A REPORT

ON

IMPORTANT ASPECTS IN OIL AND GAS INDSUTRY

BY

SUMAIR ABDUL QADEER **2016PEE063**

AT
A

BIZRUNTIME IT SERVICES PVT. LTD.

Professional Practice Centre of

PRESIDENCY UNIVERSITY, BENGALURU

(JULY, 2018)

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SUMAIR ABDUL QADEER **2016PEEO63** **PETROLEUM**

Prepared in partial fulfillment of the
PIP 101, Professional Practice – I

AT

BIZ RUNTIME IT SERVICES Pvt. Ltd., Sarjapura

Professional Practice Centre of

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

PRESIDENCY UNIVERSITY, BENGALURU

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DECLARATION

I hereby declare that the report entitled "**Important Aspects in Oil and Gas Industry**" which is being submitted to the Presidency University, Bengaluru is a bonafide report of the work carried out by me / us. The material contained in this report has not been submitted to any University or Institution for the award of any degree.

NAME OF THE STUDENT	ID. NO.	SIGNATURE
SUMAIR ABDUL QADEER	**2016PEE063**	

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Title of the Project: Important Aspects in Oil and Gas Industry

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Key Words: Geology, Land management, Joint venture accounting, GIS public data analytics, Field data capture, Production accounting, field and track management, Royalty review and Recapture, Volume allocation, Opportunity management.

Project Areas: Management, Accounting, Royalties, Data capturing and allocation.

Abstract: Management and accounting is an important aspect of any industry and as the energy sector is currently experiencing significant demands and pressures resulting in profound changes. This together with increasing global competition for resources is forcing all organizations to concentrate on developing strong management skills. I have divided this report into three parts. The first part will have the topics related to exploration of oil or gas. The second part will focus on the production area. And the last part we will see the topics which relates to marketing and selling of oil or gas.

Signature of Student **Signature of PP Faculty**

Date: **Date:**

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1. INTRODUCTION

1.1 ABOUT THE COMPANY

Biz Runtime IT Products & Services is an outstanding software development as well as web development company in India headquartered at Bangalore. Biz Runtime IT Products & Services was deep rooted by a group of senior and high professionals who has an esteem experience in the software development as well as web designing & development applications. They offer an alloy of knowledge, experience and efficiency that is readily engaged, executed and applied to the market needs or business requirements

1.2 SERVICES

- Architecture and Design

  Solution architecture (within or without enterprise architecture) is a combination of role, process and documentation that is intended to address specific problems and requirements, usually through the design of specific information systems or applications .The term solution architecture can be used to mean either or both: Documentation describing the structure and behavior of a solution to a problem, or A process for describing a solution and the work to deliver it. The documentation is typically divided into broad views, each known as an architecture domain.

- Architecture and Solution

  Organizations are gaining business momentum, driven by globalization and competition. This has led to a scenario where business performance has to be enhanced by streamlining processes, reducing organizational risk and leveraging on the global sourcing organizational model. To drive home your business advantage, there should be a synergy of providing advisory and implementation frameworks, delivered through a focus on core business issues, strong process orientation and industry domain knowledge. By aligning the right set of our varied consulting practices that will complement your business, we know what it takes to move your organization up the value chain. BizRuntime will enable you to achieve execution excellence, cost leadership and business agility through IT, resulting in sustainable business leadership in your industry.

- Consulting

  At BizRuntime Consulting, we help companies think ahead. Business today is evolving faster than at any other time in history, and tomorrow there are going to be challenges we cannot even imagine today. And opportunities. But to survive and thrive, we must imagine that future. We must anticipate it. Even while we are helping you solve your business challenges today, we are thinking about the future - and how we can take you there. Which is what gives you the competitive edge in what's to come?

- Process Automation

  What companies in the process industry need the most is a technology partner who really understands their business. BizRuntime is that process automation partner. With our industry experience and our cutting-edge products, systems and solutions we can help you achieve your goals: turn operational excellence into a permanent condition, ensure that productivity and systems work hand in hand, as well as create the foundation for maximum plant flexibility. In other words: We are a trusted partner in surmounting the challenges of today and tomorrow - for your sustainable business success.

- Request for proposal

  A request for proposal (RFP) is a solicitation document that an organization posts to elicit bids from potential vendors in order to procure a product or service through the responding business proposals. The RFP process is meant to bring structure and transparency to the procurement decision, while reducing risk through open requirements and discussion. A Request for Proposal, also called an RFP or RFQ, is a document issued by a company when it wants to buy something and chooses to make the specifications public. This usually is done to have several companies bid on the work, thus producing more competitive prices. However, if it is not done correctly, it can produce no bids or bids that are a waste of your time. So, we are providing high quality RFPs which are avoiding wastage of your time and to get the bid very relevant to the proposal.

- Application Development

  BizRuntime Application Development services help you address evolving business and technology challenges by defining, designing and building applications tailored to meet your business requirements. We deliver high quality, flexible applications that are easy to maintain, modular to facilitate enhancements, and are reliable, secure and easy to deploy using the Infosys Global Delivery Model. It is based on industry-standard process quality frameworks (such as CMMi, CMM) and uses rigorous methodologies and the expertise of our Centers of Excellence to mitigate risk and deliver cost and time-to-market benefits.

1.3 TECHNOLOGY

- Enterprise service bus
- Business process management
- Rules Engine
- Big data
- Portal
- Identity Management
- Cloud Technology

1.4 SOLUTIONS

- Manufacturing
- Healthcare
- Financial
- Social
- Ecommerce & Retail
- Payments
- Service as a solution
- Platform as a solution
- Infrastructure as a solution

2. GEOLOGY

2.1 INTRODUCTION

Geology is the study of the Earth, the materials of which it is made, the structure of those materials, and the processes acting upon them. It includes the study of organisms that have inhabited our planet. An important part of geology is the study of how Earth's materials, structures, processes and organisms have changed over time.

A geologist studies earth processes such as earthquakes, landslides, floods, and volcanic eruptions to survey land and draw up safe building plans. When geologists investigate earth materials, not only do they investigate metals and minerals, but they also look into oil, natural gas, water and methods to extract these.

2.2 PETROLEUM GEOLOGIST

Petroleum geologists are scientists that work to discover new oil and gas deposits. Petroleum geology is a “science of sciences.” The geologist puts skills in geology, physics, chemistry, biology, and other fields to the practical task of locating energy sources.

Petroleum geologists are primarily concerned with determining the location and amount of combustible fuel in sediments on land or in the ocean. This job requires a geologist to understand the origin of the fuel, the amount of fuel in the reservoir, the fuel's 'maturity' or concentration, the movement of fuel underground and obstacles that impede or expedite that movement. Petroleum geologists utilize a variety of techniques to discover this information, including geochemical analysis, ground-based sonar to discover reservoirs or satellite mapping. In some cases, petroleum geologists may work side-by-side with oil companies in the supervising of the oil extraction process.

2.3 GEOLOGICAL SURVEYS:

A geological survey is the systematic investigation of the geology beneath a given piece of ground for the purpose of creating a geological map or model.

There are many methods and types of instruments used in geophysical surveys. Technologies used for geophysical surveys include:

1. Seismic methods, such as reflection seismology, seismic refraction, and seismic tomography.
2. Seismoelectrical method
3. Geodesy and gravity techniques, including gravimetry and gravity gradiometry.
4. Magnetic techniques, including aeromagnetic surveys and magnetometers.

5. Electrical techniques, including electrical resistivity tomography, induced polarization, spontaneous potential and marine control source electromagnetic or EM seabed logging.
6. Electromagnetic methods, such as magnetotellurics, ground penetrating radar and transient/time-domain electromagnetics, surface nuclear magnetic resonance (also known as magnetic resonance sounding).

