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ECONOMIC EVALUATION OF YOGURT PRODUCTION PROJECT IN EGYPT

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ABSTRACT

Dairy processing projects, particularly yogurt production, are characterized by low initial capital requirements compared to other dairy projects such as cheese production. Additionally, these projects have a fast-working capital cycle, as costs can be recovered in a short period, making them attractive to young people and graduates seeking employment opportunities. The problem of the study lies in seeking to enhance the economic efficiency of some existing agricultural investment projects in Dakahlia Governorate, by conducting a financial evaluation of these projects under certain assumptions aimed at achieving the maximum possible economic efficiency. This is intended to provide investors with a clear picture of the actual status of the project under study, enabling investors to utilize their funds with the highest possible efficiency. The most important results were that the project achieves a positive net present value (NPV) estimated at 602,316.37 EGP/year at a discount rate of 15%. It also indicates that the ratio of discounted cash inflows to discounted costs is > 1 , with the discounted profitability index for this project reaching approximately 1.26, a value greater than one. This means that each invested pound generated a net return of 26 piasters. The results of the sensitivity analysis for the yogurt project reveal the project's sensitivity to a 5% increase in production costs, As A 5% increase in raw material costs led to a decrease in the net present value from 602,316.37 EGP to 485,49 EGP. It also caused the profitability index to decline from 1.26% to 1.20%. Based on the above results, It is also clear that the project has low sensitivity to any decrease in revenue, indicating that the project is economically feasible at present. However, its sensitivity to any future changes would increase

KEYWORDS: Yogurt Production, Economic Evaluation, Discounted and Non- Discounted Criteria.

1. INTRODUCTION

Milk and its products constitute a primary source of animal protein in the human diet, and they are also considered a fundamental input for many food industries (FAO, 2021). However, many developing countries, including Egypt, face a production gap in the dairy sector, as the quantities produced locally do not meet the growing consumer and manufacturing needs (Guadu & Abebaw, 2016). This deficit has led to a heavy reliance on imports (Mahrous & Mostafa, 2022), especially powdered milk, which has resulted in higher prices of final products and negatively impacted the purchasing power of consumers (CAPMAS, 2022). In this context, small and micro-enterprises emerge as an effective mechanism to enhance local production and reduce the food gap. Dairy processing projects, particularly yogurt production, are characterized by low initial capital requirements compared to other dairy projects such as cheese production (Maitah & Smutka, 2012; Nyamakwere et al., 2023). Additionally, these projects have a fast-working capital cycle, as costs can be recovered in a short period, making them attractive to young people and graduates seeking employment opportunities (Ata, 2019; El Wakeel & Matar, 2021).

Small-scale agricultural projects play a vital role in absorbing a considerable portion of the workforce in Egypt, particularly amid rising unemployment rates among graduates (Ministry of Planning and Economic Development, 2023; League of Arab States, 2022; Abdo, 2016). Beyond their employment-generating function, these projects are increasingly recognized as instruments for rural development and youth empowerment by creating sustainable income opportunities and enhancing local economic resilience. Evidence from comparable rural contexts confirms that small-scale agricultural initiatives can significantly strengthen rural youth capacities and improve livelihood outcomes (Khamis et al., 2023; Khalil et al., 2025).

The current study aims to assess the financial feasibility of a small agricultural investment project for yogurt production in Dakahlia Governorate, Egypt, during the 2023/2024 agricultural season. The study seeks to present an applicable model that can contribute to enhancing local production, reducing reliance on imports, and providing job opportunities for young people, in line with Egypt's sustainable development goals.

2. STUDY PROBLEM

Despite the multiple benefits of yogurt production projects, these ventures have not received

sufficient attention nor adequate extension and economic awareness from investors and decision-makers (Mpandeli & Maponya, 2014). In this context, the study raises the following question: Are yogurt production and processing projects economically feasible or not from the perspective of small and micro-enterprise owners (investors)? (Al-Gendy, 2020; Abdo, 2016).

The problem of the study lies in seeking to enhance the economic efficiency of some existing agricultural investment projects in Dakahlia Governorate, by conducting a financial evaluation of these projects under certain assumptions aimed at achieving the maximum possible economic efficiency. This is intended to provide investors with a clear picture of the actual status of the project under study, enabling investors to utilize their funds with the highest possible efficiency.

