

# Selecting an Appropriate Strategy to Increase Petrochemical Product Sales (Case Study: Iranian Petrochemical Industry)\*

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## Abstract

This article aims to find the best strategies which help increase petrochemical products sales in Iran using multivariate regression model, Grand Strategy Matrix (GSM), and SWOT matrix. *Market Development*, *Market Penetration*, *Product Development* by creating and developing chemical cities or parks, petro-chemical refineries, and Especial Economic Zones, *Vertical Integration*, and *Concentric Diversification with Diverse Portfolio* were considered independent variables, while *Increasing Petrochemical Product Sales* is dependent variable. Then, each of above mentioned factors affecting the sales were ranked in order to take advantage of the highest added-value. The statistical population consisted of 140 experts, managers, directors, and customers involved in National Iranian Gas Company and Iran Petrochemical Company. Random sampling method was employed. A total of 57 experts, managers, directors, and customers were enrolled as sample size. Data were collected using a five-option Likert scale questionnaire. SPSS, Grand Strategy Matrix (GSM), and SWOT<sup>1</sup> matrix were employed to analyze the data. According to the Cronbach's alpha (0.86), the reliability was verified. *Market Development*, *Market Penetration*, *Product Development*, and *Concentric Diversification with Diverse Portfolio* were found to be suitable offensive strategies to increase the petrochemical product sales. *Product Development* and *Market Penetration* are the most effective factors in increasing the petrochemical product sales. Therefore, they need to be taken into account.

**Keywords:** strategy selection, petrochemical industry, GSM, SWOT Matrix, SPSS

## 1. Introduction

Petrochemical industry, providing the opportunity to convert raw materials into valuable products, is of great importance in the Middle East and the world. The most important feature in Iranian petrochemical industry and world is to obtain very high oil and gas added-value which can dispel the biggest concern of the world's last decades that is optimal energy consumption management from the one hand and maximum profitability and productivity of these resources, on the other hand. Petrochemical industry, as the provider of opportunity for value creation concerning job opportunities in the industrial development of complementary industries, has always been of great importance. In addition to preventing the sales of raw materials, petrochemical industry development, especially the construction of petrochemical downstream industries, would reduce the unemployment growth and strengthen the employment policy. Therefore, the realization of these strategies reduces Iran's dependence on single-product economy of crude oil export. It also helps sustainable and balanced economic development (Shahmirzadi Esmaeili, 2013). Iran's oil and gas industry vision and major objectives of Iran's 2025 Vision Policy<sup>2</sup> focus on the achievement of the first regional position concerning the production of petrochemical goods in order to create the highest hydrocarbon resource added-value and realize the Fifth Development

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\*The article is taken from the Ph.D. thesis with above mentioned title. The esteemed supervisor was Prof. H. Hambardzumyan and the esteemed advisor was Prof. A. Antonyan and Prof. L. Ghantariyan.

<sup>1</sup>Strength, Weakness, Opportunity, Threats

<sup>2</sup>The vision was devised by the Deputy President for Strategic Planning and Control (DPSPC). The vision is going to lead the country to a developed state with the highest rank of economic, scientific and technological status in the region, maintaining revolutionary and Islamic identity, inspiring Islamic world, as well as effective and constructive interactions in its international relations.

Plan<sup>3</sup>. The plan targets at producing 126 million tons of petrochemical products, minimum 12 million tons of ethylene, 10 million tons of polymer, and 8.5 million tons of urea, overtaking the regional competitors in the petrochemical industry, and achieving 34% of petrochemical product value capacity in the Middle East and 6.3% of global petrochemical product value capacity. Achieving above mentioned objectives requires appropriate strategies and policies. One of the most important points to achieve the objectives of the 2025 Vision Policy is to study the condition of petrochemical industry in competing certain countries especially Saudi Arabia and their future plans. Such review can be an appropriate criterion for the realization of 2025 Vision Policy (Dashti, 2015). Iranian petrochemical industry has major competitive advantages such as accessing to the world's largest hydrocarbon resources, ensuring an abundant gas feedstock for the petrochemical industry with competitive price, having suitable coasts to construct export ports, containing petrochemical feedstock gas resources in the Persian Gulf, enjoying suitable geographical location concerning the proximity to the Asian markets including China, India and Europe via Turkey, and considering the low domestic demand capacity and low per capita consumption of polymeric materials compared to the international standards, suitable and compatible tax regime for export (export exemption). The availability of cheap, young, and educated workforce to work in these plans is another advantage. Increasing petrochemical product sales requires suitable strategies and the identification and analysis of certain environmental factors such as market, competitors, business environment, and economic conditions and the analysis of public environmental factors such as technology, social, political, and economic conditions. Identifying and analyzing the opportunities and threats, the role of important actors in the regional and international market would be highly effective in selecting effective and appropriate strategies in order to increase the sales of petrochemical products. Taking suitable strategies into account attracts capital and manufacture competitive products in international target markets (Europe and the Far East) and regional markets with competitors such as Russia, Saudi Arabia, Qatar and the UAE (Esmaeeli Shahmirzadi, 2013). According to the National Petrochemical Company vice president, a total of 5%-7% hydrocarbon entered the petrochemical industry in 2014. Yet, it accounted for 44 million tons of products and 40% of Iran's non-oil export, showing the high added-value of the industry. It also indicates the important role of petrochemical industry in economic growth and employment (National Conference on Oil and Economic Development, 2014).

