EVALUATION EFFICIENCY OF PERFORMING FISH PRODUCTION PROJECTS IN ANBAR PROVENCE, IRAQ

Luna M. Abdullah[1], Hameed R. Abtan[1] and Eskander H. Ali*[2]

[1] Department of Agricultural Economics, College of Agriculture, Anbar University, Iraq
[2] Department of Agricultural Economics, College of Agricultural Engineering Science, University of Baghdad, Iraq
*Corresponding Author email : eskanderhali81@gmail.com

Abstract

The aim of the research is to measure the efficiency of the fish projects of both types, floating cages and earthen ponds, identify the strengths and weaknesses of these systems, identify the management efficiency of economic systems for fish in the province by calculating the index number of the management efficiency and comparison between fish production projects in cages and earthen ponds as investment alternatives. Data were obtained from a questionnaire collected randomly from fish farming projects in Anbar Governorate, Iraq, and the research deal with the two fish systems, it included 22 projects for floating cages from among (35) projects and 16 projects for earthen ponds of origin (25) projects. The time limits for research were in 2018. As for the research method, quantitative methods were applied if the financial evaluation criteria were used, and the method of benefits and costs to compare the two systems. The index number was also calculated to judge of management efficiency. The results indicated that large projects fish achieved a return of the dinar was 1.86, the internal return rate for fish farming in earthen ponds was 1.42, while in floating cages it was 2.03, the ratio of revenue of costs in cages was 2.4 while in earthen ponds it was 1.6, recommended Researching the necessity of drawing an agricultural policy that includes measures aimed at developing the fish sector in the province and long-term planning to reach self-sufficiency of fish, by providing financial facilities, cooperation between the relevant ministries and reducing the costs of forage and finger.

Keyword: efficiency, net income, management efficiency, Cost-Benefit Analysis.

Introduction

Fish resources are gaining great importance as a source of food and creating job opportunities and a source of revenue for many countries despite fluctuations in supply and demand for these resources as a result of significant changes in their nature as well as environmental conditions and economic climate. Fish are unique from other animal products in their nutritional value for human beings to build and grow the brain and increase the intelligence; it also inhibits the growth of cancer cells in the human body, and treats many diseases, including arthritis, reducing the incidence of heart, circulatory diseases, and breast cancer (Alhaider, 2001). Fish wealth in Iraq is an important source of food safety, especially since Iraq has a very wide water area that helped the growth and reproduction of fish due to its physical and chemical characteristics (Arab Organization for Agricultural Development, 1986). Fish farming started in fish ponds in 1954, when the first field was established to breed regular and brown carp, and *Cyprinus carpio*, in Za`faraniya, Baghdad (Al-Hamid, 1984). Many methods of fish farming were found, including regular farming, which is the simplest and least-risky enterprise and the lowest cultivation patterns in its expenses. It is also one of the most profitable projects, which tempts the investor to enter into this field because the product can be easily marketed at any time of the year and at prices that generate a rewarding return for the investor with a nutritional and high value, it is easy to digest and is considered one of the environmentally friendly economic activities if they applied according to the right criteria (1997, Reman). These projects are considered as one of the pivotal structures of the national economy to achieve the development plan of employment (Al-Shaari *et al.*, 2017) through the foregoing that shows that investment in fish production is gaining great importance at the present time given that these projects represent a large percentage of the consumption of the Iraqi citizen and it is a necessary commodity For its nutritional and economic importance (Alrawi and Selim, 2011). Fish production projects are affected by the level of full localization of economic resources and the level of their production efficiency and because of the ability of these resources versus multiple uses, this has become necessary to study this important activity in order to identify the economic efficiency and its components as the most important measure of the efficiency of economic performance and then identify the extent to which the fish farmers approach or estrangement from Achieving efficiency for their projects. The research problem is that there is a clear decrease in the quantities of fish produced in Al-Anbar Governorate for several reasons, including the suspension of some production projects and the low productivity of others due to the lack of scientific use of resources. And that these projects are still adopted in the use of the decision to use their resources from the principle of intuition and guess or trial and error without relying on the quantitative method in decision-making and this is due to management and its effective role in the optimal use of resources. Also, there are marketing and production problems, the effects of which are reflected in the low profits and the low level of efficiency in the performance of these projects. In addition, most of the fish farming projects are based without economic feasibility studies that help the investor to direct his invested money towards the goals that the investor wants to achieve. It also helps him to reach the selection of the best investment alternatives using the available economic resources. The aim of this study is to measure the efficiency of the performance of fish farming projects of both types, floating cages and earthen ponds, and to identify the strengths and weaknesses of these systems. And identify the efficiency of the management of economic systems for fish farming in the governorate by calculating the index of the efficiency of management. And the comparison between fish production

projects in cages and earthen ponds as investment alternatives.