3. STUDY OBJECTIVES

The objective of manuscript is to conduct a financial performance evaluation of a yogurt production project. The focus in this study was exclusively on discounted criteria that take the time factor into account, incorporate the inflation rate, or consider the time value of money.

This was pursued through the following specific objectives:

1. To evaluate the investment costs, production costs, and maintenance and operating costs of the project.
2. To evaluate the revenues and the value of capital assets at the end of the project's useful life.
3. To calculate the financial evaluation indicators for the project and conduct a sensitivity analysis to support decision-making regarding the success of the investment in the project.

4. METHODOLOGY

To achieve the objectives, this study employed descriptive and quantitative statistical methods for data analysis and drawing conclusions. Certain criteria were used to evaluate the commercial or financial profitability of the project. The criteria used in the financial evaluation can be classified according to the consideration of the time factor into discounted and non-discounted criteria.

Non-Discounted Criteria: These do not take the time factor or the inflation rate into account. The most important of these are:

- Payback Period (PBP)
- Accounting Rate of Return (ARR)

Discounted Criteria: These take the time factor into

account, incorporate the inflation rate, or consider the time value of money. The most important of these criteria are:

- Benefit/Cost Ratio (B/C)
- Profitability Index (P.I)
- Net Present Value (N.P.V)
- Internal Rate of Return (I.R.R).

5. SOURCES OF DATA

The study relied on both published and unpublished data obtained from multiple sources, including official agencies such as: the Social Fund for Development in Mansoura City, Dakahlia Governorate, as well as reports, bulletins, and periodicals from various government entities including the Ministry of Planning, the Ministry of Agriculture and Land Reclamation, the National Planning Institute. Additionally, 10 questionnaire forms were utilized concerning yogurt processing units in the Senbelawin Center, Dakahlia Governorate. First, the factors affecting the quantity supplied of liquid milk within the framework of studying the current status of dairy production and processing, particularly yogurt production, in Egypt and Dakahlia Governorate.

6. RESULTS AND DISCUSSION

First: Technical and Economic Study of Yogurt Production

Results of the Technical Study of the Project:

1. Project Description:

Location: The project is established in a location with an area estimated at approximately 15 to 20 m². It is located near the city to facilitate transportation and distribution processes, making it close to

consumers in the Senbelawin Center, which is approximately 30 km away from Mansoura City.

Sources of Raw Materials:

The primary raw materials are buffalo milk and cow's milk, which are readily available and can be obtained daily from milk suppliers. Sometimes, dried skimmed milk is also used, which is easily obtained in 25 kg sacks when needed from its well-known sources, which will be mentioned later.

Main Products of the Project:

Yogurt in plastic containers (105 g capacity).

2. Production Capacity:

- 100 kg of milk per day = 800 yogurt cups/day
- The production cycle is daily (every 24 hours of operation), equivalent to approximately 3 tons of milk per month, with 360 working days per year.
- **Annual production capacity = 30 tons of raw milk**
- **That is = 288,000 yogurt cups**
- The price per yogurt cup was 3 Egyptian pounds, so the total annual income amounted to approximately 864,000 EGP.

3. Technical Production Methods and Description of the Yogurt Production Project:

Yogurt production is a straightforward industry with limited requirements. Although there are modern technological means in this field (Nicholson & Stephenson, 2007), the required production capacity can be achieved using simple, manual methods. The processes of receiving, weighing, and testing were carried out using simple and easy methods.

Table (1): The Technical Stages and Sequence of Production Operations for the Yogurt Production Project.

No.	Operation	Description	Time(minutes)	Note
1	Milk receiving, Weighing, and testing.	Weighing, testing, and filtering the milk	20	
2	Milk heating	In the double-jacketed boiler	60	
3	filling and adding bacterial starter	In plastic containers	90	
4	Incubation	Placing inside the incubator	180	
5	Cooling	Placing inside the refrigerator	180	
Total Manufacturing Time			530	9hours
Total Distribution Time			120	

Source: Field Data 2026.

Secondly: Fixed and Variable Cost Items for the Yogurt Production Project

1- Investment Cost Items for the Yogurt Production Project

Table No. (2) shows the capital cost items, which include preparing the place cost, purchasing

machinery and production tools, which amounted to 31,735 EGP. Operational costs reached about 1,853 EGP, and the annual rent amounted to 12,600 EGP. Therefore, the total investment costs amounted to approximately 46,188 EGP.

