

International Supply Chain: An Application Study in Oil and Gas Industry

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Abstract

This study comprises of the theoretical aspect of international supply chain and its application in the field of oil and gas industry, which is no standardized process for international supply chain, facilities, documentations and all units of international supply chain are deliberated. The application considered as a case study of logistics management in term of supply chain of oil and gas companies in Golf Cooperation Council GCC.

Logistics Management LM of supply to oil and gas companies in Gulf region is considered as an application. Oil companies in Gulf region have decided to sustain their requests not directly from producers but supplier companies in term of minimizing the risks. Certainly, the result excites supplier companies, and a suitable LM system develops critical to gain time based or cost based tenders. Originally, oil and gas companies' bidding and attainment system is introduced in details. Next, a new LM system is refined and matched with competitor companies' systems. The new system has both low rate and fast-delivery superiorities over competitor; consequently, the new system is practicable. Moreover, a monetary projection for five years is considered.

Keywords: Logistics Management, Supply Chain, Golf Cooperation Council, Oil and Gas Industry.

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Introduction

Supply chain (SC) can be characterized as the arrangement, coordination and consistent change of a consecutively sorted out arrangement of operations. The objective of Supply chain is to allocate great client service at the least cost conceivable. A client would be whoever gets benefit and utilizes from the process's production. Hence, the customer is vital to any association that emphasized on client services. In the Supply- chain management the associations functioning to connect its suppliers upstream and agents downstream so as to serve its clients. Generally, materials, data, capital, work, innovation, budgetary resources and different assets are going to be a part of Supply chain network. Since the objective of the firm is to expand benefits, the firm should increase advantages and decrease costs along the Supply chain process. The firm should evaluate the outcomes versus the operating cost of every choice it makes along its supply-chain. The expansion of emphasize on customers services is the priority of Supply chain.

As a result of the communication and information system improvements, the activities through Supply chain increased and expanded, even the companies have complex operations such as oil and gas firms. Incorporating operations administration with different elements of the operation permits all capacities to be required in the supply chain choices.

Traditionally, the possession of responsibility of supply chain has been emphasized in a great deal. The separation of high tech operations and low tech operations from capital concentrated operations from work escalated operations is customary, (Douglas, 2013). Also the economies scale is normal to be measured. However, the sense of separating the operations that manufacture consistent outputs and vast amount of services with the operations that produce a large amount of customized outputs and limited in quantities is normal and allowed. The verity of clients and different types of products are preferred and concentrated in supply chain business.

The disputes over the oil and gas industry have increased because of its inadequate resource. As a general rule in any case, the assets are not the reason for supply limitations, given the gigantic potential still accessible including, right now known and booked stores, the expanding extension for recuperation from existing fields with new advancements, further potential revelations, and the new boondocks of inconceivable oil sands and oil shale saves that are in the cash at today's costs.

The results of Industry researches showed that the availability of having adequate resources to support the recent level of output will last till next 50 years. Thus, the oil and gas recourses are not the main threaten on the level of products, but one of the challenges that face oil and gas industry is the process of putting assets into output and offering the final

outputs at the base cost conceivable. Therefore, supply-chain management will grant this objective.

1. Defining Supply Chain

“Supply-chain is defined as a group of inter-connected participating companies that add value to a stream of transformed inputs from their source of origin to the end products or services that are demanded by the designated end-consumers”, (Christopher, 2007).

In the above definition, supply chain described by various significant characteristics. First, this network could be made more than one firms, parties or companies only. Second, it is not necessary all the participants should have the similar specialty. Third, the companies should show their commitment to insert value that run through the network. This material stream, to every organization, comes in as the changed inputs and goes out as the quality included yields.