2.4 SOFTWARES:

I. MIKE POWERED BY DHI:

AREAS OF APPLICATIONS: Their software products are used within all water environments anywhere in the world. They cover oceans and coastlines, rivers and reservoirs, ecology, groundwater, water distribution, wastewater and many more.

a) Cities
b) Coast and sea
c) Water resources

II. DASSAULT SYSTEMS:

IN WHAT INDUSTRIES THIS COMPANIES SOFTWARE IS USED:

a) Aerospace & Defence
b) Architecture, Engineering & Construction
c) Consumer Goods & Retail
d) Consumer Packaged Goods & Retail
e) Energy, Process & Utilities

III. SCHLUMBERGER:

a) PETREL GEOLOGY AND MODELLING: The Petrel E&P software platform provides a full range of tools to solve the most complex structural and stratigraphic challenges—from regional exploration to reservoir development.
b) OMEGA GEOPHYSICAL DATA PROCESSING PLATFORM: Integrates comprehensive workflows and advanced algorithms with leading science, scalable processing, and flexible extensibility to unleash the potential of your geophysics data.
c) GPM GEOLOGICAL PROCESS MODELLING SOFTWARE: GPM geological process modelling software is a simulator for forward modelling of stratigraphic and sedimentary processes that works with the Petrel E&P software platform. It provides a methodology to model siliciclastic and carbonate reservoirs based on the principle of mass and energy conservation.

3. LAND MANAGEMENT

3.1 INTRODUCTION

It is a knowledge based procedure that aims at integrating the management of land, water, biodiversity, and other environmental resources to meet human needs while sustaining Ecosystem services and livelihoods. **SUSTAINABLE LAND MANAGEMENT (SLM)** One of the most important aspects of oil and gas business. Sustainable land management combines technologies, policies, and activities aimed at integrating socioeconomic principles with environmental concerns, so as to simultaneously:

1. Maintain and enhance production.
2. Reduce the level of production risk, and enhance soil capacity to buffer against degradation processes.
3. Protect the potential of natural resources and prevent degradation of soil and water quality.
4. Be economically viable.
5. Be socially acceptable, and assure access to the benefits from improved land management.

3.2 HOW TO MAINTAIN ACCURACY

1. See our rights and ownership where leases overlap and at different depths.
2. Enquire about our ownership in any formation, even if the formation is not stated in an assignment.
3. Report on developed, undeveloped, expiring and total acreage (total area of land).
4. Keep a track of our lease provisions and obligations and make timely rental payments.
5. Digitize our leases, contracts and units in the GIS (geographic information system) quickly and cost effectively.

3.3 WHO KEEPS TRACK OF LAND MANAGEMENT

Before a company can begin the drilling for oil or gas, they need to own the rights to the oil and/or minerals the land contains who are called as “LANDMAN”.

1. These are the men who bridge the gap between these companies and landowners.
2. They work as liaison between stakeholders and landowners.

3.3.1 THERE ARE TWO TYPES OF LANDMAN’S:

1. Field landman
2. Company landman

First is the "FIELD LANDMAN" who are hired by a broker to perform the services required before any drilling commence.

The services what the field landman does are:

1. Determination of land ownership.
2. Identification of mineral rights.
3. Procurement and negotiations of land and mineral leases.

The second one is the "COMPANY LANDMAN" these people handle lease payments or equipment malfunctions and are employed directly by an oil and gas exploration company.

These people handle services like**:**

1. Property record research.
2. Preparation and negotiations of leases and contracts often with other companies.
3. Manage drilling communication and activities.

3.3.2 WHO HANDLES LAND MANAGEMENT IN UNITED STATES OF AMERICA

The "Bureau of land management [BLM]" is an agency with in the United States department of the interior that administers more than 247.3 million acres of public lands in United States. The mission of BLM is "To sustain the health, diversity and productivity of the public lands. There are more than 63,000 oil and gas wells on BLM public lands. Total energy leases generated approximately $5.4 billion dollars in 2013 (372.6 billion rupees).

3.3.3 WHO HANDLES LAND MANAGEMENT IN CANADA:

The "Aboriginal Affairs and Northern Development Canada [AANDC]" provides land management services to more than 600 1st nations (first people of Canada) and covers more than 2,800 reserves with 3 million hectares reserve land across Canada. Approximately 1, 70,000 oil and gas wells have been drilled in Canada.

3.4 SOFTWARES:

1. LANDPRO CORP

It is a Tract-Based, Land Management Software Solutions for Oil, Gas, and Mining Companies since 1987. This software is from Texas, downtown Houston, southern United States.

Visual LandPro 2000 is the ideal tool for land departments of small to mid-sized Oil, Gas, and Mining Companies that have Lease inventories ranging from a few hundred Leases to over

100,000. Visual LandPro 2000 provides Oil & Gas, Mining, Land Owners, and Land Service companies with the tools to record and manage land inventory details and ownership history of land parcels.

2. P2 ENERGY SOLUTIONS

It provides financial and accounting management software, geospatial data, land asset management tools, well lifecycle management solutions, environmental, health & safety solutions and outsourcing services to both the upstream and mid-stream oil and gas sectors as well as the alternative energy sector.

3. LANDWORKS INNOVATIVE LAND MANAGEMENT:

I. LANDWORKS PROPERTY MANAGEMENT: You can administer obligations and provisions, monitor receivables, ensure accurate financial compensation, receive prompts for time-sensitive obligations or expiring leases and easily create reports for both current and historical land assets and associated data.

II. LANDWORKS GIS: This dynamically links the agreement, tract and legal description elements saved in the database to the related layers in the GIS.

III. WEBMAPS ENTERPRISE GIS SUITE: These tools are not specific to land management and are not dependent on other LandWorks software. They are for any business that wants to provide robust but easy-to-use GIS maps through a web browser to a large number of users.

4. TRUE.LAND OIL AND GAS MANAGEMENT SOFTWARE

True.Land is a premier web application for the oil and gas industry. It utilizes key document management tools as well as real-time information updates to help you succeed in your business. We offer the most cost-effective solution for land management services.

4. JOINT VENTURE ACCOUNTING

4.1 INTRODUCTION

A joint venture is a business arrangement in which two or more parties contribute resources in order to achieve a goal. This task can be a new project or any other business activity. In a joint venture (JV), each of the participants is responsible for profits, losses and costs associated with it. However, the venture is its own entity, separate from the participants' other business interests. Joint ventures can combine a large and smaller companies to take on one or several big and little projects or deals. Despite the fact that the purpose of JVs are typically for production or for research, they can also be formed for a continuing purpose.

4.2 CONTENTS OF AN AGREEMENT

A joint venture agreement usually contains the following clauses:

I. Parties to the Agreement
II. Parties participating Interests
III. Scope of Work
IV. Exclusive Operations
V. Designated Operator
VI. The Joint Operating Committee
VII. Cost Control and Contracting
VIII. Hydrocarbon Allocation
IX. Hydrocarbon Lifting and Disposal

4.3 WHY JOINT VENTURE

JVs can provide the benefits of collaboration and risk sharing while maintaining corporate independence and avoiding the economic and political risk associated with a merger or acquisition. This risk sharing and additional route to capital funding is particularly attractive to oil and gas companies as they attempt to deliver major capital projects in an environment of increasingly uncertain geopolitics and market price instability. However, the positive factors driving companies toward JVs — which by necessity reduce control and require a degree of collaboration — are often the very same factors that create operational challenges and break down the same relationships.

4.4 TYPES OF JOINT VENTURE AGREEMENTS

1. **Operational JVs:** Two or more companies create a new entity that holds the full complement of operating assets and capabilities necessary to develop and execute the project.
2. **Risk-sharing JVs:** Two or more companies create a JV primarily for the purpose of sharing risk or financing. One of the participants typically runs the entire operation, with the others contributing only funding and, potentially, input on strategy-level decisions.
3. **Capability-sharing JVs:** The JV conducts business by leveraging a combination of capabilities from the parents. For example, one parent may bring engineering and manufacturing capabilities, while the other brings political influence and resources in certain countries. In this instance, the JV itself may have limited operational assets; it coordinates a mix of capabilities held by the various participants.

