

# **Vendor Managed Inventory Application in Oil and Gas Industry**

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## **Abstract**

Vendor Managed Inventory (VMI) concept has been successfully used in many industries such as; Automobile, Retail, e-Commerce, Construction etc. However its application in commodity sector is in the stage of infancy and is exposed to many challenges. The research presents an overview of VMI application in the context of oil and gas industry and explores the possible implementation challenges by implementing in the United Arab Emirates (UAE) oil and gas industries. Process mapping of Oil and Gas industry supply chain is executed by using Supply Chain Operations Reference (SCOR) model of up to three levels to identify the VMI mechanism details. Additionally SWOT analysis is carried out to investigate the possible implementation strength and weaknesses. The research highlights the key benefits; as in dual benefits to both industry and vendors. Finally, the report proposes managerial implications to improve the current situation of VMI practices within the UAE Oil and Gas Industry (OGI) by further negating the ownership right and revenue distribution. Assessing vendors and improving the knowhow level helps within the local market for the assurance of sustainability.

## **Keywords**

Vendor Managed Inventory; SWOT Analysis; SCOR model, Oil and Gas Industry; United Arab Emirates

## **1. Introduction**

Organizations all around the world have woken up to the fact that in order for them to successfully compete in the international markets and to sustain their competitive advantage, they must strive to imbibe and rely on effective supply chains and networks. The Management of the supply chain has thus caused a paradigm shift in the way most organizations function (Brandt, 2009). Companies are seen to now focus on their core competencies and rope in external suppliers, distributors and logistic providers in order to ensure that products are manufactured and delivered as per the demands of their customer (Zammori *et al*, 2009). Hence it is imperative that there should be a close cooperation between the various members who constitute a part in the supply chain.

Vendor Managed Inventory (VMI) is one of the supply chain practices in the industry that helps bridge the gap between members of the supply chain and ensures a deeper integration and collaboration among them (Dresner *et al*, 2009; Disney and Towill, 2003). VMI, also popularly referred as Continuous Replenishment or Supplier Managed Inventory, is a strategy based on principle that the manufacturer or supplier assumes the responsibility for the management as well as all decisions regarding the product inventory at the customer by utilizing the demand information obtained from the customer (Zammori *et al*, 2009; Claassen *et al*, 2008; Chopra and Meindl, 2007; Kuk, 2004; Waller *et al*, 1999).

The globalization of the supply chain has spurred the growth of VMI. The concept of VMI was pioneered based on the belief that suppliers would be better equipped to handle the customer's inventory due to their adept knowledge in estimating lead times. An accurate and timely information about the expected demand and inventory levels from the customer enables the suppliers to plan production and delivery, preventing stock-outs, improving the visibility of stocks and reducing inventory costs (Leung *et al*, 2009; Croson and Donahue, 2005). Implementing a VMI therefore discards one echelon of forecasting demand and ordering, dampening the bullwhip effect and eliminating disruptions in the supply chain decision making. The flow chart in Figure 1 provides a gist of the processes involved in a VMI system in a generic supply chain case.

