيار نسبة العائد إلى التكلفة فقد بلغ متوسطه العام نحو ١,٤٥. كما بلغ متوسط معدل العائد الداخلي نحو ٤٨%، أي أنه أعلى من تكلفة الفرصة البديلة المتاحة لاستثمار رأس المال في المجتمع. وبالنسبة لمعيار فترة استرداد رأس المال المستثمر فقد بلغ متوسطها نحو ٢,١٣ سنة. (٢) في حالة ارتفاع تكاليف التشغيل السنوية بنسبة ١٠% يتبين أن قيم المعايير المستخدمة جيدة الأمر الذي يؤكد سلامة جدوى الاستثمار في هذا النشاط في ظل حدوث هذا التغير. (٣) في حالة انخفاض العائد بنسبة ١٠% تبين أن فئتي مراكب الصيد لازالت تحقق كفاءة عالية للاستثمار وكانت السعة الاستثمارية الثانية الأقل تأثراً. (٤) في حالة انخفاض العائد بنسبة ١٠% وزيادة تكاليف التشغيل بنسبة ١٠% أيضاً (أي حدوثهما معاً) تبين أن مراكب الفئة الاستثمارية الأولى (أقل من ٥٠٠ ألف جنيه) هي الأكثر حساسية لحدوث هذا التغير حيث أنها وصلت إلى نقطة التعادل، في حين حققت الفئة الاستثمارية الثانية (أكثر من ٥٠٠ ألف جنيه) معدل عائد داخلي بلغ نحو ١٩%، كما زادت فترة استرداد رأس المال للفئتين. وعلى الرغم من تأثير الفئتين بهذا التغير إلا أن متوسط معايير التقييم يؤكد على جدوى الاستثمار في هذا النشاط. (٥) حققت مراكب الصيد الآلية في محافظة شمال سيناء قيمة مضافة بلغت نحو ١,٣ مليون جنيه لمتوسط موسمي صيد ٢٠١١، ٢٠١٢ ساهمت فيها مراكب الفئة الاستثمارية الثانية بنحو ٨٨,٧٦%، بينما ساهمت مراكب الفئة الأولى بنحو ١١,٢٤%.

Appendixes

Table 1. Costs and revenues structure for the machinery fishing boats according to the category of investment in North Sinai Governorate

| Statement | The first category | | | The second category | | |
|---|----------------------|------------|-----------|----------------------|------------|-----------|
| | Year of construction | First year | Last year | Year of construction | First year | Last year |
| Annual operating months | 9 | 9 | 9 | 9 | 9 | 9 |
| Average of fishing Quantity (Box) | 0 | 4290 | 4290 | 0 | 4400 | 4400 |
| Sales price of the unit (pounds) | 250 | 250 | 250 | 250 | 250 | 250 |
| The scrap value | 0 | 0 | 100 | 0 | 0 | 150 |
| Cost of the vessel (thousand pounds) | 100 | 0 | 0 | 150 | 0 | 0 |
| The cost of fishing equipments (thousand pounds) | 100 | 0 | 0 | 150 | 0 | 0 |
| Cost of tools (thousand pounds) | 256.5 | 0 | 0 | 267.5 | 267.5 | 0 |
| operation license (thousand pounds) | 50 | 0 | 0 | 50 | 0 | 0 |
| 0 | 27.5 | 72 | 0 | 38.5 | 100.8 | 0 |
| Depreciation of tools and equipments | 0 | 30 | 0 | 0 | 30 | 0 |
| Annual fees (1.5%) (thousand pounds) | 0 | 16 | 0 | 0 | 19.8 | 19.8 |
| Regular annual maintenance (thousand pounds) | 0 | 15 | 15 | 0 | 15 | 15 |
| Wage of marine workers (thousand pounds) | 0 | 270 | 270 | 0 | 324 | 324 |
| Fuel ,oil and Greases (thousand pounds) | 0 | 225 | 225 | 0 | 225 | 225 |
| Conservation costs (thousand pounds) | 0 | 45 | 45 | 0 | 45 | 45 |
| Subsistence and workers Transfers (thousand pounds) | 0 | 180 | 180 | 0 | 216 | 216 |
| Delegate commission (thousand pounds) | 0 | 53.63 | 53.63 | 0 | 66 | 66 |
| Total operation costs (thousand pounds) | 0 | 773.63 | 773.63 | 0 | 876 | 876 |

Source: Collected and calculated from data of the field study during the two fishing seasons (2011 and 2012).