General Department of
Economic and Financial Affairs of Khuzestan

Preparation and Compilation of Investment Opportunities in The Province

Investment opportunity studies report

«Citric Acid Production Plan»

(Attachment Number 1)

v-2

Date: 2023/03/18

In the name of God

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1) Location of the project

1-1- Province

Khuzestan province is located in the southwest of Iran (in 47° 42′ to 50° 39′ east of the Greenwich meridian and 29° 58′ to 32° 58′ north of the equator). The area of Khuzestan province is 63,238square kilometers. With a population of 4,994 thousand people in 1400SH, it is the fifth most populous province in Iran (after Tehran, Khorasan Razavi, Isfahan and Fars provinces). **Ahvaz** is the capital of Khuzestan province and is located in the 880km of Tehran. This province is bordered by ILAM province from the northwest, Lorestan province from the north, CHAHARMAHAL and BAKHTIARI, KOHGILUYEH and BOYERAHMAD provinces from the northeast and east, the Persian Gulf (330km long) from the south and Iraq (330km long) from the west. The location of Khuzestan is in the west of Zagros mountains. Due to the vastness of its plains, the border with Iraq and the Persian Gulf, and the distance from other provincial centers have placed this province in a strategic position.

Figure (1): The Province Location In Iran


Figure (2): SHADGAN Location in Khuzestan Province

Figure (3): Political Divisions of Khuzestan Province

1-2- County

According to the latest national divisions of the Ministry of Interior in 1401SH, Khuzestan province contains 29counties, 70 districts, 145villages, 90cities and 3special governorates. The latest political divisions of the province are described in Figure (3). **SHADGAN** city is one of the cities of Khuzestan province, centered in SHADGAN city, which is located 70 kilometers away from Ahvaz. SHADGAN city has three parts "Central", "DARKHOIN" and "KHANAFRA" and three cities "DARKHOIN", "KHANAFRA" and "SHADGAN", and eight villages.

With a population of over 140,000 people, SHADGAN has about 3% of the province's population. SHADGAN city is located in the south of Khuzestan province. This city is bounded by Ahvaz city from the north, Bandar MAHSHAHR city from the east, Khorramshahr city from the west and Abadan city from the south.

SHADGAN is located at a height of 5 meters above sea level. It also has a hot and humid climate, which has caused the spread of tropical products in this area. Wheat, barley, dates, summer vegetables and rice are the most important agricultural products of the region, and most of the country's date products are supplied from this region. Animal husbandry is also popular in this city and all kinds of dairy products and animal products such as dairy products, wool and leather are among the animal products of this city.

SHADGAN city is located in one of the oil-rich regions of Iran, where about five percent of Iran's total oil production is extracted from the oil fields of this region. Private and government industries are expanding in SHADGAN. SHADGAN Steel Industry is a subsidiary of Khuzestan Steel Company. DARKHOVIN nuclear power plant is one of the power plants located in DARKHOIN, SHADGAN. SHADGAN port is the seventh commercial port of Khuzestan province. It is worth noting; Historical attractions have added to the importance of this city along with natural attractions such as SHADGAN International Wetland[1].

1 -Among the places of pilgrimage and recreation in SHADGAN city, we refer to DARKHOIN Camp, DOLAT Park, MELLAT Park, SEYED Mahmoud MOUSAVINIA Park, JAZIRI Park, SHAGHAIG Park, Khor DOREQ Wharf, SHADGAN Port Wharf (ABUKHADIR), SARAKHIEH Village (known as the Venice of Iran). becomes There is also the shrine of HAZRAT Abbas in this city. Among the ancient monuments and famous people of SHADGAN, we can mention the QATRANI area, Medina village, Ibn SEKIT al-DORQ, Mullah FAZIL SEKRANI, SHEIKH HASHIM Al-KAABI AL-DORQI, Ali IBN MAHZIAR AHWAZI (DORQI), Dr. HOSSEIN ASAKARE, a scientist of geography, etc.

2) Project Status

It is suggested; This project will be implemented in the DARKHOIN industrial area according to the following specifications and in an area of about 22,000 square meters. Acquiring industrial land in this place requires approval from ministry of industry, mining and trade, industrial estates company and environment protection agency. The reason for this choice is the establishment of factories producing sugar (and molasses) in this city and surrounding cities.

It is worth noting; There are 9 sugar cane factories and 2 sugar beet factories in Khuzestan province. The distance from this town to the three big sugarcane factories of MIRZAKOCHEK Khan, FARABI, and DABAL KHAZAI is about 70 kilometers.

Figure (4): The Province location in Iran

Figure (5): The Province location in Iran

2-1- Access to infrastructures

Currently water, gas and electricity infrastructures are available in this estate. It is also well-located in terms of access to transportation The distance of the chosen place to Ahvaz-Abadan Road is 4 km and its distance to Imam Khomeini Port is 77 km. Abadan airport is also located 55 km away from the place.

Various industries consuming citric acid are scattered in most parts of the country and Khuzestan province. The definition of this unit in the DARKHOIN industrial area does not mean that the project does not have access to consumer markets.

Table (1): access to infrastructures

No.	Required Infrastructure	Distance From Project Status	Location Of Infrastructure Provision
1	Water	0.2	DARKHOIN industrial area
2	Electricity	0.2	DARKHOIN industrial area
3	Gas	0.2	DARKHOIN industrial area
4	Telecommunication	0.2	DARKHOIN industrial area
5	Main road	4	Ahvaz-Abadan highway
6	Side road	0.8	DARKHOIN-SHADGAN road
7	Airport	55	Abadan airport
8	Port	77	MAHSHAHR, Imam Khomeini
9	Railway Station	75	Ahvaz Railway

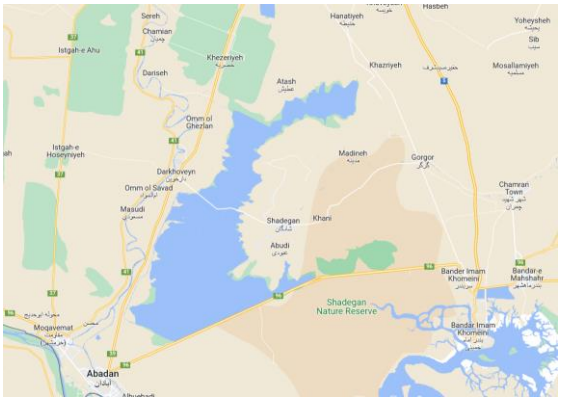


Figure (6): access routes the project

However, sugar beet and sugar cane (as raw materials for the production of sugar and sugar beet molasses) is one of the strategic products of Khuzestan province.

According to the selected method, citric acid production can contribute to the investment priorities of the province and the supply chain and develop the final and former products of the industrial and

agricultural sectors of the province. It is not bad to mention; Currently, 9 sugar factories are active in Khuzestan province. These factories produce 246 thousand tons of molasses.

Khuzestan province (with an annual production of 600 thousand tons and 11% of the country's total production) ranks fourth in the country in terms of sugar beet production. Also, Khuzestan province is the largest producer of sugarcane in the country with the production of 7.4 million tons of sugarcane per year.