## 2. Statement of Problem

The article aims to study the appropriate strategies to increase Iranian petrochemical product sales. Increasing petrochemical product sales requires appropriate strategies, the analysis of certain and public environmental factors, opportunities, and threats, and recognizing the role and importance of important actors in the regional and international markets (Rahimi, 2010). Iranian petrochemical industry is evaluated by SWOT matrix. Here, offensive strategies are recommended. The article aims to study the appropriate strategies in offensive mode including market development, market penetration, product development, integration, diversification, or combined strategies depending on the strategies affecting the development and export in Iranian petrochemical industry chain of which gas is considered an important feedstock. The article tries to offer a suitable analysis framework for studying the above mentioned factors. Market development, market penetration, product development by creating and developing chemical cities or parks and developing petro-refineries and constructing Special Economic Zones, vertical integration, and concentric<sup>4</sup> diversification with diverse product portfolio were considered independent variables. "Increasing the sales of petrochemical products" was considered the dependent variable. Each of factors affecting the increase in petrochemical product export is then ranked in order to take advantage of the effect and importance of them to reach the highest added value (Shahmirzadi Esmaeili, 2013).

## 3. Theoretical Background

Strategies are tools which can be used by companies to achieve their long-term objectives. Long-term objectives indicate the expected results of implementing certain strategies. Strategists offer practical ways to achieve the long-term objectives. The time frame of these strategies and long-term goals must be compatible with one another, which usually lasts between 2 to 5 years (David Fred, 2011).

The following well-known models and matrices are used to develop the strategies:

1. SWOT Matrix (Strength, Weakness, Opportunity, Threats)

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<sup>3</sup>Iran's development is managed through 5-year economic, social and cultural plans, that is a strategic and operational plan developed at national level and after preparing the national documents including sectorial and inter-sectorial background materials, the provincial and organizational versions should be prepared afterwards. The Deputy President for Strategic Planning and Control (DPSPC) is responsible for coordinating the process of planning at national and provincial level.

<sup>4</sup>Also known as related strategy

## 2. Strategic Position Action and Evaluation Matrix (SPACE)

## 3. Boston Consulting Group (BCG) Matrix

## 4. Internal and External Matrix

## 5. Grand Strategy Matrix (GSM)

In order to decide concerning the suitable strategy in different conditions, one or a set of attractive strategies need to be taken into account in order to fully understand the strategies (Amir Kabiri, 2010). The classification of strategies is as following:

- Integration strategies
- Focus strategies
- Diversification strategies
- Defensive strategies (SJC Institute, 2012).

Each of above mentioned strategies covers others.

Table 1. Overall Classification of Strategies

Integration	Focus	Diversification	Defensive
Forward integration	Market Penetration	Concentric Diversification	Joint Ventures
Backward Integration	Market Development	Horizontal Diversification	Reduction
Horizontal Integration	Product Development	Conglomerate Diversification	Divestiture
			Liquidation

*Strength, Weakness, Opportunity, Threats (SWOT) Matrix*

In order to determine the strategies, SWOT technique compares external opportunities and threats with internal strengths and weaknesses based upon the information obtained from the evaluation of internal and external factors. This is performed to give suitable strategies for the organization's internal conditions and the effects of conditions surrounding the organization. In most cases, there is a complex relationship between the internal and external factors. Strategies need to be balanced to compare these factors. Successful organizations develop and implement acceptable strategies. Developing strategies is considered an attack in order to take advantage of opportunities or strengths, while planning for reducing the damages resulting from threats or weaknesses is considered defense. Therefore, different strategies need to be coordinated and balanced (Ghorbanian, 2014). According to this matrix, four strategies are introduced: 1. SO: is an offensive mode and uses internal strengths to obtain an external opportunity, 2. WO is conservative mode to eliminate the internal weaknesses using opportunities and participation, 3. WT is a defensive approach to reduce the internal weaknesses and avoid external threats, and 4. ST is a competitive mode using the internal strengths to eliminate the threats. Each of these strategies monitors the company's certain condition and the surrounding effects on the organization. The suitability of this technique, correct or incorrect information, and strengths or weaknesses of these strategies heavily depend on the accuracy of internal and external factor analysis (Sehat, & Jami, 2012).

*Grand Strategy Matrix (GSM)*

Figure 1 shows GSM based on two factors (market growth and competitive position). According to the condition, every industry is placed in one quadrant (from 1 to 4). Suitable executive strategies are as following:

1. Companies positioned in this quadrant have very strong strategic positions. Stopping the current strategies has established competitive advantage which does not seem rational. These companies must concentrate on the existing market by adopting market development, market penetration, and product development. Organizations that fall into Quadrant 1, if they have abundant resources, use forward, backward, and concentric set of strategies. When companies in Quadrant 1 are committed to the manufacture of a single product, they can go ahead for concentric diversification strategy to minimize the risk related to a single product. These companies can take advantage of different opportunities in an external environment and they can also have offensive strategies and take risks in case of need (Shahmirzadi Esmaeili, 2013).