Table No. (2): Fixed Costs and Investment Costs Items for a Yogurt Production Project (Value: By Pounds).

Item	Description	Value
Place Preparation	Tiles 1.5m high + Sanitary Drainage + Electricity	5750

Aluminum Milk Churn	Capacity 40 liters	1205
Milk Testing Tools	Fat - Acidity - Specific Weight	1210
Milk Cream Separator	Electric, capacity 100 liters	2460
Stainless Steel Milk Boiler	Capacity 100 liters	1420
Gas stove	Large burner	445
Gas hoses	Large	1270
container	Stainless steel, capacity 200 kg	475
Table	Stainless steel 1*2 m	1250
Yogurt Incubator	Metal - Electric, capacity 1000 containers	2510
Refrigerator	20 ft capacity	10430
Plastic Crates	For distribution	660
Administrative Expenses	Licensing	2650
Total		31735
Investment Costs		
1	Capital Costs	31735
2	Annual Rent	12600
3	Operating Costs per Cycle (Duration: 1 Day Only)	1853
total		46188

Source: Collected And Calculated from the Average Opinions of the Sample Using the Questionnaire Form.

2- Items of Variable Costs for the Yogurt Production Project.

Table No (3): Variable Cost Items for One Day's Production and the Total Annual Value for the Yogurt Production Project. Value: In Egyptian Pounds.

Item	Description	Daily Production Cost	Annual Production Cost
Raw Milk	100 kg (80% buffalo milk + 20% cow milk)	783	281880
Packaging	400 packages at 0.5 EGP each (400 × 0.5 = 200 EGP?)	400	144000
Cleaning Supplies	Consumption	9	3240
bacterial starter	Consumption	516	185760
Wages	2 skilled workers	100	36000
Electricity + Water	Consumption	19	6840
Maintenance*	Approximately 5% of fixed capital	16	5760
Tools Depreciation	Approximately 20% of equipment cost	10	3600
Total		1853	667080

Source: Collected And Calculated from the The Sample Using the Questionnaire Form.

3- Operational Costs, Total Revenue, Net Profit, and Annual Depreciation for the Yogurt Production Project

Table No. (4) shows that the total annual operational (variable) costs for the yogurt production project, which was about 667,080 EGP. The annual

depreciation rate was 10% of the total capital costs, amounting to approximately 5,712 EGP. The table also shows the annual interest rate, which varies from year to year, and the total annual revenue, which amounts to 864,000 EGP. The table also indicates the high net return of the project.

No. (4): Income Statement: Revenues, Operating Costs, Depreciation, Total Costs, Gross Profit, Interest, Net Profit for The Year for the Yogurt Production Project. (Value In Egyptian Pounds).

years	Revenues	Operating Costs	*Depreciation	Total cost	Total profit	Interest	Net Profit
1	864000	667080	5712	672792	191208	5863.4	185345
2	864000	667080	5712	672792	191208	4690.72	186517
3	864000	667080	5712	672792	191208	3518.04	187690
4	864000	667080	5712	672792	191208	2345.36	188863
5	864000	667080	5712	672792	191208	1172.68	190035
Total	4320000	3335400	28560	3363960	956040	17590.2	938450

*Depreciation = (Capital Costs ÷ 365) ÷ 5 Years (Project Lifespan) = 15.5 - 17 EGP/Day • Depreciation = 15.8 × 360 = 5712 EGP/Year.

Source: Collected And Calculated from The Sample Using the Questionnaire Form.

Cash Inflows and Outflows for the Yogurt Production Project

Table No. (6) shows the items of both total cash inflows, which include (revenues, loan value, working capital recovery time, and residual (scrap)

value), and total cash outflows, which include (investment costs, operating costs, debt service, interest, depreciation), as well as the annual net cash flows.

Table No (5): Items of Total Cash Inflows, Items of Total Cash Outflows, And Annual Net Cash Flows for the Yogurt Production Project (Value in Thousand EGP).