1.1. Supply-chain in the Oil and Gas Industry

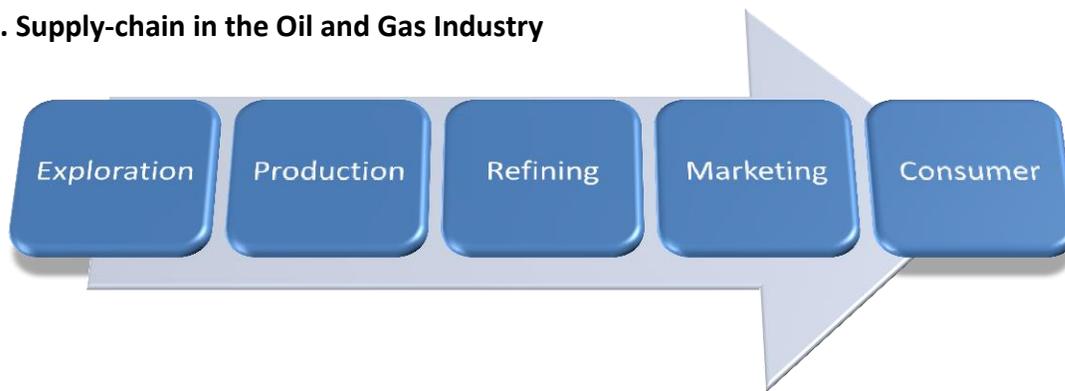


Figure 1: Supply-chain Links in the Oil and Gas Industry

The links shown above represent the major supply-chain links in the oil and gas industry. The links represent the interface between companies and materials that flow through the supply-chain. As long as oil companies have needed a phalanx of vendors to keep their systems continuously re-supplied, there has been a supply-chain. Within each stage there are many operations. The common issue along the links in the oil and gas industry supply-chain is economics; weighing benefits versus costs along the chain, (Dawei Lu, 2011).

The connection of the oil and gas industry through supply-chain management would be via the above items. These boundary and the resources that flow through supply-chain management will be introduced by these links. The oil organizations required a phalanx of sellers to keep their frameworks persistently re-supplied; there has been a supply-chain. There are numerous operations in every level. The regular issue along the connections in the oil and

gas industry production network is financial aspects; measuring advantages versus costs along the chain.

The oil and gas organizations need the efficiency of supply chain management more than other industries. In the oil and gas industry, the types of shipment consisted broadly from gloves to pipes, valves, cranes, chemicals, cement, steel, and drilling rigs, and more, (Daniel and Kedir, 2012) Furthermore, the other industries don't need these resources to be transferred and exchanged regularly and in huge amounts locally, globally, coastal and seaward. The nature of their work and functions is repetitive such exploration and production.

The firms and administrators in supply chain need to guarantee that they respond their clients' exact requested materials rapidly, and they need to prevent the actions that hinder their client's requests and supplies. If the oil and gas organizations purchase their dollars in supply chain management, their revenue will increase.

The companies' attempt to raise their revenue is one of the shortcomings of supply-chain management. These actions will lead to eliminate the objective of fulfilling the definitive clients; also it affects the decisions, opportunities and cooperation in the different phases of supply chain management, (Arne Wiig, 2001). For the sake of suppliers' reliability, these actions less need to be take into consideration such as inventories of raw materials, quality inspection systems, rework, and other non-value adding activities, resulting in incline manufacture.

2. Application "Case Study"

MTS AG is a company from Switzerland that was set up in Zurich, in 1995, the company concentrates on the issues that are related to technique and economy in the Energy & Process and Oil & Gas industries: modernising, amending, advancing, adjusting, supplying, consulting and project budgeting.

There are some countries that contain the offices of it such as: United States of America, Germany, United Arab Emirates, Oman and Singapore. In Turkey an office will be opened shortly, in this report study will focus in the major part of company in United Arab Emirates.