4.5 COMMON ISSUES

As our data analysis and project experience suggest, while JVs can add significant value to a project, they can also add considerable complexity. Indeed, while benefiting from stronger cost performance, our data suggests that projects developed under a JV structure tend to struggle (more than non-JV projects) to meet schedule targets.

- **Inappropriate JV structure:** A failure to select and engage with suitable partner organizations or to engage inadequate commercial structures is a common problem. This is of particular concern where strategy, culture, capability or priorities (as they relate to joint activities) are incompatible or misaligned. (e.g., the crash in oil prices)
- **Alignment of goals and strategy:** It's surprisingly common for partners to fail to effectively align and agree upon joint goals/strategies for the project and its key activities. Planning and investment activities become disjointed, specifically around technical capacity/complexity, as projects are developed and key design decisions (with major cost implications) are made.
- **Mutual benefit and the development of trusting relationships:** When partners fail to appropriately invest in building and then maintaining relationships based on shared investment and benefit, trust is rarely developed or maintained, effort is duplicated, and a greater level of establishment than is truly necessary develops.

4.6 SOFTWARE

1. **TouchstoneEnergy (JV accounting software):** TouchstoneEnergy's Joint Venture accounting module automates joint venture cost allocations, streamlining approval and billing workflows. It makes cost recovery a quick and easy process giving both internal stakeholders and JV partners' confidence that the figures presented are accurate.
2. **Inoapps JV accounting cloud:** Inoapps offers unique expertise with its state-of-the-art Oracle Cloud solution for Joint Venture Accounting, which provides a real-time view of expenditure and revenue throughout the entire project lifecycle.

5. GIS PUBLIC DATA ANALYTICS

5.1 INTRODUCTION

It is a computer database management system, which includes remote sensing, mapping, cartography, and photogrammetry for conducting spatial searches and making map overlays. Oil and gas data is strongly connected to geography. For example, oil exploration, pipeline construction and the environment uses GIS to make it possible. The oil and gas industry is a shockingly important sector in the world. It powers 99% of all transportation and accounts for 2.5% of the world GDP. GIS in oil and gas industry is a rapidly growing field of interest. GIS applications in the oil and gas industry can serve multiple purpose.

5.2 Uses of GIS in the oil and gas sector

1. **Well planning and acquisition:**

   a) Basin Analysis:

   Map of potential hydrocarbon accumulations; hydrological modeling; sub-surface secondary fluid migration network mapping; flow direction – flow accumulation mapping across DEM; potential migration pathways, etc.

   b) Play Analysis:

   Risk segment mapping for each petroleum play element; regional risk mapping; geological maps; ground truthing or validating imagery through field surveys.

   c) Acreage Analysis:

   Rapid evaluation and gradation of opportunities using multi-disciplinary asset data and assigning weightings and criteria; ranking of acreage, petroleum leases, blocks and companies; exploration statistics in visual platform, etc.

2. **Seismic planning:**

   a) Terrain analysis

   b) seismic survey maps and data satellite image processing

   c) Spatial analysis etc.

3. **Exploration**

   a) Well Planning:

   Well planning around multiple drilling constraints; GIS tools used in well pattern optimization workflows.

   b) Drilling:

   Spatial analysis within GIS for optimized well drilling patterns and efficient configurations.

c) Production:

GIS allows data integration and visualization of production volumes, injection rates and recovery efficiency in near real-time.

4. Field Operations:

a) GIS supports drilling around surface and geologic constraints.

b) Improved field production efficiencies for whole reservoirs or basins.

c) Data integration and visualization in real time for production dashboards, coordinated workflows and personnel across rig sites.

5. Facilities management:

a) 3D GIS with field layout helps accurate monitoring of associated environmental changes in near real time for Health, Safety and Environment (HSE).

b) Emergency response during oil spills, leaks or explosions.

6. Distribution and Pipeline management:

a) Least cost path analysis for distribution network.

b) Network analysis for environment friendly and cost effective routes.

c) Pipeline monitoring for geo-hazards and leaks.

d) Tracking of inspections using remotely acquired data.

5.3 Benefits of GIS in Oil and Gas

a. Empowers decision making:

Which acreage or play to enter, how to shorten portfolio workflows, how to plan the optimal pipeline route, integrate results of seismic survey, planning emergency response, better management of facilities, manage pipeline outage and leaks, etc.

b. Supports future action and ongoing exploration activities:

By standardizing processes and reducing technical uncertainty, GIS improves exploration efficiency. The GIS framework models a consistent exploration processes across all assets within the company. This supports a consistent, auditable corporate prospect portfolio, for ongoing portfolio decisions.

c. Increased efficiencies:

Multi-disciplinary data integration for risk assessment and uncertainty, better access for cutting wasteful downtime, optimized maintenance schedules; monitoring and analysis of daily fleet movements in real time, least cost path analysis for pipeline routing, standardized portfolio workflows, cutting down decision cycle times, etc.

d. Cost saving:

An estimate of 10-30 per cent cut in operational costs, prevention and management of incidental or accidental costs, efficient pipeline and fleet management saves costs, optimized drilling and operation workflows enhances ROI, and so on.

e. Record keeping:

The huge data loaded in centralized GIS builds a strong framework for managing data with full transaction support and reporting tools.

5.4 Analysis in GIS:

GIS systems really come into their own when they are used to analyze geographic data. The processes of geographic analysis often called spatial analysis or geo-processing uses the geographic properties of features to look for patterns and trends, and to undertake "what if" scenarios. Modern GIS have many powerful analytical tools to analyze the data. The following are some of the analysis which are generally performed on geographic data.

a. Overlay Analysis

The integration of different data layers involves a process called overlay. At its simplest, this could be a visual operation, but analytical operations require one or more data layers to be joined physically. This overlay, or spatial join, can integrate data on soils, slope, and vegetation, or land ownership. For example, data layers for soil and land use can be combined resulting in a new map which contains both soil and land use information. This will be helpful to understand the different behavior of the situation on different parameters.

b. Proximity Analysis

GIS software can also support buffer generation that involves the creation of new polygons from points, lines, and polygon features stored in the database. For example, to know answer to questions like; How much area covered within 1 km of water canal? What is area covered under different crops? And, for watershed projects, where is the boundary or delineation of watershed, slope, water channels, different type's water harvesting structures are required, etc.

5.5 ROLE OF DATA ANALYTICS IN OIL AND GAS INDUSTRY

According to **Mark P. Mills**, "Bringing analytics to bear on the complexities of shale geology, geophysics, stimulation, and operations to optimize the production process would potentially double the number of effective stages, thereby doubling output per well and cutting the cost of oil in half".

A tech-driven oil field is already expected to tap into 125 billion barrels of oil and this trend may affect the 20,000 companies that are associated with the oil business.

1. **In Real-time and Highly Cost Effective:**

a) Data volume in the oil industry grows with rapid speed and handling a large amount of data efficiently became very important.

b) Oil companies have always been generating extreme volumes of data at a very high rate on a daily basis.

c) Traditionally, large volumes of data can be very expensive for both oil and gas producers. Such huge costs can significantly impact the financial performance of the company.

d) With the use of big data, companies can not only cut costs but also capture large data in real time. Such use of analytics can help in improving production by 6% to 8%.

2. **Reduction of Risk and Better Decision Making:**

a) Geographically speaking, layers of rocks vary across regions, even though they may be similar structurally. Lessons usually learned from one area can be applied to similar areas.

b) Traditionally, unstructured data is stored in different databases or any storage facility, which requires a lot of time and effort.

c) Data science can help in reducing risk and help in learning more about each subsystem thereby increasing the accuracy in decision-making.