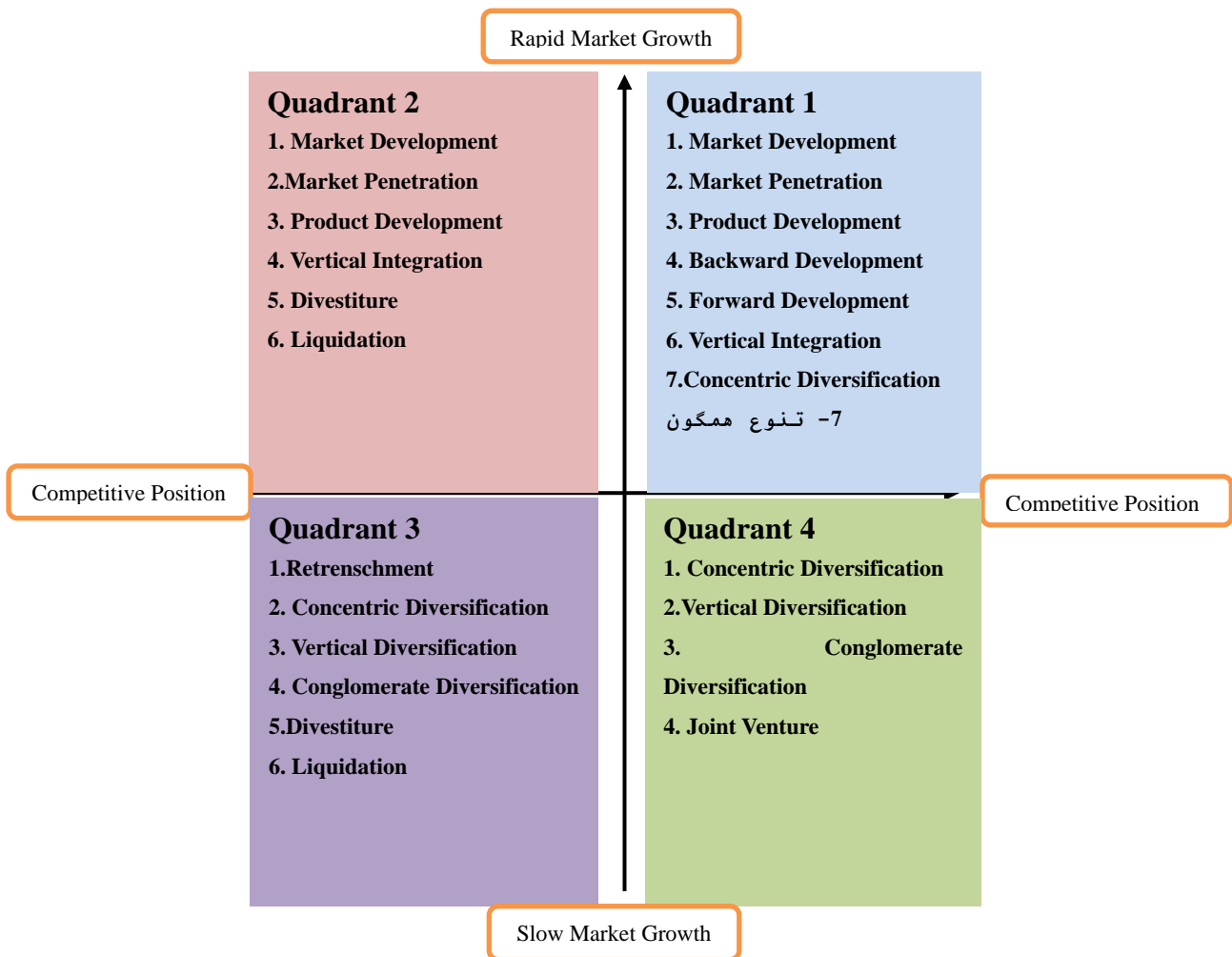


Figure 1. GSM

1. Firms laying in Quadrant 2 need to reconsider their current market strategies. Although they have rapid growing industry, they cannot effectively compete in the market and need to know why their current method is inefficient and come up with a strategy to improve their strategic position. Since the Quadrant 2 companies experience rapid market growth, they need to use "focus strategy". This way, they implement the "horizontal integration". The last strategic option available for the firms positioned in this quadrant is liquidation or divestiture of the business. Such option provides fund to acquire the competitor firms or repurchasing the share of the company from the market.
2. All those firms which fall in Quadrant 3 have slow growth market and have relatively weak positions. Firms have to make noticeable modifications to sustain their positions. Retrenchment strategy has priority in this quadrant followed by diversification to transfer resources to another growing business. The last strategic option available for the firms positioned in this quadrant is liquidation or divestiture of the business.
3. Companies laying in Quadrant 4 have slow growth industry but have a strong competitive position. These firms can grow in different untapped businesses. They have a high cash flow, while they face restricted internal growth. Therefore, this allows them to practice concentric and conglomerate diversification as well as horizontal diversification. These firms can select joint ventures (Quraeshi, 2011).
4. *Selecting Suitable Strategy using GSM and SWOT*