2.1. Commodities

There are three groups of commodities that could be supplied: turbomachinery parts, pipes, and chemicals. Most of turbomachinery portions are manufactured by Sulzer Company in Switzerland and Elliot Group in Germany. In addition, to produce the following parts of turbomachinery, these companies will supplied by Dilan Pumps & Compressor Ltd from China, Sulzer Pumps from Mexico, TST-Turbo Service from Swiss and Germany and Petrobras from Brazil. Followings are main portions of turbomachinery which is presented in the figure 2:

Hot gas casing, Lower cone, Frontsegment, Innersegment, Outersegment, Outer swirler, Centering rings, Tile carrier, U-tube, Combustion chamber, Blades.

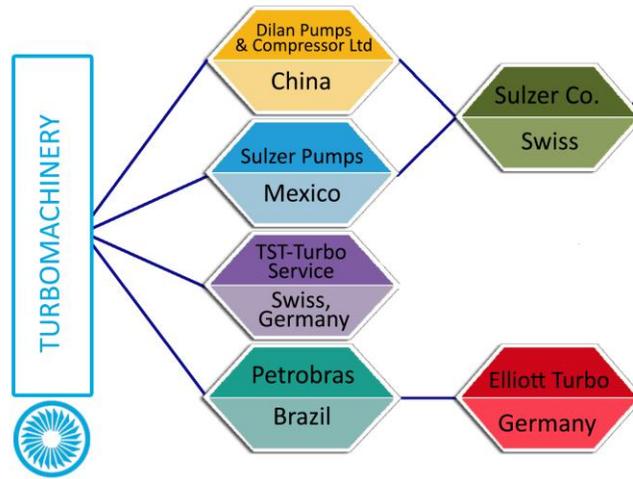


Figure 2: Supplying Turbomachinery

Pipes are supplied from Ukraine by Centravis Co., Interpipe and Cron Metals, which include steel pipes such as; Line pipe, Casing pipe and Tubing pipe. Moreover, to manufactured the pipes these companies will supported and supplied by Colakoglu metalurji from Turkey, Donetsksteel from Ukraine and Arcelor Mittal krivoy rog from Ukraine, figure 3 shows the supplying portions of pipes.

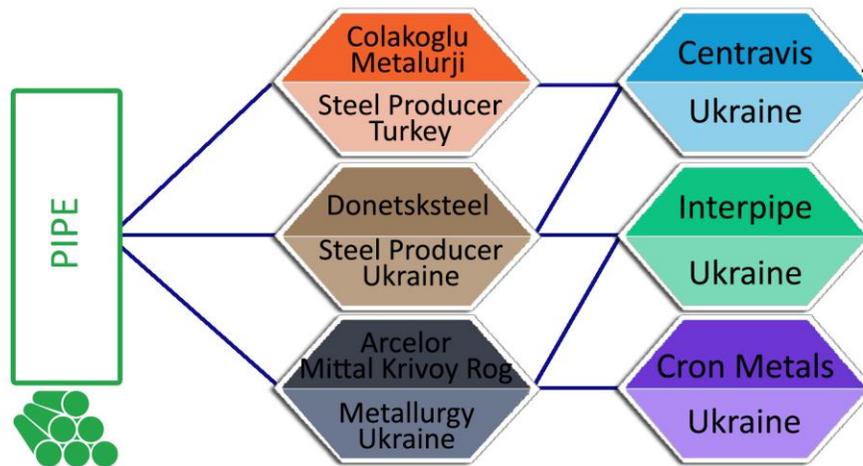


Figure 3: Supplying Pipes

Chemicals are produced from Turkey by Hayat Kimya Sanayi, Akdeniz Kimya and polikim, that consist of Additives, Demulsifiers, Cleaners and Inhibitors (scale inhibitors, corrosion inhibitor, bactericide). Furthermore, to produce the Chemicals parts, these companies will supply goods by Kayalar Kimya from Turkey, Koksan Petve Plastik Ambalaj from Turkey and Musaya Dulkader Ltd from Turkey, figure 4 shows the supplying portions of chemicals.

