Islamic Republic of Iran
Ministry of Economic Affairs and Finance
General Department of Economic Affairs and Finance of North Khorasan

The Wagon Wheels

Esfarayen Industrial Park

Center of Investment Services of North Khorasan

2021 April

Summary of Technical-Economical Pre-Feasibility Study

The Name: The Wagon Wheels

Sector: Industrial

Subsector: Metal Products

ISIC Code: 3520612386

The owner of:

Organization of Economic Affairs and Finance (North Khorasan)

The ADDRESS:

Iran, North Khorasan, Esfarayen

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1 Abstract

1.1 Project Profile

Table 1: Summary Sheet

Project Introduction			
Project Title	The Wagon Wheels		
Sector	Industrial		
Sub Sector	Metal Industries		
Location	Iran, North khorasan, Esfarayen		
The County	Esfarayen		
Products / Services	The Wagon Wheels		
Annual Nominal Capacity	27,000		Number
The Raw Material	Steel CrMoA42		
Employment	51		Person
Land Area	4,199		m^2
Floor Area	3,480		m^2
Energy and Water Consumption	Water Consumption	8,500	m^3 in year
	Electricity Consumption	100	*KW*
	Gas Consumption	600,000	m^3 in year
Fixed Capital	1,185,510		Million Rial
Working Capital (The First Year)	154,741		Million Rial
Payback Period	3.69		Year
Net Present Value (NPV)	2,302,364		Million Rial
Internal Rate Of Return (IRR)	62		%
Modified Internal Rate of Return (MIRR)	29		%
Break Even Point	18		%
The Exchange Rate (Dolar)	240,000		Rial
Description	In this project, all the materials related to the study of the wagon wheels market especially domestic and foreign supply and demand, are examined.		

Table 2: Legal Authorizations

Licensure Status	
Descriptions	Issuance Status
Principal Agreement (Establishment licensure)	☒
Land Allocation	☒
Environmental Inquiry	☒
Possibility of Water Supply	☒
Possibility of Electricity Supply	☒
Possibility of Electricity Supply	☒
Possibility of Gas Supply	☒

Table 3: Total Investment

Descriptions	Local Currency Required			Foreign Currency Required (Million Euro)	Total (Million Euro)
	(Million Rial)	Rate	Equivalent in (Million Euro)		
Fixed Capital	1,185,510	240,000	4.94	0	4.94
Working Capital	154,741		0.64	0	0.64
Total Investment	**1,340,251**		**5.58**	**0**	**5.58**

- Value of Foreign Equipment / Machinery: 0 Million Euro
- Value of Local Equipment / Machinery:3.67 Million Euro
- Net Present Value (NPV): 9.59 Million Euro in Years
- Internal Rate of Return (IRR): 62%
- Payback Period: 3.69Years

Table 4: General Information

Company Profile	
Project Type	Establishment ☒
Company Name	North Khorasan Organzation of Industry, Mine and Trade
Contact Person (Name and Position)	Morteza HoseyniMasoom
Email	smt.nkh1383@gmail.com
Mobile	+989153864144
Tel	+985831552132
Website	nkh.mimt.gov.ir
Address	North Khorasan Province, Bojnurd, North Khorasan Organzation of Industry, Mine and Trade
Company's Legal Structure	Government ☒

2 Project Location

2.1 Province: **North khorasan**

2.2 The County: **Esfarayen**

Esfarayen is a city and capital of Esfarayen County, North Khorasan Province in Iran. This project will be construct in part 124 with coordinates (532548,4109046) in Esfarayen Industrial Park. Location of project is shown in Figure 1.

