

**KHAZAR UNIVERSITY
BAKU, AZERBAIJAN**

SUPPLY CHAIN MANAGEMENT IN OIL INDUSTRY

**A Dissertation Submitted for the Degree Doctor of
Philosophy in Management**

**Prepared by
Ahmet Bahadir Baysal**

**Supervised by
Prof.Dr. Mahammad Nuriyev**

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INTRODUCTION

Our study covers mainly the followings:

1) Supply Chain Management

a) Evolution of SCM,

b) Information Technology's impact on SCM,

c) Future global Supply Chain,

2) Supply Chain Management in Oil Industry

3) Supply Chain Management in Regional Oil Industry

4) Bp Applications of Supply Chain Management

**5) Conclusion (obtained results, recommendations,
conclusion)**

SUPPLY CHAIN MANAGEMENT

Oil and gas are unrecoverable resources.

Therefore business world tries to use these resources in a most effective way.

Effective and efficient solution of this problem is supply chain management.

A supply chain is the optimal flow of raw materials and products from site of production to the site of final use.

TOPICALITY OF THE SUBJECT (1)

- Petroleum is a hydrocarbon, an organic compound containing only carbon and hydrogen. It is a mixture of other hydrocarbon compounds such as natural gas, gasoline, asphalt, and, probably most important, fuel oil.
- Currently petroleum is among our most important natural resources. We use gasoline, jet fuel, and diesel fuel to run cars, trucks, aircraft, ships, and other vehicles. Home heat sources include oil, natural gas, and electricity, which in many areas are generated by burning natural gas. Petroleum and petroleum based chemicals are important in manufacturing plastic, wax, fertilizers, lubricants and many other goods.
- Different types of petroleum can be used in different ways. Refineries separate different petroleum products by heating petroleum to the point where heavy hydrocarbon molecules separate from lighter hydrocarbons. As a result, each product can be isolated and used for a specific purpose without waste. Thus, tar or asphalt, the dense, nearly solid hydrocarbons, can be used for road surfaces and roofing materials. Waxy substances called paraffins can be used to make candles and other similar products. And less dense, liquid hydrocarbons can be used for engine fuels.

TOPICALITY OF THE SUBJECT (2)

- Although petroleum is found throughout the world, the Middle East possesses nearly two-thirds of all recoverable oil. Latin America contains about 13 percent, while the continents of Europe, North America, Asia, and Africa have only 4 to 8 percent each.
- The oil industry faces strong challenges. Environmental concerns are forcing companies to reevaluate all of their operations. Political unrest in the Middle East causes concern about access to oil suppliers. And it is only a matter of time before oil supplies finally run out.
- Oil is a key strategic commodity, critical to the modern industrial economy.
- All economies depend on secure and competitive energy supplies. Since the beginning of the last century, the oil industry has provided secure and cheap energy

TOPICALITY OF THE SUBJECT (3)

- Business will find impact on its Operations Management, thus affecting the way the company works on a day to day basis. Logistics may be affected by increasing fuel costs and a growing need to understand Zones of Economic Transportation for the company's products and raw materials. Many companies may wish to better understand where there are threats to their organization by completing an Oil Dependency Audit.
- It is clear that the impact of high oil prices will be significant to business and consumers.
- Oil prices are the most important subject in today's economies and supply chain management is the key, not only, to achieve an economic, efficient and secure supply of all raw materials and services, but also, to manage the information and money more beneficial.
- Therefore dissertation subject "Supply Chain Management in Oil Industry" is the actuality of today.

TOPICALITY OF THE SUBJECT (4)

- When we look to Azerbaijan we can see that oil and gas lay in the basis of the economic development of modern Azerbaijan. Azerbaijan became the first country to start developing the enormous resources of the Caspian Sea, in conjunction with a number of international companies.
- Azerbaijan is currently one of the most important centers of energy resources in the world, playing an exclusive role in the implementation of major oil/gas and transport/communication related projects along the energy channel that links the East to the West. The country is a true guarantor of strategic partnerships, international integration and commercial ties in Eurasia.
- Therefore dissertation subject is very important for Azerbaijan economy also.

AIM OF THE DISSERTATION

- Oil and gas are unrecoverable resources. And for this reason business world tries to use these resources in a most effective way. One of the approaches providing effective and efficient solution of this problem is supply chain management.
- The aim of the dissertation is to view supply chain management systems in oil industry, applications of SCM in the region and to give recommendations on the subject as a directory for the people working in this field.

NOVELTY (1)

- In the submitted Dissertation appraisal and determination of optimal solution of Supply Chain Management System in Oil Industry is a significant step taken in the field.
- Together with appraisal of SCM in Oil Industry and presentation of its main parts, application fields and restrictions have been analyzed as well as relationships within the SCM have been investigated.
- The role of SCM in Oil Industry in the decision making process for the organizations have been investigated.
- An appropriate Project concerning the significant Oil and Gas Projects (BP in Azerbaijan) has been selected and reviewed from the SCM point of view.
- In order to get maximum performance under the conditions of risk and uncertainty, recommendations have been given to determine an optimal group of the SCM.
- These are to be valued as an advantage of the given scientific study.

NOVELTY (2)

- Our study showed that no significant evident change of the concept of supply chain management could be noticed which the basic set of articles and literature extends, nor could any significant evident change be noticed in the examination of the difference between the forerunners' ideas and the fundamental beliefs of supply chain management.
- Based upon those examinations, the degree of novelty of our study on supply chain management in oil industry is considered medium. But, the ideas given in our study for the supply chain management are considered more coherent and condensed than the ideas of the forerunners.
- Therefore I advice that the scope of supply chain management in oil industry should be extended for future supply chain management research.

Evolution of Supply chain Management: (Ch.2)

Oil industry production system is subdivided into 2 subsystems: the upstream and the downstream supply chains.

The upstream supply chain involves the obtaining of crude oil. This is the most important specialty of the oil companies.

The downstream supply chain starts at the refinery, where the crude oil is transformed into the consumable products.

Some of the oil companies are involved in the above both processes, others specialize only in the one.

Today a supply chain performance determines who will win the market competition.

Evolution of Supply chain Management: (Ch.2, continue)

Evaluation of SCM was happened by reevaluating two key types of processes:

- 1) Movement of the Physical flows of material of a supply chains move “forward” from suppliers to customers.**
- 2) Movement of Data flows “backward” from customers to suppliers.**

The development of supply chain management practices can be divided into four periods:

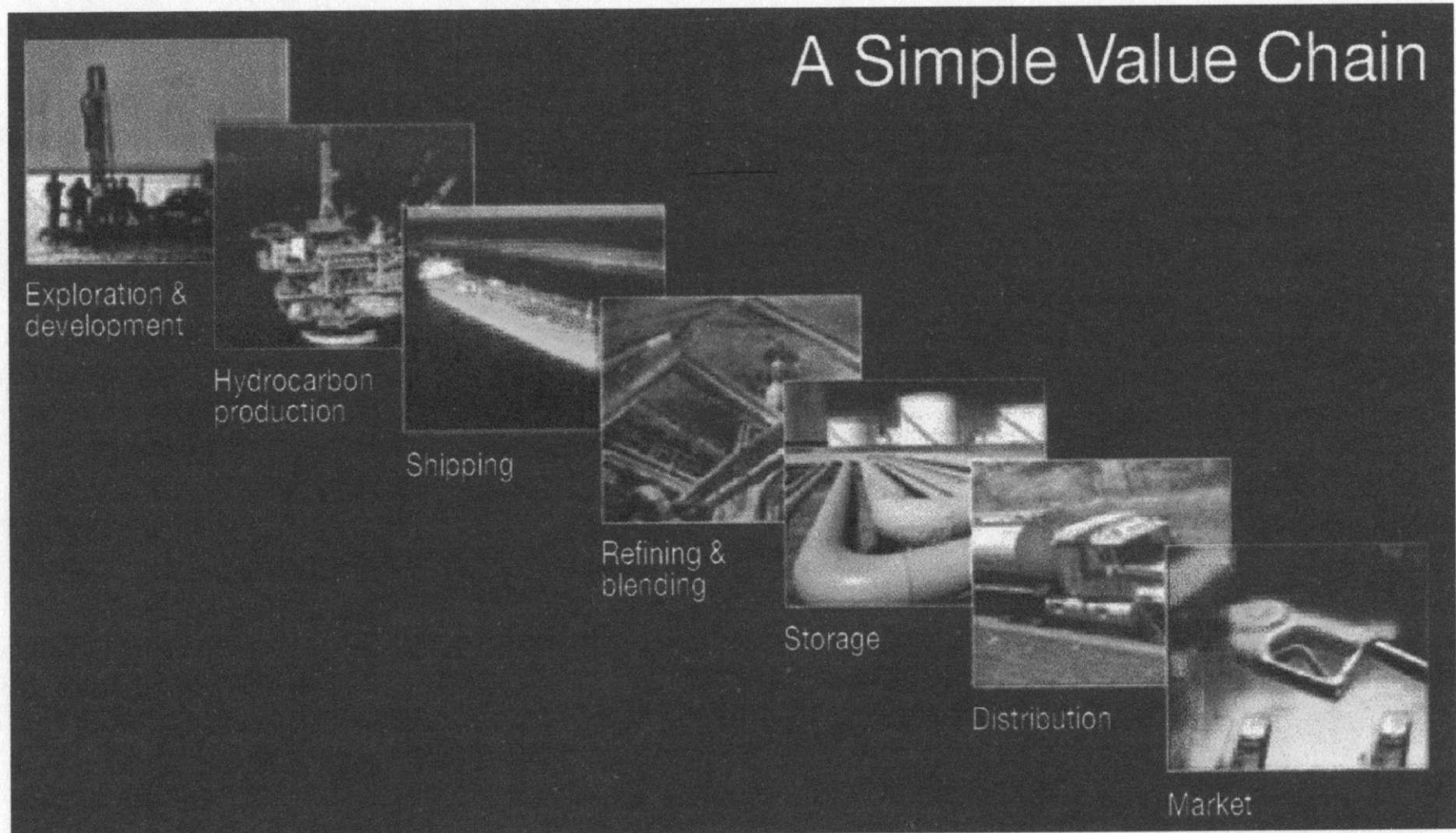
**Industrial revolution era,
Mass production era,
Lean production/quality control era,
Mass customization era.**

Macroeconomic Benefits of the E-Business and Supply Chain Technologies: (Ch.3)

In a competitive economic environment, supply chain improvements should help lower prices by minimizing production stability, inventory levels, and logistics costs.