3. **High Accuracy in Drilling Methods and Oil Exploration:**

a) Since oil depends on drilling and oil field exploration, any use of big data analytics in this field is considered a boon. Miller writes, "Big-data analytics can already optimize the subsurface mapping of the best drilling locations, indicate how and where to steer the drill bit, determine section by section, the best way to stimulate the shale and ensure precise truck and rail operations."

b) The search for new hydrocarbon deposits demands a huge amount of materials, manpower, and logistics. When we are drilling a deep water oil well it often costs over $100 million, no one will ever want to be looking in the wrong place.

c) For example, companies like "Shell" uses fiber optic cables to avoid these type of issues and the data is then transferred to its private servers, maintained by Amazon Web

Services. This gives a far more accurate idea to engineers of what lies beneath and saves a considerable amount of time and effort.

4. **Ensures efficient performance of machines:**

a) Oil drilling is a continuous process and machines have to work for long hours under severe temperatures and conditions.

b) Big data is used to ensure that machines are working properly and are not damaged due to breakdowns or failures.

c) Machines are fitted with sensors that collect data about its performance. This data is then compared to the aggregated data ensuring that parts are replaced in an efficient manner and downtime is minimized, further reducing additional expenses.

NOTE:-

Big data real-time analytics surely presents innovative opportunities to establish more efficient oil production, cost and risk reduction, safety improvement, more regulatory compliance and better decision-making. Good expertise and strategic prudence while using big data tools, will not only ensure success but also reduce the margin of error.

5.6 SOFTWARE'S

1. **ArcGIS from ESRI**

ArcGIS offers a unique set of capabilities for applying location-based analytics to your business practices. Gain greater insights using contextual tools to visualize and analyze your data. Collaborate with others and share your insights via maps, apps, and reports.

a. Spatial Analytics:

It is the heart and soul of ArcGIS. You use it to find the best location for your business, plan for smarter communities, and prepare and respond faster in crucial situations.

b. Imagery & Remote Sensing:

ArcGIS gives you everything you need to manage and extract answers from imagery and remotely sensed data. It includes imagery tools and workflows for visualization and analysis, and access to the world's largest imagery collection.

c. Mapping & Visualization:

Maps help you spot spatial patterns in your data so you can make better decisions and take action. Maps also break down barriers and facilitate collaboration. ArcGIS gives you the ability to create, use, and share maps on any device.

d. Real-Time GIS:

It empowers you with location monitoring of any type of sensor or device — accelerating response times, optimizing safety, and improving operational awareness across all assets and activities, whether in motion or at rest.

2. IDRISI GIS

a. Derivative Mapping:

1. A full suite of mathematical and relational modeling tools for deriving new data layers as a function of existing layers.
2. Models can be entered as equations with map layers as variables or through the use of a graphical modeling environment.

b. Distance and Context:

1. A rich set of context operations, including Euclidian and cost distance procedures, for the aggregation and disaggregation of directional forces and frictions, a least-cost path procedure, and spatial allocation routines.
2. The ability to analyze patterns and textures, including the analysis of local context through filtering and aggregation of contiguous groups.

c. Spatial Statistics:

1. An entire suite of tools aimed at the description of spatial characteristics including geostatistics and interpolation.
2. Tools include point distribution measures, simple and multiple image regression, logistical and multinomial logistical regression, autocorrelation procedures, pattern and texture measures, polynomial trend surface analysis and spatial sampling, and random generation procedures for support of Monte Carlo simulation.

d. Decision Support and Uncertainty Management:

1. A graphical modeling environment for multi-criteria and multi-objective decision support that includes tools and procedures for suitability mapping and land allocation.
2. A land allocation procedure that takes into account contiguity and compactness.
3. A consensus-seeking procedure for weighting criteria, fuzzy standardization, and an extensive set of criteria aggregation procedures based on Weighted Linear Combination and Ordered Weighted Averaging.

6. FIELD DATA CAPTURE

6.1 INTRODUCTION

FDC is the gathering and analysis of manually entered or electronically uploaded data from field equipment.

Oil and gas facilities have hundreds of metering points. The data from these metering points is required by multiple departments within an organization. Some of the field data is necessary to meet government reporting requirements. Data must be collected on time and accurately in order to reassure the recipients of that data of its validity.

We can store the field data capture in three forms:

1. Hand written log books
2. Excel spreadsheets
3. FDC software

Hand written log books

These log books would be difficult to share with the multiple groups and the data may not be available in order to resolve the operational issues depending on the amount of data being captured.

Excel spreadsheets

These sheets would be easily shared between groups but, as we compare them with the hand written log books, the data may not be available in order to resolve operational issues depending on the amount of data being captured.

FDC software

These software's could be easily shared between groups, and if most of the data is downloaded electronically then the data would be available in order to resolve operational issues.

6.2 Fundamental requirements:

1. The data which we have collected from the fields and metering points must be accurate.
2. Data must be available to multiple groups and departments within a company, and to external partner companies.
3. Data must be available to different departments with different urgency.
4. Operational issues must be identified and resolved daily, whereas production accounting groups need data on a monthly basis.
5. The system must be flexible and expandable when new employees or equipment is deployed to the field.

6.2.1 Currently two methods are used for capturing data:

1. Manual entry
2. Electronic capture

1. Manual entry:

These are done manually by a data collector, the collected data is written in log books or on paper or either typed into a software.

2. Electronic capture:

In this method the data can be downloaded from the field in various formats with one of many interface options

a. To be printed for filing purpose.

b. To be uploaded into the 'FDC software' for analysis and verification.

6.3 Problems faced in electronic collection of data:

1. Fragile handheld devices that are cost prohibitive for company's wide use in the field.
2. Software maintenance of the systems that must be communicated.
3. Feasible plans to allow for data capture when the system is in downtime or not in working mode (offline).
4. We need to see the limitations for the company's IT data transfer rate (bandwidth).

6.4 Benefits of Field Data Capture:

1. The benefits of excel or FDC software is that the application can perform some of the analytics and calculations necessary for the operator or engineer which gives the user more time in the day to determine solutions for increasing profitability rather than spending that time performing the calculations.
2. Also there is a reduction in duplication of work and effort when all the data and calculation results are available from a single source. The benefits of moving towards cloud based data availability is that it eliminates the oil and gas company from requiring the IT infrastructure and in-house staff which also increases profitability.

6.5 Why oil and gas companies should do Field Data Capture:

1. The important point is that the oil and gas companies need to reduce costs and increase profitability.
2. Time is money and the more time that staff are required to expend on the collection of the data, the less time they have to devote to the analysis of the data and the implementation of cost cutting and profit enhancing measures.

3. In the current economy production deferment tools are vital and allow the operator to link production outages to specific maintenance events, resulting in a more clear analysis of production issues.
4. In addition, depending on the region that the company is operating, there could be legislative requirements that need to be enforced and field data that needs to be relayed to government bodies for approval.

NOTE:

The future of FDC is moving towards cloud based data availability and internet access for software applications on many different devices and away from paper based collection.

Important issues to take into account are:

1. Field environment and its effect on handheld or mobile devices.
2. The device itself and the user (battery life, weight of device, ease of use).
3. Connection speeds with wireless service.
4. Offline options for users who will be out of range.
5. Security of information when using wireless services.
6. Hardware performance and capability of handheld and mobile devices.
7. Operating system updates of handheld and mobile devices as they may impact FDC applications.
8. Security of the data when it's being housed by a 3rd party data centre.

6.6 SOFTWARES

1. QUORUM SOFTWARE:

Increase data accuracy and efficiency of communication with full-featured field data capture that is powered by the Microsoft cloud. Real-time connectivity between the field and back office speeds decision-making that optimizes production.