Materials and Methods

To achieve the objectives of the research, data was obtained based on a questionnaire prepared for this purpose and randomly collected from fish farming projects in Anbar governorate, which is located in western Iraq, with an estimated area of (137,808) km², i.e. (31.1%) of the total area of Iraq and is the largest governorate of In terms of area, with a population of (1.771,656) people, the study examined the two fish farming systems, as it included 22 projects for fish farming in floating cages out of (35) projects and 16 projects for fish farming in earthen ponds out of (25) projects. The time limits for research were in 2018. As for the research method, quantitative methods were applied if the financial evaluation criteria were used, and the method of benefits and costs to compare the two systems. The index number was also calculated to judge the efficiency of management.

Results and Discussions

(I) Financial evaluation: The financial evaluation of the fish projects (case study) was conducted using several economic criteria, and these standards are used in all global economies, whether advanced or growing. In order to perform the financial analysis of the research sample projects, the costs and revenues of fish farming in earthen ponds and floating cages of the two small and large categories were calculated through the data obtained from the questionnaire form and the following is a presentation of the results of those criteria:

(A) Earthen ponds projects: The financial evaluation of projects measures their profitability from those in charge perspective, depending on the analysis revenues and costs due to its effects on capital or resources and the time component. The financial evaluation criteria that we presented in the second semester were applied, and following results were obtained:

Revenues: It is one of the important criteria that can give an initial indicator of the production process, and its value depends on production and prices, and as long as the agricultural market is closer to the complete competition, the revenues depend on the quantity produced and the revenue is calculated through the following equation:- revenue = amount of production x Selling price of single item. It is noted from Table (1) that the revenues in Project No. (8) were (65360000) dinars and this project achieved the highest revenue, while in Project No. (1) the revenues amounted to (11600000) dinars and this project achieved the lowest revenue at the sample level. As for the sample level, the achieved revenue has reached (653525000) dinars, the Income varied from project to another according to the prices that change during the sale period, depending on many factors, the most important of which is dumping the market and others, and production that depends on the efficiency of management.

Costs: Table (1) revealed that these projects had different costs due to the difference in factors that affected the variable and fixed costs such as drilling costs, land fare, fingerlings, and fodder; These costs vary according to prices and sources of obtaining them, as well as their quantities according to experience and capabilities of management and financing.... Etc. as Table (1) revealed that the project No. (4,8) had a cost of (4,875,8400) dinars, which amounted to the highest costs at the sample level, while the project No. (1), the costs were (9,477,000) dinars, which reached the lowest costs at the sample level, and from Table (2), the researcher noticed the difference in costs according to the different fixed costs and variable costs in the projects.

Table 1 : Production quantity, revenues, and costs of earthen ponds projects

No.	Production / kg	Revenues / Dinars	Fixed costs	Variable costs	Total costs / dinars
1	2900	11600000	3077000	6400000	9477000
2	10750	44075000	7020000	27750000	34770000
3	14000	58100000	8054000	38300000	46354000
4	15200	62320000	7778400	40980000	48758400
5	8000	33600000	6023000	19100000	25123000
6	5600	24360000	5211000	11200000	16411000
7	14000	59500000	8054000	38300000	46354000
8	15200	65360000	7778400	40980000	48758400
9	10700	45475000	6840000	25500000	32340000
10	10250	46125000	6648000	24850000	31498000
11	5600	25200000	5211000	11200000	16411000
12	7650	31747500	7643000	39350000	46993000
13	2750	11962500	4077000	6400000	10477000
14	10800	45900000	7036000	27950000	34986000
15	14000	63000000	8054000	38300000	46354000
16	5600	25200000	5231000	11200000	16431000
Sum.	153000	**653525000**	103735800	407760000	511495800

Ref: According to the questionnaire.

Profits: Profits were measured by the following equation (Debertin 2012): - profits = total revenue - total costs.

Table (1) revealed that the projects at the level of the sample achieved positive profits peaked at (142029200) dinars, despite that one of the projects achieved a loss, the profits differed from one project to another based on revenues and costs. The kilogram achieved the lowest profit

of 732 dinars / kg, and the highest profit which was 1969 dinars / kg, but at the level of total projects, the average of kg profit was (928.2) dinars / kg. Since the profit is one of the important indicators, fish farming projects in earthen ponds has a great degree of economic worthiness.

Net Cash income: This criterion is an important indicator in measuring the farm's financial ability, as well as its ability to

expand and increase its economic effectiveness. It is calculated through the following equation (Al-Samarrai, 1981): - Net cash income = cash revenues - cash costs. Applying this criterion revealed that fish projects in earthen ponds achieved a net cash income peaked at (245765000) dinars, ranged between a minimum of (5200000) dinars and a maximum amount of (24700000) dinars. Average (1606.3) dinars / kg. This reflects the farm's ability to wipe off the debts, and indicates that projects have a financial capacity to expand and increase their economic activities (Table 2).

