

Chapter-3

Research Methodology

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Chapter-3

Research Methodology

3.1 BACKGROUND AND MOTIVATION FOR THE PRESENT STUDY

My career so far has involved a mix of academic and corporate work. As far as my academic background is concerned, it is in Economics and Marketing Management at graduate and post-graduate levels. I started my career in sales and marketing but was attracted to academic or consultancy career since the very beginning. If I had opted to do PhD immediately after my Masters' in Economics, it might have been a pure academic research without any exposure to real business world, and most likely limited to theoretical economic study. My idea of research study was to integrate concept and practice within the context of emergent, significant business issues. Therefore, I delayed my doctoral work till I could gain substantial corporate and academic experience.

When I joined University of Petroleum & Energy Studies (UPES) in 2003, after 10 years of professional experience, the major challenge before me was to combine my practical and academic knowledge in economics and management with domain specific knowledge of oil and gas sector. This challenge has provided me the opportunity to explore the exciting world of oil and gas and understand the building blocks of this industry. The ideas and practical knowledge shared by the visiting faculty from the oil industry in India and abroad and my personal visits to Indian oil companies really provided me direction. It helped in applying my basic knowledge of economics and management to comment knowledgably on the business challenges in the oil and gas industry. To explore further, I wrote two

research papers titled: *Changing Face Of Indian Petroleum Sector: A Strategic View*, published in *Pragyaan* (Vol.2:Issue.1.July 2004) and *Indian Oil & Gas Industry: New Challenges and Approaches*; which was presented at 3rd International Conference of Academy of International Business-India chapter in January 2005, at Indian Institute of Technology, Kharagpur, India. During my presentation and interaction with other participants of the conference, I realized that business problems and business practices of oil and gas industry have not been researched/ discussed much in the academic institutions in India mainly due to two reasons: first, lack of interaction between management faculty and oil industry professional and second, non-availability of oil industry data from public sector oil companies, as the industry has been one of the most strictly regulated industries in the country till recently.

At this stage, I started contemplating focusing my doctoral research project on the petroleum industry and decided to focus my study on this sector. Meanwhile, in 2005, I got the offer to join Saudi Basic Industries Corporation (SABIC), the leading global petrochemical company. This offer came to me with the opportunity to move from academia to the corporate sector, which, I consider, is very rare. My employer, UPES also supported my decision by granting me two years sabbatical leave to pursue my research project.

While working with SABIC, I am trying to develop a sound understanding of the petroleum and petrochemical value chain and gaining analytical insights into business and strategic planning through my participation in the preparation of petrochemical investment projects.

As mentioned above, finally, my academic background and professional experience have motivated me to pursue this research work which is titled as *Strategic Investment Decisions in Petrochemical Sector: A comparative Study of GCC Countries*.

The idea of working on “Strategic Investment Decisions (SIDs)” came from the survey of literature done for my earlier research paper with Dr. Azhar Kazmi, *Strategic Investment Decisions of TNCs in Indian Insurance Sector*, published in *Paradigm* (Vol.4, No.2 July-Dec 2000). Dr. Kazmi and Dr. Parag Diwan, both supported the idea of exploring the SIDs in petroleum and petrochemical sector. As I was in the process of getting valuable exposure of the middle- eastern petrochemical industry, working on a comparative study of GCC countries became more intellectually attractive as well as relevant.

With this background and motivation, I worked on this project and I am sure, it will improve my ability to apply concepts to practice, develop the strategic thinking and enhance my professional capability.

3.2 RESEARCH STATEMENT

Based on the review of literature, presented in the previous chapter, it is decided to adopt the following statement as the research topic:

Strategic Investment Decisions in Petrochemical Sector: A comparative Study of GCC Countries

3.2.1 Statement of the Problem

The statement of the research problem visualized investigation into an international study of strategic investment decisions with a view to achieve two objectives:

1. Attempt to provide policy guidelines for GCC countries in order to sustain the lead they have in the global oil and gas industry
2. Endeavour to present a basis for corporate policy formulation and choice of appropriate strategy for investment decisions in the petrochemical sector.