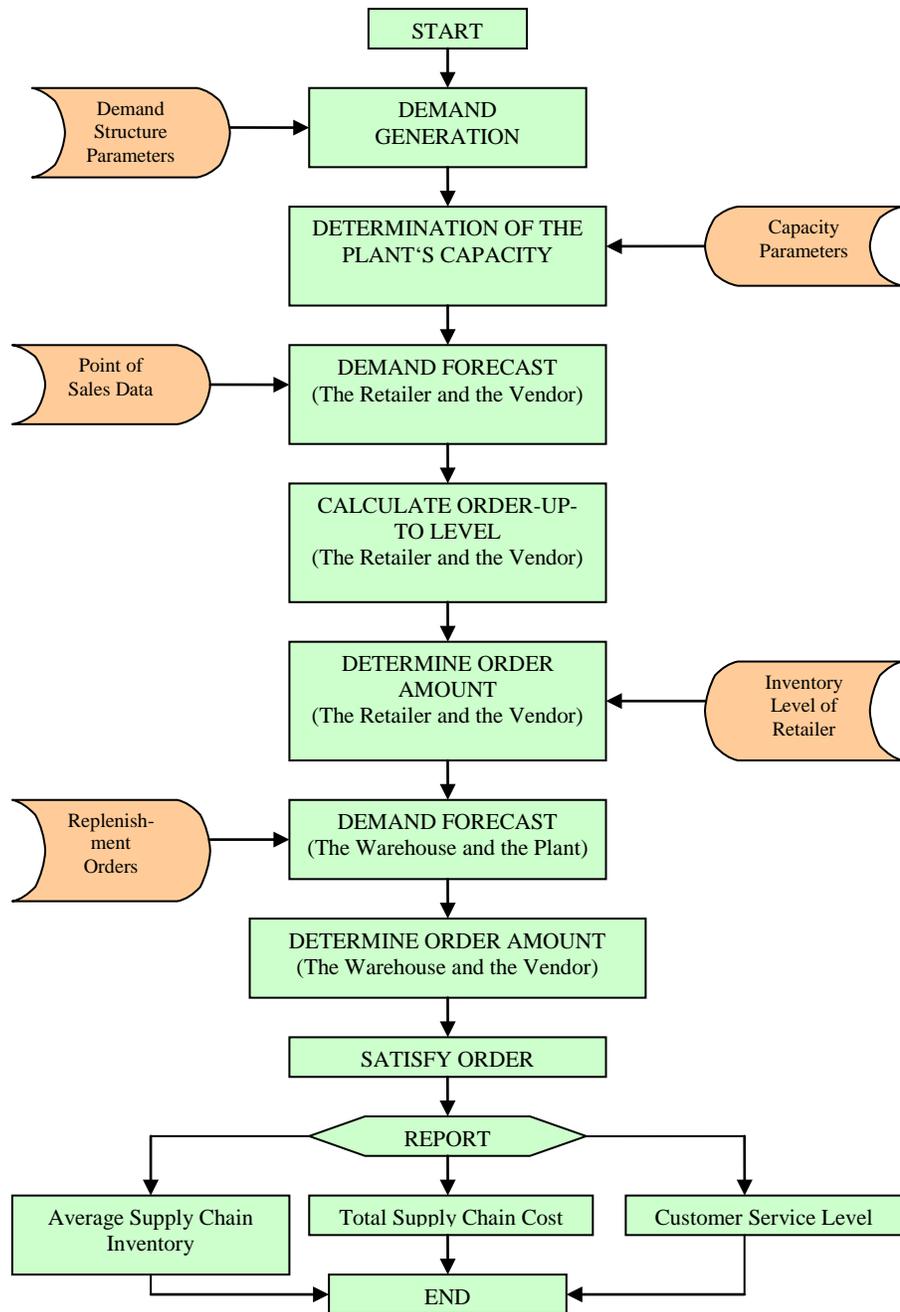


Figure 1: VMI Business processes in supply chain; Source: Adapted from Sari, 2007

From the aforementioned Figure 1, it can be ascertained that that the Manufacturer and or retailer provides the point of sales data as well as its level of inventory to the vendor/supplier. This information is processed by the supplier to determine the order amount based on the predetermined order-up-to level and then the supplier proceeds to ship the order to replenish the inventory.

## 2. Global Scan of Oil and Gas Industry

The global energy market consists of Oil, Natural Gas, Coal, Nuclear Energy, Hydroelectricity, Renewable Energy, and Primary Energy. The overall energy consumption of the global market has reduced after the economic crisis,

however still maintained a stable growth in the last two years. Currently the world produces and consumes 86 Million Barrels per Day. The oil and gas industry contributes in 50% of the world total Gross Domestic Product (GDP) which is estimated to be 8.7 trillion USD. In 2010, oil prices varied from 70\$-80\$/ barrel, with an increase in price of 29% over 2009. On the other hand, natural Gas prices have increased. According to BP statistical review of world energy June 2011, the year 2010 saw the highest energy consumption since 1973; with an overall increase of 5.6% led by commercial business activities. The Chinese market consumption increased by 11.2%; as it's known that most of the global manufacturing is being outsourced to China. China's energy consumption share in the global market has reached up to 20.03%. In the year 2010, Natural Gas consumption has reached to its peak with an increase of +7.40%, Coal share of 29.6% (BP, 2011). The reason of mentioning the Chinese energy consumption is that GCC region contributes in the supplies of the energy consumption of the Chinese market. The figures below shows ratios between oil reserves to production, oil distribution of proved reserves during 2010, production by region/ consumption by region, oil consumption per country. Latter the distribution of natural gas reserves in 2010, along with consumption per country. Figures 2 & 3 illustrate high oil reserves of the Middle East, along with high production in comparison to its consumption levels of oil. With regards to natural gas,

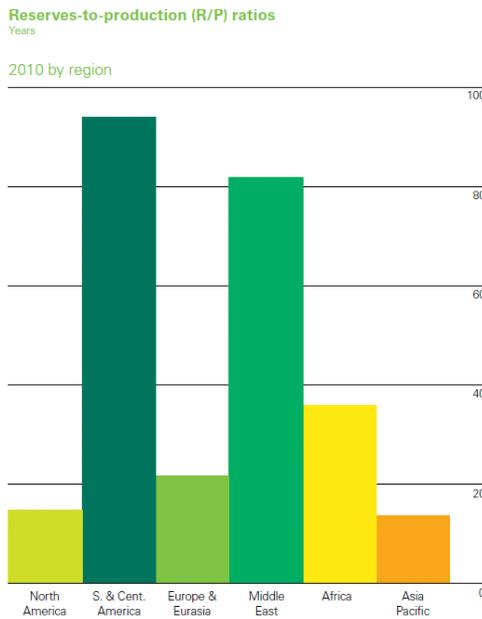


Figure 2: Oil Reserves-to-production (R/P) ratios by region in 2010 (Source: BP, 2011)