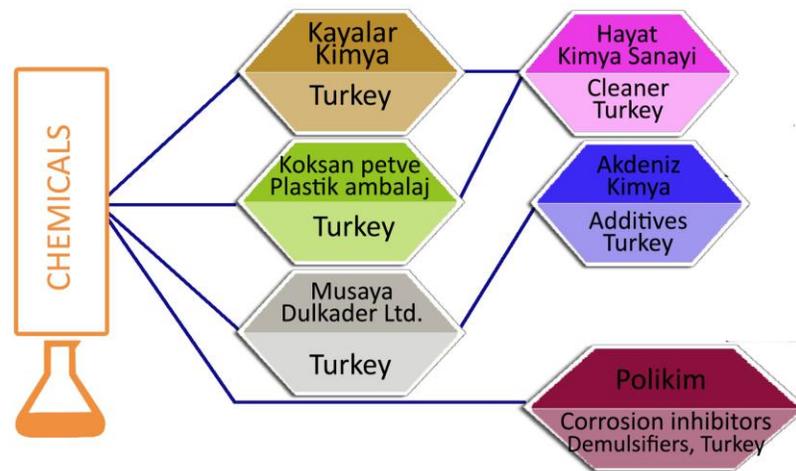


Figure 4: Supplying Chemicals

2.2. Containerizing of Commodities

Parts of turbomachinery are rolled separately in a plastic or paper foil and later put in a three stratum cardboard box with quite filling guaranteed material.

- portions are not harming each other,
- portions cannot displace,
- portions are not harmed at the time of transporting.

One sort of portions is placed per box so as not to mix portions. The index of box is showed on it. After that, boxes are placed in a larger 3-layer cardboard box or a wooden box, which is mounted on a conveyance pallet so as to ease handing.

A liquid which is foam is used as a filling material if demanded. It depends on their price and the addressing country whether a cardboard or a wooden box is chosen. Wrapping stripe and wrapping plastic foil are used to put the boxes to each other. Transmitting written documents in a transmission plastic folder, fixed on the top of the box.

Now these boxes are prepared to be put into the container case. An important thing is to bundle the similar projects parts together in a cardboard box or wooden box.

The last part of the pipes should be ended with both steel/pressed steel thread shields. Also, mill's standard antirust coating is a must. Pipes could be carried in clusters like in the below figure.



Figure 5: Grouping Pipes

Another option is using pipe bunks that are made of wood, it is capable of happening to collect many pipes, and to give a style of container to it. This geometry isn't difficult for solving and is more appropriate for intermodal transmission. The below figures are explanations of using wooden pipe bunks. A significant point is to collect pipes that have the similar project together.

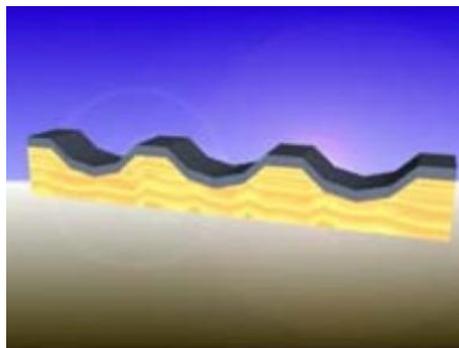


Figure 6: A Wooden Pipe Bunk

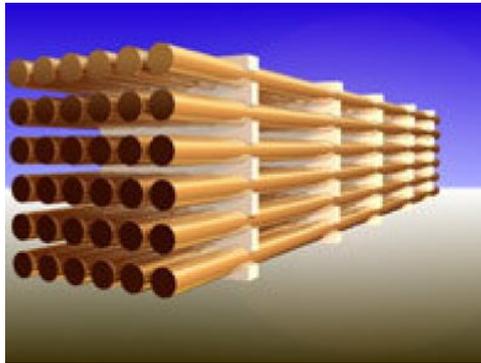


Figure 7: Use of Wooden Pipe Bunks

Chemical materials are saved and sent in tank-containers to the city of Dubai. In Dubai chemicals are flowed into 30kg and 60kg plastic drums. A tank container, showed in figure 8, is easier to solve and send than a simple tank. There container tanks are exist to 25.000 liters.