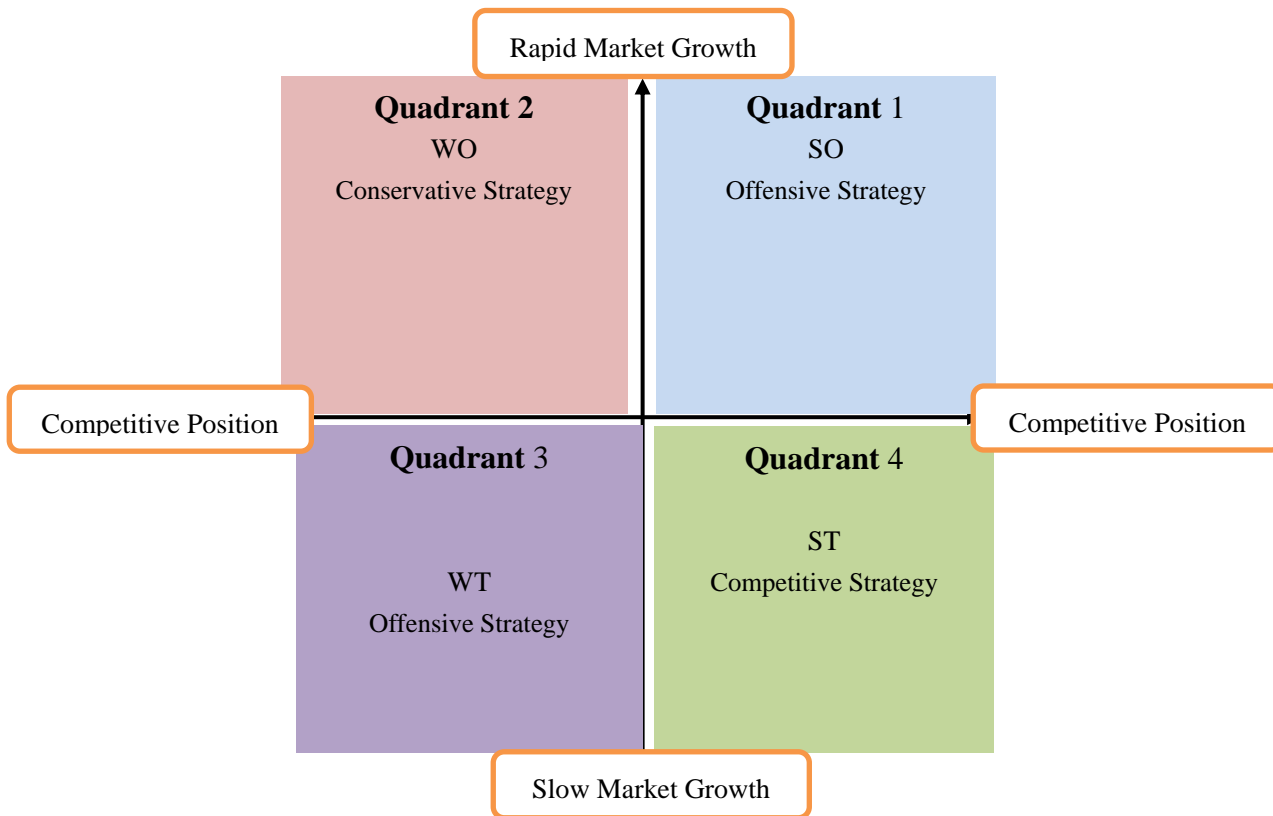


Figure 2. Selecting Suitable Strategy According to the position

According to two factors including market growth and competitive position, Iranian petrochemical industry is placed in Quadrant 1 (Figure. 1 and 2). In this mode, offensive strategies are advised. Expanding activities and investing in different fields are good strategies for firms in Quadrant 1. The size and volume of activities can be developed and expanded. Along with attack, defense needs to be taken into account. Taking advantage of opportunities is considered attack, while adopting certain plans is considered defense to stabilize the current condition. Industries in this position must not practice activities which cause to lose their desirable position. Such activities must not prevent the use of existing opportunities. Depending on the situations, organizations in offensive position face market development, market penetration, product development, integration strategy, diversification, or combined strategies (Shahmirzadi Esmaeili, 2013). The next part focuses on suitable strategies to increase the sales of Iranian petrochemical products.

**4. Suitable Strategies to Increase Iranian Petrochemical Product Sales**

Increasing petrochemical product sales requires having appropriate strategies, identifying and analyzing certain and public environmental factors, analyzing opportunities and threats, and recognizing the important role of regional and international players. Table 2 shows the strategies (Shahmirzadi Esmaeili, 2013).

Table 2. Suitable Strategies to Increase Iranian Petrochemical Product Sales

Market Development	Market Penetration	Product Development	Backward Integration	Concentric Diversification
Geographical diversification of target market for the export of petrochemical products	-Focus on petrochemical prices - Focus on petrochemical product distinction	-Creating and Expanding Special Economic Zones -Constructing and expanding chemical towns or parks -Constructing and developing petro-refineries -Using unused installed capacities in Iranian petrochemical industry	-Increasing the petrochemical raw material -monitoring -Developing downstream industries	- Diversifying petrochemical product portfolio -Manufacturing petrochemical products with higher added value

#### 4.1 Market Development Strategy

According to the GSM, diversification of target market has the priority in market development strategy in order to produce and export polymer and petrochemical products. Table 3 shows that Asian countries have the biggest market for Iranian petrochemical products, while African countries have the smallest Iran market (less than 1%). Therefore, considering the African market along with the development of target markets in Europe and Asia seems essential for Iran. Market development in more than 17 European countries and petrochemical product export to European market can be one of systematic strategies. To this end, constructing storage and distribution facilities as well as developing representative agencies for petrochemical products are prioritized in Eastern Europe and West Europe due to the geographical distance between Iran and Europe and the need to compete with agile organizations. "Petrochemical Hub" in Europe and annual sales and distribution of 200-300 thousand tons of petrochemical and polymer products are the first steps for the realization of development objectives. On the other hand, development strategy of target market in Europe can be considered an important strategy to increase petrochemical product sales because of using opportunities and competitive advantages in Iran and registering 26 petrochemical and polymer products in European Union with *Reach* Environmental Certificate (Kousha, 2011).

Table 3. Iranian Petrochemical Product Sales according to Geographical Regions in 2011

Region	Sales Percentage
India	10.7
Far East	41.5
The Middle East	23.9
South and Southeast Asian Countries	9
African Countries	Less than 1
Other	Almost 14

#### 4.2 Market Penetration Strategy

The objective of market penetration strategy is to increase the market share. In this strategy, the organization selects a part of market and focuses their efforts on this part. It focuses on selling the existing products or services into existing markets. The implementation of such strategy requires tools. The market share cannot be easily promoted in the competitive conditions. This strategy is obtainable through focusing on price and distinction. In the first condition, serving a part of market is the objective which is highly sensitive to price. If production increase causes saving and proration of production cost on higher volume of products, then this strategy is justifiable. This leads to reduced final price and provides optimal options. Sometimes, companies can have lower final price compared to the competitions due to certain conditions such as cheaper resources, more appropriate human resources, and the use of more production capacity. Therefore, they are capable of pricing. In fact, they determine the price in market (Voola, & Orcas 2010). With abundant natural energy sources and cheap natural gas feedstock, Iran does not need to import feedstock for petrochemical industry. Iran has extraordinary competitive advantage in this regard. According to the forecasts, assuming a 25% recovery factor from the hydrocarbon reservoir, Iran has crude oil for the next 100 years and natural gas for the next 200 years for production and export. In contrast, the volume of oil and gas reserves is declining in energy exporter countries. Some countries would even be among the biggest gas and oil importers in the next two decades. Petrochemical producers in Saudi Arabia are concerned with declining prices after the re-entry of Iran into the international markets and losing its share in the markets of Europe, the Middle East and Asia starting in 2016. Iran is the second largest petrochemical manufacturers in the Middle East. In 2014, the Iranian production was 60% of Saudi Arabian total production. Until 2018, Iran intends to increase its petrochemical production capacity from 60 to 120 million tones. Within the next 10 years, Iran intends to invest 80 billion dollars to upgrade and modernize the petrochemical projects. Iranian petrochemical industry requires financial resources, technology, and skilled workforce. Applying modern manufacturing systems, increasing the flexibility of production systems, identifying petrochemical product standards, and considering the competitors in identifying the production objectives to adapt with standards, petrochemical industry can reduce the production costs (Global Petrochemical News, 2015).