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In order to take these two objectives into account, the research study examined the investment decisions in petrochemical sector through a *comparative case study method*. The geographical scope for the research study is the region of *GCC countries* (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and UAE). There are two reasons for this choice. *First*, this region has figured prominently in the global economy through the last two decades for their major investment projects and also for their increasing influence on the global manufacturing industry. It is, therefore, relevant to explore the international dimensions of their activities in the petrochemical sector. This may be, for instance, competition from transnational corporations as well as rivalry among the local companies to participate in the large number of expansion and greenfield projects being currently set up. *Secondly*, this is the sector, where major capital investment projects are at an advanced stage and thus it is particularly desirable to investigate decision-making procedures in such a situation.

The four means adopted to investigate the two areas as above are as below.

- Comparison of the petrochemical investment environments in the six GCC countries
- Comparison of cost competitiveness among the six GCC countries
- Comparison of structural changes in the petrochemicals industries of the six GCC countries
- Comparison of drivers for investment in the six GCC countries

This research will explore the strategic investment decisions in GCC petrochemical industry and presents case studies of six GCC countries to explore the issues listed above. Finally, this study will suggest the strategies for petrochemical investments in the GCC region.

3.3 RESEARCH METHODOLOGY

Many studies of organizational decision making have emphasized the use of case studies, often studying one case in great depth (Pettigrew 1973). Bower's (1972) study of capital budgeting used a *comparative case method* as has the study by Marsh *et al.* (1988) where they analyzed in depth three major strategic investment decisions. In general the case studies provide a very valuable addition to the aggregate survey material since as Schoenberger notes '[they]..... can provide a qualitative context that amplifies and enriches the meaning derived from quantitative methods' (Schoenberger, 1991:181). The approach of this research is to combine both the case study and a quantitative analysis of cases.

The variable of the study focuses on investment activities in *petrochemical sector in GCC countries*. It presents the basic information about this sector and then examines the strategic investment decisions and expected changes for GCC countries as developing host countries.

The study attempts to present a comprehensive picture of the characteristics and activities of local and foreign investors in GCC countries and examine their investment decisions at the country level.

3.3.1 Research Strategy

When conducting a research project, the researcher is in need of a strategy for how to do this. The choice of research strategy depends on what kind of questions are to be answered and the problem to be solved. Yin refers to five different research strategies: experiment, survey, archival analysis and case study. In order to choose a strategy, it is necessary to understand the difference between them. The strategies are shown in Table 3.1.

Table 3.1 Research Strategy

Strategy	Forms of research question	Requires control over behavioral events	Focus on contemporary events
Experiment	How, Why	Yes	Yes
Survey	Who, what, where, How many, How much	No	Yes
Archival Analysis	Who, what, where, How many, How much	No	Yes/No
History	How, Why	No	No
Case study	How, Why	No	Yes

Source: Yin, Robert K., 1994

The chosen research strategy for this thesis is *the case study*. Our research questions are formulated as how and why questions, which also are appropriate for the case study.

3.3.1.1 Case Study

When a phenomenon can be studied in a real life situation, the case study is considered to be a research strategy of greater relevance. A case study is an empirical inquiry that studies a phenomenon within a real life situation where the boundaries between the phenomenon and the context are not clearly evident. The case study is especially advantageous when 'how' or 'why' questions are being asked about events over which the investigator has limited control. "A major reason for the popularity and relevance of theory building from case studies is that it is one of the best (if not the best) of the bridge from rich qualitative evidence to mainstream deductive research" (Eisenhardt & Graebner, 2007). The case study is built up around a deductive approach where we want to find information that suits the existing theories.

A case study was, therefore, considered the most appropriate research methodology for further explorations.

The case study plays a significant role within research and there exist at least five different applications. The most important application is to *explain* causal links in real life settings that are too complex for survey or experimental strategies. The second application is to *describe* the real settings within the context that it occurs. The third application is that a case study can *illustrate* certain topics within an evaluation. Fourth, the case study can *explore* those situations in which the intervention evaluated has no clear outcomes. Fifth the case study can be a *meta-evaluation* - a study of an evaluation study.

Searches are made for relevant theories and appropriate materials on the subject keeping in view the identified problems of the present thesis. The theories regarding strategic investment decisions have been identified to explore them further.

3.3.1.2 Case Study Design

Yin (1994) proposes the idea that all empirical research has a research design that follows a logical sequence connecting empirical data and the study's initial research questions finally leading to its conclusions. The research design can be defined as "the plan that guides the investigator in the process of collecting, analyzing, and interpreting observations". Yin discusses four different types of research designs relevant for case studies; single case designs, multiple case designs, holistic designs and embedded designs. These are shown in Table 3.2.