Mobilize field workers

a) Offline data capture
b) Auto-syncing to the cloud
c) Task management
d) Cross-platform (iOS, Android)

Capture and validate production

a) Meter readings
b) Tickets and tank gauges

c) Well tests

d) Configurable validations

Track any and every field event

a) Downtime and reduced flow

b) Treatments, services, and tank transfers

c) Spill and inspection reports

d) Digitize and capture any paper form

2. P2 eVIN software:

eVIN, powered by Merrick, is the most widely used mobile field data capture application in the upstream oil and gas industry more than 20,000 field operators use it. This solution combines manually entered field production and operational information with data from automation systems, electronic flow measurements, and SCADA historians. It also provides instant alerts, validation, and live graphing.

1. Reliable In low bandwidth terrains
2. Whatever you need captured you can capture It
3. Minimal key strokes for maximum efficiency
4. Get a clear picture of well performance.

Reliable In low bandwidth terrains:

a) Even in remote oil and gas fields where an Internet connection is nonexistent, eVIN provides quick and reliable transmissions (they typically take less than two minutes).

b) Whether the well site is monitored 24/7 or visited once a week, eVIN helps you get the job done quickly and effectively every time.

Whatever you need captured you can capture It:

a) It is used to capture standard volumetric readings and measurements like oil, gas and water volumes, well tests, run tickets, downtime information, and others.

b) It can also be used to capture nontraditional volumetric readings and measurements such as chemical usage, fluid levels, weather, greenhouse gas blowdown events, and flow back.

Minimal key strokes for maximum efficiency:

a) The time spent on field data capture and reporting is reduced by more than 40 percent.

b) This time savings is made possible via intelligent defaults that populate the current day's readings based on previous readings.

c) The defaults can then be overridden by manual entry where needed.

7. PRODUCTION ACCOUNTING

7.1 INTRODUCTION

Oil and Gas Production Accounting teaches the basics of petroleum production accounting as it relates to the petroleum industry. Oil and gas production accountants are responsible for compiling, managing and reporting financial and production data for the oil and gas industry. Production accountants receive information from the field, land administrators, joint venture analysts, marketing and financial departments in order to perform monthly requirements of their role. They work with volumes of oil, gas and water produced from the wells, inventory at facilities and distribution from the facility including revenue, division of ownership and royalties. The information that the Production Accountant produces is critical to company operations, management and financial reporting. It is the juncture where operational data is translated into financial bookings.

7.2 TYPES OF PRODUCTION ACCOUNTING

Companies involved in the exploration and development of crude oil and natural gas have the option of choosing between two accounting approaches: the "successful efforts" (SE) method and the "full cost" (FC) method. These differ in the treatment of specific operating expenses relating to the exploration of new oil and natural gas reserves.

Two alternative methods for recording oil and gas exploration and development expenses is the result of two alternative views of the realities of exploring and developing oil and gas reserves.

7.2.1 TWO APPROACHES

Successful efforts (SE) method- This method allows a company to capitalize only those expenses associated with successfully locating new oil and natural gas reserves. For unsuccessful (or "dry hole") results, the associated operating costs are immediately charged against revenues for that period. The ultimate objective of an oil and gas company is to produce the oil or natural gas from reserves it locates and develops so that only those costs relating to successful efforts should be capitalized. Conversely, because there is no change in productive assets with unsuccessful results, costs incurred with that effort should be expensed.

Full cost (FC) method- The alternative approach, known as the full cost (FC) method, allows all operating expenses relating to locating new oil and gas reserves regardless of the outcome to be capitalized. In general, the dominant activity of an oil and gas company

is simply the exploration and development of oil and gas reserves.

Therefore, all costs incurred in pursuit of that activity should first be capitalized and then written off over the course of a full operating cycle.

7.3 DIFFERNECES BETWEEN THE TWO METHODS

In general, SE and FC methods differ in their approach to treating costs associated with the unsuccessful discovery of new oil or natural gas reserves. Although both methods are indifferent as to the type of reserves, oil versus natural gas, that are associated with the costs incurred, the specific treatment of those costs by each method is responsible for the difference in the resulting periodic net income and cash flows numbers.

Regardless of the method it chooses to follow, an oil and gas company engaged in the exploration, development and production of new oil or natural gas reserves will incur costs that are identified as belonging to one of four categories:

i) Acquisition costs: Acquisition costs are incurred in the course of acquiring the rights to explore, develop and produce oil or natural gas. They include expenses relating to either purchase or lease the right to extract the oil and gas from a property not owned by the company. Also included in acquisition costs are any lease bonus payments paid to the property owner along with legal expenses, and title search, broker and recording costs. Under both SE and FC accounting methods acquisition costs are capitalized.

ii) Exploration costs: All intangible costs will be charged to the income statement as part of that period's operating expenses for a company following the SE method. All tangible drilling costs associated with the successful discovery of new reserves will be capitalized while those incurred in an unsuccessful effort are also added to operating expenses for that period. For an oil and gas company following the FC method, all exploration costs – including both tangible and intangible drilling costs – are capitalized by being added to the balance sheet as part of long-term assets.

iii) Development costs: Development costs involve the preparation of discovered reserves for production such as those incurred in the construction or improvement of roads to access the well site, with additional drilling or well completion work, and with installing other needed infrastructure to extract (e.g., pumps), gather (pipelines) and store (tanks) the oil or natural gas from the reserves. Both SE and FC methods allow for the capitalization of all development costs.

iv) Production Costs: The costs incurred in extracting oil or natural gas from the reserves are considered production costs. Typical of these costs are wages for workers and electricity for operating well pumps. Production costs are considered part of periodic operating expenses and are charged directly to the income statement under both accounting methods.

7.4 SOFTWARE

Some of the popular software which are used are:

- **Multiview -** For organizations seeking a solution that conforms to their existing operations, Multiview offers a suite of financial solutions. With Multiview, companies gain visibility over corporate data.
- **Sage intact -** Sage Intacct is a provider of cloud-based accounting software. Sage Intacct's applications are suitable for small and midsize companies and can provide real-time financial and operational insights as well as the ability to automate critical processes.
- **Acumatica ERP -** Acumatica ERP delivers an adaptable cloud and mobile-based enterprise resource planning solution with a user licensing model which enables a real-time view of business operations at anytime from anywhere.
- **Xledger Software -** Xledger is a cloud-based enterprise resource planning (ERP) solution that caters to midsize and large businesses that helps them to manage day-to-day operations by automating routines ranging from bank reconciliation to invoice entry. It caters to corporates, non-profits and public institutions.

8. FIELD AND TRACK MANAGEMENT

8.1 INTRODUCTION

Field and track management refers to the management of a company's resources employed at the property of clients, rather than on company property. Examples include locating vehicles, managing worker activity, scheduling and dispatching work, ensuring driver safety, and integrating the management of such activities with inventory, billing, accounting and other back-office systems.

8.2 REQUIREMENTS FOR FIELD AND TRACK MANAGEMENT

1. **Customer expectations:** Customers expect that their service should not be disrupted, and should be immediately restored.
2. **Underutilized equipment:** Expensive industrial equipment in mining or oil and gas can cost millions when sitting idle.
3. **Low employee productivity:** Managers are unable to monitor field employees, which may reduce productivity.
4. **Safety:** Safety of drivers and vehicles on the road and while on the job site is a concern both for individuals and their employers.
5. **Cost maintenance:** Rising cost of fuel, vehicle maintenance, and parts inventory.
6. **Service to sales:** Increasingly, companies expect their services department to generate revenues.
7. **Dynamic environment:** Continuously balancing between critical tickets, irate customers, productive employees and optimized routes makes scheduling, routing and dispatching very challenging.
8. **Data and technology:** Many a times, the data for analytics is missing, stale or inaccurate. So data should be maintained consistently.

