In the name of God

Pre-feasibility study form

Plan Name: Formaldehyde production

Employer: Chaharmahal and Bakhtiari Industrial Estates Co.

Consulting Company: Kavosh Consultants Co.

Project Address: Shahrekord Industrial Estate

Initial date: ۲۰۲۱

Update ۲

SUMMARY OF THE FEASIBILITY STUDY

General Specification
Name of The Project: Feasibility studies of Formaldehyde
Project Capacity: ۵۰۰۰ ton per year
Personnel Number: ۵٤ people
Working Days: ۲۸۹ Days
Product Usage: Adhesives and resins, disinfectants, textiles, automobiles, etc.
Marketing
Product Global Price: The world price for a formaldehyde product is ۳۷ to ٤۰ percent liquid between $ ۰,۳ and $ ۰,٤
Domestic Demand: ۲۰۰۰۰۰۰ ton- (Next ۵ years)
Domestic Production: ۱۳۸۵۹٦۸ ton
Import: ۵۲۸ kg
Export: ۱٦۵۳٦۹۹ kg
Technical Study
Land Area: ۱۰۰۰۰
Building Area: ٤۰۰۰
Main Raw Materials: Hexamine - urea - lime - additives and ...
Supplying Place of Raw Materials: Local-Import
Power Requirement: ۱،۱۰۰،۰۰۰ (kwh)
Water Requirement: ۹۰۰۰۰(m^3)
Fuel Requirement: ۱،۳۰۰،۰۰۰ (m^3)
Economical & Financial Study
Fixed investment amount: ۷۳۲،۳۵۰ million rials - ۲،۵٤۲،۸۸۲ euro
Circulating capital: ۱۵۵،۹۷۷ million rials - ۵٤۱،۵۸۷ euro
Total investment: ۸۸۸۳۲۷ million rials - ۳،۰۸٤،٤٦۹ euro
Annual sales: ٤۵۰،۰۰۰ million Rials - ۱،۵٦۲،۵۰۰ euro
Net present value (NPV): ٦۱۰،۲۹۲ million rials - ۲،۱۱۹،۰٦۹ euro
Breakeven point (BEP): ٦۹۰،۰۰۰ million rials - ۲،۳۹۵،۸۳۳ euro
Internal Rate of Return(IRR): ۳٦٪
Investment Return Period: ۳ Years
Investment Sources Ratio Equity: ۳۰٪ Financing: ۷۰٪

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Introduction

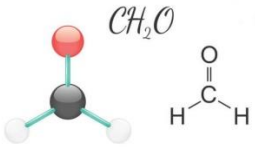
Feasibility studies are expert studies that are carried out prior to the implementation of economic investment plans. In these studies, from the market, technical, financial and economic point of view, the plan is analyzed and its results used as a basis for investor decision making.

The present report is a feasibility study of Formaldehyde production. These studies have been prepared in the framework of feasibility studies methodology and according to the above methodology, the economic capacities and volume of investments required to execute the project will be estimated and presented so that investors and interested stakeholders can obtain all the information needed. Earn money and start investing in open-ended, open-minded economic investment. It is hoped that these auxiliary studies, however small, will contribute to the development of our country.

۱ -Product Introduction

Formaldehyde, like methanol, is a volatile chemical that is the raw material for the production of many chemical derivatives. This substance was discovered in the ۵۰s. This chemical is the simplest aldehyde that gasifies at room temperature (۲۵ ° C). Its liquid solution is toxic, carcinogenic, colorless and has a pungent odor.

This chemical is easily combined with oxygen in the air and converted to formic acid. This is why commercial formaldehyde is typically contaminated with formic acid. Its chemical formula is CH_2O, its molar mass is ۳۰,۰۲۶ g / mol and its boiling point is -۱۹ ° C. This substance is known in the market as other names such as formaldehyde, oxime ethylene, methanal, formaldehyde aldehyde and formalin.



Properties of formaldehyde

Formaldehyde, although gaseous at room temperature, dissolves well in water. Formaldehyde is usually supplied as a ۳۷٪ aqueous solution called formalin. Formaldehyde in water, polymerized,

contains small HCHO monomers bonded together. Formalin usually contains a small percentage of methanol to limit polymerization. Formaldehyde has the same properties as other aldehydes. The difference is that it is usually more reactive than other aldehydes.

Formaldehyde is a strong electrophile. It therefore participates in aromatic electrophilic substitution reactions with aromatic compounds. It can also enter into an electrophilic additive reaction with alkenes. In the presence of base catalysts, it performs a self-oxidation-reduction reaction (Canizaro reaction), producing methanol and formic acid salts. Formaldehyde is reversibly polymerized to produce ٥, ٢, and ١-ring trioxane ring or polyoxymethylene linear polymers. The formation of these polymers causes the behavior of formaldehyde gas to deviate fundamentally from the law of ideal gases, especially at high pressure or low temperature, formaldehyde is easily oxidized with atmospheric oxygen to form formic acid. To prevent this reaction, the formaldehyde solution should be stored in bottles with sealed lids.

Formaldehyde production

Formaldehyde in industry is made from the catalytic oxidation of methanol. Usually metallic silver or a mixture of iron oxide and molybdenum is used as a catalyst. If iron oxide and molybdenum are used as catalysts, methanol reacts with oxygen at ٤٠٠ ° C to form formaldehyde as follows:

$$CH_٣OH + ١،٢O_٢ \text{ -----> } HCHO + H_٢O$$

Silver catalysts are commonly used at temperatures around ٦٥٠ ° C. In this process, two reactions are performed simultaneously. The first reaction mentioned above and the second reaction is the dehydrogenation of methanol:

$$CH_٣OH \text{ -----> } HCHO + H_٢$$

١-١-Product Name and Code (ISIC ٣)

According to the information received from the Ministry of Industry, Mines and Trade, the ICIC code of formaldehyde family products is as follows:

٢٤١١٥١٢٦١٩

١-٢-Customs Tariff Number

According to the Export and Import Regulations Book of ٢٠٢٠ and the Chamber of Commerce, Industries, Mines and Agriculture website, the customs tariff code of Formaldehyde is ٢٩١٢١١٠٠.

۱-۳- IMPORT AND EXPORT CONDITIONS

Basic salaries include customs duties, taxes, patents, types of duties and other remuneration received from imported goods and are equivalent to ٤٪ of the customs value of the goods. In sum, this is the income received from the business determined by the Board of Ministers in accordance with the relevant rules. The entry fee for Formaldehyde is ٥٪.