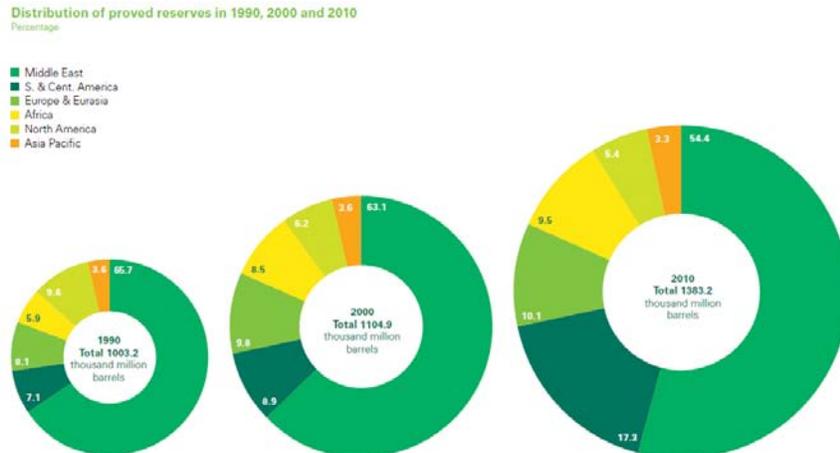


Figure 3: Distribution of proved oil reserves in 1990, 2000, and 2010 % by region (Source: BP, 2011)

### 3. The UAE Oil and GAS Industry

Economically, the UAE has an estimated \$260 billion (2011) GDP purchasing power, and an estimated GDP official exchange rate of \$358.1 billion, and a GDP official growth rate of 3.3% in 2011 (CIA, 2012). The UAE has recently diversified its economic portfolio, depending on various industries; Oil, Gas, Agriculture, Aviation, Tourism, Banking Services, Financial Service, Manufacturing, Petrochemical, And Real Estate and many others. However, the country's dependence on oil and gas production leads its exports to volatility, which risks the current account balance. However, currently the country is still in a position of trade surplus of about 15% of its GDP. The government supports free trade and has 100 free trade agreements, exchange rate and stability of the currency is high as it is pegged with the USD. According to SEB Merchant Banking, inflation rate is 1% (Järvung, 2011). The country has invested a lot in infrastructure development, and the current business cycle is in the recovery face from recession.

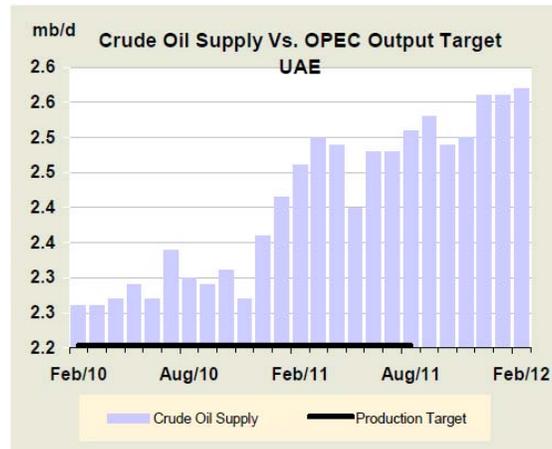


Figure 4: UAE Crude Oil Supply vs. OPEC Output Target (Source: IEA Oil Market Report, 2012)

With emphasis on Oil and Gas sectors, Abu Dhabi the capital of the UAE “has 80% of the federation’s proven oil reserves of about 100 billion barrels, enough for over 100 years of exports at the current production rate of about 2.5 million barrels per day (mbd). Of that, over 2 mbd are exported, and the UAE may have as much as 500,000 bpd of spare capacity” (Katzman, 2011). According to OPEC, the country is supplying more than what was targeted to supply. Figure 4 highlights the UAE Crude Oil Supply Vs. OPEC Output Target (Source: IEA Oil Market Report, 2012). According to Business Monitor International Report 2011, forecasted that the UAE will require 8.6% of Middle East regional oil demand by 2015, while providing 9.9% of supply Regional demand of oil is estimated to increase up to 8.9mn b/d by 2015.