E-business technologies help firms to move quickly and collect cheaply, analyze and process information.

Figure 3.2: The Value Chain



On-Time Delivery Requirements: (Ch.3, continue)

Supply chain management is a tool for achieving on-time delivery.

It is critical to maintaining customer satisfaction.

However, timing is the critical factor in the context of optimizing the functioning of a supply chain.

Figure 3.3: The Advantages and Disadvantages of Local and System-Wide Supply Chain Optimization

System Level Direct Relationships Only	
Advantages	Disadvantages
Fast guide to people with a need to know.	Confused. Difficult to know who gets what information, or what the information can be used for (e.g., information only, instructions to act).
Develops multi-company cooperation.	Difficult to carry out—requires major changes in how business is traditionally done.
Opportunity to deal with system-level phenomena.	No existing industry force is capable of making the change easier.
No new change in traditional business processes.	Communication is relatively slow up and down the chain.
The familiar traditional business case can be used.	Does not develop multi-company cooperation.
Restorable to implementation support through existing organizations (e.g., AIAG)	

Increased Globalization of Supply Chains:

(Ch.3, continue)

The process of globalization has been occurred by different factors.

For example, the oil business in Azerbaijan is an evident for increase of globalization in supply chain.

The country is planning to expand the oil business and not limit this business to pumping the crude oil through the existing pipelines.

Globalization leads to new approach in cost saving and effectives in operations. For this reason, SOCAR holds talks with the Eastern European countries concerning refinery capacities.

Future global Supply Chain: (Ch.3, continue)

The Supply Chain 2020 Project is a multiyear research effort to identify and analyze the factors.

These factors are critical to the success of future supply chains.

This new project will plan/design successful supply chains out to the year 2020.

This project hopes to deliver practical development on the design and management of future supply chains.

SUPPLY CHAIN FOR OIL INDUSTRY (Ch.4)

The sudden increase in global demand for oil have made the oil industry's supply chain management more complex and more difficult.

Oil and products are produced in specific and limited regions of the world. But they are demanded all over the world.

Maintainable oil supply has become unpredictable. It was caused by recent political unrest in the Middle East and other areas.

Along the chain, such as long lead-times, manufacturing capacity and transportation are hard factors to change.

Challenges in the Supply Chain: (Ch.4, continue)

The logistics network in the oil industry is highly inflexible.

This network includes the production capabilities of crude oil suppliers, long transportation lead times, and the limitations of types of transportation.

A detailed safety and security rules is required to protect from the effects of an attack on the supply chain.

Practices against Challenges along the Chain: (Ch.4, continue)

Terrorist activities increased tensions in the world.

Therefore, to have different and separate approaches to safety and security are not sufficient .

Instead, a whole view is necessary.

Process Control Systems, Property management, Emergency shutdown systems should be developed.

Oil Industry Profits - Analysis of Recent Performance: (Ch.4, continue)

High prices for crude oil in 2004 and into 2007 have reduced customers' purchasing power and raised costs for businesses.

This provides billions of dollars to the oil industry and oil exporting countries.

**Figure 4.2: Financial Performance of the Major Integrated Oil Companies, 2007
(millions of dollars)**

Company	Revenue	% Change	Net Income	% Change	% Return on Sales	% Return on Equity
ExxonMobil	404,552	7.1	40,610	2.8	10.0	33.4
Royal Dutch Shell	355,782	11.6	27,564	8.7	7.1	22.2
BP	291,438	6.2	17,287	-22.3	5.9	18.5
Chevron	220,904	5.1	18,688	9.0	8.5	24.2
ConocoPhillips	194,495	3.2	11,891	-23.5	6.1	13.4
Marathon	65,207	-0.4	3,956	-24.4	6.1	20.6
Amerada Hess	31,924	11.2	1,832	-4.6	5.7	18.8
Occidental	18,784	9.4	5,400	28.8	28.7	23.7
Murphy	18,438	28.9	766	18.8	4.1	15.1
Total	1,601,524	7.1	127,994	-2.9	8.0	22.7

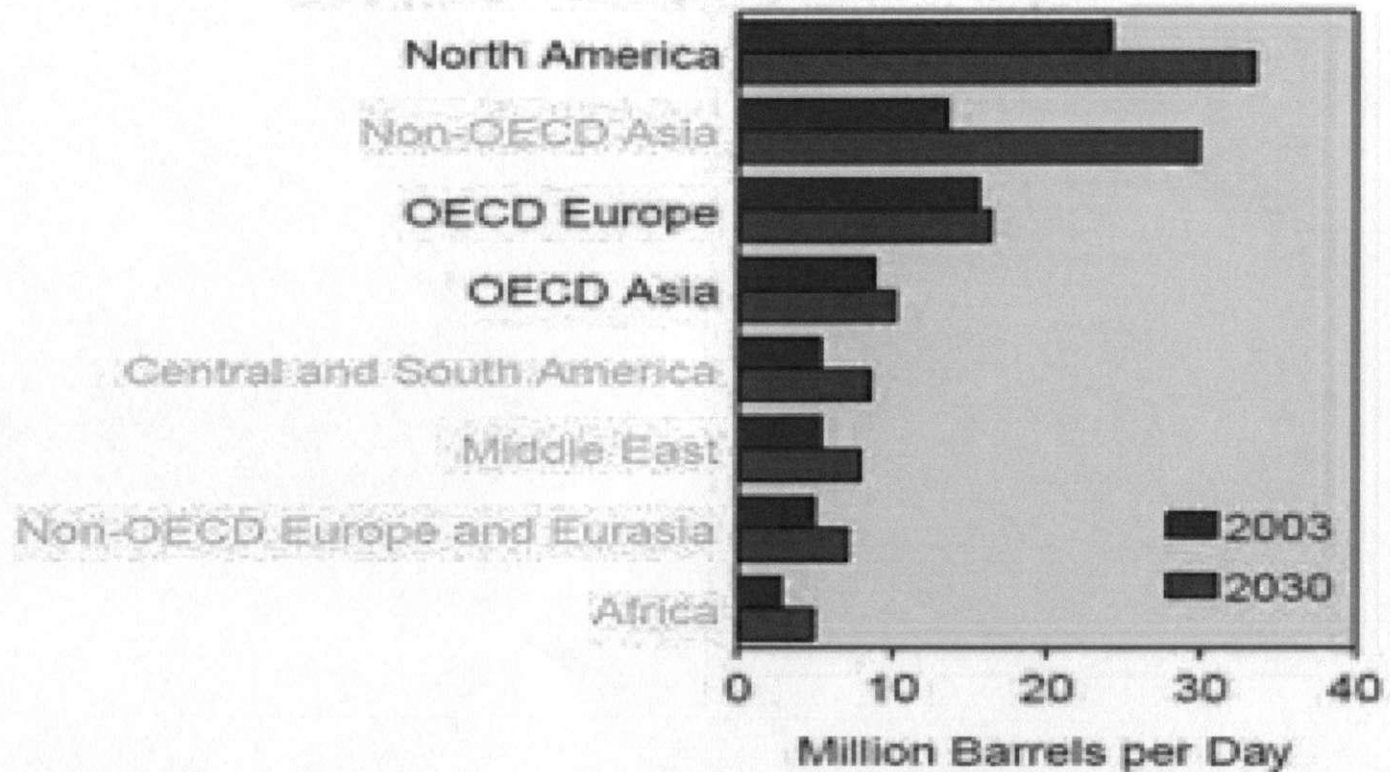
Source: Oil Daily, Profit Profile Supplement, vol.58, no.52, March 17, 2008, p.6, and company annual reports.

Note: Percent change values reflect changes from 2006.

World Oil Consumption by Region and Country Group, 2003 and 2030; Global Energy Trends: (Ch.6)

Energy experts emphasize that strong economic growth in many developing countries is already leading to sharp increases in for each person energy use.

Figure 6.1 World Oil Consumption



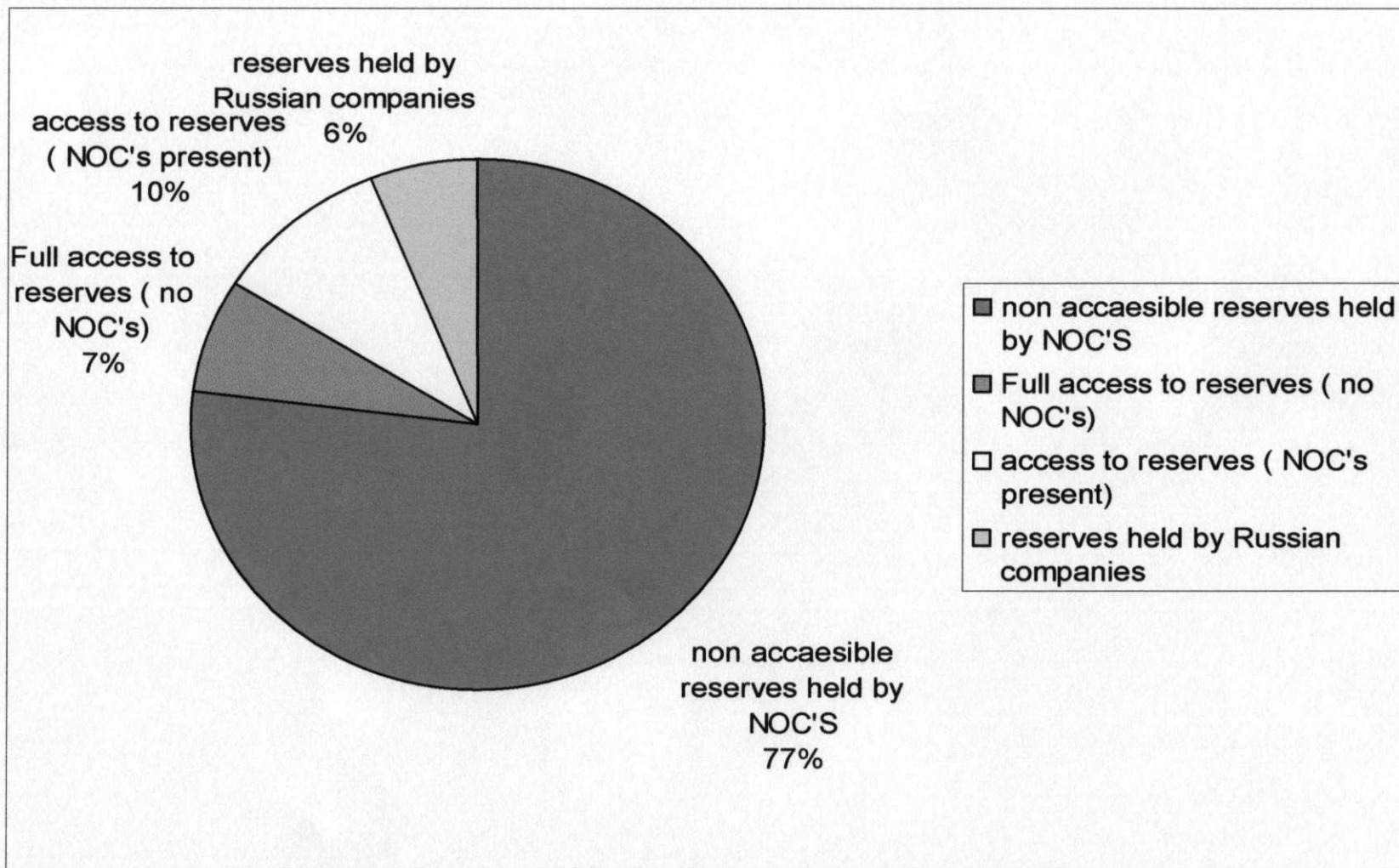
Sources: **2003:** Energy Information Administration (EIA), *International Energy Annual 2003* (May-July 2005), web site www.eia.doe.gov/iea/. **2030:** EIA, *System for the Analysis of Global Energy Markets* (2006).

