Petrochemical Industries: Problems & Prospects

The term ‘petrochemical’ has been defined in many ways: Albert V. Hahn most appropriately defined petrochemicals as consisting of all those chemical products which are derived for petroleum factors and by products or for natural gas constituents.1 A petrochemical industry accordingly is related to that segment of the chemical industry whose products are obtained from petroleum or natural gas hydrocarbons and utilized in chemical markets. It enjoys a dominant position in the chemical industry just for the reason that raw materials of high purity are abundantly available at low cost. The petrochemical industry produces chemical products that are derived mainly from petroleum or natural gas. Petrochemical are mainly organic in nature. They contain carbon compounds in combination with hydrocarbon, oxygen, nitrogen and other elements. These are differentiated from inorganic compounds or mineral organic which contain elemental carbon, its oxide, metal carbonates and sulphides. Organic chemicals are also derived, though in

small quantities, from coal, synthetic fuels and biomass. The raw material from which petrochemicals are derived are called feed stock/hydrocarbons.

In general primarily petrochemical (first derivatives materials produced directly from feed stock, which principally consist of various aromatic and olefin compounds and methanol, ammonia and carbon blacks) and intermediate petrochemicals (i.e. second derivatives materials which principally consist of various aromatic/cyclic and aliphatic/acyclic compounds) fall between petroleum or natural gas and finished products. The end products or finished products are the petrochemical products which are third or higher derivatives materials from which a great variety of products are made like plastic materials, synthetic rubber, synthetic fibres etc.

Organic chemical as pointed out by Prof. Al-Wattari, dominate 90 percent of total world output produced from petroleum hydrocarbons (such as naphtha, refinery gases, natural gas, NGL and fuel oil). For specific reasons, petrochemical include few inorganic chemicals such as (ammonia 80% of world ammonia production is derived from petroleum sources mainly natural gas) sulphur and carbon blacks.2

Industrialization plays an important role in the development process of a country. For oil based economy, its significance became

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more pronounced in view of heavy dependence of these economies on a single resource i.e. oil which is also non-renewable in nature. The term oil based economy indicates those developing countries where the share of oil production in Gross Domestic Product and total export is very high. The growth of these economies has become so much dependent on the oil revenues that even a marginal reduction can cripple down their whole economic structure. Saudi Arabia embarked on a long term industrial planning to develop capital intensive hydrocarbon based industries, in which the country had potential comparative advantage.

The industrial planning of Saudi Arabia considered petrochemical industry as a leading sector. Since the size of the domestic market was not sufficient enough, petrochemical industries was to be established mainly to carter to the export market.\(^3\) It was expected that the export oriented hydrocarbon-based petrochemical industries would diversify the economic structure and reduce the exclusive dependency of the country on oil exports. It was believed that the industrialization process would involve full utilization of indigenous productive resources and would generate forward and backward linkages. Through industrialization programme a multi-pronged strategy was adopted to overcome the shortcomings and optimally utilize the favourable factors to achieve its goal of structural transformation, from export of crude oil

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\(^3\) Masood Rashid "Industrialization in oil based Economy" ABC Publication House, New Delhi, 1984, p.2
to petrochemical products. The aim of industrial planning policy to develop a diversified economic base is well reflected from the allocation pattern. The industrial sector is one of the most critical system in the third development plan of Saudi Arabia. The basic industries, especially in the field of petrochemicals, represents one of the most important cornerstones in the industrialization process and the economic structure of Saudi Arabia.

The objectives of petrochemical industries in Saudi Arabia were the following –

1. To increase the industrial sector’s contribution to the Gross Domestic Product (GDP) and the diversification of national economy.

2. To promote industrialization base on locally available raw materials (oil & natural gas) and to diversify the industrial production, through more intensive development of upstream and downstream industries.

3. To develop economic linkages between the industrial sector and other producing sectors.

4. To add value to our abundant hydrocarbon resources.

5. To reduce the dependence of the economy on the oil sector.
(6) To support and promote transfer of modern technology in joint venture industrial projects through the foreign capital investment regulation.

Saudi Planning for petrochemical industry was performed by –

(a) Saudi Aramco, who designed, built and operates the Kingdom’s master gas system, which has the capacity to process nearly 130 million cubic meters per day of natural gas.

(b) The establishment of Saudi Basic Industries Corporation in 1976 which has been a milestone in the kingdom’s development of a viable basic and downstream petrochemical and supporting industries which utilize the local resources of hydrocarbon and minerals, as a raw materials.

(c) Construction of the twin industrial cities of Jubail and Yanbu, now strategic sites for hydrocarbon based and energy intensive industries, setting a production chain of secondary and downstream industries using their outputs as raw materials.

(d) Construction of King Fahad Industrial Port at Jubail and Yanbu.
Characteristics of Saudi Arabia’s petrochemical industries are as follows.

1. Use of local feed stocks especially natural gas.
2. Joint venture with major oil and chemical companies.
3. World scale plants utilizing latest technology.
4. Large scale production of upstream petrochemicals, mainly ethylene derivatives based on ethane crackers.

In 1960 the Saudi government was already negotiating with foreign oil companies concerning the development of petrochemical industries. Since these companies showed little interest, other ways had to be found to attract investment. In 1962 the General Petroleum and Mineral Organization (Petromin) was established precisely to undertake hydrocarbon projects that did not attract private investors. State support for industrialization increased when Faisal Ibn Abd Al Aziz Al Saud ascended the throne in 1964. The desire of the government to press forward with the development of the petrochemical industries was underlined in 1976, when the Saudi Arabian Basic Industries Corporation (SABIC) was created with Dr. Ghazi A Algosaib (The minister of industry and electricity) as Chairman of the board, and Abdul Aziz A. Al-Zamil as Chief Executive Officer. The SABIC was established in September 1976 with an authorized capital of 10 million dollars.