Years	Cash Inflows				TOTAL Cash Inflows	Cash outflows					Total Cash outflows	Net Cash Flows
	Revenues	Loan	Working Capital Recovery	Residual (Scrap) Value	TOTAL Cash Inflows	Investment Costs	Operating Costs	Debt Service	Interest	Depreciation	Total Cash Outflows	Net
1	864	46.188			910.19	46.188	667.08	9.24	4.62	5.71	732.84	177.35
2	864				864.00		667.08	9.24	3.70	5.71	685.72	178.28
3	864				864.00		667.08	9.24	2.77	5.71	684.80	179.20
4	864				864.00		667.08	9.24	1.85	5.71	683.88	180.12
5	864		1.853	3.173	869.03		667.08	9.24	0.92	5.71	682.95	186.07
Total	4320	46.188	1.853	3.173	4371.21	46.188	3335.4	46.19	13.86	28.56	3470.19	901.02

Source: Compiled And Calculated from Tables No. 2, 3, And 4.

Table No (6): The Present Value of Cash Outflows, Inflows, And Net Cash Flows for the Yogurt Production Project at A 10% Discount Rate.

Years	Total Cash Inflows (EGP)	Total Cash Outflows (EGP)	Net Benefits or Net Cash Flow (EGP)	Discount rate at 10%	Present Value of Cash Inflows (EGP)	Present Value of Cash Outflows (EGP)	Present Value of Net Benefits (EGP)
1	910188	732836.4	177351.6	0.91	827360.89	666148.29	161212.60
2	864000	685724.64	178275.36	0.83	713664	566408.55	147255.45
3	864000	684800.88	179199.12	0.75	648864	514285.46	134578.54
4	864000	683877.12	180122.88	0.68	590112	467088.07	123023.93
5	869026.5	682953.36	186073.14	0.62	539665.46	424114.04	115551.42
Total	4371214.5	3470192.4	901022.1		3319666.35	2638044.41	681621.94

Source: Compiled And Calculated from Tables No. 4 And 5.

Choose the Appropriate Discount Rate for the Yogurt Production Project

The purpose of the discount rate is to eliminate the effect of time on the project's cash flows, from its start to its end. This is done by relying on the interest rate

$$\text{Discount rate} = \left[\frac{(\text{owned capital}^1 \times \text{hurdle rate}) + (\text{Borrowed capital} \times \text{Loan interest}^2)}{\text{Total Capital}} \right] \times 100$$

$$\text{Discount rate} = \frac{(55590 \times 14\%) + (49188 \times 16\%)}{101778} \times 100 = 14.9 \approx 15\%$$

¹**Owned capital:** Variable costs for a full month = $1853 \times 30 = 55590$ EGP/month²**the bank loan Interest:** not the interest from the Social Fund for Development (currently the Micro, Small and Medium Enterprise Development Agency). **The appropriate discount rate for the yogurt production project is 15%, compared to the opportunity cost of available investments in society (bank investments).**

The discount rate is determined based on the cost of available funds or the weighted average cost of capital. That is, the discount rate = the minimum weighted average cost of financing. This rate represents the minimum return required by owners on their funds invested in the project (Attia, 2008).

Third: Evaluating Commercial Profitability Criteria:

First: Discounted Commercial Profitability Criteria. By examining the results of Table No. (7), the following discounted commercial profitability criteria are evident:

- 1- Criterion of Discounted Revenues to Discounted Costs Ratio (Benefit-Cost Ratio at a 15% Discount Rate)

on loans set by the central bank.

However, if the project's costs are covered by the Small Enterprise Development Agency or the project owners, the discount rate is estimated as follows:

- Benefit /Cost Ratio (B/C) = $\frac{431906.17}{339427.82} = 1.27 \approx 1.27\% \text{ Pound}$
- **This represents the ratio between the present value of revenues or benefits and the present value of total costs, according to the following equation:**
- By calculating this ratio, we find one of three answers, through which the project is judged to be accepted or rejected.
- **First:** If the revenue-to-cost ratio is greater than one, \therefore the project is accepted.
- **Second:** If the revenue-to-cost ratio is less than one, \therefore the project is rejected.
- **Third:** If the revenue-to-cost ratio equals 1, \therefore The acceptance or rejection of the project depends on the project owner – whether they accept or reject it is their decision, because it will not achieve any economic returns. However, it is sometimes accepted for implementation when the project has social returns, as previously mentioned (Bhandari 2017, Bouma et al., 2014). According to the present value criteria of benefits to present value of costs ratio at a 15% discount rate,

which amounts to 1.26 a value greater than one. This means that the net return per invested pound reached 26 piasters. Therefore,

we recommend continuing to finance these types of projects according to this criterion.

Table No (7): Present Value of Cash Outflows, Inflows, And Net Cash Flows at A 15% Discount Rate.