۱-٤- REVIEW AND PRESENTATION OF STANDARDS (NATIONAL OR INTERNATIONAL)

There is no direct standard for Formaldehyde. The standards are similar to this plan as follows:

Standard Name	Standard Number	Description
National standard	۱۱۱۱۸-۱	Textile - Determination of formaldehyde - Part ۱- Free and hydrolyzed formaldehyde - Extraction method with water
National standard	۱۱۱۱۸-۲	Textile - Determination of formaldehyde - Part ۲ - Released formaldehyde - Vapor adsorption method
National standard	۱۲۶۴۲-۳	Wood - Compressed papers - Determination of the amount of formaldehyde gas released - Part ۳ - Gas analysis method
National standard	۱۲۶۴۲-۴	Wood - Compressed wood sheets - Determination of the amount of formaldehyde gas released - Part ٤ - Dry method
National standard	۱۲۶۶۹-۴	Fine Ceramics (Advanced Ceramics, Advanced Industrial Ceramics) Air Purification Performance of Semiconductor Photocatalytic Materials-Part ٤- Formaldehyde Removal-Test Method
National standard	۱۲۹۱۹	Plastics-Polymer suspensions-Measurement of free formaldehyde-Test method
National standard	۱۶۳۶۱	Sterilization of health care products - Low temperature steam and formaldehyde - Requirements for the development of validation and routine controls in the process of sterilization of medical devices
National standard	۲۰۲۱۴	Paraformaldehyde-Features
National standard	۲۱۸۱۱	Paints and polishes - Formaldehyde release in melamine coatings and sponges - Determination of stable formaldehyde concentration in a small test chamber - Test method
National standard	۳۲۶۲	Adhesives - Liquid wood adhesive based on urea formaldehyde resin - Properties and test methods
National standard	۴۸۶۵	Sterilizing and disinfecting equipment Medical devices - Specifications of sterilizers that use low temperature steam with formaldehyde.
National standard	۵۸۴۳	Urea formaldehyde (UF) based cell plastics used in building insulation Thermal insulation materials - Features

National standard	۶۲۳۸	Urea formaldehyde resins - Properties
National standard	۶۲۴۰	Formaldehyde melamine resins - Properties
National standard	۶۲۴۱	Molded parts of phenol formaldehyde resins - Determination of free phenol by iodometric method
National standard	۶۲۸۰	Urea formaldehyde adhesive powder - Features
National standard	۷۹۱۳	Plastics - Phenol Formaldehyde Molded Parts - Determination of Free Ammonia and Its Compounds - Indophenol Method

Source: http://www.isiri.org/

International standards related to the title of this project are as follows:

Standard Name	Standard Number	Description
ISO	۱۴۱۸۴-۱:۲۰۱۱	Textiles — Determination of formaldehyde — Part ۱: Free and hydrolysed formaldehyde (water extraction method)

۱-۵- REVIEWING AND PROVIDING NECESSARY INFORMATION ON DOMESTIC AND GLOBAL PRODUCTION PRICES AS WELL AS GLOBAL PRODUCT PRICES

The world price for a formaldehyde product is ۳۷ to ٤۰ percent liquid between $ ۰,۳ and $ ۰,٤. In the country, it is about ۹۰ million rials per ton.

۱-۶- EXPLAIN THE USES OF THE PRODUCT

Chemical formaldehyde has many uses, some of which are outlined below.

Making adhesives and resins

Due to the good adhesion properties of formaldehyde, it is widely used to make adhesives and resins for use in cabinet making, shelving, stair systems and other home furniture. Not only are these adhesives highly efficient but they are also very cost-effective due to their easy access to formaldehyde.

The most common products made from formaldehyde are formaldehyde urea resin, melamine or melamine formaldehyde resin, and phenol formaldehyde resin. These products are produced by the reaction of formaldehyde with urea, melamine and phenol, respectively. These materials are strong

adhesives and are used in carpentry. These resins are also used to make various products as well as to create insulation layers.

Melamine-formaldehyde resins are water resistant and are used as impregnated paper resins in laminate flooring and clear car coatings. Phenol formaldehyde resins are used as mortar in wooden building panels.

Formaldehyde resins make water resistant to products such as facial cleansers and paper towels.

As a disinfectant

Formaldehyde is a very effective disinfectant. This substance completely prevents the activity of bacteria, fungi and molds.

Aqueous formaldehyde solution kills bacteria, and is used to treat skin infections.

It is used to inactivate toxic bacterial products to produce vaccines for specific infections.

Methamphetamine is a formaldehyde-derived product used to treat urinary tract infections. Formaldehyde derivatives are also used to make special topical ointments. However, long-term use of them can be dangerous.

In the textile industry

Formaldehyde is also used in the textile industry and is added to dyes and pigments. This material helps the pigments to adhere to the fabric and thus prevents it from discoloring. Formaldehyde-based resins are used to improve the fabric's resistance to wrinkles.

In the automotive industry

Formaldehyde-based products are used to produce its main components. Because phenol formaldehyde resins are resistant to fire and high temperatures, they are used to make their own parts such as brake pads.

Protect cells and tissues

Formaldehyde solution is used in the laboratory to protect human and animal specimens. For this purpose, ٤٪ solution is used.

Other applications

In addition to the main uses of formaldehyde mentioned above, this chemical has other lesser known uses. These applications include:

The most common use of formaldehyde is in the manufacture of inks. Therefore, the main material used in printers or book printing is formaldehyde.

Formaldehyde-based resins are used in the natural gas and crude oil industries to maintain the performance of these fuels.

Formaldehyde is mixed with compressed sulfuric acid (H_2SO_4) to form the reagent, which is used as an immediate test to detect alkaloids and some other compounds.

Formaldehyde is added to dyes as a preservative. It is also used as a preservative in cosmetics.

Formaldehyde is used to make polystyrene. Polystyrene is a thermoplastic material used in electrical and electronic applications.

۱-۷-EXAMINE ALTERNATIVE PRODUCTS AND ANALYZE THEIR EFFECTS ON PRODUCT CONSUMPTION

In recent years, the biggest concern for using this type of product is related to the dangerous and carcinogenic nature of the formaldehyde compound. Various attempts have been made to replace it, but no specific alternative product or product has been introduced to the market yet, and the advantages of this method include its reasonable cost and ease of its supply and production process.

۱-۸-STRATEGIC IMPORTANCE OF GOODS IN IRAN AND COUNTRIES OF THE REGION

The chemical industry is very important in a country's wealth. For example, more than ۱٪ contributes to the gross national product (GNP) of European countries, which is more than ٦٪ of the total GNP produced by all manufacturing industries. In general, personnel in the industry are among the best manufacturing industries that use it properly, because the industry has the largest number of skilled people and generally has the highest production.
In ۲۰۱۱, worldwide sales of chemicals were estimated to exceed $ ۳،٥۰۰ billion. This means that every person in the world consumes, on average, $ ٥۰۰ a year in chemicals. Of course, the main users of chemicals in developed countries use it with each person who is worth about $ ۱،۲۰۰ worth of chemicals per year.