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Saudi Riyals, with the objective of implementing the basic industries in Saudi Arabia. The industrial project that SABIC has been implementing include petrochemical complexes, methanol & fertilizer plants and iron & steel mills. The feed stock and fuel for all the projects was to be supplied through an integrated gas supply system which would gather associated gas then being flared. The gas system, considered the backbone of the industrialization programme is being implemented by the Saudi Government in cooperation with Petromin and Aramco. A joint venture company was set up by SABIC and the foreign partner. Financing arrangement for the project were secured through the public investment fund of the Ministry of Finance and National Economy in Saudi Arabia. The ratio is that 60 percent comes from fund, 10 percent secured from commercial banks and remaining 30 percent comes from partner’s equity. With such an arrangement, SABIC has the ability to implement and realize industrial projects costing several times its authorized capital.

The criteria that a foreign partner had to meet included his ability to provide know-how in the related industry, a good record of operation, the ability and willingness to train Saudi Manpower, and the capability of handling and marketing products of the joint venture company.

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The industrial projects were subjected to very severe scrutiny by SABIC and the Saudi government to ensure that such projects were economically viable. These projects provided the necessary requirement of industrialization in terms of creating value added to natural resources of the country. Saudi Arabia’s strategy for industrialization has been built up on two important factors: The need to utilize the vast amount of gas which has been flared for many years and the need to lessen the impact on Saudi people when crude oil supply begins to decline. “Through integrated industrialization and with technical and managerial competence, we will provide our people with the tools to develop other resources in various economic sector”. The interdependence of oil and petrochemical industries has been a natural phenomena especially in areas which possess abundant liquid and gaseous raw materials. The question may be asked why there has been a delay in the implementation of such industrial projects in Saudi Arabia. The explanation lies in a series of economic factors, which at first worked against any attempt to industrialize, but in time were either out weighted by other factors. In noting such factors, it should be kept in mind that the following are listed as a classification and by no means should be considered exhaustive.

(a) The shortage of energy resources began in 1970's. The ensuing crude price increase boosted oil producer’s revenues and enabled them to accumulate sufficient capital not previously available to undertake major investment.

(b) Rising hydrocarbon prices had made it economical to recover large quantities of gas which were previously flared in the oil fields.

(c) The demand for energy attracted oil companies to Saudi Arabia because of its abundant crude reserves.

(d) The moderate policies of Saudi Arabia have proved to be attractive to the foreign investors.

(e) With the needed funds available, the Saudi government has been able to plan and to develop the infrastructure needed for this industrialization.\(^7\)

"Jubail and Yanbu, where most of our projects will be located, are planned as to large and modern industrial cities. All the infrastructural support in terms of ports, extensive communication network, housing, hospitals, training facilities, recreational and other facilities to make the

\(^7\) Ibid. p.207
life of the inhabitants attractive and to maintain our historical and cultural values."^8

Increasing difficulties faced by international chemical companies due to uncertain long term availability of feed stock and their ever increasing prices, coupled with the internal advantage in Saudi Arabia, the availability of reasonably priced gaseous raw materials have led to the decision to undertake these industrial projects.9

In implementing its industrialization programme, SABIC formed eight joint venture companies. Saudi Petrochemical Company (SADAF), a joint venture undertaken by SABIC and Pecten Arabia Limited (Saudi Arabian Company) to built a complex at Jubail to utilize two of the Kingdom's basic resources – gas and salt. This petrochemical facility includes world scale plant for the manufacture of 656,000 metric tones per year of ethylene, 295,000 metric tones per year of styrene, 281,000 metric tones per year of crude industrial ethanol, 454,000 metric tones per year of ethylene dichloride and 355,000 metric tones per year of caustic soda. This complex came into production by early 1985.10 A portion of the ethylene product will be utilized by an adjacent petrochemical plant.

Al Jubail Petrochemical Company (KEMYA), a joint venture company owned in equal shares by BASIC and Exxon Chemicals, built a

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8. Ibid. pp 208-208
9. Ibid. p.209
plant to produce 260,000 metric tones per year of linear low density polyethylene at Jubail. Ethylene as a primary feed stock was provided by an adjacent petrochemical complex. The production of this plant began in early 1985. Saudi Yanbu Petrochemical Company (YANPET) is a joint venture company owned equally by SABIC and Mobile Oil Company, located in Yanbu on the west coast of Saudi Arabia. This venture constructed a complex with an annual production capacity of 450,000 metric tones per year of ethylene, 220,000 metric tones per year of ethylene glycol, 200,000 metric tones per year of linear low density polyethylene, and 90,000 metric tones per year of high density polyethylene.\(^{11}\)

Two joint venture companies to produce methanol in Jubail have been established. The Saudi Methanol Company is a venture between SABIC and Japanese Consortium, and National Methanol Company is a venture between SABIC and Celanese-Texas Eastern; the production capacity has been 600,000 metric tones per year and 650,000 metric tones per year per day of chemical grade methanol, respectively.

Al Jubail Fertilizer Company (SAMAD) is a joint venture formed between SABIC and Taiwan Fertilizer Company, located in Jubail. Production had been started in 1983 with an annual capacity of 500,000 metric tones of urea from methane gas. Also in Jubail the Arabian

Petrochemical company (PETROKEMYA) is a joint venture between SABIC and Dow Chemical (German Company). This company produced 500,000 metric tones per year of ethylene, 80,000 metric tones per year of linear low density polyethylene, and 70,000 metric tones per year of high density polyethylene.\textsuperscript{12}

Eastern Petrochemical Company (SHARQ) is a joint venture between SABIC and the Japanese Consortium of SPDC Ltd. located in Jubail. This project produces annually 300,000 metric tones of ethylene glycol and 130,000 metric tones of linear low density polyethylene. The ethylene feed stock for SHARQ was supplied by PETROKEMYA.