Years	Total Cash Inflows (EGP)	Total Cash Outflows (EGP)	Net Benefits or Net Cash Flow (EGP)	Discount rate at 15%	Present Value of Cash Inflows (EGP)	Present Value of Cash Outflows (EGP)	Present Value of Net Benefits (EGP)
1	910188	732836.4	177351.6	0.869	790953.37	636834.83	154118.54
2	864000	685724.64	178275.36	0.756	653184	518407.83	134776.17
3	864000	684800.88	179199.12	0.658	568512	450598.98	117913.02
4	864000	683877.12	180122.88	0.572	494208	391177.71	103030.29
5	869026.5	682953.36	186073.14	0.497	431906.17	339427.82	92478.35
Total	4371214.5	3470192.4	901022.1		2938763.54	2336447.17	602316.37

Source: Collected And Calculated from Tables 4, 5, And 6.

Table. (8): The Present Value of Cash Outflows, Inflows, And Net Cash Flows at A 20% Discount Rate.

Years	Total Cash Inflows (EGP)	Total Cash Outflows (EGP)	Net Benefits or Net Cash Flow (EGP)	Discount rate at 20%	Present Value of Cash Inflows (EGP)	Present Value of Cash Outflows (EGP)	Present Value of Net Benefits (EGP)
1	910188	732836.4	177351.6	0.833	758186.60	610452.72	147733.88
2	864000	685724.64	178275.36	0.694	599616	475892.9	123723.1
3	864000	684800.88	179199.12	0.578	499392	395814.91	103577.09
4	864000	683877.12	180122.88	0.482	416448	329628.772	86819.23
5	869026.5	682953.36	186073.14	0.401	348479.627	273864.297	74615.33
Total	4371214.5	3470192.4	901022.1		2622122.231	2085653.599	536468.63

Source: Collected And Calculated from Tables 4, 5, And 6.

2- Net Present Value (N.P.V)

Net Present Value (N.P.V) = Present Value of Inflows - Present Value of Outflows= 2,938,763.54 - 2,336,447.17 = **602,316.37 EGP/year**

According to the Net Present Value criterion, it is found to be approximately 602,316.37, which is a positive value (at a 15% discount rate), and thus the project is economically feasible (Adelman & Marks

2001, Becker et al., 2007, Von Loeper et al., 2016).

3- Internal Rate of Return (IRR)

It is the rate at which the present value of cash inflows equals the present value of the initial investment.

It is estimated according to the following relationship:

$$0 = -K + \sum_{i=1}^t \frac{CF}{(1 + IRR)^i} + \frac{SV}{(1 + IRR)^t}$$

$$K = \sum_{i=1}^t \frac{CF}{(1 + IRR)^i} + \frac{SV}{(1 + IRR)^t}$$

Where:

K: Investment cost

CF: The annual cash flow

$$\sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t} = 0$$

i = the year, ranging from 1 to t
t = the number of years of the project's lifespan

t = the number of years of the project's lifespan

S.V: Scrap Value

Calculating the Internal Rate of Return (Frank J. Fabozzi, 2009):

This return is calculated using the random trial

$$IRR = R_1 + \frac{(R_2 - R_1)NPV_1}{NPV_1 - NPV_2}$$

Where:

R₁ = The smaller discount rate that makes NPV positive
R₂ = The larger discount rate that makes NPV negative

method or "Trial and Error." We assume a certain discount rate at which the present value of the annual net cash flows is calculated. If the present value of the net cash flows is greater than zero, we repeat the attempt by assuming a higher discount rate.

We then repeat the attempt until we obtain a present value less than zero (i.e., a negative value) (Khol 1992, Hayes 2002, Durham et al., 2015). Then we apply the following equation:

NPV₁ = Net present value at the smaller discount rate

NPV₂ = Net present value at the larger discount rate

IRR = Internal Rate of Return

$$IRR = (\text{The smaller discount rate (15\%)}) + (\text{The difference between the two discount rates}) \times$$

$$\left[\frac{\text{The present value of net cash flow at the smaller discount rate}}{\text{The absolute difference of net cash flow at the two discount rates}} \right]$$

$$IRR = 15 + (20-15) \times \frac{602316.37}{602316.37 + 536468.63s} = \frac{3011581.9}{1138785} = 17.65\%$$

The interest rate on the bank loan is 16%. The required rate of return for the project owner is 14%. The specified discount rate is 15%.