Net Farm income: This is a key criterion for measuring the economic efficiency of projects and it is one of the important indicators that are used to draw economic policies in the field of the agricultural sector, and a competent breeder is the person who can achieve the highest level of efficiency from the project and achieved by the project manager himself by organizing the production process, or remixing the different production elements (Samurai, 1984, 184). The farm income is calculated from the cash income and the amount of what the family consumes, estimated by the market value and government assistance provided by the government within its programs to the agricultural sector and the increase in assets values (Al-Ezzi, 1988). It is calculated by the following formula:

Net farm income = net cash income + change in assets value + family consumption.

While applying this criteria, it was found that the projects achieved net farm income reached (248640000) dinars, which is an important indicator of the project efficiency and also reflects a good administrative capacity. It is also noted that all projects achieved positive net except for one project that was negative. Also, the ratio of the net cash income to the net farm income increased, and this indicates the small quantities consumed by the family, and their impact was weak because they are small quantities, and the weak change in the value of the assets, and this is the case for most agricultural projects, as there is no clear change in the value of the assets, due to the financial capabilities of the producers (Table 2).

Farm work Return : It is considered as one of the most important criteria for measuring the economic efficiency of projects in general and administrative in particular. According to the following equation (Al-Qaisi, 2010): - farm work income = net farm income – benefit on capital. When measuring the return on work, it was found that producers of fish in earthen ponds achieve an income on work reached (216019200) dinars in a difference among the sample's members depending on the above criteria and the size of the invested capital expressed by benefits on the capital. The table also indicates that one worker achieved an average income reached (304,523) dinars and the result of these criteria reflect the relative efficiency of fish projects and is considered as a good income project.

Table 2 : Efficiency standards of earthen ponds projects

No.	Profits	Net cash income	Net farm income	Net cash income%	Farm work return
1	2123000	5200000	5365000	96.92	4853000
2	9305000	16325000	16480000	99.06	14260000
3	11746000	19800000	19970000	99.15	16906000
4	13561600	21340000	21530000	99.12	18251600
5	8477000	14500000	14680000	98.77	13152000
6	7949000	13160000	13355000	98.54	12459000
7	13146000	21200000	21410000	99.02	18346000
8	16601600	24380000	24540000	99.35	21261600
9	13135000	19975000	20125000	99.25	18085000
10	14627000	21275000	21435000	99.25	19447000
11	8789000	14000000	14175000	98.77	13279000
12	-15245500	-7602500	-7387500	-	-10535500
13	1485500	5562500	5757500	96.61	5245500
14	10914000	17950000	18150000	98.90	15914000
15	16646000	24700000	24880000	99.28	21816000
16	8769000	14000000	14175000	98.77	13279000
Sum.	142029200	245765000	248640000	98.84	216019200

Ref: According to the questionnaire.

There are standards that considered as complementary to the economic efficiency criteria used in the financial evaluation of production projects, including:

- **The period of capital recovery:** The recovery period is the method that measures the time period for accumulating cash flows to reach the investment cost, and the formula below is used in case cash flows are equal to calculate the capital recovery period. This method is considered one of the most used in project evaluation processes due to its ease (Khader *et al.*, 2004). This criterion is used in most productive projects around the world, so that decision-makers are fully aware of the time required to recover the capital (Al-Ezzi, 1989), and it is calculated through the following

formula (Barbaz): - Capital recovery period = Fixed capital / Profit + wastes. When calculating the capital recovery period, as in Table (3), it was revealed that fish farming projects in earthen ponds can recover their money (0.68) years, which is a short period and a good indicator of the projects ability to cover investment expenses, and pay all amounts spent on the project, which is an indicator Encouraging decision-making in favor of the project, as it is considered one of the projects facing the risk as the criterion of the capital recovery period is one of the indicators of risk, and it is also noted that the projects vary greatly during the recovery period due to the similarity of the amount of money invested with the exception of the losing project.

- **The invested dinar's return :** It is one of the criteria used in the financial evaluation process for production units, and it does not differ much from the net present value of the investment in its uses in terms of the information required to do this standard, and is calculated using the following equation (Alsamray, 1981): -
- Invested dinar's income = total revenue / total cost. The invested dinar income criterion of (1.2) at the sample level indicated the financial success of the projects and that these projects are economically efficient and have the ability to continue their production activities; the results of this criterion varied from one project to another according to the costs and revenues of those

projects which in turn also change based on several factors Including prices, production, or management factors, etc., the dinar income peaked to the highest values in one of the projects to (1.6).

- **Productivity profits:** This criterion is an important criterion that must be calculated in order to indicate the achievement of economic efficiency, and is calculated through the following equation (Al-Jubouri, 2019): -
  Productive profits = profits / production costs x 100. While this equation applied to the research sample, it was found that the sample achieved a productivity profit rate reached (22%), and this indicates a good profit, and the projects are able to bear the high costs and that the projects are economically feasible.