The second objective of obtaining market penetration is to focus on distinction. There are certain customers who have not received any responses from manufacturers. The most important variable in this strategy is to correctly select parts of market which has a significant difference with the whole market (Daneshgar, 2014). Concerning the petrochemical product distinction, polyethylene can be pointed out. Although it is known by polyethylene, it is graded. Therefore, focus means to concentrate a certain degree. Petrochemical industry, in fact, can implement the focus strategy with a certain degree of polyethylene purity. A single *Production System Technology* can be used to create and take advantage of distinctive strategy. Therefore, an appropriate percentage of purity is produced according to customers` needs (Vazifeh Dust, 2013).

### 4.3 Product Development Strategy

Raw material, skilled human resource, technology and technical knowledge, and observation of standards are important factors to produce and develop petrochemical products. Using common licenses and localization are of great importance in industry and technology. Using technical knowledge of catalysts is an important process in Iranian petrochemical industry. The following strategies can develop the sales of petrochemical products in Iran and abroad:

#### 4.3.1 The development of Special Economic Zones in Iran

In addition to the realization of objectives in 2025 Vision Policy through infrastructures, product development causes sustainable economic development, foreign and domestic capital attraction, employment, and petrochemical product development by creating industrial and petrochemical poles within the national projects and plans in Special Economic Zones along the Persian Gulf coasts and the Oman Sea such as Pars Energy Special Economic Zone (Asaluyeh) and Mahshahr Special Economic Zone and sometimes feeding from Iran-Pakistan gas pipeline known as Peace Pipeline. Jask and Chabahar ports, located in Hormozgan and Sistan and Baluchistan province, Iran respectively, can become the center of constructing petrochemical units and increasing the production of petrochemical products due to their comparative advantage and geographical location. In this regard, Chabahar Free Zone is capable of becoming Special Economic Zone and developing the industrial and economic infrastructures (Rahimi, 2010).

#### 4.3.2 Constructing and Developing Chemical Towns or Parks

Despite being far from cheap raw materials, leading companies in valuable chemical and petrochemical production such as Germany have managed to become added-value production pole in the world by constructing and developing chemical towns and parks. This is performed by systematic development of the downstream petrochemical products in the form of chemical and petrochemical industrial parks, and petrochemical knowledge-based small and medium enterprises which have led to the production of valuable products, innovation, new products, entrepreneurship and sustainable jobs, management, reduced production cost, and finally added-value from petrochemical raw materials. Therefore, they have become one of the major polymers and petrochemical manufactures in the world. The same budget that Iran spends to construct an upstream unit is used to construct an industrial park including a set of essential infrastructure to erect manufacturing factories and research centers within a certain geographical location directly supported by the government. Most of capital requirements will be funded by the private sector (European chemical regions network, 2009). UAE, Saudi Arabia, Kuwait, and Jordan are seeking to create massive Petrochemical Park with an emphasis on specialized production of middle and downstream petrochemical products with the help of leading countries such as the USA, Germany, and England. The competitive advantage of petrochemical products especially downstream ones over the sales of gas and oil has caused many countries, even those without natural gas and oil resources, to pay attention to them (Elbanna, 2010).

#### 4.3.3 Creating and Developing Petro-refineries

To increase the oil refining profit margin, advanced industrial countries launch a new petrochemical unit along with oil refineries. In Iran, at the same time of fuel oil production reduction, the production of propylene with higher added-value petrochemical industry begins in order to increase the margins of profit in development plans. There are "petro-refineries" in Iranian refineries such as Abadan Refinery, Imam Khomeini refinery in Shazand, and future refinery of Isfahan Refinery. By the end of the Sixth Development Plan, fuel oil production will have reduced by optimizing the Iranian Oil Products Portfolio. Therefore, replacing the production with petrochemical products can be one of petrochemical strategies by constructing petro-refineries. Iran is now one of the biggest, yet, oldest refiners in the Middle East and world by refining crude oil and gas condensates of one million and 672 thousand barrels per day. By the end of the Sixth Development Plan, the capacity will have reached two million and 200 thousand barrels per day. By the end of 2025 Vision Policy, it will have reached three million and 300 thousand barrels per day (Persian Gulf Strategic Plan Manual of Petrochemical Industry, 2014).

#### 4.3.4 Using Unused Installed Capacities in Iranian Petrochemical Industries

Some petrochemical units do not use their complete capacity due to lack of feedstock, low margins of profit or loss, process and technical problems, and repair problems. An increase plan is required to 100% nominal capacity. The feedstock would be supplied for a noticeable portion of Iranian petrochemical units by launching West Ethylene Pipeline and completing its phases. According to the vice president of Iranian National Petrochemical Company, there was 20 million tons of unused capacity in petrochemical industry of which 40% (8 million tons) is related to the lack of feedstock in quantitative, qualitative, and technical forms. Some feedstock has no standards concerning the quality. Out of above 8 million tons, 3 or 4 million tons would be supplied in 2015 and 2016 with the highlighted role of West Ethylene Pipeline because the ethane requirement would enter Kavian 1 and 2 from phases 15, 16, 17, and 18. Another part is 3200 and 2300 NGLs which would supply Imam Khomeini Refinery. Another part of unused capacity is associated with repairs,

exhausted equipment, and old processes. Constructing another 50-100 thousand Polyethylene unit is not economically wise in the world. Renewing and modernizing technologies are another point worth mentioning. Imam Khomeini Refinery is 30-40 years old. Considering the valuable, accessible human resources, geographical location, and access to feedstock supplied from NGL, it needs a complete reconstruction (Kahtari, 2015).