Figure 8: A Tank Container

Active RFID is attached on every turbomachinery part, every pipe and every tank container in order to:

- minimize labor costs
- minimize errors
- reduce inventory inaccuracies
- reduce the difference between inventory record and physical inventory

2.3. Inbound Logistics of Commodities

2.3.1. From Europe to Dubai

Vehicles will realize in a container sending of turbomachinery parts from Homrechtikon in Switzerland and Bayreuth in Germany. Containers are unite into one at a lease storage warehouse in Italy at Trieste harbor, containers are placed in a ship and will be sent to Dubai port, there the company has an independent place and a storage.

On the other hand, containers could be sent to Trieste harbor through railway but the number of handling would be higher, before getting to the station containers must be sent by vehicles. Also, duration Switzerland and Italy, and Germany and Italy are near. In spite of that, Trieste harbor has good infrastructure and is one of the eldest harbor in Europe. There is an enmity between Italian and Slovenian ports, therefore there is a difference in their prices, price of Italian harbors are more logical than that of France, (Bedelbaj Mamadiv, 2007).

2.3.2. From Ukraine to Dubai

Pipes from Dnipropetrovs'k in Ukraine will be sent on railway until Odessa port, passing from Kirovohrad. Pipes will be sent on a ship from Odessa port to Dubai.

On the other hand, pipes could be sent to Odessa harbor through the river Dnipro but mill's administration decided to send pipes only by rail to a managed point. There are some difficulties of transportation on vehicles which would take a lot of bounderies, consequently, more problems, and loss of time.



Figure 9: From Ukraine to Dubai

2.3.3. From Turkey to Dubai

At the Chemical Industrial Zone near to Istanbul chemicals will be made, because the laws of the country don't allow producing chemicals in another place. The place has very good infrastructure but it doesn't have a good place to pack chemicals in small units. That is the reason for sending to Dubai that is packed in smaller forms. Chemicals will be transferred from production site to Dilovasi port on vehicles, then, transferred to a ship and delivered to Dubai.

On the other side, chemicals can be sent on railway. From production site to Haydarpasa train station and from there to Bandar Abbas port in Iran, passing through Ankara and Tehran, from Bandar Abbas port to Dubai on a ship. Number of handling is increasing is that way is chosen. Also, the political states in Iran may effect on sending in the coming years.

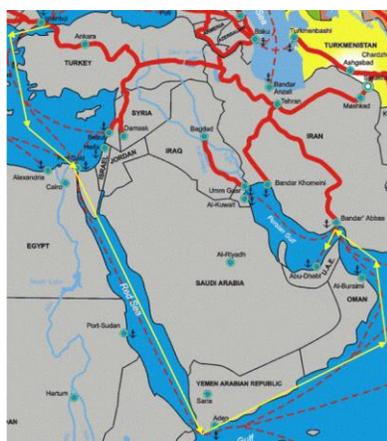


Figure 10: From Turkey to Dubai

2.4. Human Resources

Organization chart of the supply chain is given in the figure responsibilities of the people will be different depending on its level