Table 3 : Financial evaluation standards of earthen ponds projects.

No.	Fixed capital / Dinar	Extinction / Dinar	Capital retrieval period	Invested dinars return	Productivity profits %
1	1650000	165000	0.721	1.224	22.4
2	8000000	800000	0.791	1.267	26.76
3	9900000	990000	0.777	1.253	25.34
4	11000000	1100000	0.75	1.278	27.81
5	4950000	495000	0.551	1.337	33.74
6	3150000	315000	0.381	1.484	48.44
7	9900000	990000	0.7	1.283	28.36
8	11000000	1100000	0.621	1.34	34.05
9	8000000	800000	0.574	1.406	40.62
10	6600000	660000	0.431	1.464	46.44
11	3150000	315000	0.346	1.535	53.56
12	4950000	495000	-	0.675	-
13	1650000	165000	0.999	1.141	14.18
14	8000000	800000	0.682	1.311	31.2
15	9900000	990000	0.561	1.359	35.91
16	3350000	335000	0.367	1.533	53.37
Sum.	105150000	10515000	0.689	1.277	27.77

Ref: According to the questionnaire.

Summary of financial indicators for fish production in earthen ponds

Results in Table (4) revealed the financial indicators and criteria used in assessing the financial performance of fish projects in the earthen pond system, and it was found that all of them were positive at the sample level and have encouraging incomes, it also indicate that fish projects had an economic efficiency, profits, and achieved a positive net income, and there is a good income to work. Also it can recover the capital in a short period, and it has the ability to cover its financial and investment expenses and that the invested dinar retrieves more than the dinar and Projects are efficient in using their resources.

Table 4 : Financial indicators of earthen ponds projects.

Operating percent	Productivity profits	Invested dinars return	Retrieval period	Farm work return	Net farm income	Net cash income	Profits
0.78	27.7	1.277	0.68	216019200	248640000	245765000	142029200

Ref: Depending on the previous results

(B) Floating cages projects: To demonstrate the effect of size on economic efficiency, the sample of fish projects in floating cages has been divided into two productive categories; the first category was the small projects in which the number of cages is 1 to 30, and the second was the relatively large projects in which the number of cages is 30 or more, and evaluation criteria have been applied to the two categories and the results were as follows:

- **Small category:**

Revenue: It is one of the important criteria, which gives an initial indicator of the production volume that directly affects revenue. These revenues are affected by the amount of output and price, and it was calculated through the following formula: - Revenue = the amount of production x the item selling price.

Results in Table (5) revealed the revenues accrued for the study sample, which amounted to (2354360000) dinars, the average revenue was (156957333.3) dinars, and the average price reached (3980) dinars / kg.

Costs: One of the indicators that the evaluation process is based on; the averages are closely related to the project size. The fixed and variable costs were collected and reached at

the sample level (847,454,917) dinars, these projects had different costs as a result of the difference in the factors that affected the variable and fixed costs. The highest costs were in Project No. (15) Peaked at (127,089,160) dinars, while the lowest costs were in Project No. (8), reached (15198532) dinars (Table 5).

Table 5 : Production, revenues and fixed, variable and total costs in IQ dinars for floating cage projects (small category)

No.	Production amount/dinars	Revenues/ Dinars	Costs/ Dinars	Fixed costs/dinars	Total costs/dinars
1	14,400	54,000,000	13,869,500	6,069,560	19,939,060
2	9,600	158,400,000	36,359,500	14,988,760	51,348,260
3	28,800	112,320,000	34,229,700	8,013,376	42,243,076
4	57,600	241,920,000	27,015,700	8,726,256	35,741,956
5	57,600	236,160,000	38,409,760	11,101,781	49,511,541
6	64,800	259,200,000	106,247,000	13,779,760	120,026,760
7	21,450	90090000	45,771,000	7,971,680	53,742,680
8	28,800	123,840,000	9,007,900	6,190,632	15,198,532
9	47,600	178,500,000	67,204,000	11,896,320	79,100,320
10	36,000	140,400,000	33,034,900	8,167,792	41,202,692
11	50,400	206,640,000	97,882,000	14,020,560	111,902,560
12	21,600	82,080,000	15,444,000	6,720,520	22,164,520
13	35,420	141,680,000	28,498,000	8,154,840	36,652,840
14	27,600	104,880,000	31,537,000	10,053,960	41,590,960
15	57,500	224,250,000	113,277,000	13,812,160	127,089,160
SUM.	589,170	2,354,360,000	697,786,960	149,667,957	847,454,917

Ref: According to the questionnaire.