The chemical industry and the economy in China and other Asian economies are growing rapidly. China itself in the space of only ١٠ years, its share percentage increased from ٨,١ to ٣٠,٤.

Thus, the production of chemicals has increased by ٨٠٪ in ٢٠ years, but its share in the world has almost doubled. Nevertheless, the core of chemical industry production and economics is now firmly in Asia.

How big are the world's chemical companies?

Many chemical industries are multinational.

Headquartered in Saudi Arabia, Sabik has manufacturing plants throughout Europe, the United States, Asia, and the Middle East. The company shows examples of changes in the chemical industry.

Since the production of the first chemicals in ١٩٨١, it is now the largest producer of major chemicals such as poly (phenylethyrene) (polystyrene) and ethane-١،٢-diol (ethylene glycol). American and European companies, in cooperation with local chemical companies, invest heavily in large refineries and chemical plants in developing countries.

With China joining the World Trade Organization and the forced reduction of import tariffs, China has pursued an alternative protectionist policy to create higher added value domestically. To this end, China pursued an increase in taxes on raw material exports. In fact, the growth of export taxes after China's accession to the World Trade Organization has been significantly higher in industries that have experienced lower reductions in import tariffs due to accession to the World Trade Organization. In other words, the largest increase in protection through trade policy (in the form of lower export tax or relatively higher export subsidy) has been attributed to the industries that have suffered the greatest decrease in protection due to tariff reductions by joining the World Trade Organization. have became. In addition, the increase in export taxes in China has been significantly higher for raw materials than for industries related to processed goods. China's chemical industry has always been of interest to the government, and with the huge investments made in the final years before joining the World Trade Organization and thereafter, huge capacity has been created in the upstream industries. Prior to China's accession to the World Trade Organization, the average import tariff in ١٩٩٩ for chemical raw materials in Chapters ٢٨ and ٢٩ was ٨,٤ percent. And has reached ٥,٤ percent. Products classified in these seasons, after metals and minerals, had the lowest import tariff in Section ٥ in ١٩٩٩, and after minerals and metals, experienced the lowest reduction in import tariffs after joining the World Trade Organization. In this policy framework, due to the growing domestic demand for raw materials and chemical intermediate goods and to motivate investment in downstream industries by creating a cost advantage of raw materials and due to China's inability to domestic demand of raw materials and chemical intermediate products for many years. Prior to joining the World Trade Organization, the export tax on chemical raw

materials increased by an average of ۱۲,۲ percent within ۱۰ years of joining the World Trade Organization, of which ۱۱,۳ percent was due to a reduction in the VAT refund rate.

Formaldehyde has certain properties. The following are some of the properties of this chemical and provide brief information about it:

It is gaseous at room temperature.

Formaldehyde is highly unstable when exposed to air.

It oxidizes easily with oxygen at low temperatures and high pressures.

It has a pungent and annoying smell.

Available in various forms such as powder, liquid and soluble in water and methanol.

In scientific and industrial fields, its liquid form is used.

It has a small molecular size and easily penetrates tissues and materials.

Highly reactive.

Dissolves in water.

It is dissolved in water for storage and transportation.

Easily accessible.

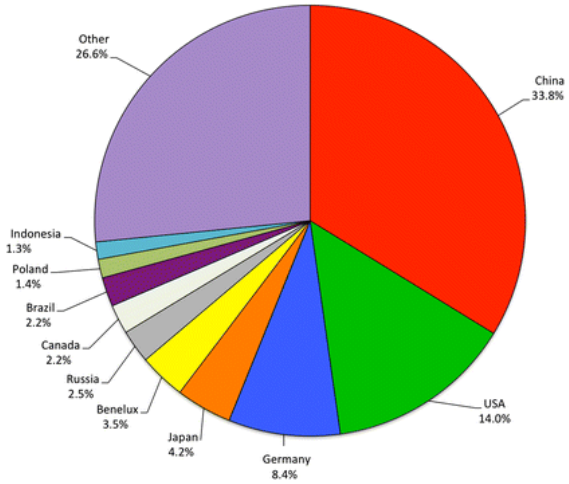
Its price is reasonable and affordable.

It has a high percentage of purity.

Its boiling point is -۱۹ ° C and its melting point is -۹۲ ° C.

۱-۹-MAJOR MANUFACTURING AND CONSUMER COUNTRIES

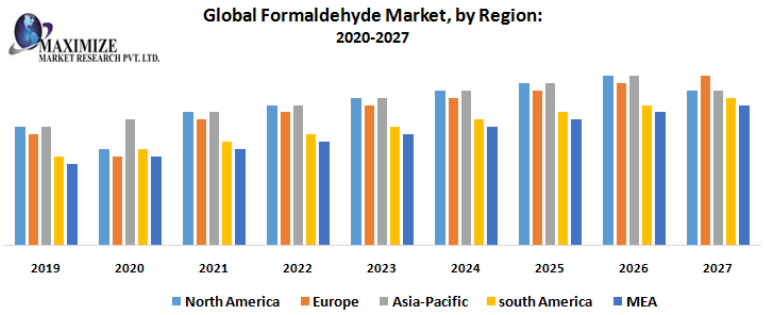
According to the Royal Society of Chemistry, the main formaldehyde producing countries in the world are China, the United States, Germany and Japan, etc., which are shown in the figure below.



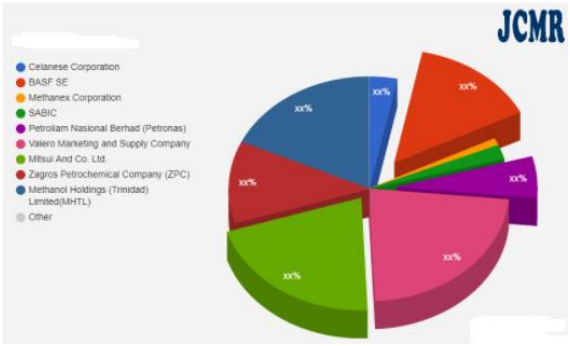
The main countries consuming this product are the Scandinavian countries, England and Germany and ...

Almost ۲۱ million tons of it is produced and consumed worldwide every year.

The market of different regions of the world is shown in the following figure:



The largest manufacturing companies in the world are shown in the figure below:



The names of domestic companies active in this industry are stated in the next section.