Therefore, the Internal Rate of Return (IRR) is calculated using a value larger than the previous ones, which is 20%. When calculating the Internal

Rate of Return using the trial-and-error method, the difference between the larger discount rate and the smaller discount rate must not be less than 5%. This means that the project remains feasible as long as the opportunity cost of the foregone investment is less than 17.65%.

Profitability Index (PI):

$$PI = \frac{\sum PVCF}{\sum PVK}$$

PI = Profitability Index

$$\begin{aligned} \sum PVCF &= \text{Sum of the present value of cash inflows} \\ \sum PVK &= \text{Sum of the present value of investment costs} \\ PI &= \frac{2938763.543}{2336447.171} = 1.258 \approx 1.26 \text{ Pound} \end{aligned}$$

According to the Profitability Index criterion, the ratio of present benefits to present costs at a 15% discount rate equals 1.26, which is greater than one. This means that each invested pound has generated a net return of 26 piasters. Therefore, we recommend promoting and continuing to finance these types of projects according to this criterion (Beker et al., 2014; Khol, 1992).

Secondly: Results of the Economic Evaluation of the Yogurt Production Project:

Table (8) shows that the project achieves a positive net present value (NPV) estimated at 602,316.37 EGP/year at a discount rate of 15%. It also indicates that the ratio of discounted cash inflows to discounted costs is > 1, with the discounted profitability index for this project reaching approximately 1.26, a value greater than one. This means that each invested pound generated a net return of 26 piasters, surpassing the opportunity cost of this project, represented by the borrowing interest rate estimated at 16%. This suggests that the project has the capabilities and ability to recover the fixed capital, production costs (variable), and operating costs (depreciation and maintenance) incurred. Additionally, it achieves a return of 10% on the funds invested by the investor (self-financing) (League of Arab States, 2022), with a required economic return of at least 14%, whether from borrowing from the Social Fund for Development (or the Micro, Small, and Medium Enterprise Development Agency currently) at an interest rate of 10%, or in the case of

borrowing from a bank where the interest rate is estimated at 16%. Therefore, this project was able to cover the loan and its cost (interest), leaving an additional profit for the investor estimated at 10%, which is the difference between the best alternative opportunity of 16% (the bank) and investing in the project at 26%. Consequently, in light of the current results, financing this project can be considered a successful endeavor by the Social Fund for Development (or the Micro, Small, and Medium Enterprise Development Agency currently). Thus, we recommend continuing to finance these types of projects according to this criterion (Ata, 2019; El Wakeel & Matar, 2023; Mahrous & Mostafa, 2023).

Third: Sensitivity Analysis of the Yogurt Project with a 5% Annual Increase in Outflows:1- Sensitivity Analysis of the Yogurt Project with a 5% Annual Increase in Outflows:

It is well known that yogurt projects, like other agricultural projects, are subject to significant risk and uncertainty. Therefore, a sensitivity analysis was conducted for the project at discount rates of 10% and 15% in the case of a 5% annual increase in outflows, with inflows held constant (Attia, 2008)., as well as in the case of a 2% decrease in inflows, with outflows held constant at discount rates of 10%, 15% and 20%. Tables (9, 10) shows the project's profitability under the conditions of the sensitivity analysis with a 5% annual increase in outflows and constant inflows at discount rates of 10% and 15% (Cucurachi et al., 2021), (Husnain et al., 2023).

Table (9): Sensitivity Analysis, Present Value of Outflows, Inflows, And Net Cash Flow at A 10% Discount Rate After A 5% Increase in Outflows (Inflows Constant).

Years	Total Cash Inflows (EGP)	Total Cash Outflows (EGP)	Net Benefits or Net Cash Flow (EGP)	Discount rate at 10%	Present Value of Cash Inflows (EGP)	Present Value of Cash Outflows (EGP)	Present Value of Net Benefits (EGP)
1*	910188	769478.22	140709.78	0.909	827360.9	699455.7	127905.2
2*	864000	720010.87	143989.13	0.826	713664	594729	118935
3	864000	719040.92	144959.08	0.751	648864	539999.7	108864.3

4	864000	718070.98	145929.02	0.683	590112	490442.5	99669.52
5	869026.5	717101.03	151925.47	0.621	539665.5	445319.7	94345.72
Total	4371214.5	3643702	727512.48		3319666.3	2769946.6	549719.72

(*) The Increase in the First Year Was Calculated As: $732836.4 \times 0.05 = 36641.82$ EGP. = $732836.4 + 36641.82 = 769478.22$ EGP.