Economic efficiency standards (financial evaluation):

There are a number of economic efficiency standards that are applied in the evaluation of projects of fish farming at the sample level and the extent to which they achieve profit they also are considered as indicators of financial success for management, including the following criteria and indicators:

Profits: Results in Table (6) revealed that the highest value of profits was in Project No. (4) reached (206178004) dinars, while the lowest value of profits was in Project No. (1) reached (34060940) dinars, while the average profits of the product in this category is (100460339) dinars; each kilogram achieved an average profit of (2557.6) dinars. In general, the small category projects achieved positive profits, rewarding and encouraging incomes, making fish farms in floating cages a successful production activity with rewarding profits.

Net cash income: Results in Table (6) Revealed that the small projects achieved a net cash income reached 1,656,573,040 dinars, ranged by a higher limit that was in Project No. (4), reached (214,904,300) dinars, and a minimum was in Project No. (1), reached (40,130,500) dinars. The weight of meat produced from fish was (2811) dinars for each kilogram, and it should be noted that the low contribution of fixed costs to the total cost in these projects made profits close to the net cash income.

Net farm income : Results in Table (6) revealed that the net achieved farm income in this category has reached (1,658,874,040) dinars, and this indicates that fish producers in floating cages achieve economic efficiency, and that the administration has the ability to organize production and mix the production elements in an efficient manner; this can be used as an indicator in drawing economic policy in the agricultural field, and it also shows that the net cash income contributes to about (99%) of the net farm income, and this is due to the lack of changing the values of farm assets, and that the quantities consumed for the family are very little.

Farm work Return : Results in Table (6) revealed that the highest value of income on work was in project No. (4), reached (212,873,044) dinars, while the lowest value was in project No. (1), reached (39,120,940) dinars, while the total work income was about (1,603,051,083) dinars; this result indicates that fish projects in floating cages (small category) achieve rewarding work incomes and that they had a degree of efficiency.

Table 6 : Financial efficiency standards for floating cages (small category) in iq dinars

No.	Profits	Net cash income	Net farm income	Net cash income percent(%)	farm work return
1	34,060,940	40,130,500	40,230,500	99.75	39,120,940
2	107,051,740	122,040,500	122,165,500	99.90	119,256,740
3	70,076,924	78,090,300	78,210,300	99.85	75,471,924
4	206,178,044	214,904,300	215,034,300	99.94	212,873,044
5	186,648,459	197,750,240	197,895,240	99.93	194,822,459
6	139,173,240	152,953,000	153,128,000	99.89	144,628,240
7	36,347,320	44,319,000	44,474,000	99.65	40,812,320
8	108,641,468	114,832,100	114,947,100	99.90	114,226,468
9	99,399,680	111,296,000	111,431,000	99.88	106,054,680
10	99,197,308	107,365,100	107,510,100	99.87	104,867,308
11	94,737,440	108,758,000	108,953,000	99.82	101,122,440
12	59,915,480	66,636,000	66,836,000	99.70	65,600,480

13	105,027,160	113,182,000	113,347,000	99.85	111,067,160
14	63,289,040	73,343,000	73,528,000	99.75	71,005,040
15	97,160,840	110,973,000	111,132,000	99.86	102,069,840
SUM.	1,506,905,083	1,656,573,040	1,658,874,040	99.86	1,603,051,083

Ref: According to the questionnaire.

There are many important criteria adopted in the financial evaluation, including:

Capital recovery period: While applying this criterion, it was found that fish projects in the small category recover their money in a very short period and reached at the level of the sample to (0.17), which is a very short and exaggerated period in terms of shortening, and this is due to the weakness of the capital invested in floating cages, since the costs of such projects do not need Investment expenditures, but only need cages and their accessories on the one hand, and on the other hand, high profits, and accordingly the period of capital recovery was too short (Table 7).

The invested dinar's return : It is one of the criteria used in the process of financial evaluation of production units, and it does not differ much from the net present value of the investment in its uses in terms of the information required to do this standard, and when applying the criterion of the invested dinar income it was found that fish projects in floating cages have a small category that achieves a dinar income reached (2.7) At the sample level and varied from one project to another according to the revenues and costs of those projects, in general the standard indicated that these projects had financial success, and that this activity is economically efficient (Table 7).

Productive profits : This criterion is one of the most important criteria that must be calculated because it indicates the achievement of economic efficiency. When applying this criterion to the research sample, it is revealed that the sample achieves productive profit rate reached (177%). This is an indicator of achieving a good profit (Table 7).