When designing a case study, it is of great importance to make a distinction between single and multiple case designs. The single case design is useful when the case represents "the critical case in testing a well formulated theory". The single case can be used to discover whether the theories

developed are relevant and if there are ways in which they can be extended and further developed. When the same study contains more than a single case the use of a multiple case design becomes relevant. That is, there exist several individual units of analysis that as a whole can be considered as multiple case designs.

Table 3.2 Basic Types of Design for Case Studies

Strategy	Single case design	Multiple case design
Holistic (single unit of analysis)	Type 1	Type 2
Embedded (multiple units of analysis)	Type 3	Type 4

Source: Yin, Robert K., 1994

The single- and multiple case studies can be holistic or embedded. The embedded case study involves more than one unit of analysis and attention is also given to sub-units. When no logical sub-units can be identified or when there is a global nature of the problem, the holistic design is preferable.

In this thesis, the embedded multiple case studies methodology has been used to explore the strategic investment decisions of petrochemical organizations in GCC countries.

3.3.2 Data Collection

When a researcher collects data there are two major alternatives. The researcher can use primary or secondary data. I explain further the differences between them and how this is applied in this thesis.

3.3.2.1 Primary Data

Primary data are data that are collected specifically for the research. According to Merriam (1998) there are three forms of strategies in data collection in the case study. These three strategies are interviewing, observing, and analyzing documents. In this study, I used a mix of these three data collection strategies. In order to conduct a valuable study, it was of great importance for me to understand the region in question: the GCC countries (Saudi Arabia, Kuwait, Qatar, UAE, Oman and Bahrain) and the specific investment environment for petrochemical sector's development. When conducting studies in GCC countries, I made some observations of each of the six countries that complemented my theoretical knowledge of this region.

Interviews can be categorized into three different forms: structured, semi-structured and non-structured. When I conducted the interviews, I leaned towards semi-structured type of interviews since I decided to conduct them personally and not to employ investigators for the purpose. Certain areas of interest have been formulated into more or less structured question topics. The semi-structured interview technique gives the researcher the possibility to reflect and respond to the situation at hand and also to explore new ideas on the topic. The checklist used for the semi-structured interviews is provided as *Annexure -A* to this thesis.

The questions in the interviews were formulated so as to stimulate discussions between the researcher and the interviewee. The cultural difference between Gulf region and India – the country of my origin - are so prominent that I required a deeper understanding of the cultural setting in GCC countries prior to starting the investigation. There is otherwise a risk that information collected is not interpreted in its right context. As I am working in Saudi Arabia for last one and half year, my exposure to culture

and business environment has been helpful for this study. The use of English as the language of communication fortunately does not pose much of a problem as the senior-level executives in the GCC countries in the petrochemical sector are well equipped in the proficient use of this language.

3.3.2.2 Secondary Data

Secondary data are data that already exist with no particular connection to the specific case. Secondary data can for example be articles, books, previous studies and Internet searches. The theoretical framework used in the thesis is built up around strategic investment decisions in petrochemical industry. Some of the sources of secondary data used for this study have been listed below:

- *Annual Energy Outlook, 2005, 2006*
- Annual Reports, Company Brochures and websites of Oil & Gas and Petrochemical related organizations and companies in GCC countries.
- Annual Reports, Statistical Data, Year Book, Periodical Publications of Governments, Ministries, Government Authorities, Central Banks of GCC countries,
- *Arab World Competitiveness Report, 2006* (World Economic Forum)
- *Asian Chemical News*
- Books on investment decisions
- *BP Statistical Review of World Energy, 2005, 2006*
- *Chemical & Engineering News*
- *Chemical Market Reporter*
- DIA Research Martech Inc.
- ICIS Chemical Business
- International Monetary Fund (IMF) & World Trade Organization (WTO) Statistics, 2005