(*) The Increase in the Second Year Was Calculated As: $685724.64 \times 0.05 = 34286.2$ EGP. = $685724.64 + 34286.2 = 720010.87$ EGP.

Source: Collected And Calculated from Tables 6, 7, And 8.

1- Sensitivity Analysis with a 5% Annual Increase in Outflows:

The results of the sensitivity analysis for the yogurt project reveal the project's sensitivity to a 5% increase in production costs, as shown in Table (10). A 5% increase in raw material costs led to a decrease in the net present value from 602,316.37 EGP to 485,494 EGP. It also caused the profitability index to decline from 1.26% to 1.20%, meaning that the profit per invested pound decreased from 26 piasters to 20 piasters, a reduction of 6 piasters for every 5%

increase in costs. Based on the above results, it is clear that the project has low sensitivity to any expected increase in costs, indicating that the project is economically feasible at present. However, its sensitivity to any future changes would increase. Therefore, this project is able to cover the loan and its cost (interest) (Martinez et al., 2021), while still generating an additional profit for the investor estimated at 4%. This represents the difference between the best alternative opportunity of 16% (the bank) and investing in the project at 20%.

Table No (10): Sensitivity Analysis: Present Value of Outflows, Inflows, And Net Cash Flows At 15% And 20% Discount Rates, Assuming A 5% Increase in Outflows and Constant Inflows.

Years	1	2	3	4	5	Total
Total Cash Inflows (EGP)	910188	864000	864000	864000	869026.5	4371214.5
Total Cash outflows (EGP)	769478.22	720010.87	719040.92	718070.98	717101.03	3643702
Net Cash flow	140709.78	143989.13	144959.08	145929.02	151925.47	727512.48
Discount rate 15%	0.869	0.756	0.658	0.572	0.497	
Present value of cash inflow	790953.4	653184	568512	494208	431906.2	2938763.5
Present value of cash outflow	668676.6	544328.2	473128.9	410736.6	356399.2	2453269.5
Net Cash Flow (EGP)	122276.8	108855.8	95383.07	83471.4	75506.96	485494.01
Discount rate 20%	0.833	0.694	0.578	0.482	0.401	
Present value of cash inflow	758186.6	599616	499392	416448	348479.6	2622122
Present value of cash outflow	640975.4	499687.5	415605.7	346110.2	287557.5	2189936
Net Cash Flow (EGP)	117211.2	99928.45	83786.35	70337.79	60922.11	432186

Source: Collected And Calculated from Tables 6, 7, And 8.

By studying Tables No. (9, 10), it becomes clear to us that:

- $IRR = 10 + (15-10) \times \frac{459719.72}{485494.01 + 549719.72} = \frac{2748598.6}{1035213.7} = 12.66\%$
- $Benefit/Cost Ratio (B/C) = \frac{2938763.5}{2453269.5} = 1.198 \cong 1.20\% Pounds$
- $PI = \frac{2938763.5}{2453269.5} = 1.198 \cong 1.20\% Pounds$

- $Net Present Value (N.P.V) = 2938763.5 - 2453269.5 = 485494.01$ EGP/Year.

2- Sensitivity Analysis for the Yogurt Project in the Case of a 2% Annual Decrease in Inflows

The results of the sensitivity analysis for the yogurt project reveal the extent of the project's sensitivity to a 2% decrease in revenue (cash inflows) with constant outflows, as shown in Table (11). A 2% decrease in revenue (inflows) with constant outflows led to a decline in the net present value from EGP 602,316.3715 per year to EGP 543,541.1 per year. It also caused the profitability index to fall from 1.26% to 1.23%, meaning that the profit per invested pound decreased from 26 piasters to 23 piasters, a reduction of 3 piasters for every 2% decrease in revenue.

Based on the above results, it is clear that the

project has low sensitivity to any decrease in revenue, indicating that the project is economically feasible at present. However, its sensitivity to any future changes would increase (Radwan et al., 2011). Therefore, this project was able to cover the loan and its cost (interest). Consequently, in light of these results, financing this project can be considered a successful endeavor by the Social Fund for Development (or the Micro, Small and Medium Enterprise Development Agency - MSMEDA). Hence, we recommend continuing to finance these types of projects according to this criterion (Al-Asraj, 2006; Tu'aima, 2013), (EL-Wakeel & Matar, 2023).