Table 7 : Financial evaluation standards for floating cages projects (small category)

No.	Fixed capital	Extinction	Capital retrieval period	Invested dinars return	Commercial profitability
1	7,600,000	760,000	0.22	2.71	170.8252
2	28,800,000	2,880,000	0.26	3.08	208.4817
3	16,750,000	1,675,000	0.23	2.66	165.8897
4	21,650,000	2,165,000	0.10	6.77	576.8516
5	41,290,000	4,129,000	0.22	4.77	376.9797
6	23,800,000	2,380,000	0.17	2.16	115.9518
7	10,100,000	1,010,000	0.27	1.68	67.63213
8	11,700,000	1,170,000	0.11	8.15	714.8155
9	29,200,000	2,920,000	0.29	2.26	125.6628
10	19,250,000	1,925,000	0.19	3.41	240.7544
11	18,900,000	1,890,000	0.20	1.85	84.66065
12	6,850,000	685,000	0.11	3.7	270.3216
13	16,750,000	1,675,000	0.16	3.87	286.5458
14	3,310,000	331,000	0.05	2.52	152.1702
15	5,500,000	550,000	0.06	1.76	76.45093
Total	261,450,000	26,145,000	0.17	2.78	177.8154

Ref: According to the questionnaire.

Large category:

After reviewing the criteria for financial evaluation of fish farming projects in floating cages for the small category, we will apply the criteria for financial evaluation to the large categories, as follows: -

Revenues: Prices varied according to market fluctuations, sales times and fish sizes, so the average price was about (3992.8) dinars, as well as the amount of production differed from one product to another according to production conditions and product efficiency and the amount of production at the sample level reached (1100000) kg, and accordingly the total revenue was (4392142857) dinars.

Costs : Table (8) revealed that the fixed, the variable and the total costs of the research sample reached at the level of category (2366711560) dinars, and the variable cost accounted (89%), while the total costs for this category reached (73.6%) of the total costs of fish production in floating cages and that The average cost of each kilogram varied from project to another; the lowest was (1913) dinars/kg, and the highest was (3206) dinars/kg. All of these costs, their averages and their relative importance were explained in the third chapter, the third section.

Table 8 : The amount of production, revenues and total costs of fish projects in floating cages (large category)

No.	Production amount	Revenues	Fixed costs	Variable costs	Total costs
1	172800	648000000	43849840	333748000	377597840
2	136800	547200000	28316200	264390000	292706200
3	129600	492480000	41097320	374404000	415501320
4	136800	574560000	35120360	291192000	326312360
5	108000	475200000	16306720	73334000	89640720
6	313600	1254400000	77484800	591560000	669044800
7	102400	389120000	28354320	167554000	195908320
SUM.	1100000	4392142857	270529560	2096182000	2366711560

Ref: According to the questionnaire.

Financial evaluation criteria:

There are a number of financial evaluation criteria that have been applied in the evaluation of projects for fish farming in floating cages (the large category), to evaluate their efficiency and financial success. These criteria include the following:

Profits : Total profits at the category level reached (28378288440) dinars among the projects according to revenues and costs; each kilogram achieved an average profit of (1831) dinars/kg, and the lowest profit per kg was about (593.9) dinars/kg and the profit criterion indicates the feasibility of these projects and the economic significance as well their ability to generate good economic incomes (Table 9).

Net cash income : This criterion is an important indicator for measuring the farm's financial ability, as well as its ability to expand and increase its economic effectiveness. When applying this criterion, it was found that fish projects in floating cages achieved a net cash income of (2295960857) dinars, ranged among the highest value (662840000) dinars and a minimum which was in project No. (3), as the value of cash income reached (118076000) dinars. At the level of kg production, the net cash income was on average (2087) dinars / kg, which reflects the farm's ability to cover its debts, and indicates that the projects have a financial capacity to expand and increase their economic activities.

Results in Table (8) revealed that the highest value of the net cash income was in Project No. (6), as its value was (662840000) dinars, while the lowest value of the net cash income was in Project No. (3), as the value of cash income reached (118076000) dinars, while the rest of Projects, the value of cash income is shown in the above table.

Net farm income : This is a key criterion for measuring the economic efficiency of projects and it is one of the important indicators that are used to draw economic policies in the agricultural filed, and a competent breeder is the person who can achieve the highest level of efficiency within the project which can be achieved by the project manager himself by organizing the production process, or re-mixing the different elements of production; Upon applying this criterion, it turns out that the category achieves a net farm income reached (2294740857) dinars, and this indicates that fish projects are economically efficient and generate farm income that reflects the impact of the product and helps to expand its activity and develop its production projects (Table 9).

Farm work return : It is considered as one of the most important criteria for measuring the economic efficiency of projects in general and administrative in particular. When measuring the work income, it was found that producers of fish in floating cages (the large category) are achieving work income reached (2127046297) dinars which is fluctuating and different among the rest of the sample, depending on the above criteria and the size of the invested capital expressed in interest on the capital. As a result of these criteria, they reflect the relative efficiency of fish projects and are considered to have a significant work income (Table 9).

Financial efficiency standards of floating cages projects (large category)

No.	Profits	Net cash income	Net farm income	farm work return
1	270402160	314252000	314102000	287402160
2	254493800	282810000	282650000	261498800
3	76978680	118076000	117901000	87948680
4	248247640	283368000	283203000	259907640
5	385559280	401866000	401686000	395819280
6	585355200	662840000	662650000	615325200
7	193211680	221566000	221366000	207961680
SUM.	2014248440	2295960857	2294740857	2127046297

Ref: According to the questionnaire.