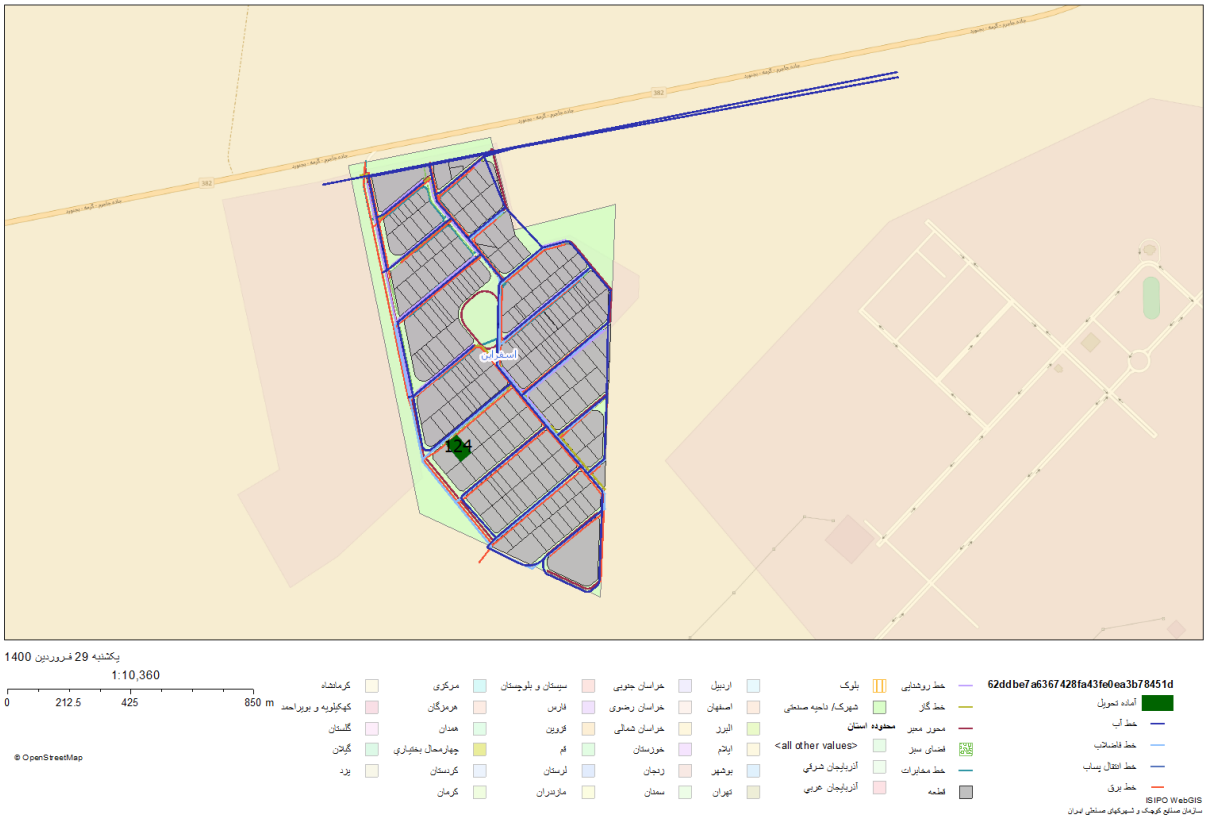

Figure 1:Location of Proposed Land in Esfarayen Industrial Park

2.3 The Project: **The Wagon Wheels**

2.4 Access to the Infrastructures

Table 5: Access to Infrastructures

No.	Needed Infrastructures	Distance to the Project	The Supply Infrastructures
1	Water	0	is provided
2	Electricity	0	is provided
3	Gas	0	is provided
4	Telecommunications	0	is provided
5	High way	<1 *km*	is provided
6	Sub way	0	is provided
7	Airport	115	is provided
8	Amirabad Port (Behshahr)	540	is provided
9	Bandar Abbas Port	1,433	is provided
10	Rail way station of Joveyn	109	is provided
11	Rail way station of Jajarm	160	is provided

3 Technical Specifications of Plan

3.1 Product

Table 6: Project Specifications Based on ISIC Code

The Product	ISIC Code	Customs Tariff	Environmental Category
Integrated Wagon Wheels	3520612386	86071900	4

In this project, all the materials related to the study of the wagon wheels market especially domestic and foreign supply and demand, are examined. In the late 17th century, when heavy loads were needed to move, the rail system was placed on the ground using wooden wheels and timbers, so-called lines. In 1,804, Richard Trevithick moved the first train carriages, equipped with a steam engine and cylindrical wheels, to the edge rails for a mining department in Wales. With the invention of the steam engine and the expansion of railways, iron wheels were used, then cast iron casting wheels replaced them. Today's modern services, operating at high speeds and heavy axial loads, are subject to abrasion pressures and resistances. Therefore, steel wheels were used instead of cast iron wheels and cast iron wheels became obsolete. Monobloc wheels are produced in two ways: forging method and casting.