Table (11): Sensitivity Analysis: Present Value of Cash Flows At 10% And 15% Discount Rates (Assuming A 2% Decrease in Inflows and Constant Outflows).

Years	1	2	3	4	5	Total
Total Cash Inflows (EGP)	891984.24	846720	846720	846720	851645.97	4283790.2

Total Cash outflows (EGP)	732836.4	685724.64	684800.88	683877.12	682953.36	3470192.4
Net Cash flow	159147.8	160995.4	161919.1	162842.9	168692.6	813597.81
Discount rate 10%	0.909	0.826	0.751	0.683	0.621	
Present value of cash inflow	810813.7	699390.7	635886.7	578309.8	528872.1	3253273
Present value of cash outflow	666148.3	566408.6	514285.5	467088.1	424114	2638044.4
Net Cash Flow (EGP)	144665.4	132982.2	121601.3	111221.7	104758.1	615228.61
Discount rate 15%	0.869	0.756	0.658	0.572	0.497	
Present value of cash inflow	775134	640120	557142	484324	423268	2879988
Present value of cash outflow	636835	518408	450599	391178	339428	2336447
Net Cash Flow (EGP)	138300	121713	106543	93146.1	83840.2	543541

- The decrease at a 10%, 15% discount rate was calculated as $910,188 \times 0.02 = 18,203.76$ EGP
- The decrease in the first year at a 10% discount rate for inflows was calculated as: $910,188 -$

$$\bullet \text{ IRR} = 10 + (15-10) \times \frac{615228.61}{543541.1 + 615228.61} = \frac{2748598.6}{1035213.7} = 12.66\%$$

$$\bullet \text{ Benefit /Cost Ratio (B/C)} = \frac{2879988.3}{2336447.2} = 1.23\% \text{ Pound}$$

$$\bullet \text{ PI} = \frac{2879988.3}{2336447.2} = 1.23 \text{ Pound}$$

$$\bullet \text{ Net Present Value (N.P.V)} = 2879988.3 - 2336447.2 = 543541.1 \text{ EGP/Year.}$$

Key Problems in Yogurt Production and Manufacturing in Local Dairy Plants in Dakahlia Governorate:

1. Low quantities of milk supplied to the plants, indicating that the yogurt-producing plants are not operating at full capacity (Mansoura Chamber of Commerce, 2022).
2. The problem of high milk prices and the rapid spoilage of milk, especially during the summer season (Mansoura Chamber of Commerce, 2022).
3. Lack of trained labor, and high prices of packaging, equipment, machinery, and starter culture (Micro, Small and Medium Enterprise Development Agency - MSMEDA, 2022).
4. Mixing cow's milk with buffalo's milk.
5. Lack of cleanliness of the raw material.

Key Proposals to Overcome Production Problems in Local Yogurt Manufacturing Plants in Dakahlia Governorate:

1. Developing small-scale yogurt manufacturing units and equipping them with machinery and equipment (Kumar et al., 2022).
2. Tightening health control/ supervision.
3. Educating both the producer and the consumer about the importance of health control, hygiene, and producing a high-quality product that ensures health safety and security (Abdo et al., 2011).

$$18,203.76 = 891,984.24 \text{ EGP.}$$

Source: Collected And Calculated from Tables 6, 7, And 8.

By studying Table No. (11), it becomes clear to us that:

4. Establishing milk collection centers in villages and districts, equipped with coolers and refrigerators (Micro, Small and Medium Enterprise Development Agency - MSMEDA, 2022).
5. Training youth in manufacturing (Nicholson & Stephenson, 2007).

Key Marketing Problems of Yogurt in the Study Sample in Dakahlia Governorate:

1. Distance of distribution points, leading to high transportation costs (Dairy, 2022).
2. Lack of adequate storage facilities for both milk and yogurt due to their short shelf life and rapid spoilage (MPO, 2016).
3. Low distribution rate and selling price due to rumors.
4. Daily returns of yogurt containers.

Key Proposals to Overcome Yogurt Marketing Problems in the Study Sample:

1. Searching for new markets to distribute a larger quantity of the product.
2. Providing distribution outlets.
3. Establishing plants near production and consumption areas.
4. Providing fast transportation means equipped with coolers and refrigerators.
5. Placing the product in a visible location for the consumer and ensuring health safety.

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