۲- SUPPLY AND DEMAND SITUATION IN IRAN AND COUNTRIES IN THE REGION

۲-۱-AN EXAMINATION OF EXPLOITATION CAPACITY AND PRODUCTION PROCESS FROM THE BEGINNING OF THE THIRD DEVELPOMENT PLAN TO NOW

The following figure and table show the specifications and capacity of units active in the field of formaldehyde production based on the statistics of the Ministry of Industry, Mines and Trade:

Name of production unit	State	Capacity
Chasb Saz	Mazandaran	۴۰۰۰
Petro Sanat Gameron	Hormozgan	۵۶۰۰۰
Arta pan	Ardabil	۷۲۰۰۰
Paksaz Shimi Neka	Mazandaran	۵۵۰۰

Cultivation and industry of clean wood compressed boards	Khuzestan	۱۰۶۰۰۰
Persia Zarrin Abnous	Fars	۱۴۰,۰۰۰
Tarashe Malbar	Golestan	۳۰۰
Fars Chemical Industries	Fars	۸۷۰۰۰
Samad Production and Industrial	Khorasan Razavi	۲۵۰,۰۰۰
Shiraz Chemical Industries	Fars	۴۰۰۰۰

Source: Ministry of Industry, Mining and Commerce - Statistics and Information Center

۲-۲-CHECK THE STATUS OF NEW PROJECTS AND ONGOING DEVELOPMENT PLANS

By referring to the industrial database of the Ministry of Industry, Mines and Trade, the status and specifications of new projects creating formaldehyde production have been collected and entered in the following table:

Name of production unit	State	Capacity
Barad Exir Azma	Alborz	۱۰۰
Aron Shimi Alborz	Alborz	۵۰۰
Raika Shimi Kimiaye Shomal	Mazandaran	۵۰۰
Arka Darou Gostar Iranian	Mazandaran	۲۰۰
Innovative chemical alchemists of Mashhad	Khorasan Razavi	۷۵۰۰
Lahij Parsian Paper and Wood Industrial Group	Zanjan	۴۰۰۰
Petro Faraz Tabesh	Bushehr	۴۱۵۰۰۰
Aron Exir Pakhsh Mehr Iranian	Alborz	۵۰۰
Petro Arka Maham Sourben	Bushehr	۱۲۰,۰۰۰
The wonders of Masjed Soleyman	Khuzestan	۹۰۰۰۰
Zarrin Dam Kimia	Khorasan Razavi	۱۰۰۰
Zobahan Gostar Semnan	Semnan	۵۴۰۰۰
Pirayeh Choob Iranian	Zanjan	۴۰۰۰۰
Arta Energy	Ardabil	۲۱۱۰۰۰
Arman Sina	Alborz	۸
Artavil Koulak	Ardabil	۲۰۰۰۰۰

Source: Ministry of Industry, Mining and Commerce - Statistics and Information Center

۲-۳-REVIEWING THE PROCESS OF PRODUCT IMPORTATION

According to the Chamber of Commerce, Industries, Mines and Agriculture, the import statistics for the last five years are as follows:

Year	Weight (kg)	Rial value	Dollar value
۲۰۱۶	۹.۴۴۱	۸۷۵.۱۷۷.۸۱۰	۲۹.۲۹۸
۲۰۱۷	۳.۰۵۵	۱۸۲.۵۸۹.۲۶۷	۵.۷۶۲
۲۰۱۸	۴.۰۵۱	۴۱۲.۲۲۸.۲۱۴	۱۲.۴۰۷
۲۰۱۹	۴۲	۱۷۱.۱۶۲.۲۵۹	۴.۰۷۵
۲۰۲۰	۵۲۸	۲.۳۷۰.۰۰۰.۰۰۰	۱۸.۹۶۰

Source: Tehran Chamber of Commerce, Industries, Mines and Agriculture http://www.tccim.ir

۲-٤-MONTORING CONSUMPTION TRENDS

The best way to determine the consumption of Formaldehyde is to use the balance of supply and demand. In such a way that the amount of domestic consumption is equal to the product of the difference between supply (total domestic production and imports) and exports. According to the latest statistics available in ۲۰۲۰, the amount of import was ۵۲۸ kg and the amount of export was ۱۶۵۳۶۹۹ kg and we had a production of about ۱۳۸۵۹۶۸ tons. Consumption of this product has increased in recent years due to the industrial development of the country and is expected to reach nearly ۲،۰۰۰،۰۰۰ tons per year in the future.

۲-۵-INVESTIGATE THE EXPORT PROCESS OF THE PRODUCT AND THE POSSIBILITY OF ITS DEVELOPMENT

According to the Chamber of Commerce, Industries, Mines and Agriculture, the export statistics for the last five years are as follows:

Year	Weight (kg)	Rial value	Dollar value
۲۰۱۶	۳۶۷.۴۷۷	۶.۳۸۸.۵۴۸.۷۳۸	۲۱۷.۳۰۷
۲۰۱۷	۶۷۰.۷۰۱	۱۴.۷۵۱.۹۳۰.۳۸۹	۴۷۱.۵۷۶
۲۰۱۸	۸۴۷.۳۸۴	۱۳.۲۵۵.۷۰۷.۹۴۲	۴۰۰.۴۹۶
۲۰۱۹	۱.۱۹۴.۳۷۷	۲۶.۷۰۲.۷۴۵.۵۸۱	۴۱۸.۱۷۲
۲۰۲۰	۱.۶۵۳.۶۹۹	۷۴.۷۶۱.۲۰۰.۴۷۰	۵۹۸.۰۹۰

Source: Tehran Chamber of Commerce, Industries, Mines and Agriculture http://www.tccim.ir

۲-٦- PRODUCT REQUIREMENT CHECK WITH EXPORT PRIORITY

Many countries that in the contemporary period, especially in the past few decades, have been able to follow the path of progress and development, have accurately implemented specific economic, social and political programs, and after going through medium- or long-term programs. Progress and development have been achieved.

The first proposed development plan after the Islamic Revolution for the years ۱۹۸۳-۱۹۸۷ was prepared. The last development plan (Sixth Development Plan) was approved by the Islamic Consultative Assembly in March ۲۰۱۷.

In many developed countries, exports are the main focus of development and are very important in the presence of that country in global markets. Domestic production and its arena in the global competitive market, or in other words, exports, is one of the factors that can make countries independent. The importance and necessity of the presence of goods made by a country in the world market and the atmosphere of the international economy are among the most important factors of development. The role of exports in this regard is so important that many export experts consider the only successful path to economic development of a country in the global market.

The most important issue for any country like Iran is to achieve economic development and to have an economic, productive and export-oriented system. In order to achieve this, first of all, it is necessary to meet the domestic needs of the country and to expand the export of goods and services in excess of domestic consumption. To achieve a society where there is no poverty, unemployment and backwardness, efforts must be made for its economic growth. Along with economic growth, there must be justice and empowerment of the people of the society to manage their lives.