Accessing Hydrocarbons: (Ch.6, continue)

International Oil Companies do not have access to the main part of the world's reserves.

Between them, the Super Majors (Bp, Shell, Total, Chevron, ExxonMobil, ConocoPhillips) control only 3% of the world's oil and gas reserves.

Figure 6.2: Hydrocarbon Reserves Controls



Source: Energy Intelligence Group, Washington Post, OPEC Annual Statistical Bulletin, Booz Allen Hamilton analysis

The Environment and Energy Security - Implications for Supply Chains: (Ch.6, continue)

Oil and gas has environmental implications.

People are increasingly looking for more responsible suppliers.

There may be enough oil and gas physically, but there is a concern whether their own supplies are secure.

The future technology will also provide alternative energy sources that are clean, local and harmless.

There were some doubts about environmental safety concerning Baku-Tbilisi-Ceyhan pipeline. Better technology and greater financial resources will allow to decrease most problems.

Besides that the BTC pipeline has an excellent safety record.

BP has learned that society has high expectations of the company to be a reliable supplier of oil and gas.

Technology approach to the future: (Ch.6, continue)

BP believes that technology is the key to the future.

The company built detailed basin models, collect seismic data, gather real time reservoir information and apply a variety of drilling, fracturing and injection techniques.

In the Caspian's ACG field, BP is using permanent ocean bottom seismic monitors on the seabed to control the reservoir over the producing life of the field.

It enables us to see in real time where the oil, gas and water are moving in the reservoir.

SUPPLY CHAINS IN THE REGIONAL OIL INDUSTRY (Ch.5)

Oil and Gas Production in Azerbaijan:

Oil and gas are the most important and huge resources of Azerbaijan.

Azerbaijan economy is mainly based on this oil and gas production and marketing.

- In October 1991 Azerbaijan Achieved its Independence.**

Until this date, Azerbaijan oil was not used for its own development but it is used for the development of the whole Soviet Union.

- In 1993 Heydar Aliyev was elected as President of the Azerbaijan Republic.**

- In 1994 an agreement was signed between the Western Oil Companies and SOCAR. This agreement is a well known “Contract of the Century.”**

- For the application of the “Contract of Century” Azerbaijan International Operating Company (AIOC) was founded.**

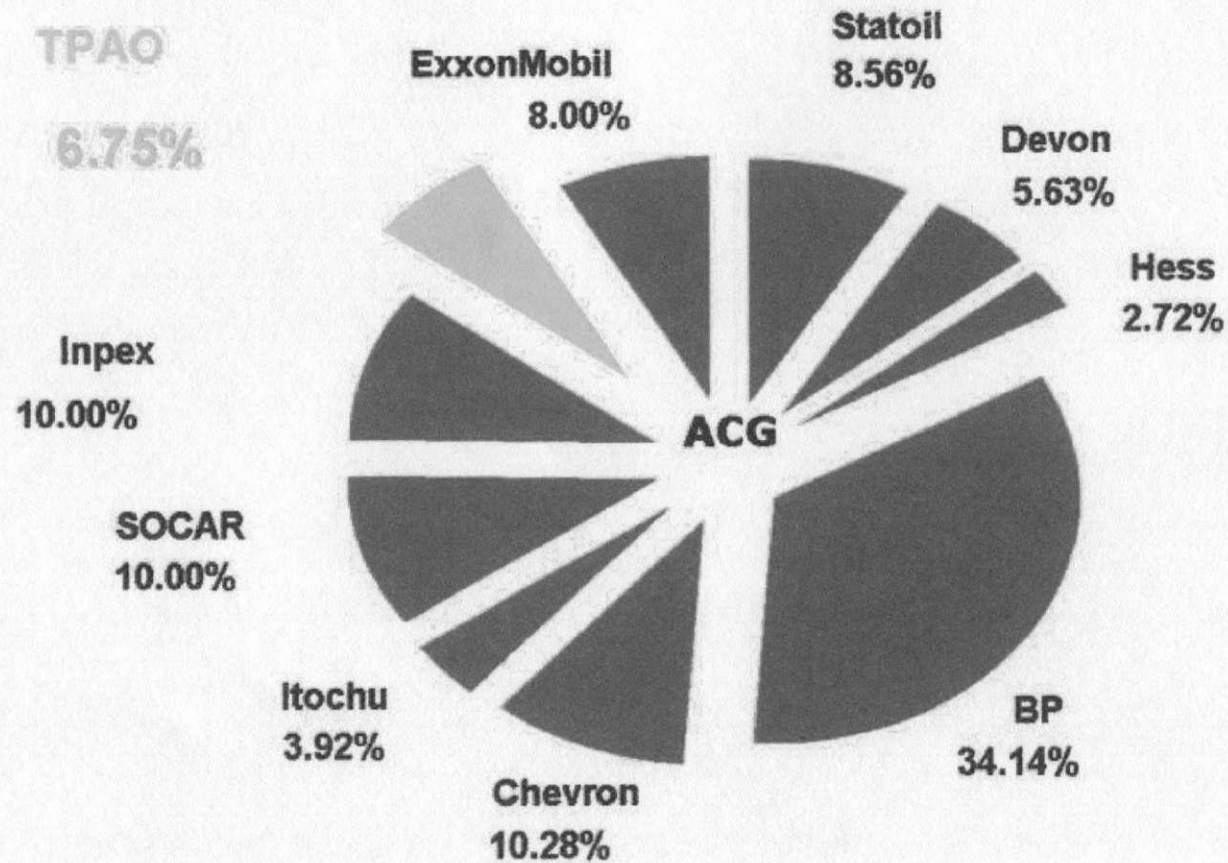
The “Contract of the Century” Generally Covers the Following Activities: (Ch.5, continue)

- 1) Oil production from Azeri, Chirag and Guneshli oil fields.**
- 2) Associated gas production.**
- 3) Transportation of this oil and gas to onshore.**
- 4) Construction of an onshore terminal.**
- 5) Construction of oil and gas pipelines.**
- 6) Marketing and sale of oil and gas.**

Azeri-Chirag-Guneshli Project:
Project Agreement Date: 20 September, 1994
Operator: AIOC

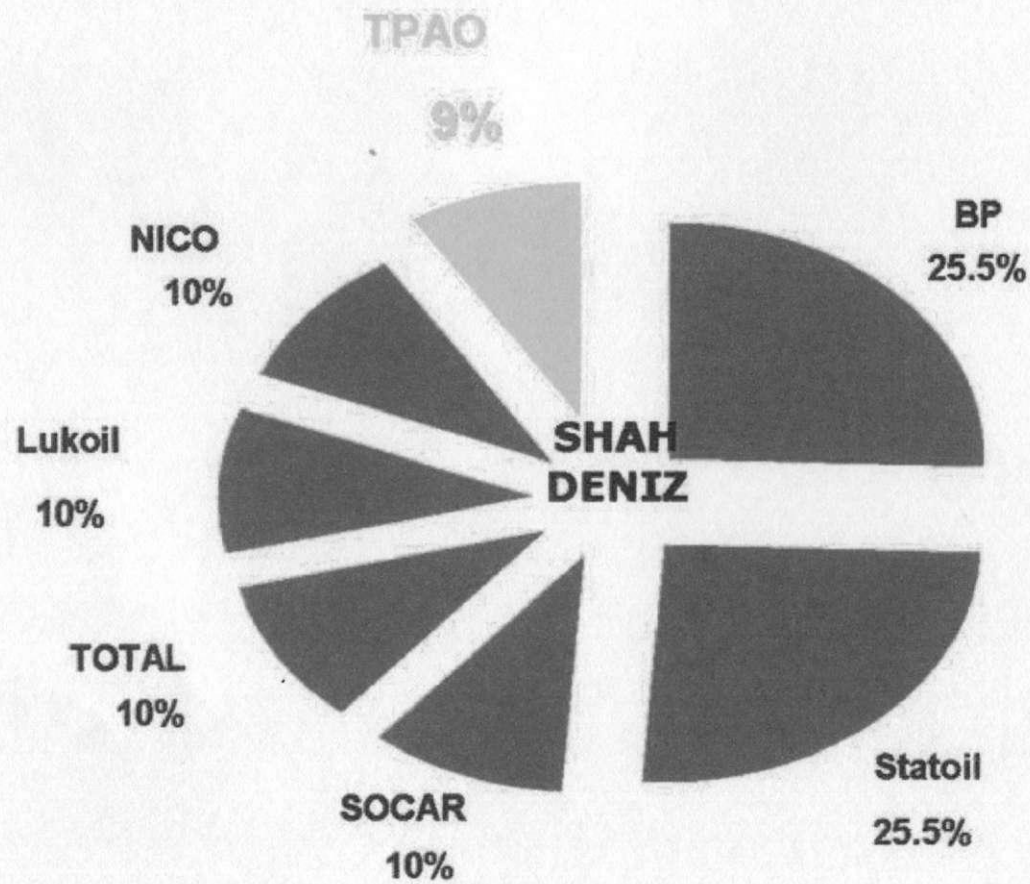
Shareholders are as follows (updated):