3) Technical specifications of the project

3-1- Product

Citric acid (Lemon essence- abbreviated as HAC) is a weak, colorless organic acid with the chemical formula $C_6H_8O_7$ that occurs naturally in citrus fruits.[2] Citric acid is found in many foods such as fruits and vegetables. Citric acid is a type of carboxylic acid that is considered one of the most important organic acids. This organic acid has a special sour taste and because of its acidity, it can prevent the growth of bacteria. For this reason, it is used as a preservative, food acidity regulator and an antimicrobial agent in the food industry.

Citric acid is a chemical, bactericide, fungicide, anticoagulant, agricultural chemical, and hematopoietic agent. Citric acid is produced in two industrial and edible grades. This acid is used in various industries. The acid can be produced into two types: dry citric acid (anhydrous citric acid) and aqueous citric acid (citric acid monohydrate). It can be said; The most widely used acid in the food industry is citric acid. Edible citric acid is a water-soluble substance that is usually used as a food additive and as a natural flavoring and preservative for food and beverages, as well as for canning in order to lower the PH. In addition, edible acid can also improve the appearance of food. Ascorbic acid, also known as vitamin C, is also found in citric acid and is often used to preserve soft drinks and meat.

Citric acid can also be used to stabilize or preserve medicines and as a disinfectant against viruses and bacteria. This substance has many benefits for the brain and body due to its antimicrobial and anti-inflammatory properties.

This substance helps the growth and health of bones by increasing the absorption of nutrients such as calcium; Also, due to its effective properties, this substance is used in canned foods, even sports supplements, all kinds of sauces and some drinks. Citric acid in agriculture (regulating soil acidity), pharmaceutical industries, cosmetics production industries, prevention of sediment accumulation in steam boilers, paint industries, plating operations, copper plating, leather tanning, in printing inks, textiles, detergent compounds and etc. is used.

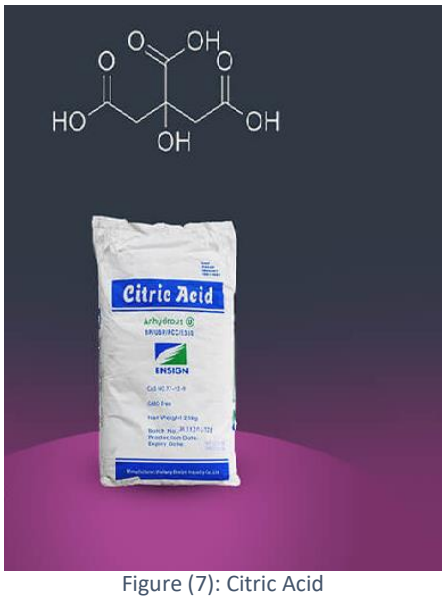


Figure (7): Citric Acid

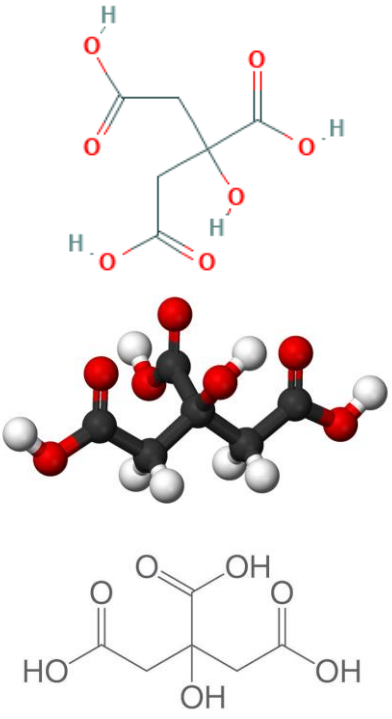


Figure (8): Structural Formula of Citric Acid

2- The discovery of citric acid is attributed to Jaber bin HAYYAN, but for the first time in 1784, a Swedish researcher produced citric acid from lemon juice. After that, researchers found that it can also be prepared from Aspergillus NIGER.

3-2- Project Requirement

3-2-1- Land And Required Infrastructure

To produce Citric acid, a land with an area of 22,000 square meters and construction infrastructure for production (industrial shed and other buildings) amounting to 10,960 square meters is required. The specifications of the land, main buildings and other required side buildings along with the amount of investment are described in the table below.

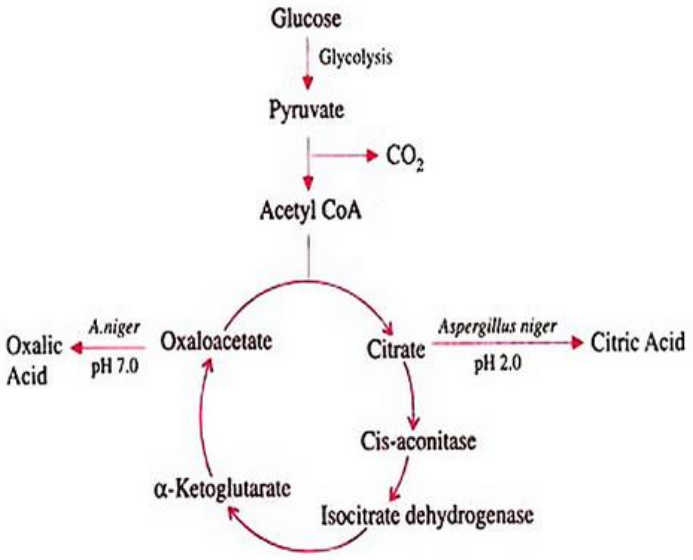
Table (2): Amount of investment in land, landscaping and building

No.	Requirements	Description	Investment Required		Total Cost (Million Rials)
			Required Area m^2	Unit Price (Rial)	
1	Land purchase 210m * 105 m	Khuzestan- SHADGAN city, DARKHOIN industrial area	22,000	2,000,000	44,000
2	Site preparation and development	According to relative calculations	10,800	3,138,889	33,900
3	Civil works, structures and buildings	Production building	5,400	65,000,000	351,000
		Office and management building	1,000	100,000,000	100,000
		Labor and support building (restaurant, dressing room, prayer room, shower and restroom)	500	60,000,000	30,000
		Water, electricity and gas facilities building	200	100,000,000	20,000
		guard and janitor building	60	70,000,000	4,200
		Concrete structures of water treatment plant and compost production	2,000	46,400,000	92,800
		Other buildings (warehouse, etc.)	1,800	5,000,000	9,000
Total			-	-	684,900

3-2-2- Plant Machinery and Equipment

There are several methods for producing citric acid. In this method, a selection of raw materials such as raw and white sugar, sugar cane, all kinds of sugar cane and beet molasses[3] and molasses from raw sugar conversion factories, juice/waste of dates, grapes, etc. (in the absence of oxygen and using anaerobic bacteria (called Acetobacter, Clostridium or Acetogenic and Aspergillus Niger, citric acid is produced. In the present project, membrane-based technology (including microfiltration, ultrafiltration, and nanofiltration) is used to separate citric acid.

$C_6H_{12}O_6 \rightarrow 3\ CH_3COOH$



Citric acid can be packed in 25 kg bags after drying by spray dryer. The supplies and equipment used in the production of citric acid are as follows:

According to the mentioned process, required equipment and machinery are as follows:

3- Molasses is one of the by-products of sugar and sugar factories, which is obtained during sugar extraction, from sugar beet and sugar cane or sugar conversion, and is in the form of a thick, brown and viscous syrup containing sweeteners, various minerals including calcium, Magnesium, iron, manganese and vitamins.