Exports play an important role in production and employment, so they require a lot of attention to expand and have an active presence in global markets. Exporters in the economic field should also be encouraged.

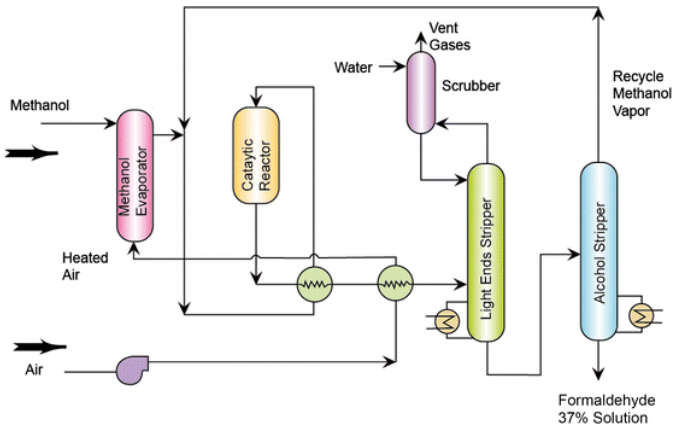
At present, we can see a very good export of Formaldehyde. Because there is a lot of demand in different countries and each of them is trying to get in touch with first-hand producers. This can help Iran's non-oil exports and boost production in the country.

۳-OVERVIEW OF TECHNOLOGY AND METHODS OF PRODUCTION AND SUPPLY IN THE COUNTRY AND COMPARISON WITH OTHER COUNTRIES

This substance is obtained by oxidation of methanol with air. The reaction takes place on the surface of the silver catalyst at ٦٢٠ to ٦٨٠ ° C when the methanol is dehydrated and partially oxidized. A mixture of methanol and water is introduced into the methanol evaporator continuously to stabilize the density and store it in the preparation tank with a pump.

The air required for this process enters the methanol evaporator through a blower and through a filter. From here, a mixture of water, methanol and air enters the reactor. Since the reaction is hot, the required heat is supplied by the heat of the reaction itself.

Mass production of formaldehyde is possible using the industrial process of catalytic conversion of methanol to formaldehyde and is done through two processes. The process of catalytic old hydrogenation of methanol to formaldehyde is the second process of catalytic oxidation of methanol to formaldehyde. The industrial process of oxidation of methanol to formaldehyde is important due to the ease of design of the industrial process and its low cost. First, the catalyst (cu / sio (۲) and the catalysts made after the drying process are reduced by hydrogen flow. The effect of adding water to the methanol feed is done using the reactor system and the step is applied to the condition improvement stage, until the best condition in which the most suitable catalyst is ۱۰٪ Ag / Sio (۲), the best. The analysis of the synthesized samples is performed by catalytic process by gas chromatography in all stages of the test. The general view of this process is shown in the following figure:



٤-DETERMINING THE STRENGTHS AND WEAKNESSES OF CONVENTIONAL TECHNOLOGIES IN THE PRODUCT MANUFACTURING PROCESS

High efficiency and quality and ease of production of prepared Formaldehyde are the most important advantages of the mentioned methods. The production of this product requires a precise quality management process, which is mentioned below.

The growth and development of the world's industries is largely due to competition between industrial units. In this regard, each industrial unit by increasing the quality of its products, tries to gain more market share and this trend over time has improved the quality of products and as a result the quality growth of industrial communities. Quality control to determine the accuracy of the production operation, according to the technical specifications specified for the product. This

operation helps to prevent the production of defective products, waste capital and reduce the cost of the product.

In general, quality control objectives can be summarized as follows:

• Maintaining the set standards

• Detection and improvement of deviations in the production process

• Identify and improve non-standard products

• Evaluate the efficiency of individuals in units

In other words, quality control is the assurance of the supply and production of goods and services, according to standards

Determined and inspected as one of the integral components of quality control in order to identify defects and provide the information needed for the quality control system in all industrial units.

The general inspection steps according to the situation of each industry are as follows:

١) In the stage of delivery of raw materials

٢) At the beginning of production

٣) Before starting the operation

٤) Before starting the irreversible operation

٥) Before starting the operation that causes the defects to be covered

٦) In the final stage of work

Each of these inspection steps may be performed on site or in a laboratory.

In this unit, according to the characteristics of this industry, each of the necessary steps of quality control and the location of these tests are determined.

will be. As mentioned, quality control should be applied in three steps.

١) Quality control of raw materials

٢) Control during production

٣) Final control

١) Raw material quality control:

This part of quality control should be checked on the product sample before the purchase stage for compliance with the expected characteristics.

Take place.

٢) Control during production:

This part of quality control includes all stages of production and in each stage the necessary controls will be performed by the relevant operator.

٣) Final control:

Manufactured products are controlled from different aspects. It is also necessary to pay attention to transportation issues.

۵- INVESTIGATE AND DETERMINE THE MINIMUM ECONOMIC CAPACITY, INCLUDING ESTIMATING THE VOLUME OF FIXED INVESTMENT IN RIAL AND FOREIGN CURRENCY

EXPLANATION: EXCHANGE RATE BASED ON NIMA SYSTEM - DATED ۲۰۲۲-۰۸ - AMOUNT: ۲۸۸۰۰۰ RIALS

Project Investment Schedule:

Description	Cost (Million Rials)	Cost (Euro)
Land	۲۵۰۰۰	۸۶،۸۰۵/۵۶
Landscaping	۱۴۹۹۰	۵۲،۰۴۸/۶۱
Construction	۱۶۳۸۰۰	۵۶۸،۷۵۰/۰۰
Production line machinery and equipment	۴۳۴۵۰۰	۱،۵۰۸،۶۸۰/۵۶
laboratory equipment	۳۵۰۰	۱۲،۱۵۲/۷۸
Utilities	۵۲۲۰	۱۸،۱۲۵/۰۰
transportation	۳۱۵۰۰	۱۰۹،۳۷۵/۰۰
Office equipment	۱۲۱۴	۴،۲۱۵/۲۸
Miscellaneous and unforeseen	۵۲۶۲۶	۱۸۲،۷۲۹/۱۷
Total	۷۳۲۳۵۰	۲،۵۴۲،۸۸۱/۹۴

The ground specification of the project implementation is as follows:

Description	Area (m ٢)	Unit Price (Rials)	Total (Million Rials)	Total (Euro)
Land	١٠٠٠٠	٢/٥٠٠/٠٠٠	٢٥٠٠٠	٨٦،٨٠٥/٥٦