SABIC petrochemical products can be classified into five main group of products namely: basic chemicals, fertilizers, polymers, intermediate products, metals. SABIC has also its modern research and development complex. This complex has undertaken a broad range of research and development activities and technical services to maximise SABIC’s technological capabilities in supporting customers. It also supports environmental and industrial health services.

\textsuperscript{12} Based on data in \textit{OPEC Annual Statistics Bulletin}, Vienna, 2002, p.114
Investment Opportunities in the Petrochemical Industries in Saudi Arabia

The petrochemical industries in Saudi Arabia have been based on local feedstocks including ethylene, propylene, methanol, isobutylene. The projects on steam can be classified as follows –

(1) Projects based on ethylene: Alpha olefins, ethylene oxide, ethanolamines.

(2) Projects based on Propylene: Propylene oxide, acrylonitrile (AN), phenol, acrylic fibres, actone.

(3) Projects based on methanol: acetic acid, vinyl acetate.

(4) Projects based on Benzene: Caprolactan, nylon.

(5) Projects based on Isobutylene: Methyl, methacrylate, butylated hydroxyluene, isoprene.

(6) Projects based on orthoxylene: Phthalic anhydride

The production of Phthalic anhydride and acetic acid is based on the availability of menthol. This acid can be used together with ethylene to produce vinyl acetate, which is utilized in household paints and adhesives.

Petrochemical depending on iso-butene: As the Kingdom is one of the main exporting countries of liquified petroleum gas (LPG), it planned to utilize this resource to produce Methyl Tertiary Ether (MTBE). Since the intermediate material used for producing methyl
tertiary butyl is isobutene, it may also be used to produce several other petrochemical materials.

All the SABIC petrochemical joint venture companies are owned equally by SABIC and the foreign partners. The Saudi Arabia's industrialization programme is based on a sound footing. Each partner had been carefully selected in each instance and thus the partner’s history and past record as to proven technical achievements, marketing and sales strategy were very carefully reviewed.

Virtually all petrochemical plants at the Saudi Industrial Cities of Jubail and Yanbu are raising capacity or having their production streams diversified. These plants are mostly joint venture between Saudi Arabia Basic Industries Corporation and foreign companies. By 2000 their total production capacity reached 3.0 million tones per year, from 2.37 million tones per year in 1997 and 2.2 million tones per year in 1995. New projects on stream beyond 2000 included three world-scale ethylene cracker units.

SABIC has been expanding its capacity for more than two decades. Its further growth will reinforce the Saudi position as the biggest producer and exporter of petrochemical in the Middle East and as increasingly important player at the global level. SABIC accounts for over 7 percent of world petrochemical production.

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In early 1997, Saudi Arabia became the biggest exporter of oxygenates in the world, with its capacity to produce methyle tertiary, butyl ether rising to nearly 3.2 million tones per year from 2.5 million tones per year in 1996. When it accounted for 13 percent of the world output. Now its (methyl tertiary butyl ether) production is much higher.

SABIC operates 17 plants producing more than 45 kinds of petrochemicals and other products. It is owned 70 percent by the state of Saudi Arabia, 20 percent by the Saudi private sector and 10 percent by GCC.\(^\text{14}\)

The growth strategy of SABIC through the 1990's has focused on two basic aims –

1. To raise capacity so that exports are increased while domestic demand is met.

2. To keep adding new petrochemicals to its production. A further strategic objective is to develop SABIC production capacity outside Saudi Arabia with Asia in priority.

**SABIC Expansion Plan**

China Petroleum and Chemical Corporation and Saudi Basic Industries Corporation signed an agreement towards forming a joint venture company. This 50-50 equal share joint venture company will

\(^{14}\) www.allbusiness.com/mining/oil/gas/petrochemical/saudi araia
invest in a 1 mtpa of ethylene derivatives complex (600,000 mta of polyethylene and 400,000 mta of glycol) to be set up in Tianjin that will receive all its ethylene feed stock from an ethylene cracker owned by Tianjin Petroleum Company, a branch of Singapore Corporation. The total investment will be around US$ 1.7 bn, with the complex scheduled to be completed by September 2009.\(^{15}\)

A joint venture between SABIC and Al-Kayan (Saudi Arabian Company), include a 2 mtpa ethane/butane crackers, including benzene extraction facilities, a 700,000 tpa polyethylene plant; a polypropylene plant with capacity of at least 350,000 tpa and a 530,000 tpa ethylene glycol unit.\(^{16}\)

SABIC and Exxon – Mobile announced recently that they have begun work on a feasibility study to define a potential project that would grow their two joint petrochemical ventures at Yanbu and Jubail. The project targeted domestic supply of carbon black and rubber and thermoplastic specially polymers to serve emerging local and international market.

SABIC has indicated that it will invest US$ 5 bn in a new joint venture project in China. Investment might include setting up production units for ethylene, polyethylene and glycol at a cost ranging between US$ 3 bn & US$ 5 bn.

\(^{15}\) www.sabic.com/en/products/metals.htm
\(^{16}\) www.sabic.com/products/polymers.htm
Saudi Arabia Basic Industries Corporation has signed a contract with German contractor to built a high density polyethylene plant at its production site in Gelsenkirchen, Germany. The plant will have production capacity of 250 kt/year, replacing as existing 100 kt/year plant.