Table (3): Plant Machinery and Equipment

No.	Equipment/Machinery	Required investment			Total cost (Million Rials)
		Amount	Unit Price	Currency	
1	heat exchanger	3	500,000	Euro	677,297
2	FERMENTOR (560 ton all steel fermentation tanks)	12	70,000	Euro	379,286
3	Distillery Tower	3	80,000	Euro	108,367
4	spray dryer	3	800,000	Euro	1,083,674
5	Bagging and packing machine for powdered products	3	35,000	(Million Rials)	105,000
6	All-steel storage tanks for fermented raw materials (50,000 liters)	30	10,000	(Million Rials)	296,000
7	All-steel storage tanks for concentrated raw materials (30,000 liters)	15	800	(Million Rials)	11,840
8	Tanks' Metal Structure	300,000	0.6	(Million Rials)	180,000
9	Cool Air Mixer and Condenser	3	25,000	(Million Rials)	75,000
10	All steel pipes and fittings	3	80,000	(Million Rials)	240,000
11	Electric pump, panel and related equipment	45	1,000	(Million Rials)	45,000
12	Vinas and compost processing and recycling system Wastewater	1	80,000	(Million Rials)	80,000
13	Treatment Plant Other main equipment	1	120,000	(Million Rials)	120,000
14	Other main equipment	1	68,536	(Million Rials)	68,536
Total		-	-	-	3,470,000

This industrial unit does not need complex equipment. Most of the factory equipment such as material storage tanks, condensers, boilers and steel reactors are produced by several factories inside Iran. Considering the relative cheapness of the raw materials for the construction of these equipment's and also the cheapness of the labor force, the finished price of these equipment's is much more economical in comparison with foreign manufacturers.

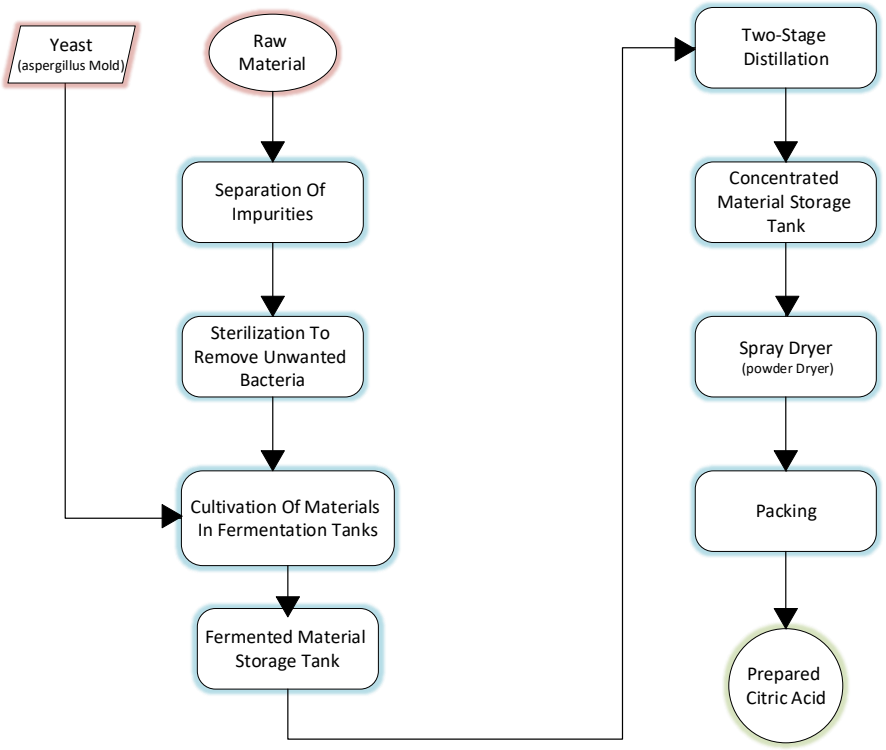


Figure (9): Citric Acid Production Steps

In the production process, molasses is diluted to 25% Brix and yeast is added to it at a temperature of 20 to 25 degrees Celsius, and after the fermentation and distillation stage, citric acid is obtained. The production process of citric acid starts with fermentation. The next steps include biomass separation, which is done by rotary filter and ultrafiltration. After purification, the dilute solution of citric acid passes through activated carbon columns and ion exchangers to remove dyes and other impurities from pure citric acid crystals. After evaporation of water, the solution goes to the crystallization stage. After this stage, the mother liquid is separated from the suspension system with a rotating vacuum filter. The separated crystals are transferred to the moistened bed to be air-dried.

Table (4): Auxiliary and service plant Equipment

No.	Equipment/Machinery	Unit of measurement	Type of equipment	Required investment		Total cost (Million Rials)
				Amount	Unit Price (Million Rials)	
1	Distribution Of Electricity / Demand Price	Kw	Facility	1,000	6	6,000
2	Several Electrical Cables	M	Facility	1,500	4.0	6,000
3	Electrical Equipment of The Greenhouse Lighting System	Amount	Facility	80	40	3,200
4	The Cost of Panel Boards and Related Electrical Equipment	Amount	Facility	24	320	7,680
5	Water Branch	-	Facility	1	2,000	2,000
6	Other Water Conveyance Equipment	Amount	Facility	1	2,000	2,000
7	Firefighting, Safety and Health Equipment, etc.	Capsule	Facility	10	30	300
8	Gas Piping	M	Facility	1,000	5	5,000
9	Gas Branching	-	Facility	1	2,000	2,000
10	Water Heater and Heater	Machine	Facility	3	350	1,050
11	Ventilation Systems for Toilets and Bathrooms	Fan	Facility	5	36	180
12	Air Conditioner	Set	Facility	5	850	4,250
13	Evaporative Cooler	Set	Facility	6	250	1,500
14	Gas Heater	Ton	Facility	8	100	800
15	Industrial Heater	Machine	Facility	5	150	750
16	2.5 Ton Pallet Jack with Scale	Machine	Vehicle	3	360	1,080
17	3 Ton Forklift	Machine	Vehicle	2	16,000	32,000
18	ZAMYAD Diesel Van	Machine	Vehicle	1	6,000	6,000
19	SAMAND Soren Car	Machine	Vehicle	2	7,000	14,000
20	Workshop and laboratory tools	Machine	Workshop and laboratory tools	1	4,000	4,000
21	CCTV System	Set	Facility	1	5,000	5,000
22	Office Stuff	Set	Office Equipment	24	1,800	43,200
23	Restaurant Equipment	Set	Office Equipment	45	30	1,350
24	Medical Equipment	Set	Office Equipment	1	2,000	2,000
25	Other Facilities	-	Facility	1	1,660	1,660
Total				-	-	153,000

3-2-3- Raw Materials and Intermediate Parts

Raw material of the composition and production formulation in this project includes light and heavy naphtha and hydrogen, which will be supplied from local market (Abadan Oil Refining Company in Khuzestan province). Light and heavy naphtha traded in Iran's energy exchange, so that transaction price is determined there. The specifications of raw materials and packaging for the production of Citric Acid are described in the following table.