The cost of landscaping is as follows:

Description	Area	Unit Price (Rials)	Total (Million Rials)	Total (Euro)
Digging and leveling	١٠٠٠٠	١٢٥٠٠٠٠	١٢٥٠٠	٤٣،٤٠٢/٧٨
Fencing	٤٠٠	١٥٠٠٠٠٠	٦٠٠	٢،٠٨٣/٣٣
Asphalt and pavement paving	٧٠٠	١١٠٠٠٠٠	٧٧٠	٢،٦٧٣/٦١
Green space and lighting	٨٠٠	١٤٠٠٠٠٠	١١٢٠	٣،٨٨٨/٨٩
Total			١٤٩٩٠	٥٢،٠٤٨/٦١

Building Information:

Description	Building type	Area	Unit Price (Rials)	Total (Million Rials)	Total (Euro)
Production	Niches	٢٤٠٠	٣١٢٥٠٠٠٠	٧٥٠٠٠	٢٦٠،٤١٦/٦٧
Raw materials and supplies	Niches	١١٥٠	٥٢١٧٣٩١٣	٦٠٠٠٠	٢٠٨،٣٣٣/٣٣
Office building and services	Official	٣٠٠	٧٠٠٠٠٠٠	٢١٠٠٠	٧٢،٩١٦/٦٧
Utilities	Niches	١٢٠	٥٠٠٠٠٠٠	٦٠٠٠	٢٠،٨٣٣/٣٣
Guard		٣٠	٦٠٠٠٠٠٠	١٨٠٠	٦،٢٥٠/٠٠
Total		٤٠٠٠		١٦٣٨٠٠	٥٦٨،٧٥٠/٠٠

Utilities:

Description	Cost (Million Rials)	Cost (Euro)
Power Supply	۱۱۰۰	۳،۸۱۹/٤٤
Water and Wastewater	۴۰۰	۱،۳۸۸/۸۹
Fuel	۳۵۰	۱،۲۱۵/۲۸
Heating and cooling equipment	۲۲۰۰	۷،٦۳۸/۸۹
Protective equipment and security system	۳۲۰	۱،۱۱۱/۱۱
Compressed air supply	۸۵۰	۲،۹۵۱/۳۹
Total	۵۲۲۰	۱۸،۱۲۵/۰۰

Transportation:

Description	Technical Specifications	Cost (Million Rials)	Cost (Euro)
Forklifts	۳ ton	۷۵۰۰	۲٦،۰٤۱/٦۷
Pickup	Nissan	Factory ۲٦۰ million Tomans	۱۲،۱۵۲/۷۸
Riding	Samand	Free market ۳۵۰ million Tomans	۱۰،٤۱٦/٦۷
Total		Factory ۱٦۰ million Tomans	۱۰۹،۳۷۵/۰۰

Equipment and Machinery:

Manufacturing machinery is the most important part of industrial investment. The machinery of each manufacturing complex determines the quality and variety of products, production technology, raw materials, and many of the methods, costs of production, and even the finished product price. Machinery selection is a critical and influential factor in the macroeconomic indicators of the plan. The cost of producing the machinery and equipment of the production line is estimated on the basis of inquiries from major manufacturing companies or reputable agencies. It also calculates the cost of procuring machinery, including shipping, installation, customs duties, and so on.

The world's leading companies producing the main equipment for the Formaldehyde production process can be listed as follows:

Anhui Hongyuan Chemical Technology Co., Guangxi Shangsi Huaping Chemical Co.,Zibo Qixing, Shanghai Chanho Machinery Co., Ltd ... But due to the capabilities of domestic specialists, the machinery of this project including reactors, furnaces, etc. can easily be supplied from Iran at a more reasonable cost. The price range for all of these companies is about ١٠ percent. The price of machines for this process is given in the table below.

Number	Name	Required amoun	Currency (Euro)	cost (million rials)	Rial sum (million rials	supply (domestic foreign)
١	Mixing tanks, soda solution, collection and formaldehyde	۴	٨٦،٨٠٥/٥٦	٢٥٠٠٠	١٠٠٠٠٠	Foreign
٢	Evaporation column	١	١٥٦،٢٥٠/٠٠	۴٥٠٠٠	۴٥٠٠٠	
٣	Mering	٢	٨٦،٨٠٥/٥٦	٢٥٠٠٠	٥٠٠٠٠	
٤	condenser	١	١٠٤،١٦٦/٦٧	٣٠٠٠٠	٣٠٠٠٠	
٥	Hopper and formic acid tanks	٢	١٢١،٥٢٧/٧٨	٣٥٠٠٠	٧٠٠٠٠	
٦	Fill	١	١٢١،٥٢٧/٧٨	٣٥٠٠٠	٣٥٠٠٠	
٧	flow transfer	١	١٠٤،١٦٦/٦٧	٣٠٠٠٠	٣٠٠٠٠	
٨	Garlic pump	١	١٢١،٥٢٧/٧٨	٣٥٠٠٠	٣٥٠٠٠	
٩	Other cases	١	١٣٧،١٥٢/٧٨	٣٩٥٠٠	٣٩٥٠٠	
Total (million rials)				۴٣۴٥٠٠		
Total (Euro)				١،٥٠٨،٦٨٠/٥٦		

laboratory equipment:

Number	Name	Currency (Euro)	Rial Cost (Million Rials)	Rial sum million) (rials
١	laboratory equipment	١٢،١٥٢/٧٨	٣٥٠٠	٣٥٠٠
٢				
Total		٣٥٠٠		

Office equipment:

Number	Name	The required amount	Currency (Euro)	Rial cost per unit	Rial Cost (Million Rials
١	Management desk with chairs	١	٢٧٧/٧٨	٨٠/٠٠٠/٠٠٠	٨٠
٢	Conference table and conference chair	١	٢٢٥/٦٩	٦٥/٠٠٠/٠٠٠	٦٥
٣	Computer desk and chair	٣	١٠٤/١٧	١٠/٠٠٠/٠٠٠	٣٠
٤	Staff desk and chair	٦	١٦٦/٦٧	٨/٠٠٠/٠٠٠	٤٨
٥	Secretary desk and chair	٢	٤٨/٦١	٧/٠٠٠/٠٠٠	١٤
٦	Showcase	٢	٩٠/٢٨	١٣/٠٠٠/٠٠٠	٢٦
٧	Library	٢	١٣٨/٨٩	٢٠/٠٠٠/٠٠٠	٤٠
٨	Four-slider file	٣	٦٢/٥٠	٦/٠٠٠/٠٠٠	١٨
٩	Waiting armchair	٧	٧٢/٩٢	٣/٠٠٠/٠٠٠	٢١
١٠	Dining table and chairs	١ Series	٦٩/٤٤	٢٠/٠٠٠/٠٠٠	٢٠
١١	Computer	٦	١،٣٥٤/١٧	٦٥/٠٠٠/٠٠٠	٣٩٠
١٢	Printers and scanners	٣	٤١٦/٦٧	٤٠/٠٠٠/٠٠٠	١٢٠
١٣	fax	٢	٢٠٨/٣٣	٣٠/٠٠٠/٠٠٠	٦٠
١٤	Phone	٥	٨٦/٨١	٥/٠٠٠/٠٠٠	٢٥
١٥	Fingerprint attendance device	١	١٠٤/١٧	٣٠/٠٠٠/٠٠٠	٣٠
١٦	Wireless network and internet equipment	١	٥٢/٠٨	١٥/٠٠٠/٠٠٠	١٥
١٧	Office stationery	٤ Series	١١١/١١	٨/٠٠٠/٠٠٠	٣٢
١٨	Central system	١	٢٤٣/٠٦	٧٠/٠٠٠/٠٠٠	٧٠
١٩	Other	١	٣٨١/٩٤	١١٠/٠٠٠/٠٠٠	١١٠
Total (Million Rials)		١٢١٤			
Total (Euro)		٤٢١٥			

Working Capital Costs:

Name	Description	Cost (Million Rials)	Cost (Euro)
Raw materials and packaging	٩٠ Days	١٥٠٠٠٠	٥٢٠،٨٣٣/٣٣
salary	٣٠ Days	٣٣٣٧	١١،٥٨٦/٨١

Energy costs	۳۰ Days	۸۸۰	۳،۰۵۵/۵۶
revolving fund	۱۵ Days	۱۷۶۰	۶،۱۱۱/۱۱
Total		۱۵۵۹۷۷	۵۴۱،۵۸۶/۸۱

Production costs:

Description	Cost (Million Rials)	Cost (Euro)
Cost of raw materials and packaging	۶۰۰۰۰۰	۲،۰۸۳،۳۳۳/۳۳
Salary Cost	۴۰۰۴۹	۱۳۹،۰۵۹/۰۳
Energy costs	۱۰۵۵۹	۳۶،۶۶۳/۱۹
Cost of maintenance	۴۷۴۱۷	۱۶۴،۶۴۲/۳۶
Unforeseen cost of production	۵۲۱۸	۱۸،۱۱۸/۰۶
Administrative and sales costs	۶۹۴۹	۲۴،۱۲۸/۴۷
Costs of financial facilities	۷۰۱۸	۲۴،۳۶۸/۰۶
Insurance costs	۲۰۵۵۶۵	۷۱۳،۷۶۷/۳۶
Depreciation cost	۵۰۰	۱،۷۳۶/۱۱
Depreciation expense before operation	۸۳۵	۲،۸۹۹/۳۱
Total	۹۲۴۱۱۰	۳،۲۰۸،۷۱۵/۲۸

۶-THE AMOUNT OF RAW MATERIAL NEEDED ANNUALLY AND WHERE IT IS SUPPLIED

Number	Description	Consumption per unit product	Unit of consumption	Amount of Consumption Required for Total Capacity	Currency prices (Euro)	Rial equivalent (per unit)	Place of supply	Cost (Million Rials)
۱	Hexamine	۰,۲۵	Ton	۱۲۵۰	۲۷۷/۷۸	۸۰/۰۰۰/۰۰۰	Local	۱۰۰۰۰۰
۲	Urea	۰,۳	Ton	۱۵۰۰	۵۶۹/۴۴	۱۶۴/۰۰۰/۰۰۰	Local	۲۴۶۰۰۰
۳	Limestone	۰,۱	Ton	۵۰۰	۳۱۲/۵۰	۹۰/۰۰۰/۰۰۰	Local	۴۵۰۰۰

٤	Additives (aluminum chloride-hydroxy sodium-calcium phosphate-formic acid)	٠,١٥	Ton	٧٥٠	٤٤٤/٤٤	١٢٨/٠٠٠/٠٠٠	Local Import	٩٦٠٠٠
٥	furfural	٠,١	Ton	٥٠٠	٣١٢/٥٠	٩٠/٠٠٠/٠٠٠	Local	٤٥٠٠٠
٦	Other	٠,١	Ton	٥٠٠	٤١٦/٦٧	١٢٠/٠٠٠/٠٠٠	Local	٦٠٠٠٠
Total (Million Rials)								٦٠٠٠٠٠
Total (Euro)								٢،٠٨٣،٣٣٣/٣٣

٧-RISK ANALYSIS OF PROJECT IMPLEMENTATION

Studies show that in the next year the market will be in short supply and there will be a greater need for imports. So it can be said that the implementation of new projects in this field is not very risky because in addition to the domestic market there is easily good potential to export this product to neighboring countries and if for any reason the applicant intends to undertake this plan, it is necessary to act with caution and superiority over other industrial units and by examining further the weaknesses and strengths as internal factors as well as opportunities and opportunities. Threats as external factors minimize project risk.

٨- HUMAN RESOURCES AND NUMBER OF JOBS

One important aspect of any industrial unit is its job creation, which is thoroughly examined in the market segment. Due to the nature of the industry and the need for ٢ shifts to work, it has been attempted to select the number of personnel in a manner that addresses the production needs of the two shifts. It has also been tried to use related specialties in different parts of production.
To calculate the amount of annual salaries and benefits, three shifts and other benefits have been added to the annual salary. For this purpose, the annual salary is set at ١٦,٤ months per year
.

Description	Gender	Number	Monthly salary per person (Million Rials)	Monthly salary (Million Rials)	Annual salaries (Million rials)	Annual salaries (Euro)
Managing Director	Man	۱	۸۰	۸۰	۱۳۱۲	٤،٥٥٥/٥٦
financial manager	Man	۱	۶۵	۶۵	۱۰۶۶	۳،۷۰۱/۳۹
Marketing Manager	Man	۱	۶۵	۶۵	۱۰۶۶	۳،۷۰۱/۳۹
Financial, sales and administrative personnel	Female	۳	۵۵	۱۶۵	۲۷۰۶	۹،۳۹٥/۸۳
warehouse keeper	Man	۳	۴۵	۱۳۵	۲۲۱۴	۷،٦۸۷/٥۰
Line Administrator	Man	۳	۵۳	۱۵۹	۲۶۰۸	۹،۰٥٥/٥٦
skilled worker	Man	۵	۴۹	۲۴۵	۴۰۱۸	۱۳،۹٥۱/۳۹
Semi-skilled worker	Man	۸	۴۵	۳۶۰	۵۹۰۴	۲۰،٥۰۰/۰۰
worker	Man	۲۰	۴۰	۸۰۰	۱۳۱۲۰	٤٥،٥٥٥/٥٦
Service	Female	۳	۴۰	۱۲۰	۱۹۶۸	٦،۸۳۳/۳۳
Guard	Man	۲	۴۰	۸۰	۱۳۱۲	٤،٥٥٥/٥٦
Driver	Man	۲	۴۴	۸۸	۱۴۴۳	٥،۰۱۰/٤۲
Secretary	Female	۲	۴۰	۸۰	۱۳۱۲	٤،٥٥٥/٥٦
Total		۵۴			۴۰۰۴۹	۱۳۹،۰٥۹/۰۳

۹- CHECK AND DETERMINE THE AMOUNT OF WATER, ELECTRICITY, FUEL AND ...