#### 4.1 UAE Oil and GAS Production.

During the 1930’s the British dominated the gulf region, 1939 saw a treaty was signed between Abu Dhabi and a British owned petroleum company, digging of first well started in 1950 (Ras Al Masdar), however, the well was dry. By the year 1958 the discovery of first oil well was in Um Al-sheef; and since that date the treaty is in operation. Latter digging started in Dubai by 1963. Where in Sharjah, surveying started by 1940, and oil got discovered by 1969. In Ras Al Khaima (RAK), digging started in 1975, and oil was discovered by 1976. The treaty of a “75-year concession for all the onshore oil rights in Abu Dhabi was awarded to the Petroleum Development Company (Trucial Coast), a subsidiary of the Iraq Petroleum Company (IPC), itself a joint venture of several oil majors, including BP, Shell, Total, Exxon and Mobil” ( Butt, 2001). The treaty included the European Operators to earn 40% of the total revenue generated from the Oil and Gas exports. The Operators have appointed Engineering, Procurement, Contracting and Installation companies (EPCI) such as ADMA (J.V between BP & ADNOC) and others to dig for oil, and build Oil mills. The key players of the EPCI companies are British/ German/ French (Schlumberger), and few local players emerged during the last decade such as Al Jabber, and Al Mazroui. The operator’s main involvement is in pumping and extracting the oil. Oil Service and Maintenance companies sector has more local presence than EPCI companies. Those companies take care of the Mills, and service them based on service schedule ongoing process, and also are responsible to act accordingly in case of any emergency situation. Oil

Transportation is mainly conducted through the operators, along with ADNATCO, wholly owned subsidiary of ADNOC. Latter oil is delivered to refineries, or sold as crude oil in the market.



Figure 5: UAE oil and gas exploration locations

Abu Dhabi National Oil Company acts on behalf of the Supreme Petroleum Council; ADNOC manages the production of more than two million barrels of oil a day. The company is largest crude oil producer and is ranked among the top ten oil generators in the world. ADNOC acts as a regulatory body that manages the overall production conducted throughout the supply chain of the industry. ADNOC consists from group of companies, where there are two largest subsidiaries; ADCO (Onshore Operations), and Abu Dhabi Marine Operating Company (ADMA-OPCO). Other subsidiaries are: ADMA-OPCO, ZADCO, GASVCO, ADGAS, NGSCO, ADNOC-FOD, FERTIL, BOROUGE. Oil produced is sent to Das Island for further processing and storage (mapsofworld, 2009). And there are other companies for offshore operations (Refer Figure 5). An Intra-gulf network of Natural Gas was initiated by the UAE through Dolphin Project, which aims to facilitate easier flow of gas from Qatar's gas reserves to the UAE. According to G. Butt, in 2000 natural gas reserves of the UAE were estimated at 6 trillion cubic metres, or 4 per cent of the world total, which makes the UAE the third largest gas reserve the third in the Middle East (after Iran and Qatar) and the fourth largest in the world (Butt, 2001). On the Other hand, Dubai oil reserves are Fateh, Rashid, Margham and Falah. Dubai Natural Gas Company and Dubai Petroleum Company; state owned enterprises responsible for mining. Emirates Petroleum Products Company (EPPCO) and EMARAT were set to export kerosene oil, jet fuel, naphtha, marine diesel oil, and liquid natural gas by the state of Dubai. In addition, Sharjah owns 5% of UAE's gas reserves, and Ras al- Khaimah generates about 400 million barrels of oil and 1200 bn cfd of natural gas. Due to lower production of oil and gas by cities of Dubai, Sharjah, and Ras Al Khayma; dependence on ADNOC has been increasing.

#### 4.2 The Industry Strategy

ADNOC is now supplying to the local consumption. In addition to that, Dubai is importing crude oil from Libya. Currently the UAE doesn't run refining activities as it requires advanced expertise. Minimal refining activities are conducted through TAKREER (basic treatment), and other facilities are being developed to support the S.C responsiveness. The manufacturing strategy of crude oil and natural gas requires high utilization of machinery, in terms of pumping and drilling. However, moving to the further stage after refinery manufacturing strategy requires moderate capacity flexibility (mainly outsourced). In terms of inventory strategy, there is always an increased level of inventory as buffer inventory. Supplier selection strategy was first based on cost, however, during the last two decades it's based on speed, flexibility, quality, safety, and technology led to lower carbon emissions. Advanced

researches are conducted to discover new oil fields, and new technologies are adopted for the geographic scanning (geo spherical). Transportation is highly responsive, and conducted through ADNATCO, and the operators. The strategic fit of industry here holds a moderate degree of responsiveness and efficiency, along with a moderate degree of demand certainty (figure 6). One of the factors affecting demand certainty is the range of quantity; which is already planned ahead of time within this industry. Demand range of quantity was planned for a stable growth; an increase in demand was seen in the period before recession. The unpredicted demand led to supply shortage, for a very short period of time, which has led to the increase in price of both oil and gas. Effective measures of increasing capacity were undertaken by the vendors, to meet growing market demand. The continuous increase in demand, led to the continuous increase in price. During recession, the year of 2009 saw a gradual drop in oil and gas prices; till they were stabilized in the global market. However, locally within the UAE prices were still increasing at the expense of the end consumer.