ACG



Shah Deniz Project: The Second Agreement relates to the Shah Deniz gas deposits. Gas found there was considerably over the expected. Project Agreement Date: 04 June, 1996. Operator: BP Exploration (Shah Deniz) Ltd. Shareholders are as follows (updated):

SHAH DENIZ



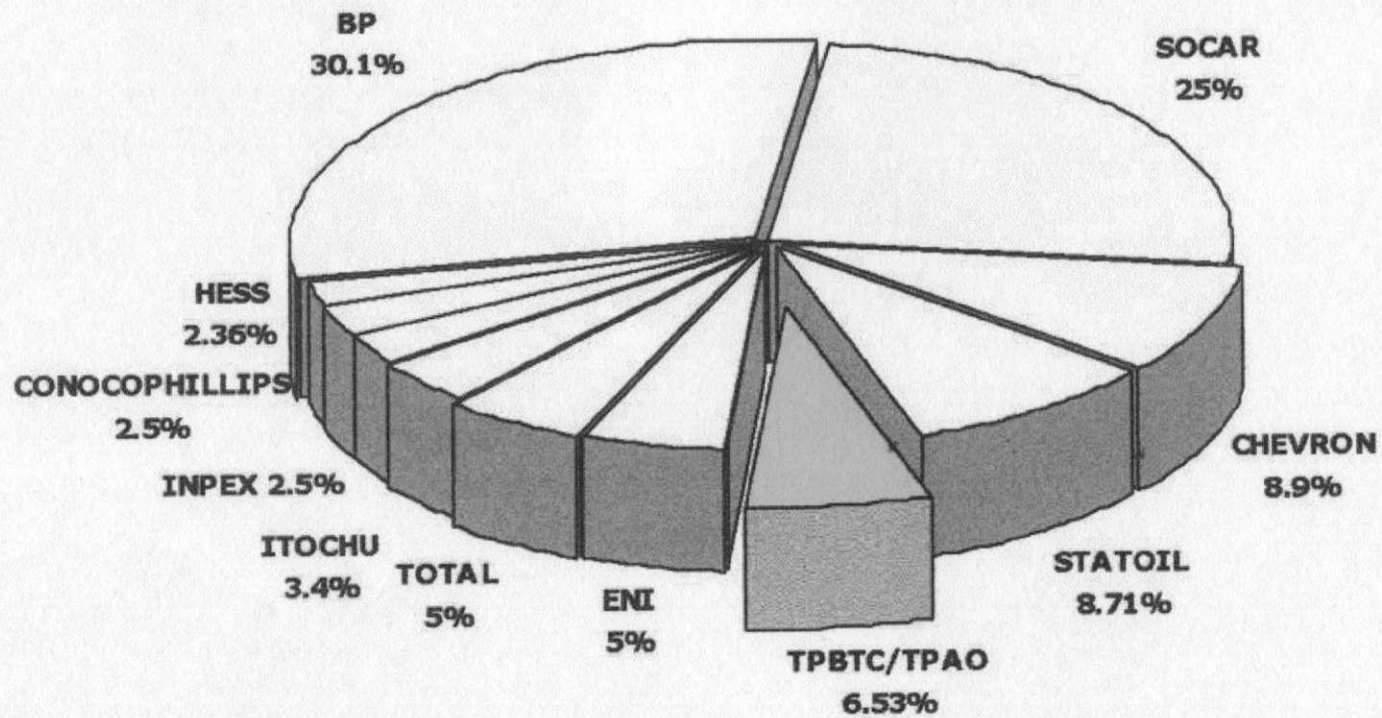
BTC (Baku-Tbilisi-Ceyhan) Oil Pipeline Project:

Project Agreement Date: 01 August, 2002

Operator: BTC Co.

Shareholders are as follows (updated):

BTC



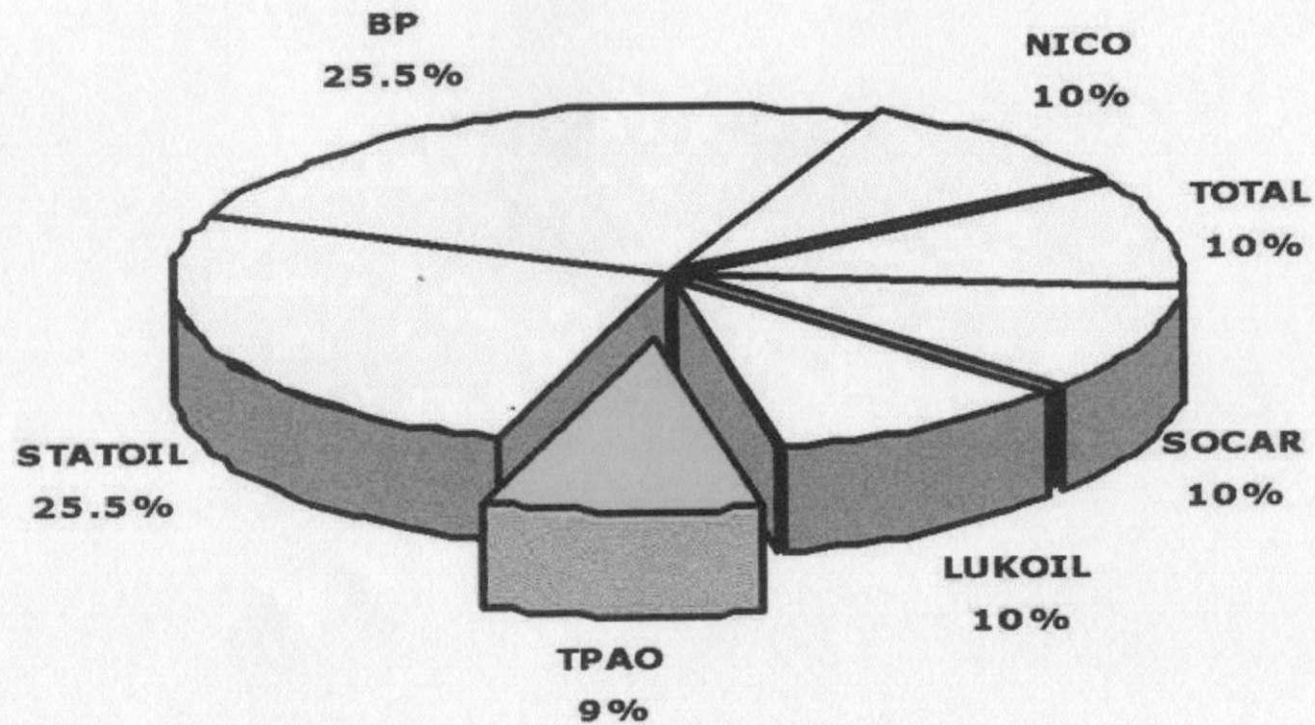
SCP (South Caucasian Pipeline) (Baku-Tbilisi-Erzurum Gas Pipeline)

Project Agreement Date: 25 February, 2003

Operator: SCP Co.

Shareholders are as follows (updated)

SCP



BP Business in Azerbaijan: Up-to-date Supply Chain Operations (Ch.5, continue)

BP Business Summary:

BP provides fuel for transportation, energy for heat and light, retail services, and oil products.

It operates in two segments, Exploration and Production, and Refining and Marketing.

It has exploration and production activities in the United States, UK, Angola, Azerbaijan, Canada, Egypt, Russia, Trinidad, Tobago, Asia Pacific, Latin America, and the Middle East.

Production Sharing Agreement (PSA) for Azeri, Chirag and Guneshli Fields became effective on 12 December 1994.

Supply chains in Azerbaijan has challenges for many reasons: (Ch.5, continue)

- A severe storm can delay urgently needed raw materials.**
- There is also probability of terrorist attacks in confusion areas of the world.**
- One of the most significant challenges to Azerbaijani government is the conflict of Karabakh province.**
- Presently, Azerbaijan's relations with Russia who is the traditional partner of Armenia are still in the tense situation.**
- Arguments over Caspian Sea borders interfere with relations with Iran and Turkmenistan.**

Figure 5.4: Oil Production in the Caspian Sea Region

	Crude oil (thousand bbr/d)		
	1992	2005	2010
Azerbaijan	222	440	1,290
Kazakhstan	529	1,293	2,400
Turkmenistan	110	196	450
Total Caspian	861	1,929	4,140
World	73,935	81,088	91,600

Sources: BP statistical Review of World Energy, 2006; International Energy Outlook, 2006.

(Ch.5, continue)

- **According to industry journals and government sources estimations Azerbaijan's crude oil reserves range between 7 and 13 billion barrels.**
- **SOCAR estimates that proven reserves are at 17.5 billion barrels as per old-fashioned Soviet reserve classification system.**
- **Until now, Azerbaijan has signed over 20 major field agreements with approximately 30 companies from 15 countries.**