#### 4.4 Backward Integration Strategy

In this strategy, the focus is on controlling the raw material. In petrochemical industry cycle, petrochemical feedstock price plays a key role in investment, cost price, profit margin, and competition and production in the region and world with regional and international players in the field of petrochemical products. After the Targeted Subsidy Act in Iran, natural gas feedstock is more advantageous over other liquid ones such as naphtha, kerosene and condensates. At the moment, almost 9% of Iranian petrochemical industry feedstock belongs to natural gas. Therefore, constructing petrochemical units with natural gas feedstock can lead to the attraction of capital for the competitive products in international target markets (Europe and Far East) and regional competitors with competitors such as Russia, Saudi Arabia, Qatar and the UAE. Urea, ammonia, and methanol production units require natural gas feedstock and Olefin units need Ethane. Other petrochemical units require condensates, naphtha, and NGL feedstock. Using petrochemical feedstock in Iran, as the raw material, is of great importance in international competition. Therefore, coordination and controlling the raw materials can be important strategies in petrochemical industries (Shahmirzadi Esmaeili, 2013). In order to have profitability, petrochemical companies need to adapt with the market conditions and rearrange and reform according to the changes. Prior to the 90s, Japan petrochemical market was a regional one without any serious competitors. With the advent of Korean petrochemical products to Japan in the 1990s, the market atmosphere slightly changed. American and European investment in the East Asian countries warned the emergence of new competitors in the next coming decade (Iran Technology Analyst Network, 2010). New market conditions and noticeable profit margin difference between Japanese petrochemical companies and competitors especially American ones made Japanese firms to work more for higher income. Accordingly, Japanese petrochemical firms in the 90s began to modify their structures and change their production policies in order to adapt with new conditions. According to the new strategy, a group of Japanese companies such as *Mitsubishi Kansy* and *Mitsubishi Petrochemical* were merged in 1992 and they divided the tasks. As a result, Japan petrochemical industry was accelerated and it entered a new stage. Parts of these firms began to produce ethylene, the main feedstock of the production of petrochemicals, and general resins. Others reduced their upstream production and took the policy of producing downstream products and petrochemical derivatives. Such policies require developed organizational structure, management, and human resources so that they are flexible. It is obvious that companies without such organizational ability cannot seriously attend the competition. It is also important to highlight the importance of organizational capabilities to rearrange, change policies, and take suitable strategies. The main competitive advantage in the market is organizational and managerial ability to handle the profitability. Cheap feedstock cannot lead to profitability if organizational and managerial ability is not taken into account (NWW research, NHI research institute, 2000).

#### 4.5 Diversification Strategies

Companies diversify their strategies in three different ways including conglomerate, concentric, and horizontal diversification. Concentric diversification is a type of business strategy where a company acquires or creates new products or services to reach more consumers. These new products and services usually are closely related to the company's existing products and services. In horizontal diversification, the company adds new products or services that are often technologically or commercially unrelated to current products but that may appeal to current customers. Conglomerate diversification is a growth strategy that involves expanding a company's business into an area, or areas, totally unrelated to its core business (Aml & Yigit, 2011). Concentric diversification with diverse product portfolio is a general and applicable strategy. Commercial activities would be related to each other if they have a single market, technology, raw material, or each of similar factors. Concentric diversification reduces the single-product risks, meaning that any changes in the market will not leave serious harms in the organization. When new related products can lead to noticeable sales and the company is able to take such strategy, adopting concentric diversification strategy is useful. In concentric diversification-based strategy, companies use the same markets or technologies (Ayoubi and Razmi, 2013). Adopting concentric diversification-based strategy is being done with development plans to increase the capacity of petrochemical production. Using concentric diversification strategy with diverse portfolio needs to be performed by product added-value. Concerning the diversity of portfolio, increasing the tonnage of petrochemical production is possible regardless of added-value. This leads to the production of bulky, undervalued products. Such products have the lowest added-value in the world and considered among the cheapest petrochemical products. Like for instance, methanol has lower value compared to the value of exported gas, used as the raw material. In other words, the production and export of such products mean packaging natural gas with reliable labels such as methanol. Portfolio diversity with undervalued petrochemical products is not a beneficial solution against selling raw materials. Iranian petrochemical



export value was 14 million dollars in 2014, while, considering less production capacity, Germany produced more than 50 thousand products (195 billion dollars). The objective of adopting diversification strategy in petrochemical industry is to draw an optimal condition and create valuable portfolio, pay attention to customer needs, and evaluate the market in order to design products which are compatible to maintain the competitive advantage in the market. Certain grades of imported products are not produced in Iran due to the specific reasons (Petrochemical Exclusive, 2014). One of Iran's macro-policies in petrochemical industry in the future is to increase the production of Propylene, Polypropylene, and Polyethylene, widely used in complementary industries especially packaging, automotive parts, and food and health products industry instead of certain products such as ethylene, methanol, urea, and ammonia. Constructing and developing upstream units such as olefins, polyolefin, urea, ammonia, and methanol, which have low added-value despite of their high tonnage, only complete the value chain, develop the industry, create job opportunities, and acquire added-value. According to international statistics, actual added-value depends on the completion of the value chain and constructs downstream industries in petrochemical industry. It means that higher added-value is related to downstream products which are closely linked to the final market (Shahmirzadi Esmaili, and Hambardzumyan, 2012).

