IMPACT OF INCIDENCES ON REGIONAL NATURAL GAS PRICE

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Overview

The oil and gas industry plays a critical role the world's business sector today, and this necessarily involves huge financial flows that have a significant impact on the global economy. Many challenges influence the nature of the supply chain in the oil industry--complex characteristics, lengthy lead-time, and limited distribution capacity at the different levels in the supply chain are all solvable by oil and gas supply chain management. The common concern along the links in the supply chain are the economics of weighing benefits versus costs along the chain. Economic shock or political changes that have an impact on the price of the oil are other challenges that cause unexpected situations. Any disruptions in the supply chain in the oil and gas industry can cause a huge impact on this industry and the economy. Therefore, optimization of supply chain models within the oil and gas context is critical for smooth and uninterrupted operation of oil flow.

Henry Hub serves as the official delivery location for futures contracts on the NYMEX. Henry Hub interconnects with nine interstate and four intrastate pipelines.The "Henry" hub is so named for its location in the Henry hamlet of Erath, which was named after a High School that stood there until damaged by the flooding and storm surge from Hurricanes Ike and Rita though the natural gas facilities suffered minimal damage. The New York Mercantile Exchange (NYMEX) declared force majeure for its contract deliveries because of a shutdown of the Sabine Pipeline.the area experienced minor damage to its interconnection with the Henry Hub due to Hurricane Ike. destruction of crude oil pipelines can deny service to a refinery for days, while explosion or fire can cause long term damage, lasting several months. **(Achebe, 2011).** Considering the high risk of serious damage due to hurricane in future, this study examines how a major breakdown in a distribution link in a supply chain in the aftermath of some disasters can cause huge damage to businesses and facilities. Crude oil arrives at processing plants where it is refined and turned into different products and they are sold and distributed to appropriate locations. The purpose of this paper is to investigate the role of supply-chain management in the oil and gas industry and to propose a mathematical model to maximize the profit of this supply chain.

Methods

The high economic value and uncertain nature of the oil and gas business are driving forces for developments in the oil and gas planning process. The problem is to develop a method to determine maximum capacity and minimum cost for the industry with presence of disruption in the system. This paper has applied a linear program (LP) for a case study related to incidential shut down of Henry Hub and presents the optimal natural gas flow through the pipeline networks. linear programming (LP) model is suggested to optimize the project value of an oil and gas supply system at Hub, with decision tasks that can involve technological structure design, supply chain design, and strategic capacity planning. Linear programming is a branch of applied mathematics that deals with solving optimization problems of a particular form. Here the linear programming problem consists of a linear cost function (consisting of a certain number of variables)which is to be minimized or maximized subject to a certain number of linear cost, material balance, transporting(east-west) and capacity constraints. The economic performance indictor in this model is the maximization of the delivery capacity even in presence of any disaster (shock) in the system.

The high economic value and uncertain nature of the oil and gas business are driving forces for developments in the oil and gas planning process(Dahitaleghani,2016). The problem is to develop a method to determine minimum cost for the industry with presence of disruption in the system.
the problem that we deal with in this study is a model of offshore and onshore gas transportation to the different markets across the country by pipelines. The Hub has a total capacity of 1.8 billion cubic feet per day (Bcf/d) and equipment at the Hub facility has the ability to compress 520,000 dekatherm per day (Dth/d). : Acadian(1 Bcf/d) , Columbia Gulf (1.7 bcf/d), Gulf South Pipeline(1.7 bcf/d), Bridgeline(0.92 Bcf/d), NGPL, Sea Robin(1 Bcf/d) , Southern Natural Pipeline, Texas Gas (2.4 bcf/d), Transcontinental Pipeline(1.2 Bcf/d), Trunkline Pipeline(1.5 Bcf/d), Jefferson Island(0.2

Bcf/d), and Sabine(0.235 Bcf/d). Base on the results of the LP model for the tactical optimization that is implemented in the modeling system GAMS, and solved with a LP linear solver; optimal values of the decision variables are calculated. As indicated, the current model assumes constant gas prices.

Results

the purpose of this research was to discuss the problem of any breakdown in the supply chain operations in gas distribustion in Henry hub. Any delay in the Hub can cuase fluctuation in gas price and also causes loss in profit. and what happens in the aftermath of any disaster. We considered how it would affect the flow, the cost, and the sales and still have a maximum net present value.

The current model assumes constant gas prices. The associated prices and costs assumed to be externally imposed in the planning.The modeling considers a fixed market. The model ensures the total fulfillment of the specific customer. For the simplicity, we assume the total cost of the all steps (from offloading at port to delivering to the customer) is not changed.

Here, we developed a scenario that one of the pipeelines went out of order for a week in the aftermath of hurricane. By noticeably reducing the amount of transported gas, reduction in profit, having maintenance cost and uncertainty regarding the delay, it effects numerous tiers of supply chain, and the oil and gas industry faces challenging times until the pipeline is brought back to normal operations. Therefore, it is critical that sectors and businesses work together collaboratively to improve the supply chain. Using this model, an optimal oil flow through the networks is determined. Two case studies are introduced to show how improving supply-chain logistics in the oil and gas industry can improve efficiency (provide maximum profit at the lowest cost possible). Further, a sensitivity analysis on different scenarios with major breakdowns at different supply stages is studied as to what is the aftermath effect on flow, cost, and sales to the management.

Conclusions

Any major breakdown in a production, pumping node or a distribution link that is part of a supply chain can cause economic disruption for the company and region. Natural disasters (hurricane, earthquake, etc.) are one reason for disruptions to the supply chains. Therefore, there is a need to make sure that each company in parallel in the supply-chain can respond quickly to the exact material needs of its customers, protect itself from problems with suppliers and buffer its operations from the circumstances it faces. This mathematical model maximizes total profit which is defined as total revenue minus total cost, even if it is experiencing natural or man-made damages. It yields the optimal volume of tanker, pipelines, storages, terminal, refineries, trucks and customer pipelines of an oil and gas system in the Henry Hub Louisiana. The outcome of this work is a new distributed decision support framework which is intended to help optimize the oil and gas mid and downstream supply chain for the critical energy zone and to boost economic gains in the oil and gas industry under unpredictable situations which can be used as tool to predict fluctuation in the regional price of natural gas as a aftermath of an incidence.

References

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