8.3 SOFTWARE

1. **ServicePower:**
   Optimization technology through service scheduling which improves the efficiency, productivity and utilization of increasingly hard to find human, field based resources. Centralize and standardize management and scheduling of field based resources, reducing infrastructure and management overhead. Ensure necessary tools and equipment are scheduled simultaneously to decrease the total time spent on site.
2. **Fieldez**
   It Makes Operational, Environmental and Maintenance easy and tasks more efficient through mobile automation. It handles Well test data, Security and Environmental Checklists also work order automation Field Data Capture or manual data entry.
3. **Service Cloud Field Service Software**
   It is a cloud-based customer service management solution that is designed to initiate customer service activities from anywhere. It works to centralize and optimize the agent efforts, allowing them to handle customers' requests and manage cases. It was developed to offer support mobility to agents, allowing them to receive service requests and provide support from anywhere.

9. VOLLUME ALLOCATION

9.1 INTRODUCTION

An amount of resource assigned to a particular recipient. We distribute the resources or duties for a particular purpose. In the petroleum industry, allocation refers to practices of breaking down measures of quantities of extracted hydrocarbons across various contributing sources. Allocation aids the attribution of ownerships of hydrocarbons as each contributing element to a commingled flow or to a storage of petroleum may have a unique ownership. Contributing sources in this context are typically producing petroleum wells delivering flows of petroleum or flows of natural gas to a commingled flow or storage. The terms hydrocarbon accounting and allocation are sometimes used interchangeably. Hydrocarbon accounting has a wider scope, taking advantages of allocation results, it is the petroleum management process by which ownership of extracted hydrocarbons is determined and tracked from a point of sale or discharge back to the point of extraction. In this way, hydrocarbon accounting also covers inventory control, material balance, and practices to trace ownership of hydrocarbons being transported in a transportation system, for example through pipelines to customers distant from the production plant.

Allocation rules define how volume allocation operates. Allocation rules are defined at well completion, measurement point, and delivery network levels within a delivery network. Once the allocation rules are established, volume allocation executes the steps required to carry out allocation.

9.2 THREE RULES

There are three volume allocation rules. These rules are defined at:

1. Well completion level.
2. Delivery network level
3. Measurement point level

1. **Defined at well completion level:-**

   Theoretical calculation method: This methods are used to determine how the well completion estimated production is calculated.

   This dictates how the volume allocation process will determine a well completion's 'estimated' or 'theoretical' production for a given period of time. The TCM is established for each major product produced out of a well completion.

Average Test:

In this TCM, you define the number of well tests to be used to determine the estimated well completion production. These tests are retrieved for a given allocation frequency and the average is calculated, then the uptime hours for the well completion is applied to this average to derive the well completions calculated estimated production.

Latest Test:

This TCM retrieves the latest well test results for the given material, well, well completion, allocation type, allocation period, and frequency, then the downtime associated with the allocation period is applied to the latest test to get the estimated production for a well or well completion.

Weighted Average Test:

This TCM retrieves the well tests for the given material (that is, oil, gas, condensate, and water), allocation type, allocation period, and frequency. It determines the hours produced during the test periods by applying well downtime. Applies the well test value to the hours produced to get a total for the period and then calculates a weighted average for all test periods.

Average for the Month:

This theoretical calculation method retrieves the well test within the selected month of the allocation period, then applies the downtime associated with the allocation period to the calculated average of the retrieved tests.

2. **Defined at delivery network level:-**

Delivery network allocation profile: The DN allocation profile directs the volume allocation process in the allocation of all product volumes within a delivery system. The DN allocation profile lists the products and volume types that will be allocated to well completions within a delivery network.

This transaction defines the allocation rules for a particular delivery network. The allocation rules established in this transaction directly affect how the volume allocation cycle processes allocations for the delivery network specified in this transaction.

Allocation rules include details about:

a) The product to be allocated.
b) The volume type to be allocated.
c) The order in which the products and volume types are to be allocated.

Prerequisites:

When determining how to structure the order in which the products and volume types are to be allocated, allocate the dispositions as they occur from the most upstream node generally wells to the most downstream node which is generally a sales point.

3. **Defined at Measurement point level:-**

Measurement Point Allocation Profile:

This transaction defines allocation rules for a given measurement point within a delivery network.

The MP allocation profile directs the volume allocation process on what type of volume to allocate from a measurement point. The MP allocation profile also indicates the manner in which volumes for a product and volume type are derived at the measurement point.

The allocation rules determine:

a) The products and volume types of all volumes to be captured at the measurement point
b) The method used to capture the volume

Three reports can be generated as a result of the allocation process:

a) Error report
b) volumetric source report
c) well completion disposition report

In addition to the standard reports generated out of an allocation, two trace reports can be generated:

Trace Report 1 will be Theoretical

Trace Report 2 will be Allocation

After volume allocation has been run, it is a good idea to view the error, volumetric source, and well completion disposition reports in order to verify the data.

There will be trial allocation and a final allocation. Volume allocation can be run in either trial mode, or final mode.

1) Trial allocation run:

Trial allocations can be requested at any time during the production month. Well completion dispositions will not be posted to the WC volumes table. The network will not be closed. Trial allocations allow you to carry out a test run of the allocation process, and to verify, using allocation reports, that actual results match expected results. This allows you to see and correct errors, before final allocation.

2) Final allocation run:

In final allocation, well completion dispositions are posted to the WC Volumes table. The network is closed.

Allocation rules cover the following:

a. If volume is to be captured at a measurement point, complete a delivery network allocation profile, and a measurement point allocation profile.
b. If volume is to be captured at a well completion, complete a delivery network allocation profile.
c. Complete a theoretical calculation method for each well completion, as required.
d. If a formula is required, enter formula rule.

NOTE:

Theoretical calculation methods are required for well completions, unless no test data or metered volume is available for deriving theoretical volumes. When no test data or metered volume is available, the allocation base is defined.

Once the allocation rules are established, volume allocation then:

1. Determines theoretical volumes, usually from well test and downtime data these are the beginning theoretical.
2. Determines inputs, which are the sum of theoretical and estimates
3. Determines outputs, which are the sum of actuals
4. Determines the percentage difference between inputs and outputs
5. Determines any applicable tolerance or tolerances.
6. Adjusts inputs when the difference is within tolerance to match outputs
7. Allocates volumes
8. Reduces theoretical

9.3 SOFTWARE

1. **PRODUCTION ALLOCATION SOFTWARE FROM NEOFIRMA**

   NeoFirma production allocation software is part of a fully integrated, cloud-based suite of oil & gas production software. Capture allocation data, including multi-well or lease level volumes and well tests, using NeoFirma's leading field data capture tools, including Field App. Our production management software provides flexible options to fit your existing production accounting workflows. The software integrates reports with numerous leading accounting, economics or forecasting, and regulatory applications through pre-configured interfaces, services, and export templates.

2. AVOCET VOLUMES MANAGEMENT FROM SCHLUMBERGER

Avocet platform volumes management provides data entry, production visualization, computation, fluids allocation, and operational and regulatory reporting all through an easy-to-use application that runs on desktops, field laptops, and the web.

Built from extensive worldwide allocations experience, the Avocet platform performs full-stream allocations. Production is calculated using measurements, tank inventories, shipments, and tickets supported by a host of industry calculations, including API, ISO, and AGA standards for volume computation and temperature and pressure corrections

3. VOLUMES MANAGEMENT

The oil and gas extracted at the well site is directly equated to your revenue. Accurate, real-time, reliable recording and reporting is truly business-critical. Excalibur Volumes Management gives you the functions you need to ensure you're concentrating assets and resources where they can be most valuable.

a) Daily Production:

Accurately track daily oil, gas and water production volumes. Volumes are allocated to wells based on well test and down time and provide daily production tracking, reporting and analysis.

b) Energy Production Accounting:

The Excalibur Energy Production Accounting (EPA) module provides transactional data including sales, production, well test and well downtime to create well history detail for each production period. Monthly transactional data can be manually entered or uploaded via Excalibur Data Interchange.

c) PRA SYSTEMS

A network is a series of nodes that are linked for the purpose of allocating a product back to the well completion level, ultimately, to provide PRA (production and revenue accounting) Revenue with the data it needs. A network hierarchy is built on a series of different levels. The concept of level is very important, as PRA uses levels in applying allocation formulas and network validity edits.