## 5. Research Methodology

This is an applied, descriptive-analytical study. Field-document approach was used. Data were collected using desk study, Internet search, and a researcher-administered questionnaire. Inferential statistics were used for hypothesis testing. A questionnaire was used to evaluate the suitable strategies (offensive strategy) by professional managers and experts working in National Petrochemical Company and National Iranian Gas Company. SPSS, SWOT matrix, and GSM were also employed. The statistical population consisted of 140 experts, managers, directors, and customers working in Iran National Petrochemical Company and National Iranian Gas Company. A total of 57 were enrolled as the sample size using stratified random sampling method. Excel was used to enter and integrate the data. Then, the data were analyzed by SPSS. Student's t-test and Friedman were utilized for hypothesis testing. The former was used to study the effect of factors (strategies) on increasing petrochemical product sales. In this test, if the value of each strategy is greater than 3, the hypothesis is then verified. Friedman non-parametric test was used to rank the strategies affecting the sales increase. If the probability is than 5%,  $H_0$  is rejected and the alternative hypothesis is verified. The questionnaire has 30 items. The items are scored on a five- point Likert rating scale (Khaki, 2009).

### 5.1 Variables and Hypotheses

Independent variables are market development, market penetration, product development (by constructing and developing chemical towns, parks and developing petro-refineries, and constructing and developing Special Economic Zones), vertical integration, concentric diversification with diverse portfolio, and appropriate packaging. Petrochemical product sales increase was dependent variable.

Hypotheses are as following:

- "Market Development" strategy is effective in increasing petrochemical product sales.
- "Market Penetration" strategy is effective in increasing petrochemical product sales.
- "Product Development" strategy is effective in increasing petrochemical product sales.
- "Vertical Integration" strategy is effective in increasing petrochemical product sales.
- "Concentric Diversification" strategy and diverse portfolio are effective in increasing petrochemical product sales

## 6. Research Analytical Model and its Variables

According to the theoretical principles, objectives, and the variables, the conceptual model is as follows to study the effect of each of strategies as independent variables on "petrochemical product sales increase" as dependent variable.

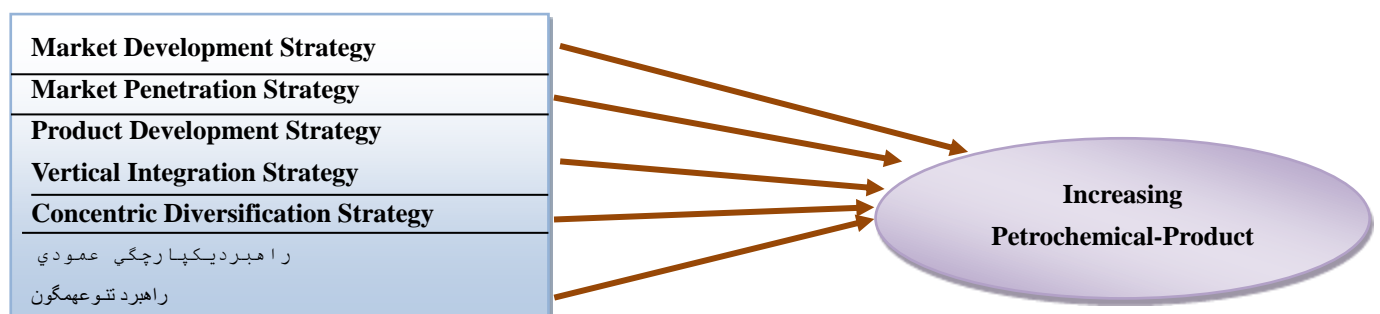


Figure 3. Research Model

6.1 Questionnaire Reliability

The objective of questionnaire reliability is to use it at different times. It means that the results are similar if it is forwarded in a short period of time and then collected. Unreliability is likely to be associated with question ambiguities, irrelevant questions to hypotheses, etc. (Khaki, 2009). Cronbach's alpha is one the most popular methods to evaluate reliability as follows:

$$\alpha = \frac{K}{K - 1} \left( 1 - \frac{\sum S_i^2}{S_{sum}^2} \right)$$

Here, Si is standard deviation of <sup>i</sup>th question, Ssum is total standard deviation, and K is the number of items. Closer Cronbach's alpha to one shows higher reliability.

Table 4. Questionnaire Reliability

Cronbach's alpha	Number of Observations
0.861	57

Source: Research Findings

According to table 4, Cronbach's alpha is 0.86, showing high reliability.

7. Findings

Table 5 shows the effect of the factors (strategies) on sales increase using Student`s t-test. According to the table 6, the levels of effectiveness are different. Table 7 shows ranking of strategies.

7.1 The Effect of Strategies on Increasing Sales

Empirical evidence confirms that sequential variables act like interval variables if the classes have a noticeable distance. Therefore, using t-test and regression is justified for parametric variables. It means that if morethan-5-option Likert rating scale is used (from very low to very high or strongly disagree to strongly agree), a coding system (1 to 5) or other parametric statistical analyses such as t-test and regression can be used (Iran Nejad Parizi, 2006).

Null and alternative hypotheses are written as following for all above mentioned hypotheses:

$$\begin{cases} H_0 : \mu \leq 3 \\ H_1 : \mu > 3 \end{cases}$$

Null hypotheses are as following:

- "Market Development" strategy is not effective in increasing petrochemical product sales.
- "Market Penetration" strategy is not effective in increasing petrochemical product sales.
- "Product Development" strategy is not effective in increasing petrochemical product sales.
- "Vertical Integration" strategy is not effective in increasing petrochemical product sales.
- "Concentric Diversification" strategy and diverse portfolio are not effective in increasing petrochemical product sales.

We study the statistical distribution and test statistic estimation in order to study the hypotheses. Test statistics has relatively normal distribution as shown in table 5. According to the table, all hypotheses are verified except the 4<sup>th</sup> hypothesis.

Table 5. Hypothesis testing

	Number	Mean	St. Deviation	T value	Freedom Degree	Sig. level
"Market Development" strategy is effective in increasing petrochemical product sales.	57	3.30	0.96	2.34	56	0.023
"Market Penetration" strategy is effective in increasing petrochemical product sales.	57	3.79	1.03	5.78	56	0.000
"Product Development" strategy is effective in increasing petrochemical product sales	57	3.79	0.84	7.10	56	0.000
"Vertical Integration" strategy is effective in increasing petrochemical product sales.	57	3.07	0.94	0.56	56	0.576

Source: Research findings (5% level)

7.2 Ranking Strategies Affecting the Sales

The question outlined here is based on the following issue: Which factor is believed to be the most effective in increasing the sales of petrochemical products?