Table (5): Costs of Raw Material for Production

No.	Title	Production quantity at maximum capacity	Unit	Average price (Rials)	Purchase unit	Consumption per product unit	Amount of consumption in nominal capacity	The cost at the maximum nominal capacity (Million Rials)
1	Sugar beet molasses	10,000	ton	50,000,000	ton	3	25,000	750,000
2	Date waste	10,000	ton	40,000,000	ton	5	50,000	2,000,000
3	sugarcane molasses	10,000	Ton	51,000,000	Ton	3	30,303	939,394
4	yeast (aspergillus mold)	30,000	ton	2,000,000	ton	0.020	600	1,200
5	Other materials needed for cultivation	30,000	ton	150,000,000	ton	0.001	30	4,500
6	Packaging materials (25 kg bag)	30,000	ton	66,667	amount	40	400,000	80,000
Total		-	-	-	-	-	1,320,933	4,881,155

3-2-4- Management and human resource

For citric acid production, 90 human resources will be required in the production, management and support department as described in table (6).

Table (6): Management and Human Resource

No	Level of skill	Number of staff	Average basic salary
1	Senior	30	216,000,000
2	Mid-level	9	120,000,000
3	Junior	51	103,333,333

Number Of Direct Mid-Level Staff Required	9	Person
Number Of Direct Junior Staff Required	51	Person
Number Of Direct Senior Staff Required	30	Person
Total	90	person

4) Ownership and legal permissions

4-1- land ownership

The suitable location for this project is DARKHOIN industrial area. The legal right for exploiting the land is 2,000,000 Rials. This estate is subject to the rules and regulations of Less developed industrial towns. Having legal permits which are mentioned in 3.4 section are required to obtain a land in this estate. If the construction phase in this estate gets rejected, it should be established in Imam Port Economic Special Zone.

4-2- Intellectual Property and Concessions

In order to use citric acid, relatively high technical knowledge is not required. Technical knowledge is considered to exist in the country. The production must be in accordance with the international standard (BRITISH PHARMACOPOEIA) BP2016 and E330 (European Union) as well as the national standard 3381.

4-3- Legal permissions

In order to produce this product, we need legal permits such as (establishment permit and operating permit) from the Khuzestan Province Industry and Mining Organization, and environmental permit. It is worth noting; The material transfer processes are suitable in steel pipes and tanks and the production of citric acid is in a condition where there is no leakage and release of materials to the outside. Therefore, the production of this product in the mentioned industrial town will not cause serious problems for the environment and it is possible to obtain environmental permits.

5) market research and competition

5-1- Target market introduction

Citric acid has many applications in various industries, therefore the demand for this organic acid increases every day compared to its production. Every year, more than 2 million tons of citric acid are produced in the world, and the food industry accounts for the largest share of the consumption of this very useful acid. The consumption of citric acid varies in different industries: in the food industry more than 70% (almost more than 50% of citric acid produced to adjust the acidity of drinks, 20% for other food applications), pharmaceutical 12%, chemical 11%, leather 4%, Cosmetics 2% and other industries 1%.

According to official statistics, 2 active units in the field of citric acid production with ISIC code 2411512792 have been reported as described in the table below.

Table (7): Active Units Producing citric acid

province	Title of unit	Year	Nominal capacity (ton)
Khorasan Razavi	KESHT o SANAT JOIN	1400	40,000
Kermanshah	KIMIA VARZAN MEHR GHARB	1395	12,000
Total			52,000

KESHT o SANAT JOIN Company in Razavi Khorasan province is the largest producer of citric acid in Iran with a nominal capacity of 40 thousand tons per year[4].

According to field information, currently the mentioned factories are not fully operated. One of the reasons for this is the lack of access to raw materials.

Table (8): Industrial plans with physical progress

province	Title of unit	Year	Physical progress	Nominal capacity (ton)
Alborz (Laboratory production)	Arman Sina	1394	99.46	2

Also, there is a unit with a plan in the field of citric acid production in Alborz province with a physical progress of over 90%.

The customs tariff code of Citric acid is 29181400. According to customs administration statistics, the import volume has decreased and is around 12 thousand tons in 1399 SH, as shown in the table below.

Table (9): Iran Imports

Year	1390	1391	1392	1393	1394	1395	1396	1397	1399
Imports volume(ton)	16,181	17,507	20,184	1,979	20,522	15,871	16,122	13,879	12,514
Value (million Rials)	151,795	276,609	557,364	63,772	461,331	356,435	466,496	457,252	376,728
Value (1000 USD)	13,980	17,797	22,347	2,426	15,612	11,310	13,768	10,963	8,970

Source: Customs of the Islamic Republic of Iran * The statistics of 1399 have not been published for some reasons.

According to customs statistics, the country's export is very small and, in some years, it is zero.

Table (10): Iran Exports

Year	1390	1391	1392	1393	1394	1395	1396	1397	1399
Export volume(ton)	0	0	1	0	3	26	154	31	89
Value (million Rials)	0	0	24	0	140	973	5,154	3,526	16,649
Value (1000 USD)	0	0	1	0	5	30	156	45	73

Source: Customs of the Islamic Republic of Iran * The statistics of 1399 have not been published for some reasons.

Market summary: In 2016, the size of the world citric acid market was 2.50 billion dollars; Also, in 2018, the amount of citric acid produced in the world was about two million tons, of which more than 50% was produced by China. Citric acid is widely used in dyeing, food, oil extraction, water treatment, printing, textile, chemical, emulsifier, photography, plastic and many other industries; Therefore, it is necessary to set up more citric acid production units. Available statistics show that currently an important part of the country's needs (in some years more than 20 thousand tons per year) is supplied through imports. An important part of the goods in the country is also replaced by other similar goods due to its absence.

Therefore, with the construction of this factory, there is sufficient domestic demand for the manufactured product. Especially since export markets for this valuable product are available in other countries of the world (especially neighboring countries).

■ No ☐ Yes _____

4 - The official statements of the officials of this company indicate that this factory has been operating at a capacity of less than 20 thousand tons due to the lack of proper amount of feed in the last few years.

6) Physical progress of the project

This plan is a new project and has been defined to cover the needs of Khuzestan province and the country, and the stages of its construction phase have not made physical progress.

7) Operational plan and implementation scheduling

The time between implementation and utilization is estimated to be 30 months. Project utilization is expected in the middle of 1405 SH. The project scheduling is described in Table (11).

Table (11): Project Scheduling

year	1401	1402				1403				1404				1405	
Operations/Season	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2
Prior to investment studies															
Fundraising and starting															
Obtain legal permissions															
Providing engineering services															
Land purchase and preparation															
Selecting contractor															
Equipping site															
Construction and landscaping															
Order, purchase and transportation of machinery															
Machinery installation															
Facilities															
Hiring and onboarding of staff															
Pilot utilization															
Unexpected delays															
production phase															

8) Financial Plan

8-1- Cost Estimation

Generally, there are two ways to fundraise for this project, fixed capital and initial working capital. The required investment before utilization is provided through fixed capital. Initial working capital will be used during utilization. Fixed capital includes, purchasing land, construction and landscaping, machinery and equipment, facilities, office stuff and pre-production costs. These types of costs are incurred at the beginning and before operation and are consumed during the life of the project according to their service life. Working capital includes the capital required during the operation of the project. The working capital of a production unit is the set of facilities, inventories and work in progress, as well as the liquidity required for the exploitation of fixed capital in order to maintain the operation.