10. ROYALTY REVIEW AND RECAPTURE

10.1 INTRODUCTION

Whenever oil or gas production begins, the landowner is entitled to part of the total production. A royalty is agreed upon as a percentage of the lease, minus what was reasonably used in the Lessee's production costs. The royalty is paid by the Lessee to the owner of the mineral rights, the Lessor in the Lease. It is based on a percentage of the gross production from the property and is free and clear of all costs, except for taxes.

Royalty Interest:

There are two types of royalty interest which may be acquired from the landowner:

a) In one, the landowner conveys by royalty deed the title in fee simple to all or a portion of the landowner's royalty interest in the property. The deed may describe the interest sold as a fraction of the "landowner's royalty" or a number of "royalty acres." Each royalty acre is entitled to a fraction usually $1/8^{th}$ of the production attributable to that acre, free and clear of production costs. This transaction may take place before or after leasing. The interest thus assigned is a fee royalty. We can also call this first type as a “bonus” from the company in respect to land.

b) In the other type, the landowner, after leasing, may sell portions of royalty interest in the lease. This is not a fee interest, but a share of the production of oil or gas under this lease, and expires with the termination of the lease. In this respect, it is similar to an overriding royalty.

The royalty interest is purchased from the landowner, who may sell his or her entire interest, or any fraction thereof. Usually this is after a lease has been granted for the development of the property and there appears to be a prospect of future production. The purchase is usually made by an investor or royalty dealer. The principal issues encountered here are the treatment of acquisition costs and deductions for worthlessness losses claimed as a result of unsuccessful exploration.

10.2 Types of investors:

a) The small investor:

   He may maintain ledger control accounts of producing royalties and nonproducing royalties. These are supported by separate accounting for each property interest particularly producing properties and usually showing the property interest owned. The landowner usually has the recorded instruments of conveyance for inspection if they are needed.

b) The larger investor:

He may maintain control accounts of Producing Royalties and Nonproducing Royalties, and a subsidiary record known as a Royalty and Fee Land Record for each royalty interest owned. Such record shows the property, location, description, interest owned, from whom acquired, date acquired, cost, lease information, and record of rentals received. When verifying cost for an investor who has claimed an abandonment loss, the agent should verify that the cost has been removed from the subsidiary record as well as the control account. The cost may have been written off for tax purposes without appropriate charges on the books. When a royalty becomes a producing property, the investment account is transferred from the Non-producing Royalties account to the Producing Royalties account. At this point, the property should be shown in the return as income producing property subject to depletion.

Ways to pay royalty to the owner.

a) By Credit card
b) By Cheque
c) By money order or cash
d) By Internet banking
e) Directly giving crude oil as a royalty

NOTE: Most landowners choose to receive the royalty in cash at the posted price of the oil. Electing to receive royalty in the form of crude oil could be a disadvantage and the landowner may not benefit from it.

10.3 How do we calculate royalty?

Traditionally, royalty can be 1/8th of the production or 12.8 percent of the production. However, it can be any fraction of production, depending on the royalty clause in a lease.

The landowner should negotiate for as high a royalty as can be arranged. In the event oil and gas were found and the wells produce, then the royalties kick in.

So if the oil well produce 100 barrels a day and the price of oil is 5060 rupees/- per barrel that month, then the cash flow is 100x5060 = 506,000 rupees/day The royalty owner, who agreed to 12.8% royalty, would receive 506,000 x 0.128 = 64,768 rupees/day. Over a month, that brings in 19,43,040 rupees per month to the mineral owner or if the mineral rights are owned by land owner then to land owner.

10.4 Generally we use three methods for establishing the royalty payment.

First method: Market price and value of the oil or gas. Market price at the well in the field is used as the prevailing price. Landowners usually have been taking the field price at the well because it allows the price to rise as the price of crude oil and gas rises.

Second method:

Ties the royalty to actual revenue received from the sale of the oil or gas. In this case, the royalty received may or may not be equal to the actual market price of the oil or gas. This method of computing royalty is used mainly with gas royalties.

Third method:

The landowner takes possession of the oil or gas produced for the landowner's share of the oil or gas production before the oil or gas is marketed by the production company. The landowner can insert a clause in the lease to take royalty either 'in kind' or 'in proceeds'. This clause allows the landowner more flexibility and a higher royalty based on decisions of the market.

10.4.1 Why oil and gas companies review their royalties:

Royalty Reviews

Identify unpaid royalties and manage royalty streams through a thorough royalty review. Signing a royalty agreement is usually a welcome event. But after time, doubt can creep in. Are you actually receiving the money that's due you? How much should be coming in, and why are the checks arriving late or getting smaller? If you have nagging questions about your royalties, it may be time for a royalty review.

During the royalty review process, we should start examine our royalty contract to determine whether we are being underpaid. Common underpayment causes include clerical errors, misinterpretations of the license agreement language, or intentional understatements. Once a contract has been reviewed, we can assist ourselves in implementing a compliance monitoring program with red flags to notify ourselves when there's a substantial deviation

10.4.2 Why we need to recapture the royalty:

If you sold it at a loss, there isn't any depletion recapture. In calculating the loss, however, you would adjust the basis by the amount of depletion claimed.

If the royalty trust is sold at a gain, past depletion deductions which reduced adjusted cost basis must be recaptured as ordinary income. The remaining gain is eligible for capital gains treatment.

For oil and gas property placed in service after 1986, the amount required to be recaptured is the smaller of the aggregate amount deducted as IDC on the property plus the depletion deductions that reduced the basis of the property or the gain realized on the disposition.

10.5 SOFTWARES

i. Pops Royalty management

Pop's Royalty Manager is a modern lease and royalty tracking software system focused on easing the burden of paper work, reducing your time spent with run statements and document management. You gain the time to work on maximizing the potential of your mineral, oil and gas royalty investments instead of grinding through paper work. Some users have reduced the hours spent on their royalty business by as much as 70%. Built on industry standard software by experienced software engineers, Pop's Royalty Manager is a robust solution for your document management needs. The relationships of the documents are drawn together into a rich interface that puts all the important information right in front of you.

ii. Integra energy solutions

The Integra Energy Management System is the ultimate oil and gas accounting software for managing working and royalty interest ownership, drilling operations, exploration and development of properties and more for the oil and gas enterprise.

The Integra Royalty Owner Solution provides oil and gas royalty owners and investors with an integrated suite of software components to manage the accounting and reporting needs of their organization. Integra is a configurable software system designed to meet the needs of individual royalty owners, royalty management companies, institutional investors and trusts. Integra's scalable database architecture is offered in four editions that can meet the needs of one to hundreds of concurrent users.

iii. Mineral ware

Accounting and revenue recovery:

a. **Revenue & Expense Tracking** - Automatically track all of your royalty revenue and deductions to make sure you are getting paid correctly.
b. **Revenue Recovery** - Mineral Ware identifies wells on your properties that you are not getting paid on. Recover revenue that you are owed and increase your monthly revenue stream.

iv. Quorum royalty management

It manages the royalty accounting and distribution of royalty payments for production of energy to royalty owners.

11. OPPORTUNITY MANAGEMENT

11.1 INTRODUCTION

Opportunity management (OM) has been defined as a process to identify business and community development opportunities that could be implemented to sustain or improve the local economy. Opportunity management is a collaborative approach for economic and business development. The process focuses on touchable outcomes. Opportunity management may result in interesting and motivating projects that help improve teamwork.