Saudi European Petrochemical Company, a subsidiary of the SABIC awarded Samsung Engineering Company Ltd., South Korea, a contract for the construction of 500,000 tones per annum polypropylene plant. The Plant was erected at the IBN ZAHR Complex in Al-Jubail, Saudi Arabia. The Saudi Petrochemical Company (SADAF) already running the world’s single largest conventional production site at Al-Jubail, plans to build a third world scale plant, boosting styrene production by over 60% making it the world’s largest single complex styrene. The Saudi Methanol Company (Al-RAZI) is part way through its fifth expansion project, Al-RAZI’s offering an annual capacity of 1.7 mt per annum of methanol.

SABIC has been on a major expansion drive. Its total capacity is stated to increase from 43 mt/a in 2004 to 64 mt/a by 2008. To reach these targets, SABIC has expanded aggressively both domestically and internationally. At present the sector is dominated by Saudi Basic Industries Corporation (SABIC) which accounts for 95 percent of the domestic petrochemical output. However, private investment in the
The petrochemical sector has also been expanding. By 2010 SABIC's share of domestic petrochemical production is likely to decline to 75 percent. The private sector's investment in this sector is expected to increase to Saudi Riyal 154 bn during 2004-09.

A big number of private petrochemical industries have emerged as satellites for the major plant of the state-controlled Saudi Arabia Basic Industries Corporation. The plants producing basic petrochemicals has been joint ventures between SABIC and major foreign firms. The Saudi Venture Capital Group (SVCG) comprises 47 key Saudi businessmen. Saudi Venture Capital Group is a 50-50 venture with Chevron which has a world-scale aromatic complex built in Jubail. It is the first big private Saudi venture in the aromatics business. It was completed for test operation in April 1999 and inaugurated in February 2000. It can turn 480,000 tonnes per year of benzene, which is partly being used to produce 220,000 tonnes per year of cyclohexane a feedstock to make plastic and 70,000 tonnes per year of gasoline.

Saudi Arabia, a significant global producer of commodity petrochemicals, increased its position in the global market due to five growth strategies.

(1) Diversifying the product portfolio,

(2) Establishing more joint ventures with industry majors

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18. Oil and Gas Journal, Jan 2, 2001, p.36
Placing great emphasis on research and development

Endorsing a large role for private sector

Diversifying into downstream operations

Investment in Saudi petrochemical industry have so far been heavily concentrated in the methanol and ethylene product chains. The primary reason is that petrochemical producers in Saudi Arabia have access to low cost feed stock (methane and ethane), which provides them with substantial cost advantage, this makes them highly competitive in export market.

Although increased demand for methanol, ethylene, polyethylene and ethylene glycol continues unabated in Saudi Arabia. There is mounting pressure on petrochemical producers to consider new products. Before 1994 all the steam crackers in Saudi Arabia were fed with 100% ethane. Thereafter and due to limited ethane availability, most cracker projects have been allocated mixed feed stock (ethane, propane, ethane-butane, and ethane-light condensates). A substantial volume of basic petrochemicals other than ethylene will become available in Saudi Arabia, resulting therefore in a more diversified set of chemical streams that assist in developing the respective secondary derivatives.

19. *Oil and Gas Journal*, Jan 2, 2006, p.52
In conjunction with the processing of heavier feed stock the Saudi government has modified the feedstock allocation process to extend the petrochemical value chain further in secondary and tertiary products. This will increase the industry’s cost competitiveness in the primary petrochemicals through back integration. This trend is creating a conversion industry and industrial clusters. This is bringing a radical transformation to the basic structure of the petrochemical industry in Saudi Arabia.

This is evident by petrochemical projects under development, which would have been difficult to imagine in the last decade, primarily because they were more specialized. Some of these include –

- The Petro Rabigh (Saudi Aramco-Sumitomo Corporation Joint Venture, Japanese Company) project includes propylene production. The propylene will be used for producing polypropylene and propylene oxide. Propylene oxide is an intermediate product that is not currently among the industry’s products. This could stimulate a set of downstream derivative including polyether polyol (precursor for polyurethane and propylene).
- Two acetyls (acetic acid and vinyl acetate monomer) projects are being developed by Saudi International Petrochemical Company
(Sipchem) and Tansee Petrochemical Company (Saudi Arabian Company) for catering to the domestic and regional markets.

Saudi Basic Industries Corporation (SABIC) Alpha Olefins project is another milestone in the diversification drive. This company would use new polyethylene processes, which will result in products different from the gas phase unipol polyethylene grades currently used by all of SABIC's affiliates in Saudi Arabia. The Saudi-Chevron Petrochemical Joint Venture, in its planned olefin complex used the services of Chevron Phillips Chemical Corporation. As in the beginning, the petrochemical industry in Saudi Arabia sought business partners that could provide technology and a market for its products.20

The industry's adopted business model, therefore, entailed up joint ventures with leading global players. About 70 percent of the existing petrochemical projects in Saudi Arabia are joint ventures with industry majors including Exxon Mobile Corporation, Royal Dutch Shell PLC, Mitsubishi Corporation, Hoechst Celanese Corporation and Chevron Phillips.

Research and development is recognized as a source of competitiveness and key to maintaining future growth in the increasingly competitive environment of the petrochemical industries. A successful research and development programme is therefore crucial to a

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successful business strategies. SABIC demonstrated this strategy in 1991. It launched its state of the art research and development centre in Riyadh. More recently SABIC has opened four external research & development centres in Jubail, Houston, India and the Netherlands to supplement the research activity of the Riyadh Centre.21

This research and development efforts has currently led to the development and commercialization of several indigenous technologies including –

1. SABIC technology for butane-1 production, developed jointly between SABIC and Institute Francis Du Petrole. It is licensed to more than 19 chemical companies in eleven countries.