Determining the basic amount for inventories, work in progress and claims depends on the supply, production and sales capacity and business environment. In this section, the evaluation and estimation of the required investment (based on the price of the base year 1402 SH) is proposed.

Table (12): Cost Estimations

No.	Subject	Amount (Million Rials)
1	Total Fixed Investment Costs	4,640,700
2	Total Net Working Capital Requirements	575,195
3	Total Production Costs (Annual)	6,030,578
4	Depreciation	453,060
5	Total Investment	5,215,895

Table (13): Fixed Capital Estimations (Capital Costs)

No.	Subject		Cost (Million Rials)
1	Purchasing land		44,000
2	Landscaping and land improvement		33,900
3	Civil operations and construction of buildings		607,000
4	Production machinery and equipment		3,470,000
5	Service equipment		153,000
6	Protection and environmental equipment		0
7	Overhead costs		0
8	Pre-Production Expenditure (As described in Table (15)	Prior to investment studies	6,780
		Project management	100,590
		Obtaining technology	10,030
9	Unexpected costs		215,400
Total			4,640,700

The primary items included in working capital are:

- Raw materials (local and foreign): To prevent any interruptions in production process, production capacity, source and method of supplying materials, length of time during ordering and receiving materials, time of delivery and transportation, the amount of required raw materials, auxiliary materials and packaging are determined as one of the working capital items for one period. In this project, the material inventory coverage period is equal to 30.
- Finished product and work in progress: Considering the steps and methods of production, the required time for production and storage has been determined and the related costs are considered as working capital. In this plan, the coverage period for finished product and work in progress are 3 and 5 days, respectively. With this in mind, the total stock in hand is equal to 38 days.
- Claims of expected funds from sold products that are collected in a short period of time. The duration for expected funds must be determined. According to the economic condition of Iran, cash is preferred.
- Revolving fund to finance the company's current expenses is considered as cash balance or revolving fund for a period of time in working capital based on production costs (without considering the cost of raw material production and depreciation). 30 days is considered in this plan.

-

Table (14): Total Net Working Capital Requirements (Production Costs)

No.	Subject	Amount (Million Rials)
1	Raw Materials Inventory	406,763
2	Work In Progress	44,137
3	Finished Product	77,664
4	Accounts Receivable	0
5	Cash-In-Hand	46,632
6	(Commercial Accounts Payable)	0
Total Net Working Capital Requirements		575,195

Table (15): Pre-Production Expenditure

No.	Subject		Description	Total (million Rials)
1	Incorporation		-	50
2	Obtaining Licenses / Production License		-	800
3	Studying, Consulting, Research and Development, Traveling, Visiting and Participating in Local Exhibitions, etc.		1.5 thousandth of the investment costs of the project	6,780
4	Property Insurance		2 thousandth of depreciable fixed assets	9,050
5	Survey Fee, Financing, Contract and So On		Survey fee 0.5 thousandth, other 2.5 thousandth	10,860
6	Cartography, Supervising		2 thousandth of contract expenses	8,220
7	Other's	Staff Training	Equivalent to 3 days of Staff salary	1,810
		Wages And Salaries During the Construction	Equivalent to the salary of 13 personnel in 30 months	77,441
		Other Expenses	٪2.10	2,389
Total				117,400

8-2- Sales Revenue

Currently, the citric acid market does not have an organized market and the market needs are provided by two active production companies and several importing companies. The selling price based on the latest field information of market participants is equivalent to 270,000 Rials per kilogram. Based on this (according to the production plan), the total sales amount of the project in 1405 at the fixed prices of 1401 is estimated to be equal to 4,700 billion Rials. This figure will increase in the following years due to the increase in production capacity and will increase to a maximum of 9,400 billion Rials.

Table (16): Project Revenue in The First 5 Years of Production Phase (Billion Rials)

No.	Subject	Q_1	Q_2	Q_3	Q_4	Total 1st Year	Total 2nd Year	Total 3rd Year	Total 4Th Year	Total 5th Year
1	Citric acid	1,013	1,013	1,013	1,013	4,050	5,670	6,480	7,290	8,100
2	Vinas/compost by-products	163	163	163	163	650	910	1,040	1,170	1,300
Total		1,175	1,175	1,175	1,175	4,700	6,580	7,520	8,460	9,400

8-3- Length of Production Phase

The construction period of the plan is equal to 30 months and it is considered to start from the beginning of 1405. The duration of the project is considered to be 7 years.

Table (17): Planning Horizon

Title	Month	-	year
Project identification	11	/	1401
Beginning of construction phase	7	/	1402
Beginning of production phase	1	/	1405
End of production phase	12	/	1411

Length of construction phase (months)	Start of phase (months)	Length of production phase (years)
30	12	7

8-4- Break-Even Analysis

From an economic point of view, break-even point analysis is an important technique that is used to study the relationship between costs, income and profit. The break-even point is the point at which total cost

and total revenue are equal. In other words, it is used to analyze the effect of product volume change on the profit. The break-even point is calculated for 100% of practical capacity (year 1408SH onwards) below.

$$\text{Break-even sales value (Rials)} = \frac{\text{Total Fixed Costs}}{1 - \frac{\text{Total Variable Costs}}{\text{Sales Value}}}$$

$$\text{The number of sales at the break-even point} = \frac{F_C}{S - V_C}$$

FC = Total Costs VC= Average Variable Costs Q = Quantity of Sales S = Unit Price

$$\text{Break-even sales value} = \frac{693{,}302}{1 - \frac{5{,}328{,}993}{9{,}400{,}000}} = 1{,}600{,}843 \text{ (Million Rials)}$$

$$\text{The number of sales at the break-even point} = \frac{693{,}302{,}400{,}000}{163{,}763{,}066 - 92{,}839{,}601} \approx 9{,}775 \text{ Ton}$$

$$\text{Break-even ratio (\%)} = \frac{1{,}600{,}843}{9{,}400{,}000} = 17.0\%$$

Table (18): Project break-even point estimation (Million Rials)

Title	Production 1405	Production 1406	Production 1407	Production 1408	Production 1409	Production 1410	Production 1411
Sales revenue	4,700,000	6,580,000	7,520,000	8,460,000	9,400,000	9,400,000	9,400,000
Variable costs	2,726,970	3,767,779	4,288,184	4,808,588	5,328,993	5,328,993	5,328,993
Variable margin	1,973,030	2,812,221	3,231,816	3,651,412	4,071,007	4,071,007	4,071,007
Variable margin ratio (%)	42	43	43	43	43	43	43
Fixed costs	638,500	667,591	682,136	691,374	693,302	688,647	688,647
Break-even sales value	1,520,986	1,562,022	1,587,239	1,601,853	1,600,843	1,590,094	1,590,094
Break-even ratio (%)	32.4	23.7	21.1	18.9	17.0	16.9	16.9

- According to COMFAR Results

Based on the calculations of COMFAR software, the break-even point including operating and non-operating costs, is 1,600 billion Rials and it will be achieved in the 17 % of the practical capacity.

In the mentioned formula, the break-even point is determined by the relationship between fixed costs and the difference between unit sales price and unit variable costs. Therefore, three practical results are obtained from it:

- The higher the fixed costs, the higher the break-even point.
- The greater the difference between unit sales price and variable operating costs, the lower the break-even point. In this case, fixed costs are absorbed faster through the difference between unit sales price and unit variable costs.
- One of the break-even points is disproportionate. Since it makes the company vulnerable to changes in production (sales) levels.