- *Middle East Economic Digest (MEED)*
- *Middle East Economic Survey (MEES)*
- *Oil & Gas Journal*
- Oil Market Reports, (IEA)
- Organization of Petroleum Exporting Countries (OPEC) *Annual Statistical Bulletin 2005, 2006*
- Product and Industry Reports, Conference Materials (Chemical Market Associates, Inc)
- Product and Industry Reports, Conference Materials (NEXANT Chem System)
- *Purvin & Gertz Energy Reports*
- Relevant research works on strategic investment decisions, GCC economy, global and middle-eastern petroleum and petrochemical industry.
- Tecnon OrbiChem
- Trade Statistics (GCC countries & other Middle East countries)
- *World Bank Country Profile (2005-2006)*
- World Chemical Publications (SRI Consulting)
- *World Energy Atlas (Schlumberger & Economist) 2006*
- World Petrochemical Conference 2005 & 2006 Proceedings

3.3.3 Research Process

To carry out this research work, a systematic research process has been followed as presented in the Figure 3. 1. First of all, a wide survey of literature was carried out and presented in detail in Chapter-2. Based on the review of literature, it was decided to adopt the following statement as the research topic:

Strategic Investment Decisions in Petrochemical Sector: A comparative Study of GCC Countries

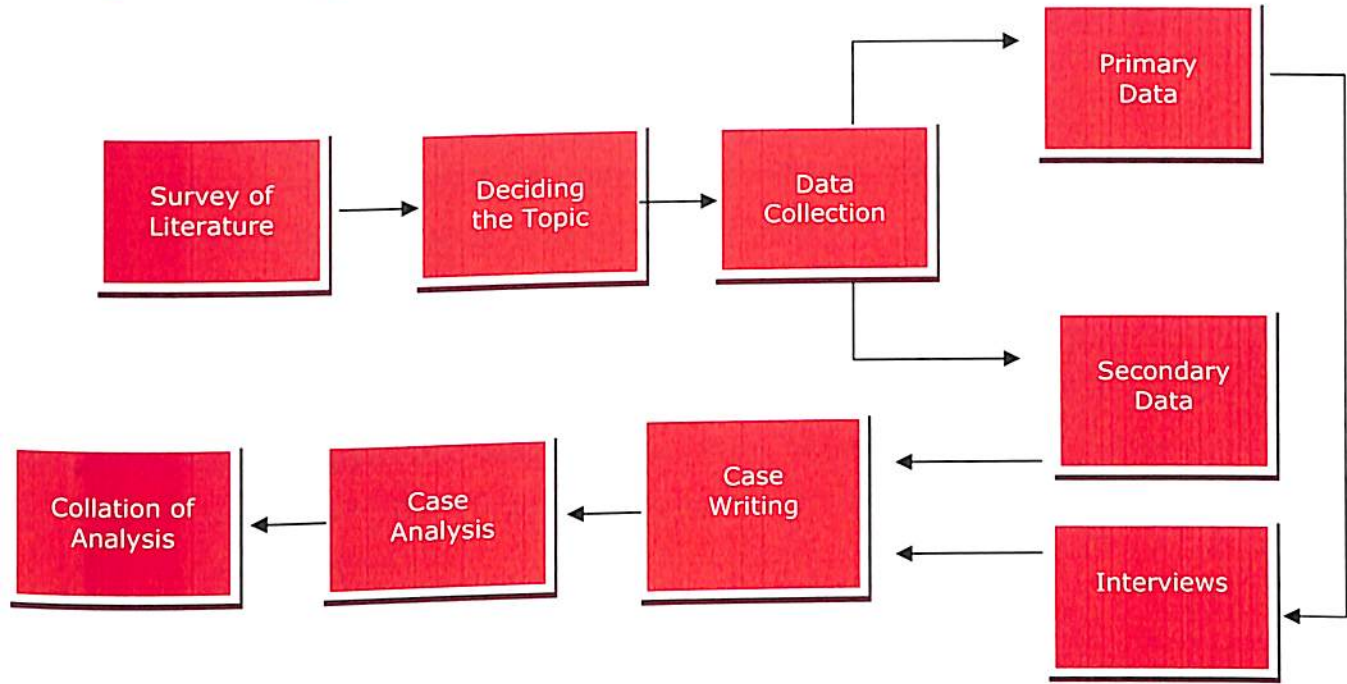
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After finalization of topic for research, the data collection for the study started for which data from both the sources: primary as well as secondary have been gathered. Main sources of primary data were interviewing, observing and analyzing documents. Section 3.3.2 presented the detail on data collection methodology for this study. For the interviews, a semi-structured interview technique has been followed. The checklist used for the semi-structured interviews is provided as Annexure-A to this thesis. For collection of primary data for this project I have undertaken field trips to visit the government offices, companies and organizations in GCC countries and arranged several telephonic discussions. For the interviews, senior level managers - who are responsible for investment decision either in project management department or corporate finance departments of major petrochemical companies of GCC countries, the independent consultants and advisors who are advising these companies - have been contacted. The companies and organizations includes SABIC and its affiliate companies, Saudi Aramco, SIPCHEM, Qatar Petroleum and its subsidiaries companies, PIC, EQUATE, Petroleum Development Oman, BAPCO, ADNOC and SAGIA, SAMBA and SAAB.