2. Acetic acid technology is a locally developed route to acetic acid from direct oxidation of ethane, commercialized in 2005 by SABIC affiliate Ibn Rushd.

3. Linear alpha olefin technology (a-Sabiine) developed jointly by SABIC and Linde AG.

At Jubail United Petrochemical Co., a wholly owned affiliate of SABIC, is building a linear alpha olefin production facility.

In support of the research and development efforts, SABIC has recently acquired Scientific Design Co. including in partnership with

Sud-Chemic. Scientific Design Co. is a research company in the field of industrial catalyst.

Primarily, due to lack of expertise in developing large scale petrochemical projects, private sector petrochemical investment were previously concentrated in project’s downstream of steam crackers. SABIC therefore, was the sole company in the upstream petrochemical sector until 1995, when the Cabinet liberalized the sector and invited local and foreign private investors to invest in the industry. This led to the start up in 1999, of the Saudi-Chevron Phillips plant in Al-Jubail, the first wholly owned private petrochemical venture in Saudi Arabia.

Currently, the private investors involved in the Saudi petrochemical industries include Tasnee, Sipchem, Saudi Chevron, Sahara Petrochemical Co., Lujian Industrial Co., Kayan Petrochemical Co., National Polypropylene Co. and Saudi Formaldehyde Co.

The private sector is actively developing large scale petrochemical products in Saudi Arabia. The share of private investment in the planned basic petrochemical is 51 percent of total capital investment planned for 2004-09.

Future development regarding the involvement of the private sector in the petrochemical industry may be in the form of –

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22. *Oil and Gas Journal*, Nov. 13, 2000, p.52
- An acceleration of the privatization process, resulting in the transfer of some of the state shares in SABIC to private sector.

- Partnering between the private companies in developing upstream/petrochemicals and refinery projects. This is exemplified by the Sahara Cracker Project owned by Sahara Sipchem, and Tasnee Petrochemicals.

- The formation of marketing alliances between petrochemical producers to increase market share and geographical spread. SABIC has signed an off-take agreement to market 50 percent of Lujian’s polypropylene output.

**Downstream Expansion:**

Current investments in Saudi petrochemical industry are heavily concentrated in the upstream segment due to the fact that petrochemical producers at this level benefit from low cost feedstock which provide them with significant cost advantage at the primary and secondary level.

These economic benefits are not currently shared with highly developed downstream industries, such as the plastic conversion plants; current transfer pricing for employer is set in accordance with global market prices. Conversely, however, the plastic conversion industry in Saudi Arabia has maintained steady growth during the past three decades.
This growth was achieved despite the fact that the plastic conversion industry is fragmented and caters mainly to local demand and export are limited amount to regional markets. The government is eager to develop the Saudi plastic conversion industries to compete globally.

Saudi Arabia currently exports substantial quantities of polyethylene resins to China which are then proceeded into films, roll stock and plastic bags for export to US and European Union. It is logical that Saudi Arabia is exploring the prospects for serving the export markets directly from the country, thereby capturing more of the value chain. The target is to increase Saudi Arabia’s share in the global plastic market to 15 percent by 2020 from 1 percent currently.24

The main challenges in achieving this objective is to establish a plastic conversion industry that derives its global competitiveness from a competitive resin’s transfer pricing mechanism. This may happen as a result of the increasing number of local resin suppliers coupled with the traffic-reduction on imported resins, which is expected to derive a competition that will eventually drive resin price down. Regarding the petrochemical industry, Saudi Arabia offers the best current and future investment; its government actively endorses industrial expansion and investment inflows. This commitment includes maintaining a

competitive feedstock pricing formula and expanding the industrial infrastructure in the industrial cities of Jubail and Yanbu. This indicates the sizable expansion needed to meet the growth in the petrochemical industry. SABIC has advantage of abundant low cost gas feed stock. This makes the company highly competitive in the global market providing it profit despite a slump in the market and protective tariff on both sides. SABIC reported a 36% fall in net profit in the first half of 1999 to SR 488 million, as low petrochemical prices continued to hit hard. Profit declined from SR 1,342 million in January – June 1998. By mid 1999 the fall had reached more than 85% since the record half yearly profit of SR 3,350 million reported in 1995.

SABIC Vice President & Managing Director Mohammad Al Mady said the company performed better in the second quarter of 1999 due to a slight improvement in the prices of some commodities and additional cost saving measures. Production and sales in the first half of the 1999 declined slightly because of maintenance work.25

A minority shareholding was offered to private equity investors from the start, and when the stock market was established SABIC became the largest quoted company not only in the Kingdom but in the entire region, a prime position that was to last until the partial privatization of the Saudi Telecommunication Company in December

25. MEED, 38(2) 4-10 Aug. 2006, p.49
2002. SABIC is actually structured as a holding company, with a series of multinational joint venture partners involved in each particular project. These have included, Mobile, Shell, Dow Chemicals, Mitsubishi & The Taiwan Fertilizer Company. By the 1980s SABIC had increased its stake in the joint ventures. The role of the joint venture partners being downgraded to management, servicing and fee based contracts rather than their having a direct share in the equity and hence the profit. This suited the foreign partners, as they reduced their risk profile and were yet assured of continuing involvement.

The challenges in the decade ahead will be to encourage more linkage and spin-offs from SABIC to downstream industries capable of employing greater numbers of Saudi population. The HADEED Steel Company was initially geared to producing reinforcing rods and girders for the construction industry after its establishment in 1983. By 1990, it was producing rolled steel for the local and GCC engineering and manufacturing industries. SABIC polymers are a major exporter of polyethylene including polypropylene and polystyrenes with a production capacity of almost four million tones annually. They have diversified downstream into polyester fibres and filaments, textile grade chips and packaging resins, as well as melamine.