8-5- Cost-Benefit Analysis

In project analysis, one of the most common methods is the **Benefit-Cost Ratio**. In this method, the ratio of the current value of possible benefits to the current value of costs is obtained. If this ratio is greater than one, the plan has economic justification for implementation. In terms of this index, the plan has favorable conditions.

Net Present Value is one of the other evaluation methods which is calculated according to the following relationship:

NPV= The Present Value of The Total Cost of The Period of Construction Phase and Production Phase - The Present Value of The Total Income of Construction Phase and Production Phase

NPV= The Present Value of The Fixed Assets Depreciation + Initial Investment - The Present Value of The Future Cash Flows

The **net current value** of the project at a discount rate of 30% is over 1,035 billion Rials, which shows that the project is economically feasible.

One of the other methods of evaluating investment plans **internal rate of return**. In fact, the internal rate of return is the interest rate or the discount rate in which the current value of all the plan benefits is equal to the current value of its expenses.

According to the calculations, the internal rate of return of the project is estimated at 38.7 % and compared to the Minimum Attractive Rate of Return, it is favorable.

Table (19): Project Return Index

Index	Amount	Unit of measurement
The Present Value of The Total Cost of The Period of Construction Phase and Production Phase	10,913,573	Million Rials
The Present Value of The Total Income of Construction Phase and Production Phase	11,949,068	Million Rials
NET PRESENT VALUE (NPV)	1,035,494	Million Rials
Cost-benefit RATIO (B/C)	1.09	-
INTERNAL RATE OF RETURN (IRR)	38.7%	Percent
NPV RATIO (PI)	0.29	Rial per Rial of investment
NORMAL PAYBACK	2.23	Year

Profitability Index (PI) indicates how much economic profit will be obtained for each unit of money invested during the lifetime of the project.

Project Investment payback is the period of time required to recover the project investment from net income, measured in years. In other words, it shows the length of time taken for the initial investment to be returned. This index shows the speed of investment return and the amount of project risk coverage. The ROR (simple) of the plan is estimated to be 2.23 years (equal to the year 1407) according to the calculations.

8-6- Sensitive Analysis

In the sensitivity analysis of the plans, the percentage of changes in the internal rate of return (IRR) is measured in relation to the change in some basic parameters and variables. In this plan, the analysis has been carried out by major variables such as sales, fixed and operating costs. Table (20) shows the results of the sensitivity analysis regarding the variables of sales income, fixed assets and operating costs.

8-6-1- Sales Revenue

Changes in sales revenue are mainly caused by alteration in two variables: planned sales amount and product sales price. The results of the sensitivity analysis regarding sales income show; 20% increase in sales revenue of the plan, the internal rate of return will increase from 38.7 % to 54%. On the contrary, in the case of a 20% decrease in sales revenue, the internal rate of return of the project will decrease to 19%.

Table (20): Sensitivity Analysis (Percentage of IRR changes caused by sales revenue, fixed assets and operating costs alteration)

Variation (%)	Sales revenue	Increase in fixed assets	Operating costs
-20%	19%	46%	48%
-4%	35%	40%	41%
0%	38.7%	38.7%	38.7%
4%	42%	37%	37%
20%	54%	33%	28%

8-6-2- Fixed Assets

The change in the fixed assets is due to the fixed costs of the initial investment alterations. The results of the sensitivity analysis according to the fixed costs of the plan have been done and it shows that in case of an unexpected 20% increase in the fixed capital costs of the project, the internal rate of return will decrease

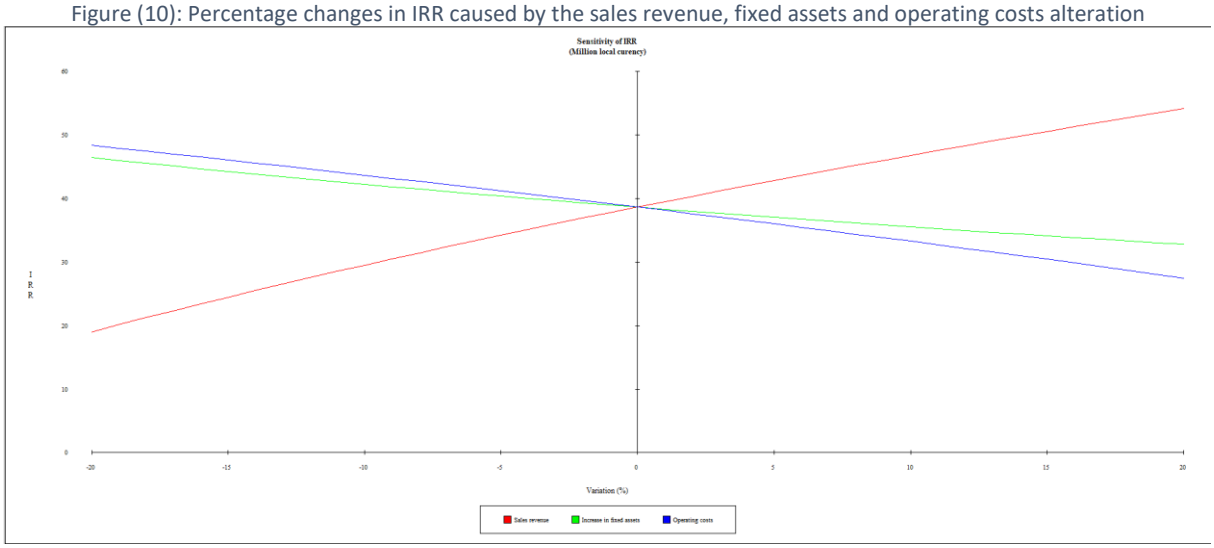
from 38.7 % to 33%. Conversely, if there is a 20% reduction in the fixed capital costs, the internal rate of return will increase and reach 46%.

8-6-3- Operating Costs

The operating costs of the plan is one of the crucial items in terms of sensitivity analysis regarding its changes. Therefore, unexpected and possible changes should be investigated.

The change in project operating costs is mainly caused by changes in raw material, supply, human resource and finally changes in other overhead costs of projects. If these parameters change, it can be as a result of the change in the technical coefficients of product production or the change in their purchase price. The sensitivity analysis indicates that in case of a 20% increase in the operating costs, the efficiency rate of the plan will decrease to 28%. On the contrary, if the total operating costs of the project are reduced by 20%, the internal rate of return will increase to 48%. Finally, the results of the sensitivity analysis show that the current project has a very high sensitivity to changes in sales revenue (changes in sales amount or sales price) and more considerations should be taken in this regard.

Figure (10): Percentage changes in IRR caused by the sales revenue, fixed assets and operating costs alteration



As you can see, the slope of the IRR change curve is higher relative to the changes in sales revenue compared to other items while the slope of the IRR change curve is lower relative to the changes in fixed assets, which indicates the greater sensitivity of the plan's internal rate of return to sales revenue and its lower sensitivity relative to operating costs and fixed assets.