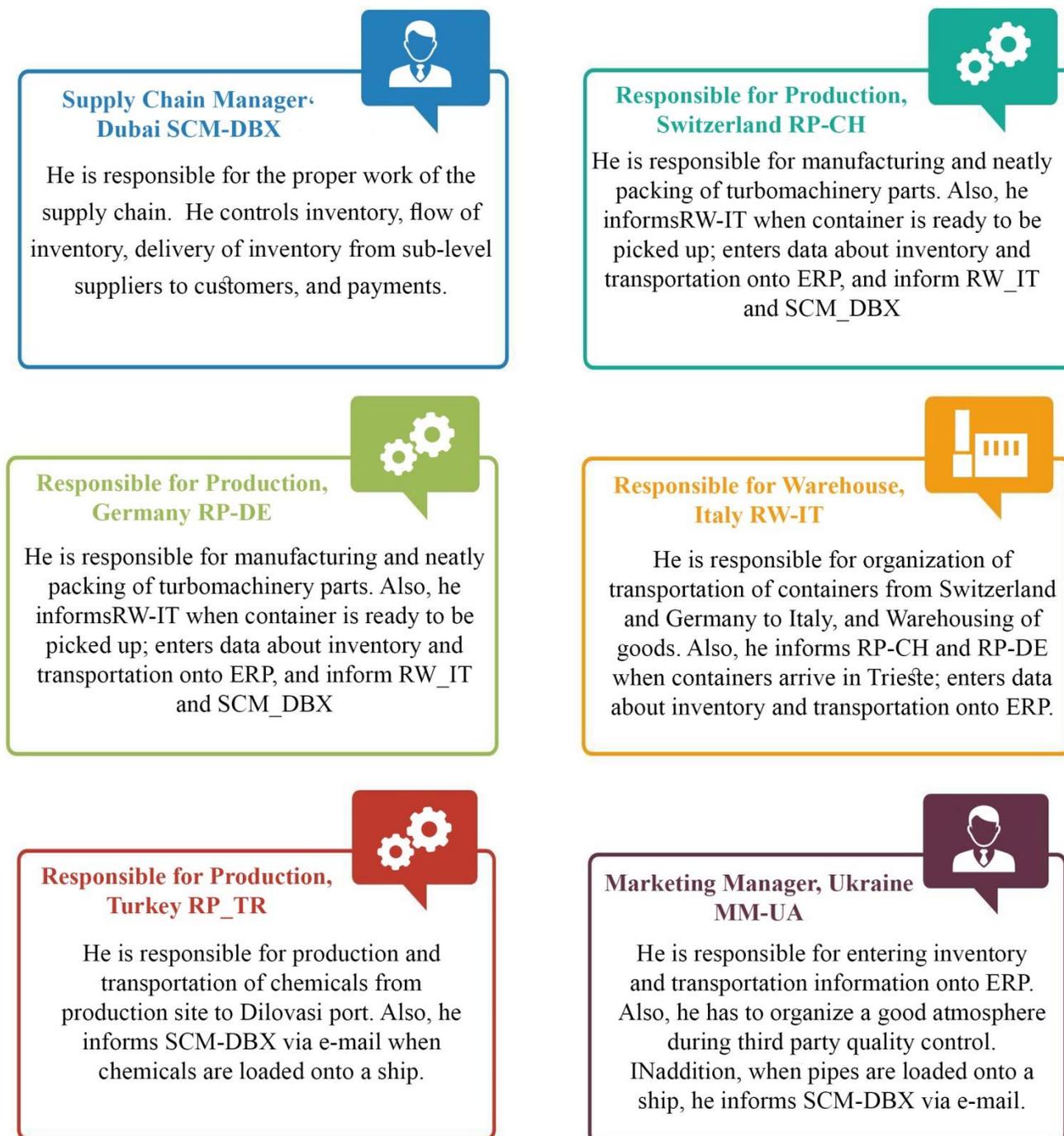


Figure 11: Organization Chart of the Supply Chain

2.5. Warehousing, Handling and Inventory Management

All sections of the supply chain will be connected together at an ERP system. The system will help to manage inventory. Active RFID will help to protect savings more appropriately. Projects are continuing even in winter in GCC because temperature level is near to 15-20 degree Celsius, so supplying goods will do the same all the year.

2.5.1. From Europe to Dubai

Turbomachinery parts from Switzerland and Germany will be given every month; 4 containers for each country will be sent to Trieste harbor. A part of storage will be rented near to Trieste harbor. Warehouse storage will have a crane that will be able to lift the container. Occupied volume will be as much as of 8*40 foot container. This makes, approximately, $8 * 77.10\text{m}^3 = 616.80\text{m}^3$. WMS will be used to trace inventory. Signals from active RFID will be gathered and transferred to WMS program.