There are many important criteria adopted in the financial evaluation, some of them are calculated, including:

Capital recovery period : While applying this criterion, it was found that fish projects in the large category recover their invested capital in a very short period and reached at the level of the sample up to (0.27) years, which is a very short and exaggerated period in terms of shortening, and this is due to the weakness of the capital invested in floating cages, since the costs of such projects do not requires investment expenses, because it only needs cages and its accessories on the one hand, and on the other hand, high profits. Accordingly, the period of capital recovery was short.

The invested dinar's return : While applying this criterion, it became clear that the income of the invested dinar is greater than one, as it reached (1.8). This means that fish projects in floating cages (the large category) achieve

financial success and achieve economic efficiency (Table 10).

Productive profits : This criterion is one of the most important criteria that should be calculated because it indicates the achievement of economic efficiency, and it is calculated through the following equation: -

Productive profits = profits / production costs x 100. When applied to the research sample, it was found that the sample achieved a productivity profit rate of 85%, and this indicates an achievement of a significant profit. Projects are able to cover the high costs and the projects are economic merit (Table 10).

Table 10 : Financial parameters of floating cages projects (Large category)

Project	Fixed capital	Capital retrieval period	invested dinar return	Productivity profit
1	65500000	0.24	1.72	71.61
2	62650000	0.24	1.87	86.95
3	67950000	0.81	1.19	18.53
4	63250000	0.25	1.76	76.08
5	91900000	0.23	5.3	430.12
6	127100000	0.21	1.87	87.49
7	71000000	0.35	1.99	98.62
SUM.	549350000	0.27	1.86	85.11

Ref: According to the questionnaire.

Summary of financial indicators and standards for floating cage production projects:

Results in Table (11) revealed the financial indicators of fish production projects in floating cages for the small and large categories, and these parameters indicated the significance of the large category in terms of profits, net cash income, net farm income, and productive profits, while the small category exceled in other indicators that are the recovery period and the return of the dinar The investor and productivity profits, due to the high costs in the large category.

Table 11 : Financial evaluation standards of floating cages.

No.	Profits / dinars	Net cash income / dinars	Net farm income / dinars	Farm work return / dinars	Retrieval Period/year	Return on the invested dinar	Productivity profit%
Small category	1506905083	1656573640	1658874000	212873044	0.17	2.7	177
Large category	2014248440	2295960857	22994740857	2127046297	0.27	1.8	85

Ref: According to previous Tables.

(II) Cost - Benefit Analysis (CBA)

Through the C-B analysis of fish producers in Anbar Governorate and in the two breeding systems (floating cages and earthen ponds) and in order to reveal the financial and economic differences and preferences it shows the following:-

- **The net returns:** The net incomes of each kilogram of fish produced by the two systems are calculated and the revenues are calculated by the average of real prices at which the product was sold. It turned out that the net incomes in floating cages reached (2332) dinars, and in earthen ponds reached (1613.1) dinars; this indicates the significance of breeding under the floating cages system due to the decrease in their costs, knowing that the change in the total costs amounted by (61%) and this indicates the bearing of pond fish producers more costs.
- **Internal return rate (IRR):** It is one of the most important advanced criteria for making a trade-off between different investment alternatives; The World Bank uses it for financial and economic analysis of all projects, and most financing institutions use it when they

accept or reject projects submitted to them for funding. The internal rate here indicates that the floating cages had an internal rate of about (2.03), which is the rate achieved by the earthen ponds, which reached (1.42), and this means that investing in the floating cage system is more beneficial and economical.

- **Net present value (NPV) of investment:** Since the cash flow received at the present time has a benefit (value) that is much greater than the same amount of cash flow being received but at a later time and accordingly NPV was calculated with a discount factor under benefit rate (8%), and it was found that fish projects in floating cages achieved a net present value of the investment that amounted to (2145.4), which is higher than what was achieved from the pond system, which was (1484.05).
- **Benefits/costs ratio:** It is also called the profitability index, which is the basis for evaluating projects and knowing their economic feasibility. It determines acceptance or rejection of the economic project. According to this criterion, the priority here for fish projects in floating cages that achieved a ratio of (2.4).

Table 12 : Cost-Benefits Analysis (CBA) pf fish producers according to the production systems.