Description	Unit	annual consumption	Cost per unit in Rials	Total Cost (Million Rials)	Total Cost (Euro)
Power Consumption	KWh	۱/۱۰۰/۰۰۰	۹۳۹	۷۱۳	۳،٥۸٦/۸۱
Water Consumption	Cubic meters	۹۰/۰۰۰	۳۳۶۲۲	۱۷۸	۱۰،٥۰٦/۹٤
Gas	Cubic meters	۱/۳۰۰/۰۰۰	٥۰۰۰	۱۳۰۰	۲۲،٥٦۹/٤٤

Total	۱۰۵۵۹	۳۶،۶۶۳/۱۹

۱۰- CONDITIONS OF ECONOMIC AND COMMERCIAL SUPPORT

۱۰-۱- CUSTOMS TARIFF SUPPORT (PRODUCTS AND MACHINES) WITH GLOBAL TARIFFS

Support for fertilizer producers, especially Formaldehyde, is part of the Agricultural Support Service Company program and is monitored periodically by a technical working group on behalf of the company and the Ministry of Agriculture and Water and Soil to monitor the quality of fertilizers. The agricultural support services company relies on domestic production and a significant reduction in fertilizer imports, including the supply of fertilizers, organic fertilizers, biofertilizers, microbes and more. Also, in most petrochemical companies, unfortunately, some of the raw materials and machinery needed are supplied from abroad, which come to Iran after initial tests and technical examinations, and in the absence of problems. Therefore, the customs duty received is about ۱۰٪ of the total imported genus. It also requires payment of customs duties if the product is exported. Although in recent years appropriate incentives have been adopted to encourage domestic producers to export their products, which has led to increased exports, but more attention must be paid to this issue by the authorities.

۱۰-۲- FINANCIAL SUPPORT (EXISTING UNITS AND PLANS) OF BANKS - INVESTOR COMPANIES

Long-term facilities to finance part of the investment costs for the creation or development of industrial, mining and tourism units or to provide the necessary conditions for optimal utilization of these units, the facility bank in foreign currency and rial in the form of an Islamic contract Grants.

Terms:

۱- Only financial facility projects that have the necessary technical, financial and economic justification are granted.

۲- The granting of facilities to natural persons up to one billion rials shall be permitted and the payment of such facilities shall be exclusively permitted to legal persons.

۳- The Bank typically finances up to ۷۰٪ of the project's fixed capital investment as a facility, while ۳۰٪ of the total project investment (including fixed capital and working capital) must be provided by the applicant as paid-in company capital. .

٤- The repayment period of the facility is typically a maximum of ٥ years. It was the Bank's authority to change this period to suit the status of the plans.
٥- When applying for a facility, the applicant shall open a loan account.
٦-In general, ٣٠٪ of the total project investment must be financed by the investor and the bank can invest up to the remaining ٧٠٪.
Steps:
١-Acceptance: At this stage the applicant can apply to any bank branch and submit his / her application. If the plan is not on the priority list, the Bank agrees to provide the justification.
٢- Compilation of project justification report: Applicant prepares justification report through Bank Consulting Engineer companies.
٣- Acceptance: At this stage, the project justification report will be delivered to the branch with the required documentation.
٤- Evaluation and approval: The Bank's justification report will be reviewed and if approved, the facility payment will be approved by the competent authority.
٥- Contract: After providing the required documents and guarantees, the contract for granting the facility will be concluded.
٦- Payment: The project progress report will be prepared at the time specified by the consulting engineer and submitted to the bank. Once the progress report has been approved by the bank, payment is made as appropriate to the progress of the plan.

١١-ANALYZING AND PRESENTING FINAL CONCLUSIONS AND PROPOSALS FOR THE CONSTRUCTION OF NEW UNITS

- One of the basic principles of sustainable production is to improve soil quality from fertility and to return nutrients absorbed by plants to the soil. Fortunately, we are very successful in the field of biofertilizers in the country. The use of these fertilizers not only contributes to environmental sustainability, but also to food security. Due to the growing of the agricultural industry, the need for farmers to use different fertilizers such as Formaldehyde is very high. Although the process of this product is not complicated, for unknown reasons this product is produced in small quantities in Iran and according to the Chamber of Commerce, Industry, Mines and Agriculture, its imports amounted to about ٤٧،٥٤٩،٣٦٢ kg in ٢٠١٨. Therefore, if access to the raw material, applicants are suggested to build one (or several) ٢٠،٠٠٠ tonnes (or even more) units in different areas (especially deprived areas). The plan is to start operating at ٦٠ percent capacity in the first year and increase below capacity in the following years, respectively.
- The plan is to start operating at ٦٠ percent capacity in the first year and increase below capacity in the following years, respectively.

Year	First Year	Second Year	third year	forth year	Fifth year
Capacity(%)	٦٠ %	٧٠ %	٨٠ %	٩٠ %	١٠٠ %
Production capacity (ton)	٣٠٠٠	٣٥٠٠	٤٠٠٠	٤٥٠٠	٥٠٠٠

prime cost	٣١ million rials/Per Ton –١٠٨ Euro
Selling prices of products	٩٠ million rials/Per Ton – ٣١٣ Euro
Total Sales (Million Rials)	٤٥٠,٠٠٠ million rials - ١,٥٦٢,٥٠٠ euro
Percentage of sales at the point head to head	٦٩
Profit (Million Rials)	٢٩٥,٠٠٠ million rials - ١,٠٢٤,٣٠٦ euro
Gross Value Added (Million Rials)	١٩٤،٧٠٠ million rials - ٦٧٦،٠٤٢ euro
Net Value Added (Million Rials)	١٥٩,٦٥٤ million rials - ٥٥٤,٣٥٤ euro
Ratio of gross value added to total sales	٠/٤٣
Ratio of net added value to total sales	٠/٣٥
Ratio of gross value added to investment	٠/٢٢
Return of capital	٣