## 5. VMI implementation across Oil and Gas Industry

Moving to sourcing which is mainly vendor managed (operator such as EPCI/ M & M, S & M). Few local vendors' presence is in the market. Although locals are employed in EPCI, M &M, and ADNOC subsidiaries they count a few % of total employment; due to the shortage of skilled local labor in this field. With regards to information technology, sophisticated systems are being used. Currently ADNOC is using ERP system, and various other solutions are being used by vendors (information about technology and systems is not being disclosed). Tables and figures should be included in the main text (see Figure 1 and Table 1), as close to the point of their introduction as possible. It is noted that figure and table numbering should be independent. Captions guidelines are as follows:

### 5.1 Vendor Managed Inventory Approach: SCOR Based

The production cycle of the oil and gas industry has various operations such operations could be described in four stages Planning phase, Sourcing Phase, Making Phase, Delivering Phase. The planning activities illustrated in Table 1, is based on the operators and oil and gas industries. Sourcing activities are conducted by operator and EPCI. Making activities are conducted by EPCI and operators. Delivering activities are conducted by operators, EPCI, M&M, S&M, and transportation companies (ADNATCO). Latter crude oil is refined in refineries, sold in the global market, or sold to petroleum products wholesalers, petroleum lubricating oil and grease manufacturing companies.

Table 1: SCOR based operational activities of Oil and Gas Industry- level 1 mapping

Plan		Source	
-Industry research. -Geo spherical analysis. -Feasibility study. -Market research. -Demand forecasting. Competitor analysis. -Facilities design, & location. -Plant design & layout.	-Resource planning. -EPCI, M&M, S&M selection criteria and evaluation. -Financial planning. -Master production planning. -labs. -Distribution model.	-Inventory management & monitoring decisions. -Material forecasting. - EPCI, M&M, S&M selection. -Material replenishment. -equipments, machinery, pipelines sourcing.	-labor & technology sourcing. -Procurement & logistics. -Shipment & transportation.
Make		Deliver	
-Organize facilities. -Inspection -Maintenance & replacement. -Installation. -Drilling.	- Chemical testing. -Commissioning. -extraction of Crude Oil. -Natural Gas liquid extraction. -Replenishment decisions.	- Crude Oil, Natural Gas distribution. -Shipment & transportation. -After production Mills service & maintenance. -Waste management (Sulphur)	

Within this industry procurement and manufacturing cycles and continuous cycles; as the industry participates in the overall GDP of the country. In here we are discussing an overall country supply chain which requires macroeconomics decision making, and visibility. Customer order cycle is conducted based on a pull supply chain, and then the replenishment cycle starts. This hybrid S.C increases the overall customer satisfaction; inventory is never out of stock as long as natural resources are in place. Unlike other industries, the UAE oil and gas industry is

mainly vendor managed which increases the supply chain responsiveness, although a moderate level of efficacy is required.