8-7- Conclusion

The implementation of the project is planned by acquiring a land with an area of 22,000 square meters and carrying out construction with an infrastructure amounting to 10,960 square meters. The total investment in land, Civil works, structures and buildings is estimated at 685 billion Rials and in Plant machinery and equipment and auxiliary equipment is estimated at 3,838 billion Rials. The total pre-production expenditures are also estimated at 117 billion Rials. So, the total fixed investment costs (required) are 4,640 billion Rials and the total working capital (required) for the project is 575 billion Rials. The total investment is provided with the company's shareholders.

The project is expected to be sold at fixed prices equal to 4,700 billion Rials in 1405. This number will rise in the following years due to the increase in production capacity and reach a maximum of 9,400 billion Rials. The net profit of the plan will be positive in all years. The profit is estimated to be 1,334 billion in 1405 which will be greater in the following years and reach a maximum of 2,536 billion Rials. The average annual profit of the plan is 2,370 billion Rials and the average profit margin is estimated to be 29.9%. The internal rate of return (IRR) of the project is estimated at 38.7 % and the rate of return is estimated at a maximum of 2.23 years. Also, the net present value of the project's cash flows (NPV) is positive and, considering the expected interest rate of 30%, is equal to 1,035 billion Rials.

The liquidity status of the plan and the payment of dividends to the shareholders from the company's funds are also acceptable. Therefore, if the assumptions and predictions are fulfilled, this plan has favorable profitability and according to the financial results obtained, its implementation is recommended. The economic features of the plan are summarized as follows.

Table (21): Summary of Economic Features

Nominal Capacity and Unit of Measurement	Product Name	Title Of the Project with ISIC Code	Title Of the Project
30,000 ton	Citric Acid	Citric Acid (2411512792)	Citric Acid Production Plan
Required Human Resource (Person)	Equity Shares (Million Rials)	Total Fixed Capital (Million Rials)	Project Duration
90	575,195	4,640,700	30
B/C	Applicant Available Cash (Million Rials)	Net Present Value (NPV) (Million Rials)	IRR (%)
1.1	5,215,895	1,035,494	38.7%
ROI (%)	NPV Ratio / Profitability Index (Rial per Rial invested)	Dynamic Payback Period (Year)	Normal Payback Period (Year)
46	0.29	4.58	2.23
Average Assets Turnover Ratio	Average Net Profit Margin (%)	Average Annual Profit (Million Rials)	Maximum Annual Sales (Million Rials)
0.88	29.9%	2,370,813	9,400,000

8-8- Estimation of currency rate fluctuation during the project implementation

The currency rate at the time of evaluation is included as described in Table (22). In the present plan, it is an important part of the cost of buying foreign equipment and requires foreign currency.

Considering the currency of buying equipment and raw materials, both in the construction phase and in the implementation phase, the following are significant:

- As long as the financing of the project is through foreign currency sources, the number of financial resources required will not change much.
- If the financial resources of fixed and circulating capital are provided through internal sources, the increase in the exchange rate will directly increase the fixed and circulating investment costs and will make it difficult to provide financial resources for the implementation of the plan.

Table (22): Currencies exchange Rate

Unit of Measurement	Unit Price	Currency
Rials	413,204	USD
Rials	451,531	EURO

Exchange rate of Central Bank, Exchange Trading System (ETS) dated 05/25/1402

9) Investment Required, method of fundraising and guarantees

9-1- Foreign Currency Required

The fixed foreign investment is required for the purchase of foreign machinery which is estimated at a total of 4,980,000 euros. It is planned to be paid within two years (30 months according to the completion progress of the project). Other fixed capital costs are in Rials

Table (23): Foreign (Fixed) Currency Required

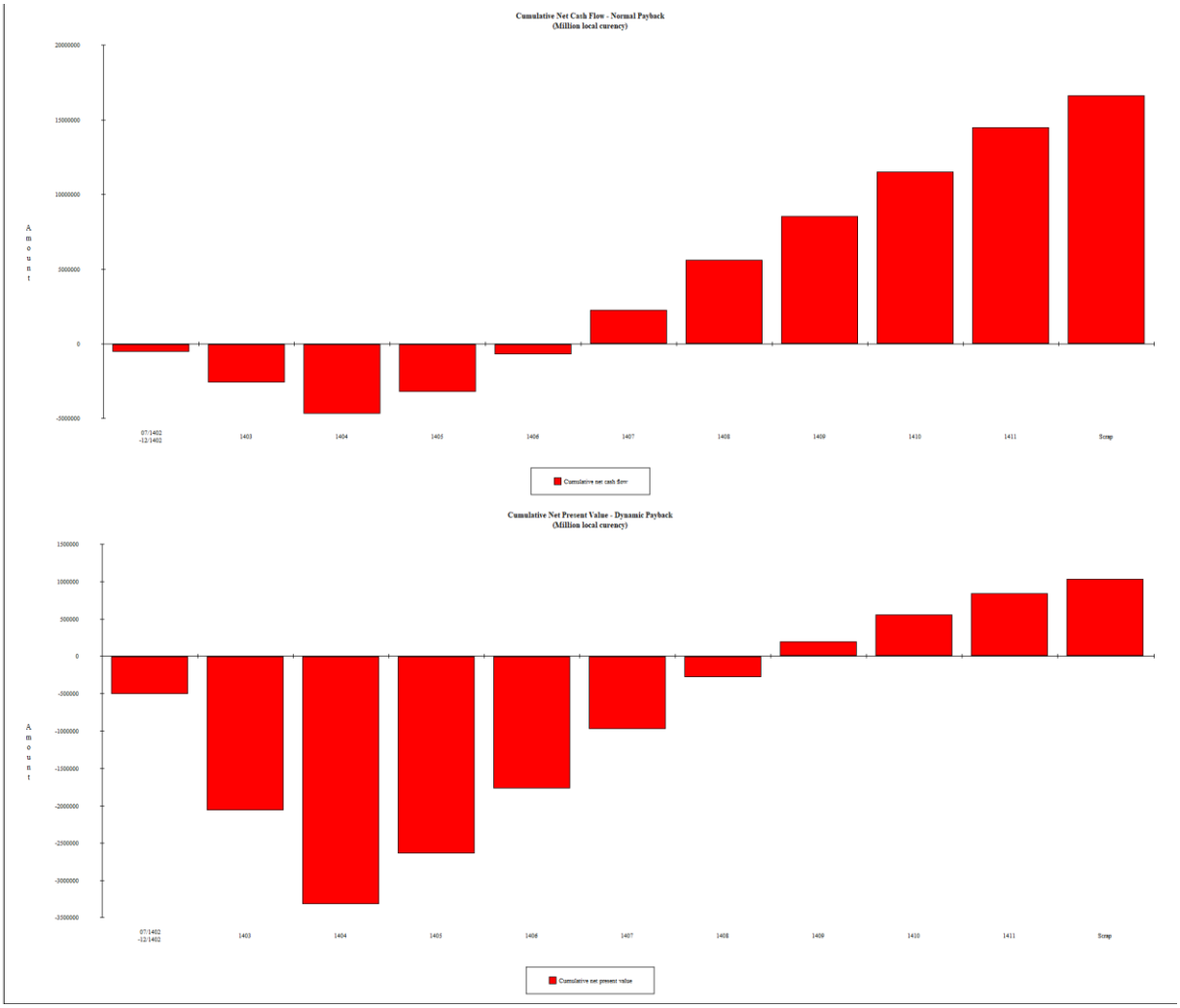
No.	Year	Required Investment
1	Year 1 (1402)	996,000
2	Year 2	1,992,000
3	Year 3	1,992,000
4	Year 4	0
5	Year 5	0

9-2- Model Of Partnership and Fundraising

Participation in the present project and its fundraising process is predicted to be in the form of establishing a company inside Iran. The total required investment is predicted through the investor's contribution. Financing through local banks has not been included in the fundraising process.