Figure 5.5 Oil Production and Consumption in Azerbaijan, 1992-2007*

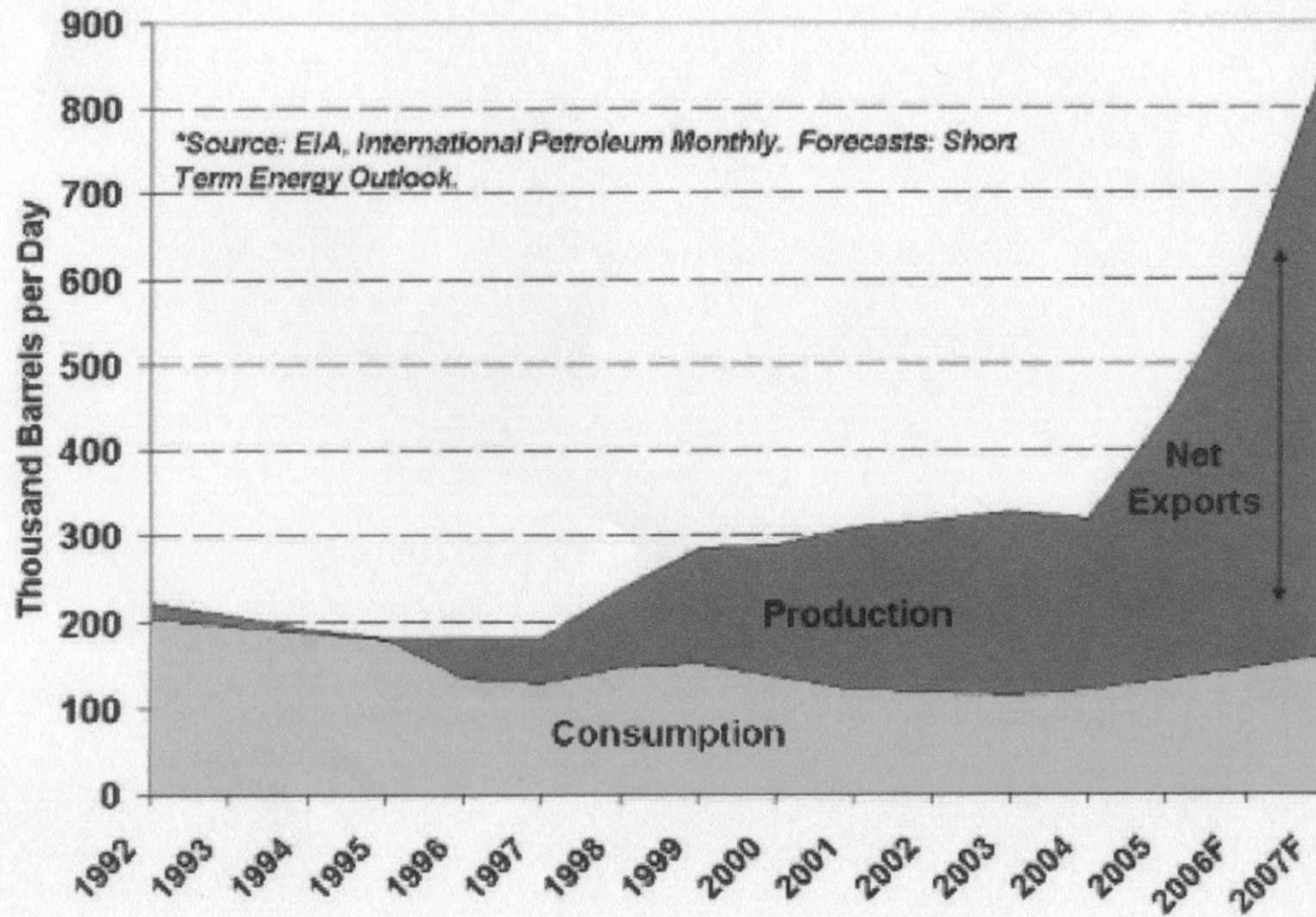


Figure 5.7 Offshore PSAs (Production Sharing Agreement) in Caspian

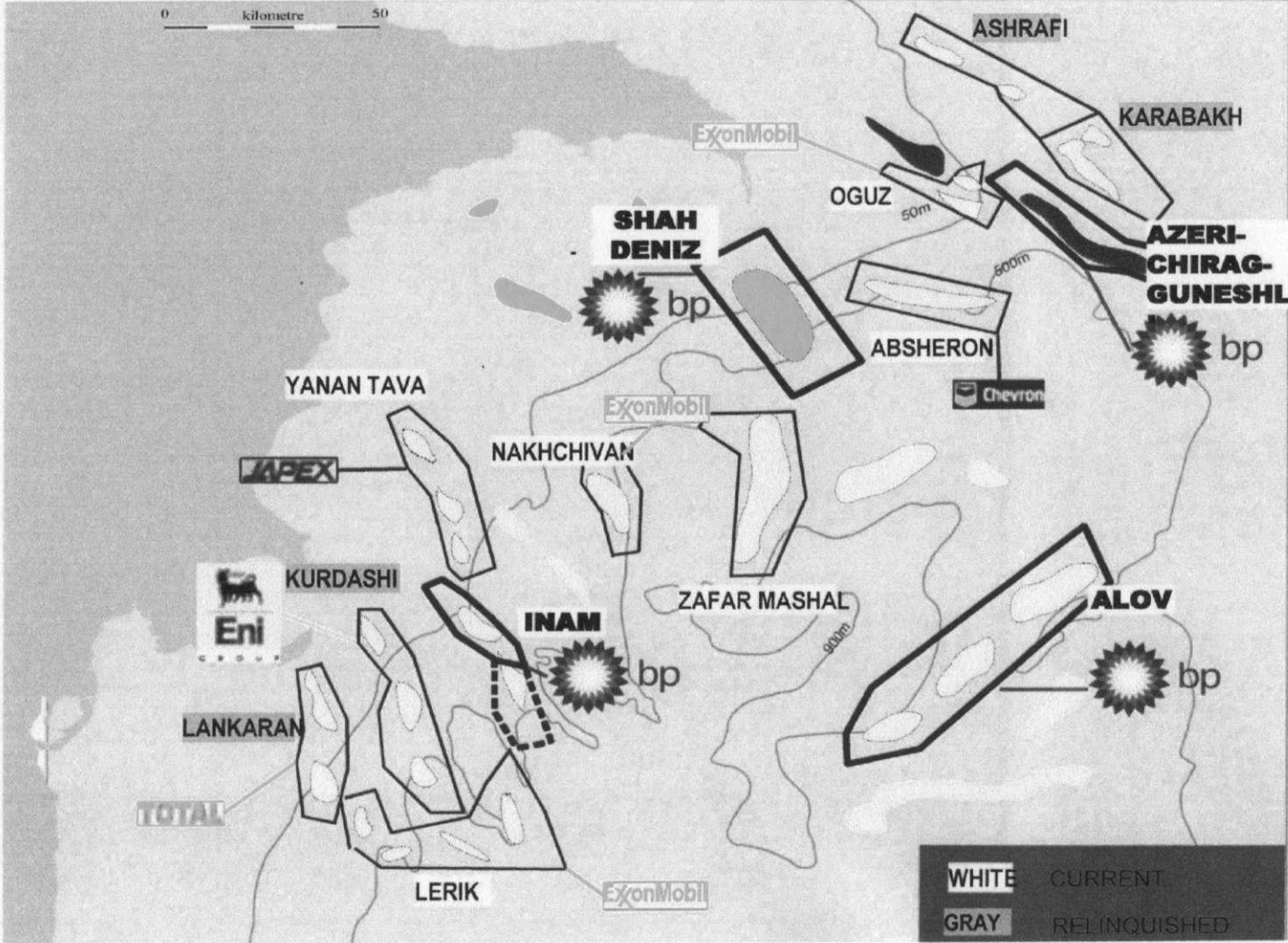
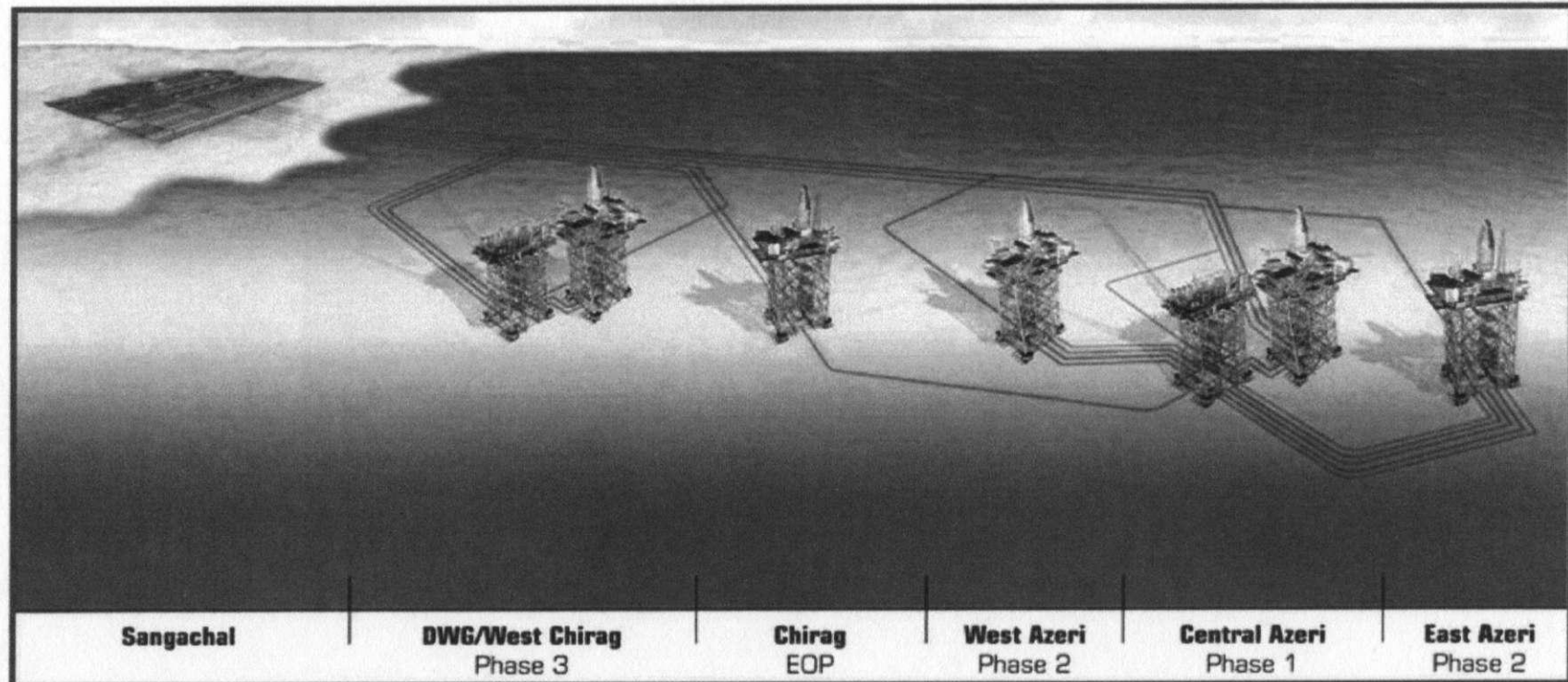


Figure 5.9: ACG Project – Scope & Scale



- Capex: \$8.6bn total / \$6m / day
- 90,000 te topsides
- 90,000 te jackets
- 1000 km offshore pipelines

- 7 years of execute
- 30 million man-hours total so far
- Over 2 million man-hours/month

- 80% of man-hours in Azerbaijan
- 20% across another 10 countries
- New Workforce - 6000 Azeris

Figure 5.10: Azerbaijan Oil Production Market Shares

company	2005 oil production (000 b/d)	Market share %
SOCAR	220	50
BP Azerbaijan	100	22.7
Unocal Azerbaijan	30	6.8
Inpex	30	6.8
Statoil Azerbaijan	25	5.7
ExxonMobil	24	5.6
TPAO	20	4.5
Devon Energy	16	3.6
Itochu	11	2.5
Delta Hess	8	1.8

Natural Gas Production: (Ch.5, continue)

The Caspian Sea region's natural gas production of 3.0 trillion cubic feet each year in 2005.