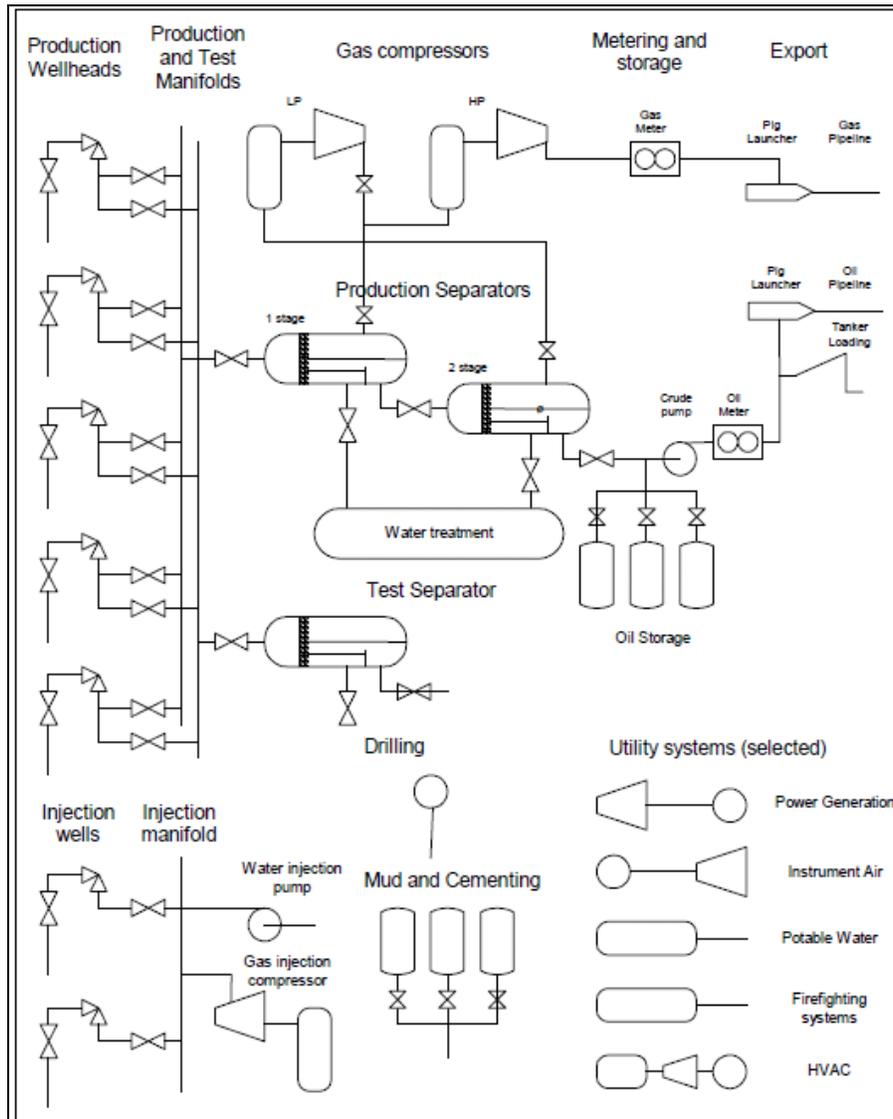


Figure 6: Oil and Gas production mapping (SCOR – level 2) (Source: ABB, 2012)

The key processes of operations starts with feasibility (depletion index, sizing the well, chemical testing. The drilling process by EPCI includes geo spherical analysis, land marking, drilling. Latter the casing process starts (pumping water in, to lift the oil up), well head is then installed by the operators. Further stage is pump installation (oil well drill election process (hammer stroke)), and this is the end of the upstream process. In the begging of the down stream process pumping starts (oil extraction), latter basic treatment of the oil is conducted. Latter crude oil is either distributed, stored, sent to refineries. Throughout the full process operation maintenance is conducted. Below is the figure describing the full processes (refer Figure 6&7).

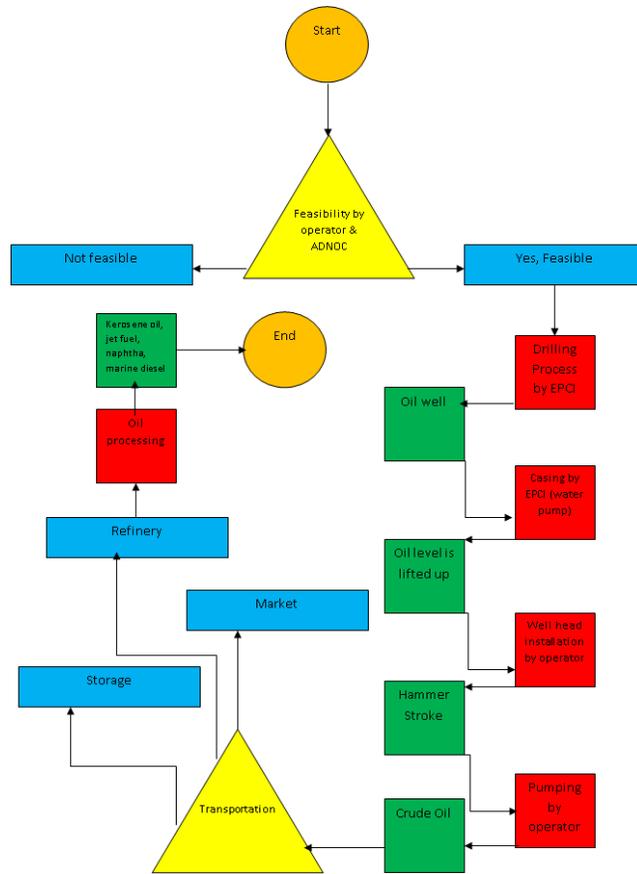


Figure 7: Oil and Gas – Production process mapping (SCOR-level 3)

## 5.2 VMI Implementation Challenges

### 5.2.1 Ownership Issues

Although Vendor Managed Inventory has various benefits, it has its own limitations, challenges and drawbacks; if the situation is converted from vendor managed inventory to vendor managed industry. One of the key challenges of VMI in the UAE is the ownership right. Although Mills are owned by the government, the investments are done by both parties (Operators/ ADNOC). In addition, machineries, equipments, labor (capacity) is mainly owned by the vendors. ADNOC has a limited control on the overall operations, which in fact drives the ownership right into risk. Another issue is the revenue distribution which is 40% (operators) - 60% (ADNOC). The critical point here is that the operators doesn't only get 40% of the revenue, they also generate revenue from their own refineries. In fact, they participate in the production of the crude oil, they buy it, refine it, and sell it back to the country.

### 5.2.2 Vendor Rating and Selection

Vendor rating has been a critical issue in VMI across all supply chains of various industries. The selection of vendors should be based on their appropriate evaluation, and technical capability assessment. It has been observed that vendors were selected decades ago; where emergence of new vendors was not seen. The operators also appoint the EPCI, where most of the production is made by them. This critical area requires re-measurement. In theory, vendors should be selected based on an approved list, and tender. Where in this industry, the requirement of continuous oil and gas production, eliminates the tendering process in many situations; as tender and tender selection requires a lot of time and could be cheated. On the other hand, ADNOC is losing a lot of opportunities in making business relationships with the Chinese, rather than working with only Europeans and Americans. A critical point in vendor rating is their reputation. The incident of BP oil spill has affected the reputation of BP, and their shares values are devaluated. If BP fails to compensate the victims a serious situation might occur; as BP is a shareholder in

ADNOC, and ADNOC has bought some of BP's share in the last few years and is planning to increase its share in BP. Investments in share is a critical issue, needs to be looked through again. And the potential of new and growing Chinese operators should be looked through.