According to studies, demand is on the rise until 2,025, so that from 2,020 to 2,023, about 2,400 tons will be added to the country's needs. Now, if we assume that factories are set up with a percentage of progress (above 75%), the shortage of demand in the country will be around 2,200 tons. It should be noted that the capacity of the plant is about 3,800 tons, so there is 1,600 tons of domestic demand in 2,023 overproduction, but in the same year we have close to the same import capacity, so with a suitable program this capacity can be replaced by imports. Therefore, according to the authors of the plan, the factory can be established.

3.2 Project's Requirements

In the supply and supply of monoblock wheels, most technical specifications refer to UIC regulations, including UIC 812-3. The International Union of Railways has removed this standard and replaced (EN 13,262) standard. Most of the technical specifications of the wheels in the standard (UIC812-3) are different from (EN 13,262). Because the standards must take into account the requirements for the design and production of wheels, the process of replacing the wheels in passenger cars also provides a suitable and reliable method. These two rail standards cover all monoblock wheels in passenger and freight wagons with different grades.

Also, according to the standard, the following tests and criteria should be measured.

- Hardness test
- Fatigue test
- Toughness values
- Material cleanliness - micrograph test
- Surface defects
- Internal defects
- Geometric tolerances
- Static imbalance
- Residual stresses

3.3 Space and Infrastructure Required

Table 7: Land Purchase Costs (Million Rial)

Specifications	Area (m^2)	Price per m^2	Cost		
			Paid Cost	Needed Fund	Total
A piece of land in Esfarayen	4,199	0.6	0	0	2,519

Table 8: Site Preparation and Development Costs (Million Rial)

Description	Working Capacity	Unit	Unit Price	Paid Cost	Needed Fund	Total
Excavation	2,000	*cm*	0.3	0	0	600
Wall Construction and door	2*(50+84) =268	*Sm*	9	0	0	2,412
street construction (5% of the amount of land)	294	*Sm*	7	0	0	2,058
Green space and Lighting (1% of the amount of land)	42	*No*	8	0	0	336
Total				**0**	0	**5,406**

Table 9: Civil Works, Structures and Buildings Costs (Million Rial)

Description	Area (m^2)	Unit Price	Paid Cost	Needed Fund	Total
Production Hall	2,500	25	0	0	62,500
Raw Material Warehouse	400	30	0	0	12,000
Product Warehouse	400	30	0	0	12,000
Office Building	150	45	0	0	6,750
Guardroom	30	45	0	0	1,350
Total			**0**	0	**94,600**

Table 10: Infrastructures

No	Description	Unit	Annual Consumption	Unit Cost (Rial)	Total (Million Rial)
1	Water consumption	m^3	8,500	7,000	60
2	Electricity consumption	*Kw*	480,000	1,100	528
3	Gas consumption	m^3	600,000	1,200	720
4	Gasoline	*Litr*	3,600	30,000	110
5	Unforeseen	5% of the above		-	66
Total					**1,484**

3.3.1 Equipment and Machinery

Table 11: Plant Machinery and Equipment Costs (Million Rial)

Description	Unit Cost	Costs Required				Total
		Local Costs	Costs of Currency		Cost to Complete	
			Rate	(Million Euro)		
Complete line of wheel	780,000	780,000	240,000	3.25	0	780,000
Overhead Cranes	4,000	8,000		0.03	0	8,000
Gate crane	4,500	4,500		0.01	0	4,500
Tools	8,000	8,000		0.03	0	8,000
Miscellaneous (10% of the above items)	-	80,050		0.33	0	80,050
Total cost of machinery		**880,550**		**3.67**	**0**	**880,550**

- The exchange rate is: 1 € = 240,000 Rial

3.3.2 Raw Material and Intermediate Components

Table 12: Raw Material and Intermediate Components (Million Rial)

Description	Unit	Total Consumption of the Raw Material	Price per Unit of Raw Material	Annual Cost of Providing Material
Steel 42CrMoA	Ton	-	-	805,600
10% of the above				80,560
Total				**886,160**

3.3.3 Management and Human Resources

Table 13: Salary of Administrative Staff (Million Rial)

No.	Position	Number of Shifts	Personnel per Shift (No.)	Total Staff (People)	Monthly Salary (per Person)	Annual Salary
1	manpower (in Administrative sector)	-	-	4	63.21	5,310
2	manpower (in Production sector)	-	-	44	48.75	25,740
Total				**48**		**31,050**

- Number of skilled personnel required: 44
- Number of non- skilled personnel required: 4
- Total number of personnel required: 48

4 Market Study and Competition

4.1 Examining Supply and Demand Trends

The amount of domestic suplly or production of wagon wheels based on production licenses (according to the information of the ministry of industry, mine and trade) from 2015 to 2020 is as follows.