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26. *Oil & Gas Journal*, Feb. 9, 2006, p.31
27. Ibid.
Given the Kingdom’s abundance of feed stocks, the attractive financing, and above all the will and determination of Saudi Arabia to industrialize, there existed ample incentives to the various chemical and oil companies to participate in such programmes. The potential partners were selected and the negotiation started in 1970. Therefore, the joint venture companies, which SABIC has formed so far do represent the determination of both SABIC and selected partners to implement the project, which were identified in the Kingdom’s industrialization plan.

Here it may be helpful to mention briefly why the joint venture approach was adopted. The Kingdom lacks certain specific expertise in the operation of large petrochemical complexes and the marketing of petrochemical products worldwide. It was understood that for the Kingdom to built a viable petrochemical industry, the plants have to be large enough in order to offset any disadvantages that Saudi Arabia petrochemical plants may have in terms of remoteness from traditional petrochemical markets. Clearly SABIC also is very concerned about developing the domestic Saudi markets and thereby facilitating several downstream investment in the Kingdom and the adjacent markets in the Gulf.²⁸

Out of the projected distribution of total production of SABIC’s joint venture, United States will account for 20%, Europe 22%, Japan

20% and the rest of the world 38%. Such a strategy was consistent with the Kingdom’s location with respect to the consumers and the need in certain areas for petrochemical products.

In addition to the Saudi commitment to industrialization, it was also necessary to develop their manpower. SABIC has emphasized from the very beginning its investment in manpower development and its determination that at the time of start up of its industrial projects, most of the skilled and semi-skilled labour force would be Saudi nationals. That percentage will be gradually increased until the plants are entirely run by Saudis. The benefit from this strategy had to be tremendous to Saudi Arabia, enabling the people of Saudi Arabia to acquire, among other things, technical know-how. SABIC partners will benefit as well since the need for expatriate labour will be reduced and hence, operating cost decreased. By adopting carefully drawn manpower development plans, Saudi Arabian dependence on foreign labour will gradually decrease.

However, so many problems cropped up in implementing the Saudi plan for industrialization. However, none of them has undermined the commitment to achieve the aim of industrialization. There should be no doubt that SABIC is determined to achieve its objectives laid down in Saudi Arabia industrialization programme. The evidence of determination and achievements by SABIC should make the skeptics
more objective in pointing out the accomplishments in various fields. The achievement has been considerable, indicating that the Kingdom is on the right path. SABIC has been confident that between its determination and its partner's dedication and commitment, the Saudi's aspiration to become an industrial country could prove true.

In addition to SABIC's programs and the creation of downstream industrial projects, the Saudi private sector has been active in complimenting the activities of SABIC. The number of downstream plans has tripled in the past years. The majority of this plants depend on imported material for feed stocks. The Saudi businessmen value the importance of industry and therefore, willing to undertake an industrial project with more confidence. This has been attributed to a better understanding and ability to judge projects on their merits, coupled with the incentives given by the government. The undertakings by SABIC represents the achievements that would secure the proper utilization of the resources of Saudi Arabia and would guarantee the continued well being of future generation. In a nut shell, it is found that a small but dynamic group of technocrats from the Saudi Ministry of Industry and Electricity, SABIC, the Royal Commission for Jubail and Yanbu, and other entities as well as executives from Mitsubishi, Mobile, Shell, Exxon, Dow, Celanese and other corporation have, despite having
divergent interests, pooled their ability to create a great new industry in Saudi Arabia.

Table – 1

Total Production of Refined Products and Their Exports*

(Million Barrels)

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Production (Million Barrels)</th>
<th>Exports (Million Barrels)</th>
<th>% Share (Million Barrel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>225.297</td>
<td>207.89</td>
<td>92.27</td>
</tr>
<tr>
<td>1975</td>
<td>210.835</td>
<td>175.26</td>
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* Including LP and Natural Gas

**Source**: Ministry of Petroleum & Mineral Resources.

➢ Total production includes: fuel oil, diesel oil, gasoline & naphtha LPG, jet fuel, kerosene, asphalt & others.

➢ **Source**: Oil & Gas Journal various issue.
Total Production of Refined Products and Their Exports* (Million Barrels)
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<th>Year</th>
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<th>South America</th>
<th>% Share</th>
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<th>% Share</th>
<th>Middle East</th>
<th>% Share</th>
<th>Africa</th>
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* Including LPG and Natural Gas

- Not Available

**Source:**
1. Ministry of Petroleum & Mineral Resources
2. Oil & Gas Journal various issue.
Marketing / Export of Refined Products:

The total production of refined products and their export is shown in Table 1. This table shows that total production of refined products has increased continuously from 1971 to 2006. The production was 225.297 million barrels in 1970, which increased to 715.421 million barrels in 2006. But the share of export in total production has decreased in the same period. It was 97.27 percent in 1970 while it came down to only 65.17 percent in 2006. The share of export in total production was the lowest in the year 1985, estimated to be only 47.41 percent. From the year 1970 to 1975, the production decreased from 225.297 million barrels to 210.835 million barrels while the percentage share of export in total production decreased from 92.27 percent to 83.12 percent. Production increased to 302.494 million barrels in 1980 with the percentage share of export in it decreasing to 58.99 percent. Production further increased to 415.255 million barrels in 1985 and the percentage share of export further decreased to 47.41 percent. Production again increased to 561.236 million barrels in 1990, while the percentage share of export increased tremendously to 85.34 percent. In the year 1995 production decreased to 529.241 million barrels whereas the percentage share of export increased further to 91.15 percent. Production increased to 602.154 million barrel in 2000 with the share of export decreasing to 597.45 million barrels in 2001, while the percentage share of export
decreasing to 66.13 percent. Production of the refined products increased to 642.621 million barrel in the year 2003 with the percentage share of export slightly increasing to 64.10 percent. Production of refined products further increased to 698.113 million barrels in the year 2004, while the percentage share of export increased to 69.76 percent. Production of refined products increased further to 720.647 million barrels in 2005 while percentage of export slightly increased to 70.16 percent. The production remained more or less at the same level of 715.421 million barrels in 2006, and percentage share of export decreased to 65.17 percent.