The response of these executives varied from giving the overview of their investment activities, talking about current and future directions of the investment of the companies, to announced mergers and acquisitions of the companies. Getting the hard data on investments were very difficult and in some of the cases impossible. But these discussions have helped in authenticating the public data used for the analysis. Most of the executives have preferred not to be quoted in the research report keeping in line the cultural sensitivities in this region of the world.

The data collected from these sources has been used for the writing of *six case studies*. A justification for choosing the case study method has already been presented in section 3.3.1.1.

Figure 3.1: A diagrammatic representation of research process adopted



The purpose of these case studies is to evaluate the status and structure of petrochemical industries, current and future production capacities, the competitiveness of petrochemical companies and review of major petrochemical investment projects. The following structure of case study has been followed in all case studies, so that it can be easy for comparative analysis:

- Overview
- Petrochemical industry organization
- Petrochemical infrastructure
- Petrochemical products & production capacities
- Petrochemical demand & supply analysis
- Major petrochemical projects & investment

These six case studies are presented at Chapter- 5 and the analysis of the same been presented at Chapter-6. The analysis of these case studies covers a country-level comparison of GCC petrochemical industry. In comparative study,

different aspects of strategic investment decisions in petrochemical sector have been covered which includes:

- petrochemical investment environments
- cost competitiveness
- structural changes in the petrochemicals industries
- drivers for investment in six GCC countries

Based on the analysis, appropriate strategies for GCC petrochemical investments have been suggested which are presented in Chapter-7. For proposing strategies the entire value chain of petroleum and petrochemical industry have been taken into account and the appropriate actions at each point have been suggested.

3.4 OUTLINE OF THESIS CHAPTERS

This thesis is organized as described below.

As this study is centered around strategic investment decisions in petrochemical sector therefore, **Chapter-1** of the thesis *introduces* the concepts of decision making for investments, strategic investment decisions and global petrochemical industry.

In **Chapter-2**, a detail *review of literature* has been presented which covers works and studies on foreign investment, strategic investment decisions, petroleum and petrochemical industry and works on GCC economy.

Chapter -3 presents the details of *research methodology* adopted and spells out the research strategy, data collection methods, detail research process. It also covers the limitation of this research study as well as its contributions.

Chapter -4 of this study presents a broader picture of the GCC petrochemical industry in detail and it starts with an overview of GCC economy and covers hydrocarbon resources, the structure of GCC petrochemical industry, and present the analysis of petrochemical feedstock and its prices.

As the chosen research strategy for this thesis is case study, **Chapter -5** presents six GCC petrochemical case studies covering each of the six GCC countries.

In **Chapter -6** of this study presents the analysis of six GCC petrochemical case studies.

Chapter-7 is the last chapter of the thesis. It sums up the main findings on strategic issues and suggests the strategies for GCC petrochemical investments in the form a framework that is the main contribution of this study.

3.4 LIMITATIONS OF THIS STUDY

There could be limitations of the study some of which could be mentioned as below.

- The scope of the study is limited in geographical terms to the six countries of Gulf Corporation Council (GCC): Saudi Arabia, Kuwait, Qatar, UAE, Oman and Bahrain. Although, in some sections of the report data and information about Middle East region have been used, this has been done purely for reference purpose in order to present wider comparative picture, otherwise, the study, analysis and recommendations are focused on six members GCC countries.