Table 14: The Amount of Domestic Supply of wagon wheels

Year	Nominal Capacity (Number)	Nominal Capacity (Tons)
2015	30,000	4,200
2016	30,000	4,200
2017	42,000	5,880
2018	42,000	5,880
2019	42,000	5,880
2020	42,000	5,880

The real production capacity of active units in 2015 up to 2020 is shown in Table 15.

Table 15: The Real Production Capacity of Active Units in 2015 up to 2020

Year	Nominal Capacity (Number)	Nominal Capacity (Tons)
2015	30,000	4,200
2016	30,000	4,200
2017	42,000	5,880
2018	42,000	5,880
2019	42,000	5,880
2020	42,000	5,880

The following chart shows the prediction of production according to the Table 15 based on linear regression.

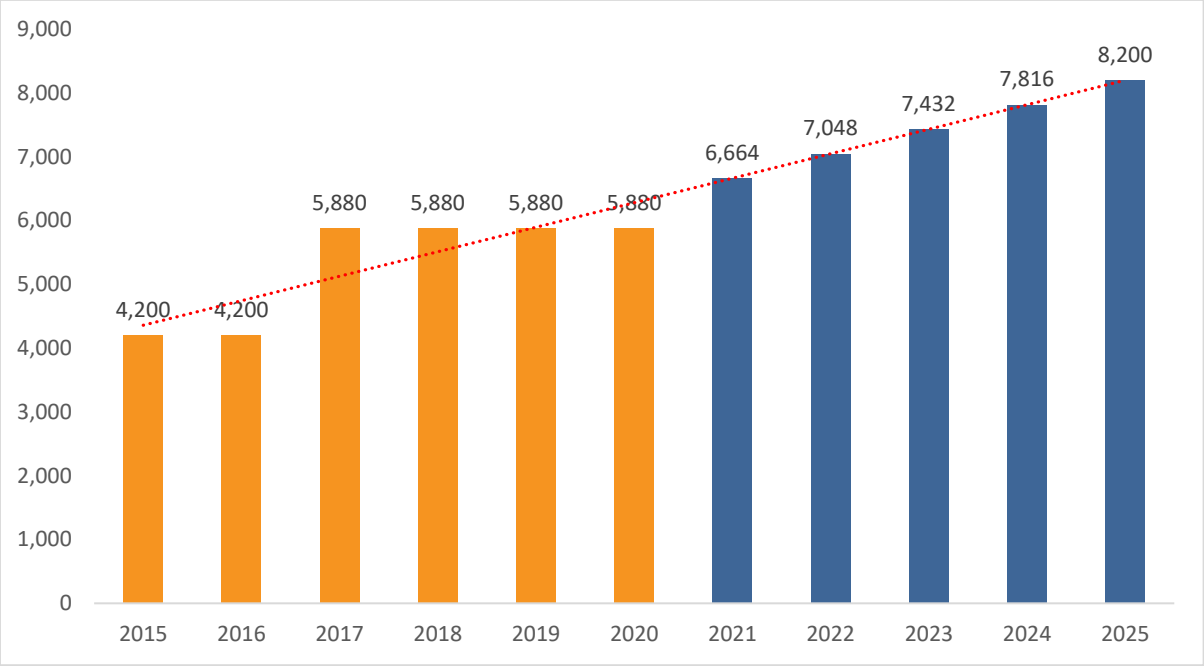

Figure 2: The Prediction of Production

As Figure 2 shows, the wagon wheels production is increasing, so there is the capacity to create new factories.

The amount of imports to the country is based on the information of the Tehran Chamber of Commerce, Industries, Mines and Agriculture at http://www.tccim.ir according to the (There is no data for 2019 and 2020 so the information is considered as the initial data for the forcast for the coming years from 2015 to 2018) following table.