Floating cages production		Earthen ponds production	
Inputs	**Costs (IQ diners)**	**Inputs**	**Costs (IQ diners)**
Fingerlings	497.38	Fingerlings	377.5
Fodder	1026.00	Fodder	285.94
Medicines	23.92	Medicines	703.9
Hiring work	85.07	Hiring work	418.3
Fuel	5.45	Fuel	193.7
Maintenance	16.22	Maintenance	685.6
Total	1654.05	**Total**	2664.94
Return			
Total return	**3986**	**Total return**	**4278**
Parameters			
Net return	2332	**Net return**	1613.1
Net returns variation%			**30.82**
Total costs variation%			**61.11**
Internal return rate (IRR) of Ponds			**1.42**
Internal return rate (IRR) of cages			**2.03**
Net percent value (NPV) of cages			**2145.4**
Net percent value (NPV) of ponds			**1484.05**
Costs-Returns ratio	2.4	**Costs-Returns ratio**	1.6

Ref: According to the CBA analysis results

(III) Index Number of Management Efficiency (INME)

The efficiency of management for fish projects is an important and specific factor in production, and this efficiency depends on many factors and determinants, including the ability of management to make the right decisions, and the adoption of a quantitative method in taking them. In addition to the personal characteristics of the project manager; for example, his age, his experience in fish farming, his educational level, and the number of courses he participated in. Therefore, the index for the efficiency of the administration in these projects was calculated by the following equation (Oh Ji, 2019):

INME = (Y.b1 + E.b2) / (Ya.b1 + Ea.b2)

Y: Years of Project Manager Experience.
B1: Estimated regression parameter through the relationship between productivity and educational level.
B2: Estimated regression parameter through the relationship between productivity and years of experience.
Ya: Average educational level of project managers in the research sample.
Ea: average years of experience of project managers in the research sample.

To estimate the above equation and calculate the index for management efficiency, a regression was estimated between productivity (cage productivity and pond productivity). The educational level of managers (expressed 0: Illiterate, 1: for elementary, 2: Middle school, 3: High school, 4: diploma, 5: bachelor. 6: master). And the level of experience (expressed in years of experience in fish farming), the OLS method was applied, Using the Eviews9 standard program, the following equations were estimated:-

Productivity = 1924.43+67.21 Education + 10.49 Experience...
Productivity = 1449.67.43+67.21 Education + 10.49 Experience...

After applying the above functions b1 and b2 in the index number equation, the efficiency of the administration was calculated as shown in table (63), it was found that the efficiency of management varies from one project to another according to their specifics and project conditions, as it was found that breeding projects in cages fluctuated the efficiency of their management among a higher limit It reached (179%) in Project No. (20), and a minimum was in Project No. (11) reached (9.6%). It is also noted that (50%) of these projects have achieved higher efficiency than (100%). This reflects that the fish farming projects have a relatively efficient degree that is reflected in increasing the production efficiency and consequently the increase in outputs, while it was observed that the level of management efficiency in fish farming projects in floating cages ranged between the limit of (153.2) in Project No. (5) and (30%) In project No. (12). It was found that (56%) of these projects achieved administrative efficiency higher than (100%), and this indicates the influence of management factors represented by experience and education and their role in increasing production if reflected in the efficiency of management.

Table 13 : Management Efficiency Index

INME	Earthen ponds projects	INME	Floating cages projects
124.5529	1	32.41343	1
111.7898	2	152.3675	2
150.0791	3	61.59365	3
140.5068	4	154.523	4
153.2699	5	32.41343	5
42.77893	6	43.1908	6
79.1763	7	119.4152	7
112.3829	8	91.31274	8

77.28434	9	153.9841	9
96.42901	10	31.33569	10
106.0013	11	9.699637	11
30.01582	12	62.67139	12
56.84086	13	41.03533	13
74.09356	14	90.235	14
146.8883	15	148.0566	15
99.61978	16	149.6732	16
100.10	MEAN	160.9894	17
		121.0318	18
		162.0672	19
		179.9311	20
		76.68197	21
99.85	MEAN	122.1096	22

Ref: According to the regression equations

Conclusion

The increase in variable costs in fish farming projects and the increase in their contribution to the total costs, due to the high costs of fingerlings and fodder that made up the largest percentage of the variable costs, and that fish farming projects and their earthen pond systems and floating cages have achieved financial success and are economically feasible and projects that have a significant economist income. It can recover the capital in a short period of time, and the projects are affordable, and have the ability to expand their production activities; through a comparison between investment alternatives and according to the C-B analysis, it turns out that fish farming projects with floating cages are the best alternative with net incomes and this means that this activity is more beneficial and feasible Economic, and management features improved the age, experience and educational level of management efficiency, increased productivity and (50%) of the research sample achieved greater efficiency than (100%).

Recommendations

It is necessary to draw an agricultural policy that includes measures aimed at developing the fish sector in the governorate and long-term planning to reach self-sufficiency in fish, by providing financial facilities and cooperation among the relevant ministries. Reducing the costs of feed and fingerlings by providing them at subsidized prices, and supporting the establishment of hatcheries, feed factories, cage manufacturing factories.. etc. in the governorate. The current administrative system must also be developed by introducing them to financial, economic and technical matters by engaging them in development courses and workshops that increase their skills and thus the efficiency of management.

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