Think Tank

TECHNOLOGY DATA MANAGEMENT (BIG DATA/IOT/BLOCKCHAIN) CHEMICALS & ENERGY

Utilizing the Power of Data and Advanced Analytics in Oil and Gas Supply Chains

February 28, 2022 *Carroll McIntire, SCB Contributor*

Digitization has brought forth the next spurt of growth for the oil and gas industry.

O&G decision makers are charged with analyzing data from multiple sources, including satellites, port agents, suppliers and field technicians, to stay ahead of the competition. In a recent survey, industry CIOs listed artificial intelligence, machine learning, analytics and the industrial internet of things (IoT) as the top game-changing technologies in 2021.

Navigating through the O&G supply chain can be chaotic. Growing complexities, ever-changing market conditions, fluctuating oil prices, demand imbalances, and storage and transportation issues all act as stumbling blocks. Moreover, with numerous vendors and an extensive partner ecosystem, multiples silos exist across the supply chain. They can impact visibility, efficiency and service levels, and act as a barrier to supply chain collaboration.

Best-of-breed supply chain analytics can support and harmonize distinct functions across the upstream, midstream and downstream supply chain. From enhanced product movement to retail trading, from asset supervision to procurement and storage, from traffic management to last mile optimization — the O&G supply chain can draw on data analytics to maximize operational efficiency and monetize novel opportunities.

The O&G supply chain industry yields a rich mix of use cases. A few are listed below.

Logistics, transportation and shipping. Advanced logistics planning and analytical tools can help capture real-time inventory at oil tank terminals, route hazardous substance across challenging terrains, and optimize loading operations. Additionally, O&G analytics can help track the journey of cargoes, implement capacity management strategies, and enhance the order-management process. Organizations can use data and analytics to capture negative spending tendencies, check inconsistencies in freight operations, and reduce dead miles for effective logistics management.

Asset management and predictive maintenance. With old facilities and aging equipment, organizations face increasing challenges in maintaining the reliability and integrity of assets. Any failure or breakdown can affect production and costs, and disrupt supply chain operations. To drive effective field-level asset management, O&G companies can utilize real-time data, IoT and GPS to instantly trace and manage their valued assets. Predictive and proactive analytics can assist field technicians in collecting health statistics and other information on both onshore and offshore assets. Real-time flow of information and enhanced collaboration among stakeholders can help to deliver the right part and quantity to the right place with at least cost. This further helps to minimize the average time taken to complete work orders and meet agreed-upon service-level agreements (SLAs) efficiently.

An analysis of wireless video streaming and data from IoT sensors can help establish a resilient and reliable infrastructure, keeping wind farms, rigs, vessels, liquefaction sites and pipelines connected centrally and cost-effectively. O&G analytics can help manage asset maintenance and spare-parts inventory, and maximize asset performance and lifespan.

Warehousing and storage. By integrating analytical systems with radio frequency identification (RFID) technology, warehouses can drive visibility, efficiency and collaboration across distribution processes. Predictive and proactive analytics can assist facilities in maintaining optimal stocks or, even better, anticipating shipping and stocking requirements for elevated customer experience. Warehouse managers can use computer visuals and analytics dashboards to enable optimization planning, inventory rationalization and the movement of parts and equipment along the warehouse perimeter. Real-time data from dispersed, global facilities and demand-sensing techniques can assist in delivering the right part with the right technical configurations to well sites.

Supplier management and procurement. In the wake of the pandemic, O&G boardroom discussions have shifted toward supplier risk assessment and enabling transparency across the supply chain. Organizations can draw on the power of intelligent analytics to qualify oil field services and equipment suppliers and ensure a

resilient digital supply network. They can examine threats by studying metrics and analysis such as vendor availability scores, compliance rates, defect rates and other project economics. Critical suppliers in different basins can be ranked on the basis of risk and other stress points like lead times, invoice accuracy, purchase order cycle times and debt recovery. Data and analytics can also be used to tackle inevitable cost escalation around strategic sourcing, spend analysis, category management and performance management.

Last-mile disruption. O&G retailers can extract customer insights and assess buying habits to drive personalized and superior experiences. They can use advanced analytics, point-of-sale data and demand-sensing technology to revamp omnichannel retail models and enable on-demand doorstep delivery of fuels such as gasoline, petrol and diesel. The same can be done for industrial equipment delivery. Yoshi, a U.S.-based startup backed by ExxonMobil, offers contactless fuel and automotive services at locations where cars are parked.

Faced with constantly changing business dynamics, global laws and stringent environmental regulations, the O&G industry is under pressure to find sustainable and economical ways to conduct operations. A resilient and agile network, supplemented with real-time data and analytical tools, can predict anomalies beforehand, and support a variety of supply-chain applications. Combining analytics with new technologies such as AI, digital twin, augmented reality and IoT, O&G giants can break up silos in the supply chain, add speed and quality to decision-making, and fuel growth with new revenue streams.

Carroll McIntire is senior vice president of Innover.