Turkmenistan is the largest producer; with production of 2.0 tcf/yr. It is almost two-thirds of the region's gas output.

Azerbaijan has proven natural gas reserves of approximately 30 trillion cubic feet.

Figure 5.11: Gas Production in the Caspian Sea Region

	Natural gas (tcf/yr)		
	1992	2005	2010
Azerbaijan	0.28	0.18	0.7
Kazakhstan	0.29	0.84	1.24
Turkmenistan	2.02	1.97	3.5
Total Caspian	2.59	2.99	5.44
World	72.195	97.534	116.50**

* includes natural gas liquids

** Consumption

Sources: BP statistical Review of World Energy, 2006; International Energy Outlook, 2006.

(Ch.5, continue)

The Shah Deniz natural gas field was discovered in 1999.

BP Exploration (Shah Deniz) Limited is the operating company for SD.

Shah Deniz is one of the world's largest natural gas field of the last 20 years.

According to the BP, the field contains 14 Tcf of natural gas.

Other industry and trade sources estimate the field's size to be 35 Tcf.

Figure 5.13 : Shah Deniz

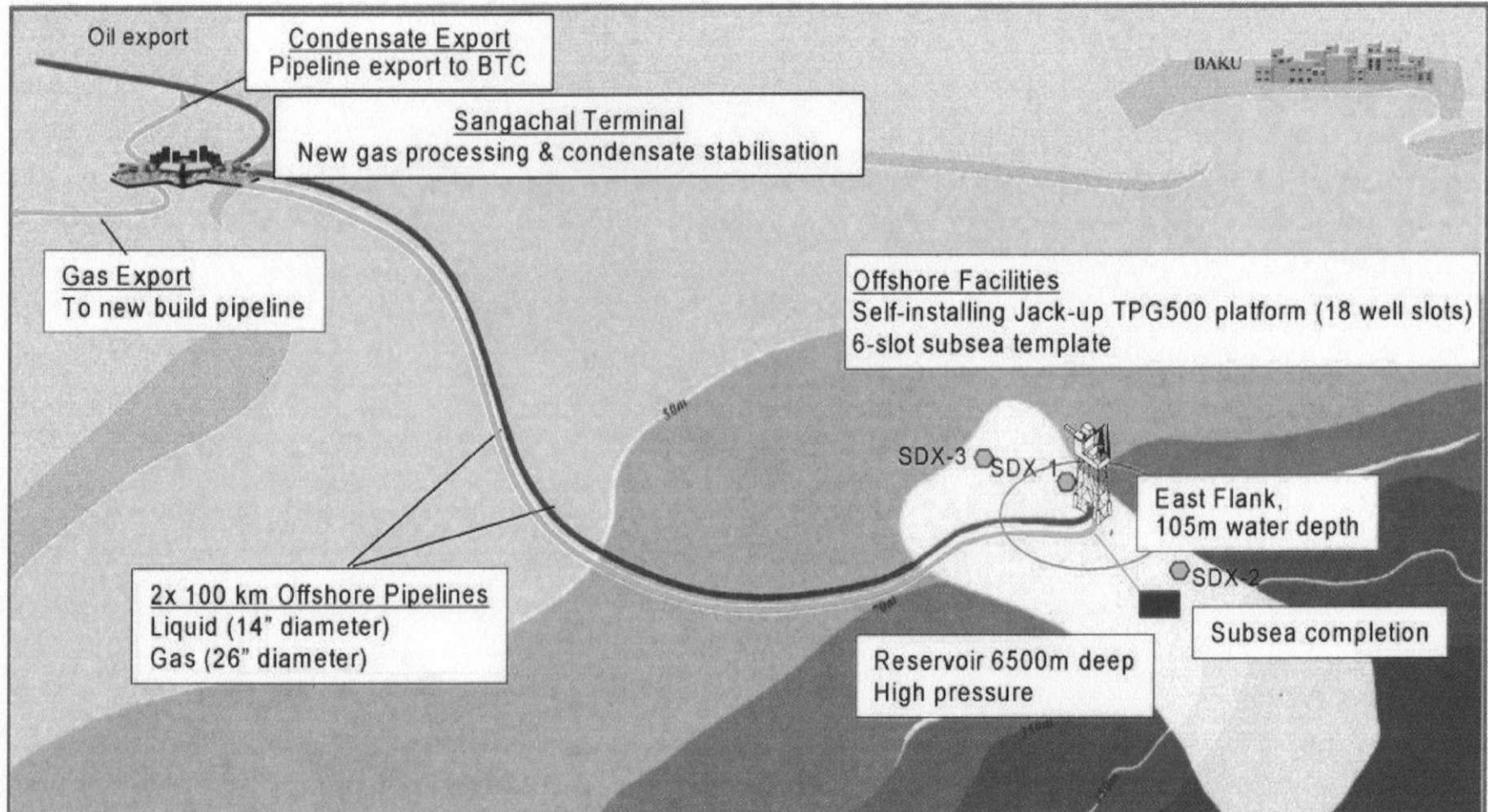
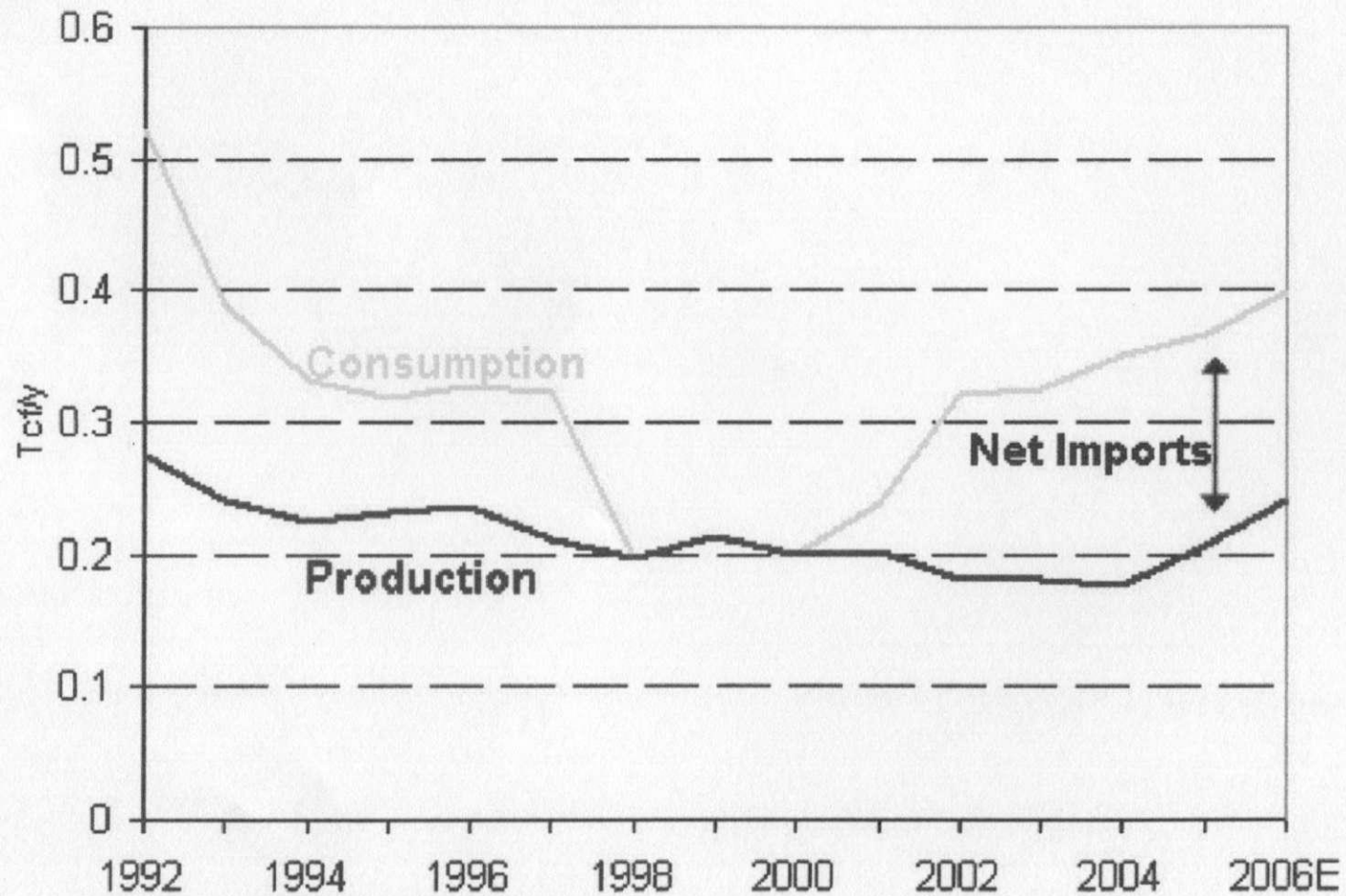


Figure 5.12: Natural Gas Production and Consumption in Azerbaijan – 1992-2006



Source: EIA. 2006 is a preliminary estimate.

Terminal Operations (Ch.5, continue)

Sangachal terminal is a processing central terminal.