Table 16: The Amount of Imports From 2015 to 2018

Year	Customs Tariff	Imports (ton)	Countries
2015	86071900	260	Germany, China, Italy, Turkey, Korea, Swiss, Spain, Netherland, Ukraine, Romania, Czech Republic, France, Vietnam, Serbia, Armenia, Slovenia
2016	86071900	280	China, Ukraine, France, Germany, UAE, USA, Serbia, Turkey, Russia, Slovakia, Italy, Romania, Canada, Swiss, Slovenia, Netherland, Hongkong, India, Korea
2017	86071900	612	UAE, China, France, Ukraine, Germany, India, Turkey, Czech Republic, Korea, Kazakhstan, Russia, Slovakia, Romnia, Spain, Netherland
2018	86071900	550	China, Ukraine, France, UAE, Czech Republic, Germany, Russia, Slovakia, Turkey, Romnia, Spain, Serbia, Oman, Astria, Korea, Italy

The following chart predicts the amount of imports according to the Table 16 by 2025, It shows based on linear regression.

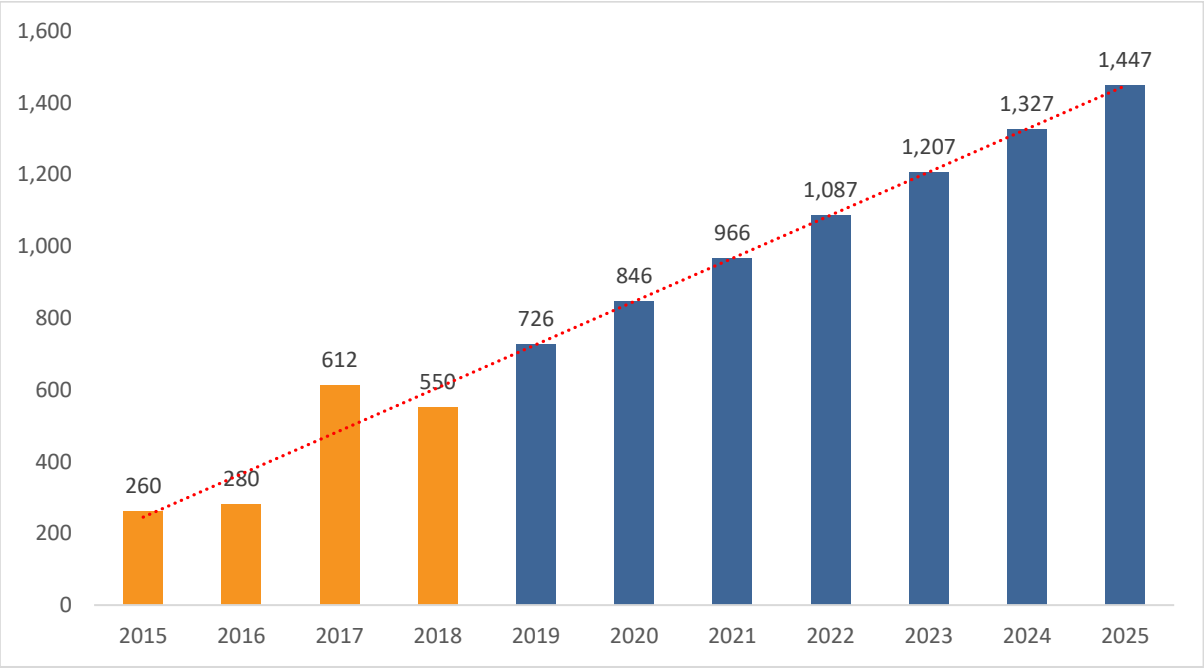

Figure 3: The Prediction of Imports

The amount of exports to the country is based on the information of the Tehran Chamber of Commerce, Industries, Mines and Agriculture at http://www.tccim.ir according to that customs tariff is about zero.

The amount of domestic demand that is equal to the amount of domestic production plus the amount of imports mines the amount of exports is in Table 17.

Table 17: The Amount of Domestic Demand form 2015 to 2018

Year	Demand (Tons)
2015	4,460
2016	4,480
2017	6,492
2018	6,430

The following chart shows the prediction of domestic demand based on linear regression.