### 5.2.3 Technological Knowhow

Technological Knowhow is the most critical issue in Vendor Managed Inventory, especially in the field of Oil and Gas; GCC countries were found to outsource many main activities. In the UAE oil and gas production, many activities are managed through vendors. The figure below shows the technological knowhow matrices based on market research, and analysis, along with experts opinion. The matrices consists from Knowhow index that determines how critical is the knowledge (Basic =1, Intermediate =3, Advance =5), and local level of involvement (Low Involvement =5, Moderate Involvement =3, High Involvement =1).

**a. Low level of local involvement scenario:**

1. Knowhow is Basic, Intermediate, Advance.

**b. Moderate level of local involvement scenario:**

1. Knowhow is Basic, Intermediate, Advance.

**c. High level of local involvement scenario:**

1. Knowhow is Basic, Intermediate, Advance.

The results of the weighted scoring are as the following:

1. (1-3) Normal Risk. (Involvement level is sufficient).
2. (5-9) Moderate Risk. (Involvement level is moderately sufficient).
3. (15) Watch List. (Needs additional Involvement level and monitoring)
4. (25) Warning Sign. (Involvement level needs immediate and serious action)

### 5.3.4 Inventory and Vehicle Routing decisions

There are additional challenges of VMI in the UAE oil and gas industry, one of them is Inventory and Petrol Tanker routing decisions. This cost is mainly transferred to vendors. Routing throughout the supply chain is a cost; moving inventory from plant, to storage, market, and distribution centers, other facilities, laboratories, other processing centers and consumer, along with the holding cost of inventory. To solve the inventory routing problem, it is essential to know where, when, to whom exactly you are moving the inventory (raw material/ WIP/ finished goods). The firm has to develop a distribution policy that maximizes profit over along horizon. This distribution policy should require daily decision making to keep monitoring the inventory level. The policy should prevent the likelihood of stocking-out, and the probability of risk occurrence /impact of stocking-out should be assessed.

### 5.3.5 Change in Process Design

The implementation of VMI across any sector requires process redesign; what processes will be conducted through the vendor (roles/ responsibilities/ functions). In addition to the supervision role and assessment of the vendor that will be carried out by ADNOC. The process re-design suggests the elimination of duplicate processes, and lowering the cost/ risk/ responsibility of operations by transferring them to the vendor. Another challenge is to have vendor insured goods (oil and gas), whether they were at storage/ goods-in-transit. The storage of oil and gas necessitates storage in different temperature, different material to be stored in (to prevent chemical reaction), and any possible leakage. Vendor insured goods, increases the cost of goods, which affect the price of goods. However, it covers company losses if occurred.

### 5.3.6 Oil Spill preparedness

Moving to another challenge, which is oil spill preparedness. This requires a lot of research (quantitative/ qualitative) and stress testing (what could happen worse, if this happened?). Oil spill preparedness requires the in cooperation of all the supply chain, and scenarios should be tested at all points of supply chain; as any spill affects the entire supply chain. Operations could be banned from a certain area, and marine custom may route the entire shipment of the oil. The spilled oil is a loss to the entire supply chain; the loss of receiving the goods along with the loss of un delivering the goods. Compensation to any possible victims/ government fine should be taken into account. 100 Barrel spill damages a location of X amount of space. The level of absorption of oil in sand if not cleaned within 24 hours of spill/ 48 hours of spill; all of this should be taken into account. In addition to any damages to marine life/ agricultural land, should be considered. Emergency plan/ team should act responsively to the incident. Public relations departments should be prepared to protect the reputation of the company and the entire supply chain.

### 5.3.7 Regulatory Pressures

Another challenge is related to regulatory pressures on local players from global players. This has been a critical issue till date. The UAE is not allowed to have its own refineries to refine its own oil. The regulatory pressure and debate is regarding labor safety, public safety, ecology, environmental damage, lack of expertise in this field. The UAE should look through the potential of creating alliances with the Chinese government to develop its own refineries as long term industry objective. A critical challenge in the present time being is the economic risk imposed on the UAE oil and gas industry of the EU debt, which has lowered the consumption of oil and gas across the EU region.

### 5.3.8 Risk of Substitute player

The UAE has to expand its market presence in strategic areas like China to compensate the loss occurred of decreased fuel consumption in EU. The UAE has to also consider the risk of substitute power generators such as (Nuclear, water, wind, solar, geothermal (Heat), coal). Recently the EU has increased the consumption of coal due to the crisis, and has lowered its dependence on oil. Critical internal challenges in VMI and external challenges of the oil and gas industry must be taken into consideration; and possible solutions and measures should be placed for the growth and sustainability of the industry. Table 2 Analysis the VMI implementation with SWOT standpoint.