9-3- Payback Period

The payback period is the period of time when the initial investment of the plan is compensated from the annual cash funds. The payback period (simple) of the plan is estimated to be 2.23 years (equal to 1407) according to the calculations of CAMFAR.



Dynamic Payback Period of the plan is also estimated at 4.58 years.

10) Incentives, features and benefits of the plan

Some of the financial supports for production companies are loans and bank facilities and tax exemptions which can facilitate the project implementation and provide the favorable condition for investment. In the following, some of these supports will be discussed.

One of the important bank facilities for production units is the long-time repayment period loans up to 70% of fixed capital by the Iran's state banks. This amount can be increased up to 90% for deprived areas if foreign machinery is used. The interest rate of long-term facilities in the industry sector is 23%, which in case of financial prudence, only a part of the interest can be repaid. The repayment period of long-term bank facilities is up to 8 years according to the production plan, the type of technology and the possibility of product exportation.

Another important bank facility is short-term bank loans (6 to 12 months) to use as working capital needed to carry out production processes, which will be provided up to 70% by bank communities. Obtaining short-term facilities to this extent depends on gaining the trust of the operating banks and having an acceptable financial history.

Tax exemption is another incentive for investors to establish factories. To name a few;

- Tax exemption for up to 10 years for implementation in deprived areas
- Tax exemption for up to 4 years for implementation in industrial towns

Investments in the project during implementation is of the investments in developed towns with industrial and mining activities. Since it is located within 30 kilometers of cities with more than 300,000 people, it doesn't have any tax exemption. But if it establishes in another industrial town within a range of more than 30 kilometers from cities with a population of more than 300 thousand people, it can get exempted from Article 132 of the Direct Taxes Law and up to 80% until four years after the date of operation from Article 105 (Direct Taxes Law)5.

So, the effective performance tax rate (annual profit) can be reduced to 4% in the first 4 years, and then it will be considered on the basis of 20%. Obviously; If the project location is in one of the deprived areas, it will be subject to 10 years of 100% exemption.

If the produced Citric Acid (provided that it is in excess of the local market) can be exported to foreign markets, it can be exempted from Article 141 and 100% of the income from exports is exempt from taxes.

Obviously, If the legal personality of the partnership is defined as a public company accepted in the stock exchange market during its operation (in such a way that its shares can be traded with stock brokers), this type of company is subject to Article 143 of the Direct Taxes Law and up to 10% of the company's tax will be exempted.

5 - The exemptions of this article will not include the income of production and mining units located within a radius of 120 kilometers from the center of Tehran and 50 kilometers from the center of Isfahan, 30 kilometers from the centers of provinces and cities with more than 300 thousand people (according to the latest census).

(Attachment Number 2)

Summery Sheet

Project introduction
1. Project Title: Citric Acid Production Plan
2. Sector: Production sub-sector: Industry
3. Products/services: Citric acid
4. Location: Khuzestan- SHADGAN city, DARKHOIN industrial area
5. Project description: The implementation of the project is planned by acquiring a land with an area of 22,000 square meters and carrying out construction with an infrastructure amounting to 10,960 square meters. The total investment in land, Civil works, structures and buildings is estimated at 685 billion Rials and in Plant machinery and equipment and auxiliary equipment is estimated at 3,838 billion Rials. The total pre-production expenditures are also estimated at 117 billion Rials. So, the total fixed investment costs (required) are 4,640 billion Rials and the total working capital (required) for the project is 575 billion Rials. The total investment is provided with the company's shareholders. The project is expected to be sold at fixed prices equal to 4,700 billion Rials in 1405. This number will rise in the following years due to the increase in production capacity and reach a maximum of 9,400 billion Rials. The net profit of the plan will be positive in all years. The profit is estimated to be 1,334 billion in 1405 which will be greater in the following years and reach a maximum of 2,536 billion Rials. The average annual profit of the plan is 2,370 billion Rials and the average profit margin is estimated to be 29.9%. The internal rate of return (IRR) of the project is estimated at 38.7 % and the rate of return is estimated at a maximum of 2.23 years. Also, the net present value of the project's cash flows (NPV) is positive and, considering the expected interest rate of 30%, is equal to 1,035 billion Rials.
6. Annual Capacity: 30,000 ton

Project Status
7. Local/internal raw material access: 100%
8. Sales: 9,400,000 (Million Rials) **Anticipated local market:** 100% **Anticipated export market:** 0%
9. construction period: 30 months
10. project status: - Feasibility study available? Yes. The feasibility of the project has been evaluated from different aspects and the results of the feasibility study are favorable in terms of market, engineering, financial and economic indicators. - Required land provided? Yes. Currently, there is industrial land in DARKHOIN industrial area, and it has been selected based on geospatial criteria for the implementation of the project. - Legal permission (establishment license, foreign currency quota, environment) taken? Currently, no legal permission is taken so far. According to the investigations, it is possible to obtain legal permission and it has the necessary conditions for obtaining environmental permits. - Partnership agreement concluded with local/foreign investor? No - Agreement with local/foreign contractor(s) concluded? No - Infrastructural utilities procured? If the project is established in DARKHOIN industrial area, infrastructure facilities such as water and electricity, roads, etc. are available. - List of know-how, machinery and equipment concluded? Citric acid is a product of the group of biotechnology products. The production technology in the present project is called fermentation method and does not require complex equipment. An important part of the equipment is provided from within the country. Considering the relative cheapness of the raw materials of these equipment's and the cheapness of labor, the finished price of these equipment's is much more economical compared to foreign manufacturers. - Financing agreement for machinery, equipment and know-how concluded? No

Financial structure

11. Financial table:

Description	Local Currency Required			Foreign Currency Required	Total Euro
	Million Rial	Exchange Rate	Euro		
Total Fixed Investment Costs	2,392,076	451,531	5,297,700	4,980,000	10,277,700
Total Net Working Capital Requirements	575,195	451,531	1,273,877	0	1,273,877
Total Investment	2,967,271	-	6,571,577	4,980,000	11,551,577

– Value Of Foreign Equipment/Machinery:	4,980,000	Euro		
– Value Of Local Equipment/Machinery:	2,704,965	Euro		
– Value Of Foreign Technical Know-How:	0	Euro		
– Value Of Local Technical Know-How:	0	Euro		
– Net Present Value (NPV):	2,293,296	Euro	Net present values discounted to:	1402/12
– Internal Rate of Return (IRR):	38.7%	٪		
– Normal Payback:	2.23	year	equivalent to 27 months	
– Minimum Attractive Rate of Return:	30%	٪		

General information

12. Project Type: new Project ☑ Explanation / Rehabilitation project ☐

Name / Company name: -

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Email: mh_rahimzade@yahoo.com Website:

Local entrepreneur: Private Sector ☑ government /public sector ☐