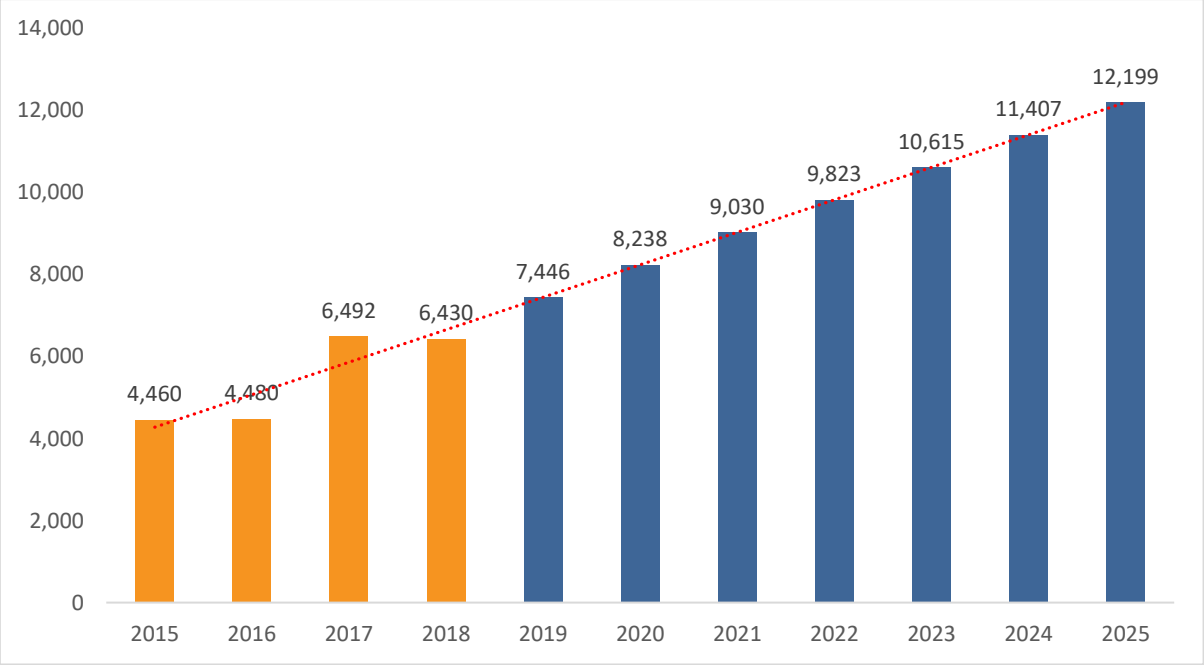

Figure 4: The Prediction of Domestic Demand

As Figure 4 and Table 17 shows, the amount of domestic demand is increasing. In theTable 18 the information of the units that have obtained a lisence is provided based on the amount of progress according to the information of the ministry of Industry, Mine and Trade.

Table 18: The Amount of Progress of Units that have Lisence

Progress Persent	Capacity (Number)	Capacity (Ton)
0% - 25%	41,500	5,810
25% - 50%	-	-
50% - 75%	-	-
75% - 100%	1,700	238

5 Financial Projection

5.1 The Cost Estimate

Table 19:Total Investment (Million Rial)

No.	Subject	Cost
1	Fixed Capital	1,185,510
2	Working Capital	154,741
Total Investment		**1,340,251**

Table 20: Fixed Capital (Million Rial)

Subject	Paid Cost	Cost Required				Total Cost
		Local Cost	Foreign Exchange Cost		Needed Fund	
			Rate	(€)		
Land Purchase	0	2,519	240,000	0.01	0	2,519
Landscaping	0	5,406		0.02	0	5,406
Building	0	94,600		0.39	0	94,600
Equipment and Machinery	0	880,550		3.66	0	880,550
Laboratory and Workshop Supplies And Equipment	0	10,284		0.04	0	10,284
Facilities	0	27,322		0.11	0	27,322
Transportation	0	11,900		0.04	0	11,900
Office and Services Equipment	0	1,255		0.005	0	1,255

Subject	Paid Cost	Cost Required				Total Cost
		Local Cost	Foreign Exchange Cost		Needed Fund	
			Rate	(€)		
Pre-Operation Costs	0	43,900		0.18	0	43,900
Unforeseen (10% Of The Above Items)	0	107,774		0.45	0	107,774
Total Fixed Investment	**0**	**1,185,510**		**4.94**	**0**	**1,185,510**

Table 21: Working Capital (Million Rial)

Subject	Day	Total
Packaging material (2 months raw materials and packaging)	60	147,693
Salary (2months salary)	60	5,175
Imprest fund (15 days of water, electricity, fuel and repair costs)	15	1,874
Total		**154,741**