Table 2. SWOT Analysis of VMI implementation

Strength	Weakness
<ul style="list-style-type: none"> <li>• Service responsiveness.</li> <li>• Better quality of goods.</li> <li>• Stock-out reduction (order fulfillment).</li> <li>• Increased inventory turnover.</li> <li>• Better inventory management decisions.</li> <li>• Market visibility.</li> <li>• Smooth SC processes.</li> <li>• Easier flow of information, fund, and product.</li> <li>• Reduce bullwhip effect.</li> <li>• Cost transfer to vendors/ clients.</li> </ul>	<ul style="list-style-type: none"> <li>• Adoption of VMI requires long term planning and market positioning.</li> <li>• Pay-back period is long, in comparison to high investments in expenditure.</li> <li>• Requires process re-engineering.</li> <li>• High investments in technology.</li> <li>• Necessitates change management and adaptation.</li> <li>• Increased product pricing.</li> </ul>
Opportunity	Threats
<ul style="list-style-type: none"> <li>• Opens access to larger markets.</li> <li>• Strategic partnership opportunities with suppliers.</li> <li>• Evolvement of new technologies.</li> <li>• Macro-level trade agreements.</li> </ul>	<ul style="list-style-type: none"> <li>• Overall control level decreases.</li> <li>• Job loss.</li> <li>• Rivalry within existing competitors.</li> <li>• Substitute threat (coal, solar..Etc).</li> <li>• Economical/ Political threats and sanction on the industry.</li> <li>• Vendor rating and reputation.</li> <li>• Environmental and ecological pressure and restrictions on the oil and gas industry.</li> </ul>

## 6. Manarial Recommendations

- In terms of ownership, OGI's industries should put more pressure to have a control over the operations; though it's a vendor managed inventory. Not all the operations should be outsourced.
- OGI's may also re-think in negotiating the revenue distribution methodology of 40%-60%, and the 75 years right of benefit; taking into consideration the total amount of investments by operator with respect to revenue generated over the years. Earlier, there was no other choice, and currently the economy and market has changed.
- In terms of vendor rating, OGI might re have to seek for alliances with other vendors based on appropriate assessment, proper tendering, along with cost benefit analysis; though its advised to preserve the strategic partnership relation between the vendor and OGI.
- The value of shared information should be more emphasized. More transparency in the operations is required, to increase visibility and widen the horizon of decision making.

- With regards to technological knowhow, serious action should be taken. The management of knowhow and knowledge should be transferred to the country; as a part of business continuity plan.
- Efforts should be made where knowhow is critical, higher local involvement should be in place. Along with other additional efforts to maintain a satisfactory level of knowhow; for the assurance of sustainability.
- Another way to get knowhow is to have alliances with the Chinese, though the cost of the learning curve is high; we may at least ensure that knowledge will be brought to the UAE.
- Regarding inventory routing decisions it advisable to implement DSS (Decision Support Systems); for the assurance of effective and efficient decision making.
- OGI may also need to ensure that all inventories are insured by the vendor, in the possibility of any loss, or any natural disaster, or spill; for goods at storage/ goods-in-transit.
- All possible measures/ tests/ controls should be taken for the better assurance of Oil Spill Preparedness.
- Affective public relation team should be in place in case of any requirement; or any incident that might affect the reputation of the company/ country.
- The UAE should seek to avail the right of establishing refineries within the country, and all safety measures (labor/ public)/ and ecological sustainability controls should be in place.
- To lower the economic risk imposed from the EU debt and EU lower consumption capacity of oil after the recession, OGI may also look further to have greater access and presence in the market.

## 7. Conclusion

In conclusion, the market has seen an increased presence of the practice of vendor managed inventory within industries such as the retail industry, automobile industry, e-commerce, oil and gas industries. The application of VMI within the UAE has facilitated easier revenue generation, and management of supply chain and operations within the UAE oil and gas industry. The oil and gas industry represents a critical portion of GDP worldwide, and within the country. As a critical industry, it's more advisable that not all the supply chain activities should be managed by the vendor. Further, the paper illustrated vendor managed inventory approach adopted by the industry. In addition, strategic analysis of VMI in the UAE Oil and Gas industry was discussed; SWOT analysis, along with the key benefits; as in dual benefits, OGI benefits, and vendor benefits. The paper highlighted key challenges and limitations of VMI in the UAE oil and gas; ownership right, vendor rating, technological knowhow, Inventory routing decisions, vendor insured goods, oil spill preparedness, regulatory pressures, challenges in obtaining refining right, and economic risk. Finally, the paper rapped up with some key recommendations to improve the current situation of Vendor Managed Inventory within the UAE Oil and Gas Industries.

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