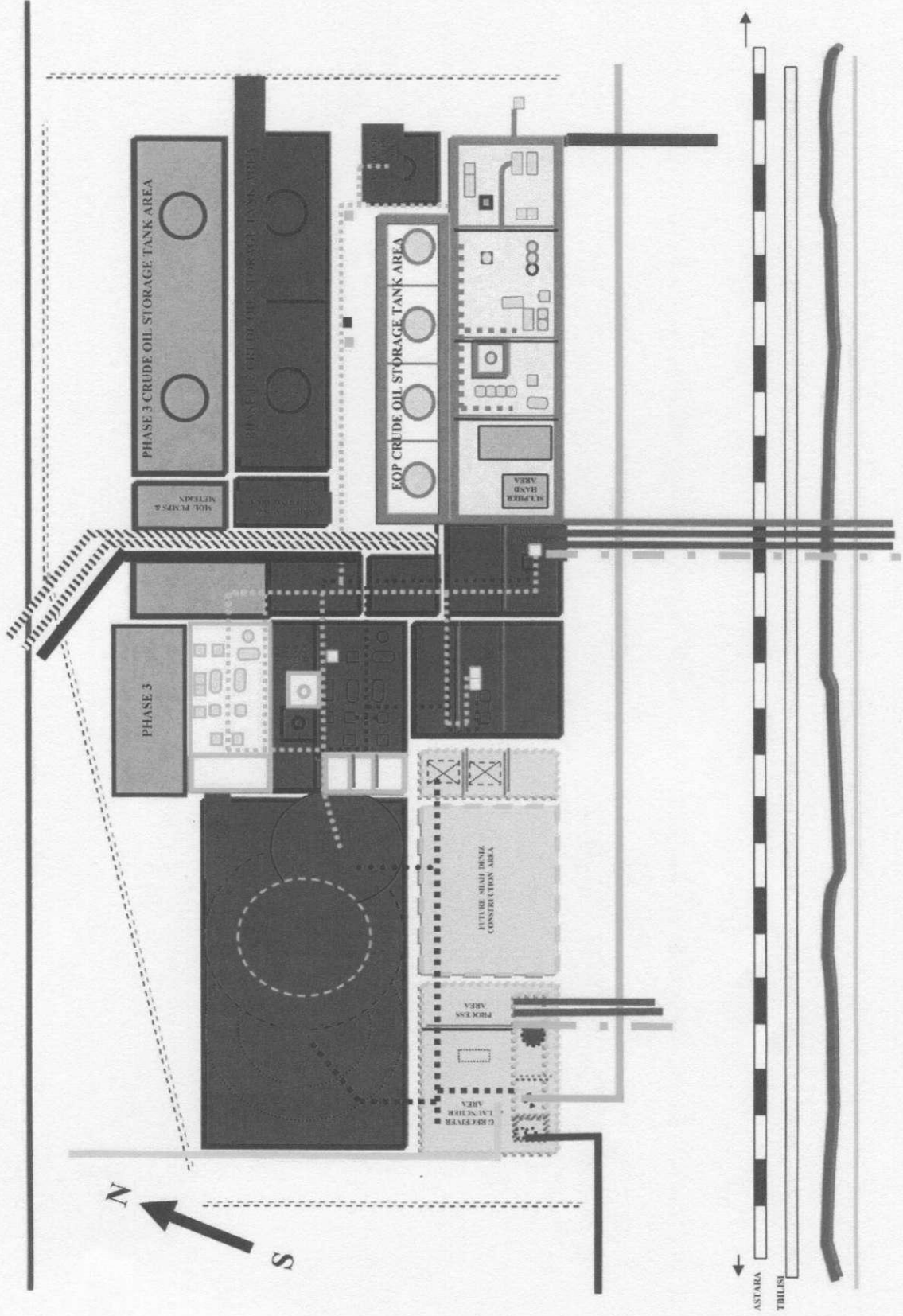
All hydrocarbons from offshore Caspian are processed before export there.

The terminal is designed to treat production from all BP's operated properties in the Caspian and to allow future expansion.

It includes ACG oil processing facilities, SD gas processing facilities, the BTC first pump station and the SCP compressor.

Phase 3 facilities at Sangachal Terminal was completed during the fourth quarter of 2007.

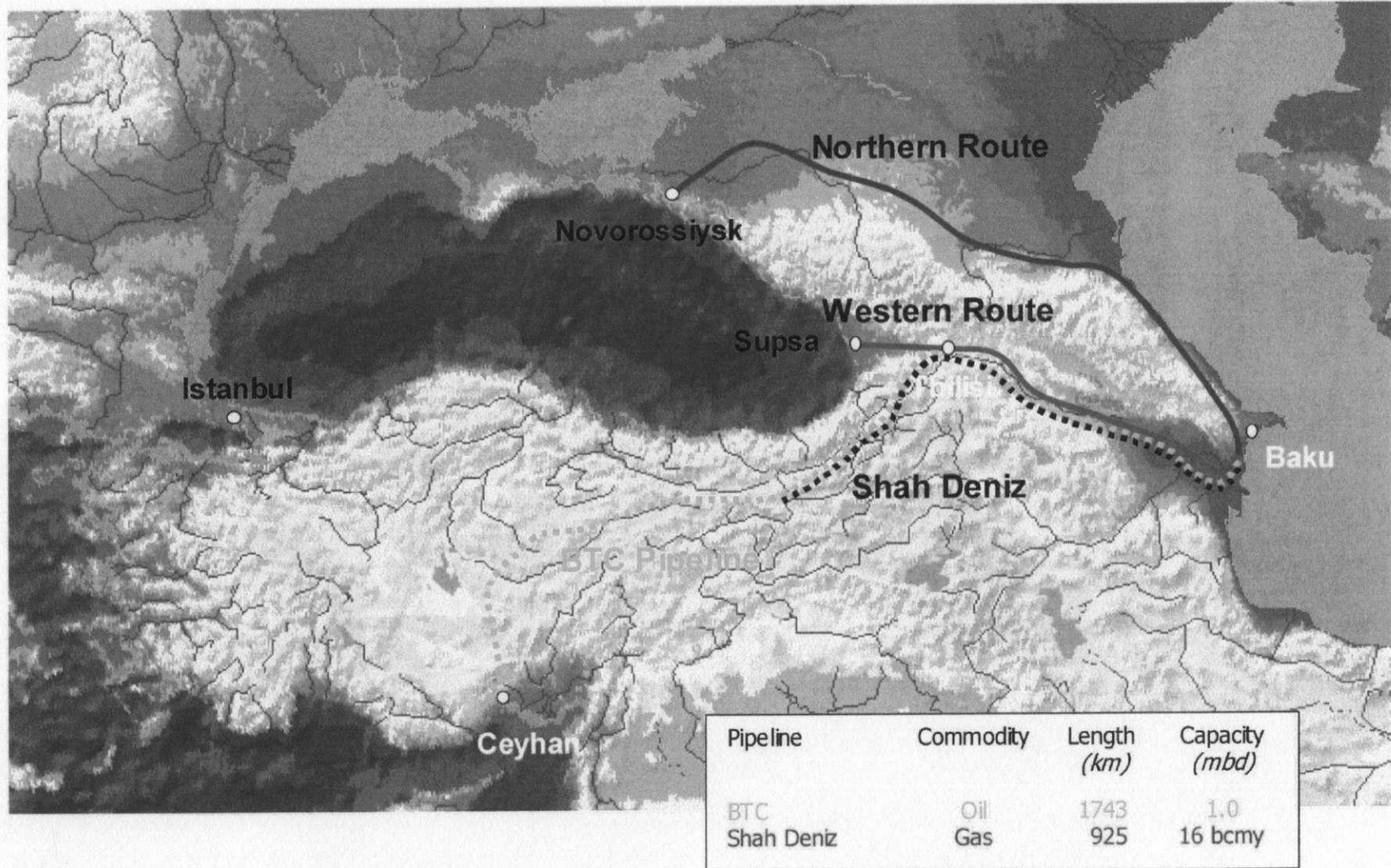
Figure 5.14: Sangachal Terminal Expansion Program



Pipelines: (Ch.5, continue)

- **The BTC pipeline has been constructed to transport oil from Sangachal terminal through Tbilisi to Ceyhan in Turkey.**
- **Azerbaijan's other export routes are the Baku-Novorossiysk pipeline and Baku-Supsa pipeline.**
- **The main gas export pipeline is the "South Caucasus Pipeline", (Baku-Tbilisi-Erzurum).**

Figure 5.15 Pipelines from the Caspian



Survey of Supply Chain Effectiveness - BP Applications in the Region: (Ch.5, continue)

BP Supply Chain Global:

BP has recognized the importance of strategic approaches to the management of goods and services.

BP has brought supply chain management agendas to a senior level of the company.

And today Bp SCM department's purpose is to undertake strong strategic source planning of corporate demand and supply conditions, utilizing reactive or proactive strong opportunities to improve value.

Figure 5.17 BP Group Global Net Oil Production in 2006

2006 BP group net production^a
1.351 thousand barrels per day
(excluding equity accounted entities)



^a Includes natural gas liquids and condensate.
^b Includes Angola, Australia, Canada, Colombia.

Figure 5.18: BP Portfolio in Caspian



Key Achievements and Challenges in Azerbaijan Projects – 2006 (Ch.5, continue)

Achievements:

Operations: The East Azeri field came on stream. BP achieved a production rate of more than 600,000 barrels a day. BTC oil pipeline became operational, and the first oil was loaded onto a tanker at the Ceyhan terminal. First gas was produced from the Shah Deniz field.

Technology: The first multi-platform was built in Azerbaijan and started officially in January 2007.

Environmental management: In 2006, most of the assets of BP Azerbaijan were re-certified with ISO 14001 environmental management system.

BP people: BP adjusted local salaries to reflect regional pay levels.

Achievements: (Ch.5, continue)

Local content: To encourage the BP contractors, BP started the annual 'Best of Business Awards' which recognized four companies for their achievements and efforts in developing the national workforce.

Social investment: BP and co-ventures invested around \$6.59 million in social development projects in Azerbaijan.

Relationships—working together: BP Procurement & Supply Chain Management Team became the responsible for the procurement and supply chain management of all operational requirements for BP Azerbaijan.

September 2006, BP restarted the Caspian Energy Centre at the Sangachal Terminal.

In October 2006, BP re-started the Enterprise Centre in Baku.