Table 2 gives data about the total export of refined products by destination from Saudi Arabia in different years from 1970 to 2006. Saudi Arabia made export of 207.89 million barrels out of which exported 0.08 million barrels to North America, 6.40 million barrels to South America, 6.71 million barrels to Western Europe, 1.67 million barrels to Middle East, 7.56 million barrels to Africa and 6.20 million barrels to Asia & Far East, 8.03 million barrels to Oceania. The lowest percentage of export has been destined for North America which is equivalent to 0.08 percent of total export. Export of refined products of Saudi Arabia decreased to 178.45 million barrels in the year 1980. Out of this it exported 4.53 million barrels to North America and 2.31 million barrels to South America, 36.93 million barrels to Eastern
Europe, 1.88 million barrels to Middle East, 0.39 million barrels to Africa, 100.34 million barrels to Asia and Far East, 2.59 million barrels to Oceania. The percentage of export in this year was highest for Asia and Far East, equal to 56.22 percent and the lowest share of export was for Africa, which was equal to only 0.21 percent. The export of refined products of Saudi Arabia increased to 478.98 million barrels in the year 1990, out of which the export to North America was 50.61 million barrels, 6.43 million barrels for South America, 80.67 million barrels for Western Europe, 34.64 million barrels to Middle East, 18.73 million barrels to Africa, 274.64 million barrels for Asia & The Far East, 10.87 million barrels for Oceania. Among which the largest percentage of export was for Asia and Far East, which was equal to 57.33 percent. The export of refined oil production of Saudi Arabia was 448.24 million barrels in the year 2000, out of which 7.70 million barrels was exported to North America, 20.56 million barrels for South America, 28.48 million barrels for Western Europe, 43.77 million barrels for Middle East, 39.65 million barrels for Africa, 292.83 million barrels to Asia and Far East, 15.24 million barrels to Oceania. The highest percentage share of export was for Asia and Far East, it was equal to 65.23 percent and the lowest of export was for North America, it was equal to only 1.71 percent. The export of refined oil products increased to 505.67 million barrels in the year 2005. Out of which 18.55 million barrels was
exported to North America, 12.12 million barrels to South Africa, 55.57 million barrels to Western Europe, 56.75 million barrels for Middle East, 41.40 million barrels for Africa, 317.22 million barrels for Asia and Far East, 4.06 million barrels for Oceania. Among these the highest share of export goes to Asia and Far East and lowest to Oceania. The total production of refined products of Saudi Arabia was 466.31 million barrels in 2006. It declined marginally as compared to the previous year. 13.23 million barrels went to North America, 7.23 million barrels to South America, 49.64 million barrels to Western Europe, 72.01 million barrels to Middle East, 45.17 million barrels to Africa, 275.92 million barrels to Asia and Far East, 3.11 million barrels for Oceania. The highest percentage share of total refined products of Saudi Arabia went to Asia and Far East and the lowest to Oceania.

Tariff Problem by European Union

Restriction imposed on the free flow of trade are called trade barriers. Trade barriers can either be tariff barriers or non-tariff barriers. Tariff barriers are the levy of extra ordinary custom duties on the imports. Whereas non-tariff barriers are those which are concerned with other than custom duties. There are many kinds of non-tariff barriers. These are –

(1) Import policy barriers
Standard, testing, labelling and certification requirements.

Anti dumping

Export subsidies and domestic support

Government procurement

Service barriers, etc.

The European Union is the biggest trader of the world, accounting for 20 percent of global imports and exports.\textsuperscript{29} The European Union trade policy is closely linked to its development policy. The Union has granted duty free or cut rate preferential access to its market for most of the imports from developing countries.

The European Union developed a new trade and development strategy with its 78 partners in the Asia Pacific – Caribbean group of countries aiming at integrating them into the world economy. It also has a trade agreement with South Africa that will lead to free trade between two sides, and it is negotiating a free trade deal with the six members of Gulf Co-operation Council (GCC) – Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates. However, the European Union has specific trade agreement with its major trading partners among the developed countries like United States and Japan. Trade is handled through the WTO mechanism, although the European Union has many agreements in individual sectors with both countries. The WTO

\textsuperscript{29} Arab News, May 9, 2007, Riyadh, p.16
agreement also applies to the European Union’s trade with China, a
country which greatly benefited from the WTO decision to remove
restriction on textile trade from January 2005. Special agreements were
negotiated between the two sides during the year to prevent the
continuation of a surge in Chinese exports to the European Union which
affected the European garments industry.  

The WTO memberships calls for the lowering of tariffs and
subsidies on a wide range of goods and services. A strengthening of the
protection accorded to intellectual property rights; and measures for a
speedier resolution for all trade grievances and disputes which would
provide extra assurance to foreign investors in Saudi Arabia and lead to
greater prospects for inward investment. The World Trade Organisation
(WTO) provide a good platform for setting the cases of dumping
petrochemicals in the Kingdom by producers in tariff – protected
economies.  