2.5.2. From Ukraine to Dubai

For Ukraine, planned to benefit from pipe mill's warehouse but it has to be connected to ERP program. Proposed to deliver 1,000,000.00 meters of pipe annually, frequency of delivery will be once in two months. 166,666.00 meters of pipe will be delivered at once. Pipes are usually 15 meters long, that is, the number of pipes will be $166,666.00/15.00=11,111.00$. Weight of pipes nearly will be $166,666.00\text{m} * 57.14\text{kg/m} = 9,523,333.00\text{kg}$, approximately 9,523.00 tones if average weight of pipe per meter is 57.14 kg/m,

The required volume for pipes will be $0.25 * 0.25 * 15 * 11,111.00 = 10,416.56 \text{ m}^3$ if total outer diameter of pipes is approximately 25.00cm (0.25m). This volume is suitable for the pipe mill.

2.5.3. From Turkey to Dubai

Once in a week tank containers will be given, in a 20` tank container. 7 tank containers will be transported at each time.

2.5.4. In Dubai

MTS ME FZCO, Dubai will be the midpoint, the center of all deals. There has to be 10,000.00m² of near area for both warehousing and packing chemicals again. The company will locate at the free place. Dubai Free Zone has the following advantages compared to non-Free Zone:

- Suitable to create a 100% foreign company. (U.A.E. citizen partner is a must in non-Free Zone place),
- Exemption from all receive duties,
- 100% repatriation of capital and profits,
- Freedom from corporate taxation,
- Cheap energy,
- Simple and efficient recruitment procedures making available competitive skilled and experienced workspace,
- High level support from Free Zone Authority.

Storeroom and packing again site is explained in figure 11. Left side of the storeroom is for turbomachinery parts and pipes; right side is for chemicals.

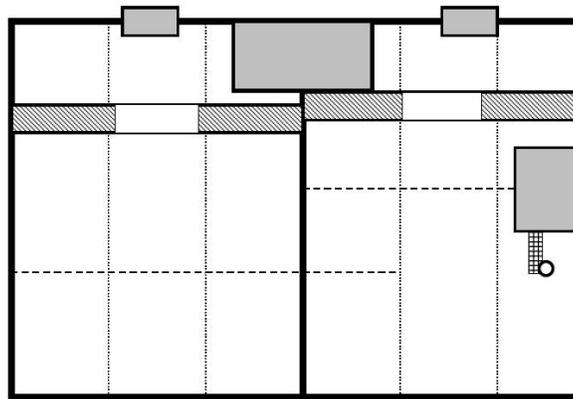


Figure 12: Design of the Storeroom and Repacking Site

2.6. From Dubai to Gulf Cooperation Council

Bringers will be monthly from Dubai city to Gulf Cooperation Council (GCC) nations. Bringers to Kuwait will be by ships through the sea, because at the Kuwait harbor there is a warehouse of oil Company. There is no rail network between GCC nations therefore provide to other GCC nations is going to be transported by vehicles. Trustworthy of the oil company contracts, and informs SCM-DBX about receipt when equipment are sent, (Bedelbaj Mamadiv, 2007).



Figure 13: Supplying Gulf Cooperation Council Countries

3. Conclusions

Tenders in golf corporation council countries are fast-delivery or low-price constructed. Based on designed system, Commodities can be supplied around in twenty days. Ukrainian pipes are economy than others due to functioning costs and lower employment. Moreover, fast-delivery assembles them valuable in tenders. Russian pipes are also economy, but they are delivered around in twenty five days. Manufacturing chemicals in Turkey will also result in low-rates because rates of labor and row-materials are cheaper than in countries where opponent companies are placed. These countries are Holland, France and the USA. All those aspects make the business practicable.

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TURBOMACHINERY



PIPE



CHEMICALS