- In terms of the *industry focus* for this study is limited to the *petrochemical industry*. The references to oil and gas industry have been used at many places as it is unavoidable. The petrochemical industry is heavily dependent oil and gas assets and its downstream activities.
- The study considers only the major investment projects made for the purpose of *growth and expansion* within the petrochemical industry and the GCC countries.
- There are limitations in terms of the research methodology used. Use of case study has been made precluding the use of other direct methods such as survey questionnaires.
- Based on the case study method, the primary data presented in the study is qualitative. The quantitative data is derived from secondary sources and carries the disadvantages typically associated with such data. For instance, some of the secondary data may be outdated, partly irrelevant or left partially unutilized for the purpose of analysis.
- The analytical methods used are deductive and discursive in nature limited to the nature of the methodology of case study used. Rigorous statistical methods could not be applied owing to the limitations of the case study method.

This study explores and compares the industry structure of petrochemical sector in GCC countries, for this purpose selected individual firms of petrochemical sector and their strategic investment decisions are discussed.

3.5 CONTRIBUTION OF THIS STUDY

The major contributions of this study can be enumerated as below.

- The *immediate* contribution of the study is to add to the available literature on strategic investment decisions in petrochemical sector.
- The significant contribution of this project is to make a comparison of the petrochemical investment environments in the six GCC countries studied and reported in the study. A reading of the comparative description is likely to provide a good understanding to an observer and analyst of the petrochemical industry.
- The project makes an in-depth analysis of cost competitiveness of the petrochemical industry and compares it across the six GCC countries. This comparison is expected to provide a tangible basis to the industry observer of the factors that contribute to the cost components that make up the total cost of the outputs of the petrochemical industry. The relative differences also help to explain the comparative cost competitive advantage that each of the six countries of the GCC are likely to possess.
- The study makes a detailed analysis of the structural changes ongoing in the petrochemical industry in the six GCC countries. These industry profile can serve as a basis for industry analysis of petrochemical industry.
- The study highlights the strategic investment decisions among GCC countries and their role in economic development of that particular host country. The description of the contributions that informed strategic investment decisions could make to the economic development are indicative of the efforts that national governments could make to make their countries widen the ambit of economic and industrial activities for a balanced growth.

- Finally, the contribution is to suggest the strategies for petrochemical investments in the GCC region. These could be of special interest to decision-makers in the petrochemical industry not only of the six GCC countries but of other countries that have a substantial contribution from the petrochemical industry.

3.6 FUTURE DIRECTIONS FOR RESEARCH

This research may lead to some interesting future studies. Some of the future directions for research are suggested below.

- Researchers could consider developing studies based on the framework adopted for this study. In doing so, they could replicate the study for other oil and gas economies by considering other geographical regions such as the wider Middle Eastern region, South-East Asian region, South Asian region or South American region.
- Similar studies could also be done for specific countries. For instance, country specific studies could be done for China, India or Russia where new investments in petroleum and petrochemical sectors are expected to come in future.
- The basic issues explored in the study could be approached with the aid of alternative research methodologies such as survey questionnaires generating a lot more numerical data amenable to rigorous statistical analysis.
- Research studies advancing the agenda of the present study could also offer meaningful future research directions. For instance, an extension to the study can be done by taking up individual elements of strategic investment decisions. Such an approach could present opportunities for an in-depth analysis of the issues explored in the present study.

- An interesting opening can be thought in the terms of research by looking at the other side of the petrochemical industry viz. the value chain partners. For instance, a research could be designed to look at the impact of the strategic investment decisions of the petrochemical industry on the buyers or users of the output. What this means is that an industry such as chemicals or fertilizer is directly affected by the nature of strategic investment decisions made in the petrochemical industry. This impact could form the subject matter of future studies in the area.
- A different perspective can be pursued by conducting similar studies from the standpoint of the multinational corporations who have business interests in the petrochemical industry in the GCC region.
- Finally, the framework of strategic investment decisions proposed at the end of the study (in Chapter 7) offers substantial scope for delineating variables for future studies. For example, if the four contributory factors of development of integrative capabilities, balanced regional development national economic strategies, development of petrochemicals human resource development, and long-term development of institutional framework are taken individually and their impact on the four strategies of market development, forward integration, international expansion, and international investments are analyzed it could offer valuable insights into the relationship.

Overall, the research study can be considered as an attempt to push the boundaries of knowledge in the theoretical area of strategic investment decisions and the practical area of the management of petrochemical industry opening up opportunities for future research.