It is believed that the Saudi accession to the WTO will further
enhance the competitive advantage enjoyed by the Saudi petrochemicals
industry and strengthen its position in the international market. Being
export oriented, the Saudi petrochemical industry stands to gain from
the WTO provisions, including its extension to services, particularly to
finance, insurance and transportation. Whose prices, following this


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extension, may decrease significantly. These services are purchased in fairly large quantities by the Saudi petrochemical industry and the resulting cost reduction may further add to the competitive advantage of the industry. Over all adhesion to the WTO bestows benefits and poses potential challenges to Saudi Arabia’s petrochemical products.

On the benefit side the removal of trade barriers called for by WTO bylaws will allow Saudi petrochemical producers to offer lower prices to tariff protected markets such as the European Union, US and Japanese market. The tariff reduction in these economies may induce a sizeable increase in Saudi petrochemical export to those economies depending on the response of supply and demand to the lower prices resulting from tariff reduction.\textsuperscript{32} For instance, tariff on polymers (polyethylene, polystyrene, polypropylene) in the European Union are to be reduced by approximately half from 12.5 percent to 6.5 percent. As a result, it will be difficult for these high cost production economies to compete at the lower market prices, caused by the tariff reduction. In the short run, they may reduce their production levels and possibly sell at a lower profit margin. The petrochemical output in these economies may thus decline less proportionately than prices. In the long run the high cost producer will exit the industry and thereby reduce the number of

\textsuperscript{32} Ibid.
producers. Inversely, the increase in demand caused by the lower prices will benefit Saudi petrochemical export.

The tariff reduction will benefit these export through a direct (price effect) and an indirect (income effect) impact. The lower prices, caused by the lower tariffs, will produce the direct (price) effect. The increased real income due to lower prices will induce an increase in demand, producing the indirect effect.

In return, Saudi Arabia has to lower its own tariff and open its market to imported petrochemical products. The tariff on key secondary petrochemicals, such as polyethylene, polypropylene and polystyrene, are at present set at 12 percent with a provision that it would be reduced to 8 percent within an interim period ending in year 2008, followed by a second interim period ending in year 2010. By which time this tariff will drop to 6.5 percent. Though the volume of imported polymers is small, the tariff reduction may induce a strong competition among petrochemical producers as they seek to increase their share in the domestic market.

This may result in a pricing ramification leading to narrow profit margins on local sales. The petrochemical producers may thus need to focus attention on regularly reducing their production cost and ensuring that their product qualities match or exceed the world standards. Given the strong competitive advantage enjoyed by the Saudi producers, it is
likely that they will meet the competitive challenges and retain their market share in the domestic market.

The downstream petrochemical industries in the Kingdom stand to benefit from the expanded market caused by lower prices. However, the Kingdom is committed to reduce the tariff on proceeds plastic imports, from 20 percent to 6.5 percent over an interim period ending in 2010.\textsuperscript{33} This may increase the import of finished plastic products from lower cost Asian producers, including China. However, the WTO provisions allow the developing countries to restrict their import in order to protect their infant industries in the situation that import from particular countries increase disproportionately. The downstream industries will need to be restrictive, with the small partners consolidating and merging to reach a critical mass, which is essential to competitiveness in domestic and global market alike.

This accomplishment is by far more important to the petrochemical industry than the impact of tariff reduction in protected economies for two main reasons, namely that more than 50 percent of Saudi petrochemicals export are destined to non-tariff protected Asian markets and that the competitiveness of the Saudi petrochemicals industry depends primarily on competitive price feedstocks, which represent as much as 60 percent of the integrated cash cost in the

\textsuperscript{33} Arab News, May 9, 2007, Riyadh, p.16
industry. In turn this will expedite the pace of the ongoing shift in the
centre of gravity of the global petrochemical industry towards the most
cost efficient area with close proximity to markets. Saudi Arabia is
rapidly emerging as a global petrochemicals hub and the premier
location for future investment in the petrochemical industry.

Moreover, the fragment of the economy into blocs such as the
European Union, Mercosur, ASEAN and NAFTA, combined with the
lamentably low level of inter-Arab trade provides a big incentives to
governments in the region to do more to reduce barriers and help trade.
To this end, the Foreign Minister of the countries of the Damascenes
declaration – the GCC states together with Syria and Egypt – announced
in a communiqué issued on 26 June that they were forming a committee
to look into the creation of a free trade area in these eight countries. The
committee, they said, would meet before the end of September 1997 in
Saudi Arabia to look into the practicalities of the proposal.

Dr. Majid Al-Moneef, advisor to the Saudi Minister of Petroleum,
opines about the economic distortion that oil taxes and energy subsidies
create in the market, and their impact on oil’s market share. That
“petroleum product taxation, especially gasoline, continued irrespective
of crude oil prices, thus denying the consumer the benefits of lower
prices and exacerbating the effect of higher crude prices,” adding that
any extra taxation on the already distorted prices would add to
inefficiency and would effect the consumption of different fuels disproportionately to their environmental impact. The Saudi economist illustrated this by saying that "the loss in oil share in fossil fuel consumption in the OECD between 1973 and 1990 was partly due to the taxes on petroleum and the subsidies to coal and nuclear energy. For example, oil share declined from 59 percent to 50 percent while coal's share increased from 20 percent to 25 percent and share of natural gas from 21 percent to 23 percent between the two years." Apparently, the Saudi Arabia Petrochemical Policy has been able to reduce the degree of dependence of the economy on the oil sector and has pulled it towards the self-reliance. A very solid foundation of an advanced industrial base has been laid. With the acquisition of required skills and upgradations of technological level, Saudi Arabia is likely to become one of the leading producer of petrochemicals.

34. Op cit. 30