Challenges: (Ch.5, continue)

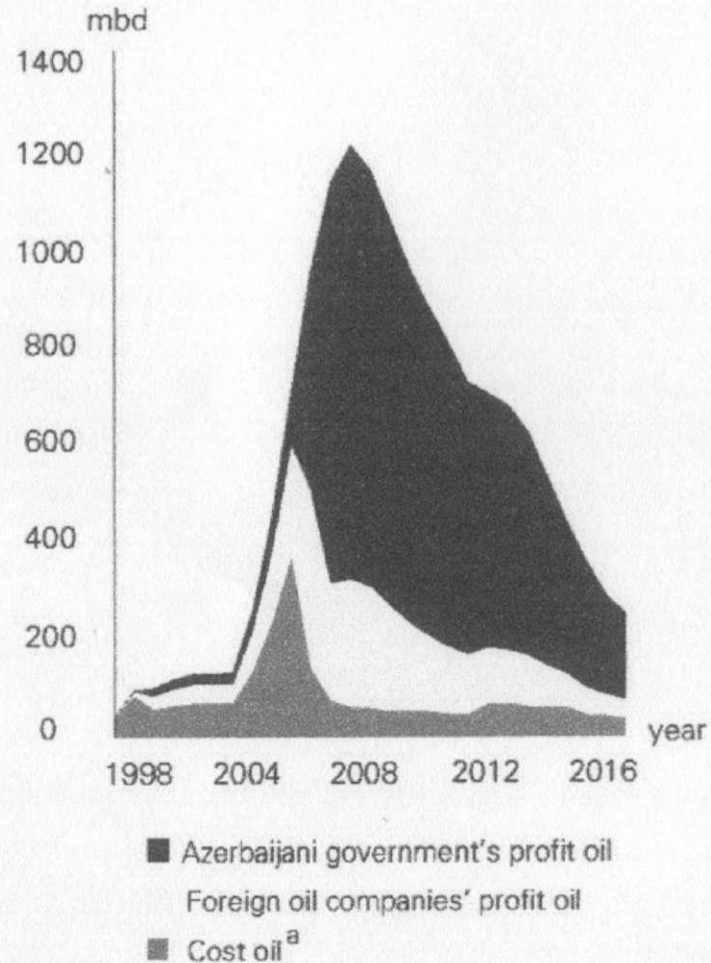
Fatalities: One of BP contractors died in Azerbaijan during construction activities at Sangachal terminal. BP take actions to learn from this incident.

Shah Deniz/SCP: It is shut down for a while for remedial works to be undertaken.

Extension of WREP shutdown: The Western Route Export Pipeline was closed as part of a 10-day planned maintenance programme.

Waste management: The lack of waste management facilities in Azerbaijan was a challenge to BP during 2006.

Figure 5.20 Gross ACG Oil Production Split at \$60/bbl



a : cost oil: a portion of a crude oil required to recover capital and operating costs as per ACG PSA.

CONCLUSION SECTION (1)

Conclusion section is divided into three sub-sections:

- **a) Results obtained from the study:**

An extensive research work has been carried out, current supply chain management theories and practices in the region have been viewed, and as a result of all these studies, obtained results have been summarized in 21 items.

- **b) Recommendations about SCM for Organizations and/or companies:**

At the light the results obtained at the end of the study regarding supply chain management, recommendations have been given in 27 items and now we have a very good directory for the people working in this field.

- **c) Conclusion:**

Importance / significance of oil, importance of supply chain management in oil industry and topicality of the dissertation have been briefly explained, and it is advised that the oil companies should not only concentrate on their profits but they should also remember their social responsibilities.

A) OBTAINED RESULTS (1)

SCM is very broad and wide subject. But after our study I summarized the obtained results as follows:

- 1) Improved supply chain management principles combined with new information (e-business) technologies can help companies reduce costs, increase revenues, increase efficiencies, and expand market opportunities.
- 2) We find evidence that these improvements caused reduced wave effect (production instability, sales instability), lower inventory levels, reduced logistical costs, and effective procurement processes.
- 3) We show evidence that these improvements are linked to macroeconomic benefits. These benefits are: lower inflation, more stable economic output, higher productivity growth, and better standards of living.

A) OBTAINED RESULTS (2)

- 4) Supply chain applications need the application of the 'Five Lean Principles':
 - a) Specify the Product Value – correctly define the value.
 - b) Identify the Value Stream.
 - c) Make the Product Flow.
 - d) Pull of the Customer – let the customers pull the product from you as needed.
 - e) Follow to Catch Perfection.

- 5) The Lean Enterprise is the target of many progressive Supply Chain organizations. But the process of change is full of risk and waste. Therefore the Lean Principles should be enriched and at the same time techniques are to be developed to achieve the target with the minimum possible waste.

A) OBTAINED RESULTS (3)

- 6) A value stream is defined as the set of all the specific actions required to bring a specific product (whether a good, a service, or a combination of the two) through the 3 critical management tasks:
 - a) The problem-solving task running from concept through detailed design and engineering to making the product publicly available.
 - b) The information management task running from order-taking through detailed scheduling to delivery.
 - c) The physical transformation task proceeding from raw materials to finished product in the hands of the customer.

- 7) The only value stream is Order Fulfillment. And according to the Order Fulfillment the management of physical assets is the key aspect of business effectiveness.

A) OBTAINED RESULTS (4)

- 8) Information management helps to reach effective results. The key driver of effectiveness is the key dataflow transactions, decision making, communication, and dependent events. They are subset supply chains.
- 9) Most organizations don't have deep statistical modeling capabilities.
- 10) There are different ways to organize supply chains depending on different company objectives, competitive conditions and long-term macro economic changes.
- 11) But a company's SCM system can be designed around four performance areas and five interdependent processes. The performance areas are financial, productivity, quality, and cycle time. The five processes are customer response, inventory planning and management, supply, transportation, and warehousing.
- 12) If one can define the organization's supply chain then it can certainly measure it. Once you begin to measure it, you'll find great opportunities to drive continuous process improvement to it.

A) OBTAINED RESULTS (5)

- 13) Most supply chain planning systems generate a lot of 'busy work' for planners such as exception conditions processing. Planners may become buried in details, unable to spend more time on high value added tasks more likely to identify and reduce a potential disruption to the supply chain.
- 14) Supply chain management in the petroleum industry contains various challenges, specifically in the logistics area, that are not present in most other industries.
- 15) These logistical challenges are a major influence on the cost of oil and its derivatives. However, opportunities for cost savings in logistics still do exist.
- 16) Companies in the petroleum industry have become increasingly dependent on the services of the 3rd-party logistics companies to manage their supply chains. This cooperation can be in the form of swaps. Swaps is a practice that can offer companies huge savings and introduce new opportunities.

A) OBTAINED RESULTS (6)

- 17) Great savings are realized by companies using swamp practices.
- 18) In the petroleum industry efficient and cost effective supply chain practices represent important factors for maintaining continuous supplies of crude oil, the reduction of transportation times, and lowering of production and distribution costs.
- 19) Due to the inflexibility involved in the petroleum industry's supply chain network, logistics represent a great challenge. However, it is only one of several challenging factors. Integrated process management, information systems and information sharing, organizational restructuring, and cultural reorientation are equally important.
- 20) Despite the all studies mentioned before there are still many opportunities for improvements and cost savings in the petroleum industry's supply chain.
- 21) Supply chains cannot tolerate even 24 hours of disruption. If you lose your place in the supply chain because of various reasons you could lose a lot.

B) RECOMMENDATIONS (1)

In the literature you can not find many definitions which identify an ideal organization or structure for SCM.

Finding an exact set of measurements which all of industry would agree upon is impossible.

Because no one, agreed-upon solution to the most successful SCM processes and measurements.

But I strongly recommend the followings:

- 1) Develop and/or refine supply chain policies, policies addressing specific and emerging issues areas such as hazardous materials.
- 2) Develop management systems to promote improved working, health and safety conditions.
- 3) Identify and prioritize the primary social and environmental issues arising from operation of their global supply chains.

B) RECOMMENDATIONS (2)

- 4) Try to understand specifically what customers want and accordingly restructure the organization. Once the structure is in place, performance measurements can be developed. The performance dimensions should include measures of efficiency, effectiveness, quality, productivity, quality of life, innovation, profitability, and budgeting.
- 5) Develop business plans required to deliver, measure and sustain benefits.
- 6) Eliminate the waste to obtain better return of investment (ROI).
- 7) Use Swap Practices.
- 8) Implement Lean practices to improve the supply chain.
Implementation of Lean practices is a proven technique to improving processes.
- 9) Use statistical modeling and/or optimization techniques for the application of supply chain planning.

B) RECOMMENDATIONS (3)

- 10) Use the Supply Chain Operations Reference – model (SCOR).
- 11) Try to estimate what will happen in the future and change plans and methods accordingly (for example take part of Supply Chain 2020 Project).
- 12) Improve technology transfer.
- 13) Conduct risk assessments to prioritize the most urgent issues in a company's supply chain.
- 14) Develop audit tools, verification, monitoring, and remediation approaches.
- 15) Analyze supply chain performance versus industry best practice gaps.
- 16) Concentrate on specific challenges.

B) RECOMMENDATIONS (4)

17) Focus on training for Supply Chain Managers.

18) Provide better information to supply chain managers to manage the logistics business.

19) Improve labor (worker) practices in its supply chain.

20) Give performance awards to successful management like company employees and supply chain partners.

21) Educate themselves as to the reality and implications of looming oil shortages.

22) Hire a dedicated person within the enterprise or outside consulting firm to address the specific issues and challenges.

B) RECOMMENDATIONS (5)

- 23) Investigate whether the improvement in supply chain performance is worth the investment cost.
- 24) Develop a national policy on energy and resources (by governments).
- 25) Clarify energy policy so that oil industry can make appropriate long-term decisions (by governments).
- 26) Focus on regional and bilateral trade agreements that provide effective market access (by governments).
- 27) Improve highway infrastructure, in particular the construction of highway (by governments).

C) CONCLUSION (1)

Oil is a key strategic commodity, critical to the modern industrial economy. Even we can say “oil is the lifeblood of the world”.

- Oil prices are the most important subject in today’s economies. Consequently SCM is the key to achieve an economic, efficient and secure supply of oil to end customers.
- When the oil and gas demand increases, risk, regulation, and supply unpredictability increases.
- There are numerous definitions of SCM, but simply, it is the management of all processes and functions necessary to satisfy a customer's order.
- No one agreed-upon solution to the most successful SCM processes and measurements.

C) CONCLUSION (2)

- There are some basic best practices. The use of Supply Chain Operations Reference – model (SCOR) have a significant impact in both the public and private sectors, which is evidenced by the numbers and types or organizations.
- Focusing on the strategic goals and developing leading metrics will be critical to the success of SCM improvement.
- Supply of oil and its products to consumers, including all major industries, is the critical subject, therefore the sector must continue with timely demand fulfillment by overcoming the difficulties.
- Excellent experience is one of the necessary prerequisites for achieving this timely demand fulfillment.
- To have better operational standards, the industry needs to work cooperatively. They should not only focus on maximizing benefit for their organizations but also they should be aware of the social responsibility of providing oil products to customers.