In other words, how is ranking the effective strategies in increasing sales?

Friedman non-parametric test is used to compare the effect of strategies (Azar and Momeni, 2000). Null and alternative hypotheses are formulated as following:

$$\begin{cases} H_0 : \bar{R}_1 = \bar{R}_2 = \dots = \bar{R}_5 \\ H_1 : \bar{R}_i \neq \bar{R}_j \quad \exists i \neq j = 1,2,\dots,5 \end{cases} \equiv \begin{cases} H_0 : \text{The average of ranking is equal.} \\ H_1 : \text{The average of ranking is not equal} \end{cases}$$

Table 6. Test Statistics

Test Statistics	
Number	57
Chi-Square	22.048
Freedom Degree	4
Sig. Level	0.000

Table 7. Ranking Average of Strategies

	Ranking Average
Product Development Strategy	3.54
Market Penetration Strategy	3.38
Concentric Diversification strategy and diverse portfolio	2.82
Market Development Strategy	2.68
Vertical Integration strategy	2.58

Source: Research Findings Source: Research Findings

According to chi-square (22.05) null hypothesis is not verified at 95% confidence level. It means that the effectiveness of strategies is different. Product Development and Market Penetration are the most effective factors in increasing sales. Concentric Diversification and Market Development are in the 3<sup>rd</sup> and 4<sup>th</sup> positions. Vertical Integration strategy is the least effective strategy. Figure 4 shows the average ranks of effective strategies in increasing sales.

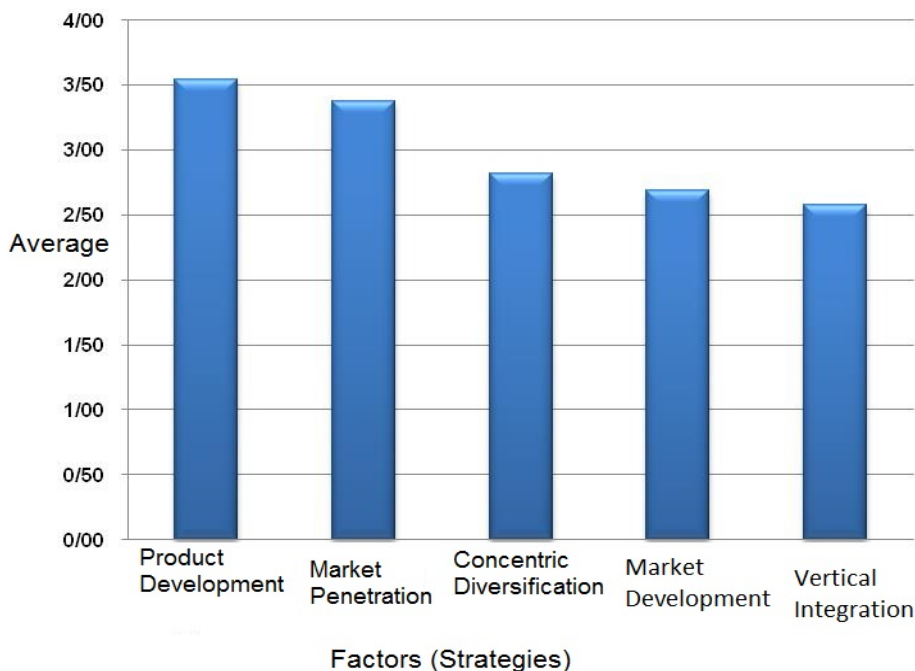


Figure 4. Ranking Strategies

Source: Research Findings

## 8. Conclusion

It was 100 years ago when the first oil well erupted in Masjed Suleiman, Iran and the Middle East. Crude oil used to be only applied for lighting. Numerous products and derivatives are, however, extracted from these strategic goods of the century. Today, we can find the traces of crude oil and its products in every industry. Single-product economy which is based on exporting crude oil is not justifiable for Iran with the oil industry which dates back to a century. This has become a fundamental problem. Therefore, modern and optimal strategies are required to produce petrochemical products which guarantee the completion of value chain and application of added value for oil products, job opportunities, and the promotion of sustainable development of national economy. Petrochemical industry growth is the basic path for Iran's development. The realization of National Vision Policy which is winning the first position in petrochemical product industry in 2025 requires having production strategies, identifying the target market, and targeting optimally, using opportunities and reducing threats, and stabilizing the strengths and reducing the weaknesses in order to reach "Sustainable Economic Development" using capital resources (knowledge-based human resources, technology, and economic capital). In addition to Iran, other Middle East countries tend to dominate the regional and global petrochemical market within the next 10 years. Using feedstock advantage and inexpensive gas, Saudi Arabia and Qatar try to wing over the competitors. Therefore, in addition to preventing raw material sales, *Product Development Strategy* would decrease the unemployment growth and increase the employment rate because of its added value. Therefore, the realization of these strategies would reduce Iran's dependence on single-product economy and exportation of crude oil, resulting in sustainable and balanced economic development. According to above mentioned issues, the researcher conducted a field survey in order to find appropriate strategies to increase the sales of petrochemical products using SPSS, GSM, and SWOT matrix. After verifying the reliability of the questionnaire using Cronbach's alpha, it is concluded that market development, market penetration, product development, concentric diversification with diverse portfolio, and suitable packaging are suitable strategies (offensive strategies) to increase the sales of Iranian petrochemical products. Using and improving these strategies are highly effective sales improvement and the realization of 2025 Vision Policy. Product development and market penetration are the most effective strategies to increase the sales. Therefore, they need to be taken into account.

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