Table 22: Fixed and Variable Costs

No.	Production Cost	Fixed Cost		Variable Cost	
		%	Cost	%	Cost
1	Raw material	0	0	100	886,160
2	Energy & utility	20	297	80	1,187
3	Repair & Maintenance	20	8,698	80	34,790
4	Production salary	70	21,735	30	9,315
5	Depreciation	100	105,448	0	0
Total Production Costs			**136,178**		**931,453**

5.2 Break-Even Analysis

Table 23: Break-even Analysis

Period	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
Break-even ratio (%)	18.08	16.80	15.65	14.60	13.61	12.57	11.80	11.10	10.46	9.88

5.3 Sensitivity Analysis of IRR

Table 24: Sensitivity Analysis of IRR

Variation (%)	Sales Revenue	Increase in Fixed Assets	Operating Costs
-20.00%	36.13%	74.85%	76.36%
-16.00%	41.56%	71.89%	73.57%
-12.00%	46.86%	69.18%	70.77%
-8.00%	52.06%	66.68%	67.94%
-4.00%	57.18%	64.38%	65.10%
0.00%	62.24%	62.24%	62.24%
4.00%	67.24%	60.26%	59.36%
8.00%	72.18%	58.41%	56.46%
12.00%	77.06%	56.68%	53.54%
16.00%	81.90%	55.06%	50.59%
20.00%	86.68%	53.54%	47.61%

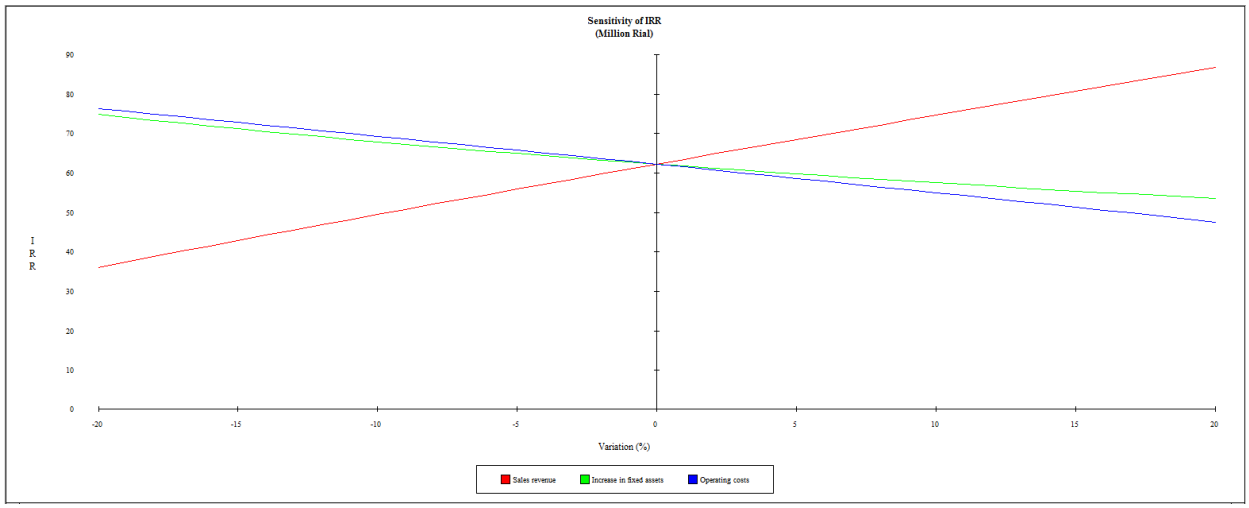

Figure 5: Sensitivity Analysis of IRR

6 Duration of Project Operation

The time of doing early stages and completing its process is about 20 months.

Table 25: Action Plan and Implementaion Schedule

Description	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Land Purchase																								
Constructing Buildings																								
Execution of Facilities																								
Order, Purchase of Machinery																								
Landscaping																								
Machinery Strat-up and Trial Production																								

7 Incentives, Features And Advantages of Project

North Khorasan Province is a province located in northeastern Iran. Bojnord is the capital of the province.This province contains many historical and natural attractions, such as mineral water springs, small lakes, recreational areas, caves and protected regions, and various hiking areas. Advantages of the agriculture of this province involves favorable and diverse climatic conditions and other parameters affecting growth.