11.2 TWO COMPONENTS

The two components which come under opportunity management -

1. Generating ideas
2. Recognizing and driving opportunities

11.3 GENERATING IDEAS

Each time new technologies and equipment for oil and gas exploration appear, such innovative ideas and prototypes must undergo a long conversion process to become suitable products for industrial use. The problem with field-testing new technologies is particularly critical in this industry—to obtain access to a well, the technology should already demonstrate its efficiency and reliability, but it is impossible to do this without field-testing. Small innovation companies along with big oil field service enterprises and equipment manufacturers each face this problem. Start-ups with outstanding teams, investments, and technologies that have only passed laboratory testing can sometimes be delayed in their development while searching for an oil producing company ready to take a risk and be the first to implement a new technology.

11.4 RECOGNIZING AND DRIVING OPPORTUNITIES

1. Understand the business impact
This sounds obvious, but too many companies start new technology projects or pilots without thinking in detail about how the business will use the results. Just providing the technology however well it works is not enough to deliver the change and desired business impact.

2. Build multi-disciplinary teams
Successful digital projects require multi-disciplined teams with both IT and oil and gas domain knowledge. Data scientists and other IT experts can work to mine the data for potential insights, but functional engineering expertise is needed to analyze and validate those insights and identify the right action that needs to be taken in order to generate real business value.

3. Expect data problems
Poor quality and unstructured data is a fact of life in the oil and gas industry. Great progress has been made in some areas in recent years, but we still have a lot of poor quality data. Digital pilots can highlight or priorities areas for data clean-up, or digital activities can be focused initially on areas where data quality is high.

4. Develop a strategy

Think about the long-terms goals of the organization and develop a digital strategy to complement and support those goals. A digital strategy is not built by asking everyone what should be digitized and prioritizing the associated list. Employees will have some great ideas, and these need to be harvested, but don't mistake good ideas for a proper strategy. A strategy does not have to be highly detailed, and it will need to be flexible and evolve as a company progresses on its digital journey but, having that high-level target of what the company is trying to achieve provides a framework against which new ideas and pilot results can be evaluated and prioritized.

5. it's a journey

Transformation will not happen overnight. There is no doubting the potential of new technologies to transform, but the journey will take time. Businesses should look to take small, smart steps to encourage innovation, and at the same time, balance that with an over-arching strategy that allows innovation results to be clearly evaluated, prioritized and harvested.

11.5 SOFTWARE

1. **GoldMine**

   It is a Customer Relationship Management software package for small businesses worldwide. It's a Windows program that manages client and prospect contact details as well as interactions with these contacts, such as calls made to and by the contact, emails sent and received, and sales forecasts.

2. **Microsoft Dynamics CRM**

   Microsoft Dynamics CRM provide solutions for businesses to achieve more and deliver amazing experiences to their customers across marketing, sales and service in a way that makes collaboration between roles natural and easy.

3. **Sugar CRM**

   Sugar CRM helps in improving customer relationships. It is a Saas (software as a service) product. Sugar provides both mobile and social CRM to its consumers. Sugar provides crm software in four editions: Sugar Enterprise, Sugar Professional, Sugar Ultimate and Sugar Corporate.

12. RECOMMENDATIONS AND CONCLUSIONS

12.1 CONCLUSION

The oil and gas industry employs people in a very wide variety of job roles, both offshore and onshore, in all sorts of specialisms and professions. People can be employed in jobs as different as drilling to find oil under the North Sea, to negotiating and implementing legal agreements for the development of oil and gas fields. In managing such a diverse range of staff, appropriate management styles are vital to ensure safety and best solutions.

As the industry is blooming in many parts of the world it will face many problems too. There is vast field of opportunity in this area. Therefore it requires proper management of all the data and proper guidance. Maintenance is key. I hope this report provides an insight on how the oil and gas industry operates. There are number of ways as we have seen, to maintain all the data present so there are number of software too which can be used to maintain everything.

12.2 RECOMMENDATION

The risk of workplace injury or illness or disorder varies both across and within occupation and industry, and workers' exposure to such risks varies across the course of their lives. Therefore, analyses that attempt to explain life course health outcomes or that use health characteristics as variables to help explain major life course transitions such as retirement should have good information on these health and safety risks.

Maintenance of equipment should be their priority because not only it can harm people around them if there is any damage or in case of an accident but it can cause a loss in elements and damage to the nature too.

13. APPENDICES

Theoretical calculation methods are used to determine how the well completion estimated production is calculated.

Features

The following TCMs are available:

- **Average Test**

For example:

If there are three well tests existing as shown below for the production allocation on 6/30/2010:

Date	**Well Test Data**
5/15/2010	100 barrels (BBLs)
6/15/2010	75 BBLs
6/30/2010	125 BBLs

Each of these test are run for 12 hours. A well completion is down for 24 hours on 6/1/2010 and 6/2/2010 and 12 hours on 6/14/2010.

If the allocation frequency is monthly and the production date is 6/30/2010, then the estimated production of well completion is calculated as follows:

- Total hours for the month = 30 * 24 = 720 hours
- Total downtime hours for the month = 24 + 24 + 12 = 60 hours
- Total uptime hours for the month = 720 - 60 = 660 hours

If the number of tests specified is 3, then the well tests on 5/15/2010, 6/15/2010 and 6/30/2010 are chosen. Since all the well tests are performed for 12 hours, an average is taken.

- For 12 hours = (100 + 75 + 125) / 3 = 100 BBL
- For 660 hour = (100 / 12) * 660 = 5500 BBL

So the estimated production of the well completion on 6/30/2010 is 5500 BBLs.

- **Latest Test**

For the example mentioned in the average test, if the allocation frequency is monthly and the production date is 6/30/2010, then the estimated production of the well completion is calculated as follows:

- Total hours for the month = 30 * 24 = 720 hours
- Total downtime hours for the month = 24 + 24 + 12 = 60 hours
- Total uptime hours for the month = 720 - 60 = 660 hours
- For the latest test, the test done on 6/30/2010 is chosen

- For 12 hours = 125 BBL
- For 660 hours = (125 / 12) * 660 = 6875 BBL

So the estimated production of the well completion on 6/30/2010 is 6875 BBLs.

- **Weighted Average Test**

For the example mentioned in the average test, if the allocation frequency is monthly and production date is 6/30/2010 and the TCM selected is weighted average test, then the estimated production of well completion is calculated as follows:

- The days of the month is split based on the well test dates. There are 3 well tests on 5/15/2010, 6/15/2010 and 6/30/2010.
- Well test 5/15/2010 is valid for date range 6/1/2010 to 6/14/2010 = 14 days = 14 * 24 = 336 hours
- Well test 6/15 is valid for date range 6/15/2010 to 6/29/2010 = 14 days = 14 * 24 = 336 hours
- Well test 6/30 is valid for date 6/30/2010 = 1 day = 24 hours

Considering downtimes as 24 + 24 + 12 = 60 hours, since it is between the first date range 6/1/2010 to 6/14/2010:

- Total uptime hours for date range 6/1/2010 to 6/14/2010 = 336 - 60 = 276 hours
- Total uptime hours for date range 6/15/2010 to 6/29/2010 = 336 hours
- Total uptime hours for date range 6/1/2010 to 6/14/2010 = 24 hours
- For 12 hours = 100 BBL
- For 276 hours = (100 / 12) * 276 = 2300 BBL
- For 12 hours = 75 BBL For 336 hours = (75 / 12) * 336 = 2100 BBL
- For 12 hours = 125 BBL
- For 24 hours = (125 / 12) * 24 = 250 BBL

So the total estimated production for the well completion is 2300 + 2100 + 250 = 4650 BBLs.

- **Average for the Month**

For the example mentioned in the average test, if the allocation frequency is monthly and production date is 6/30/2010 and the TCM selected is average for the month, then the estimated production of well completion is calculated as follows:

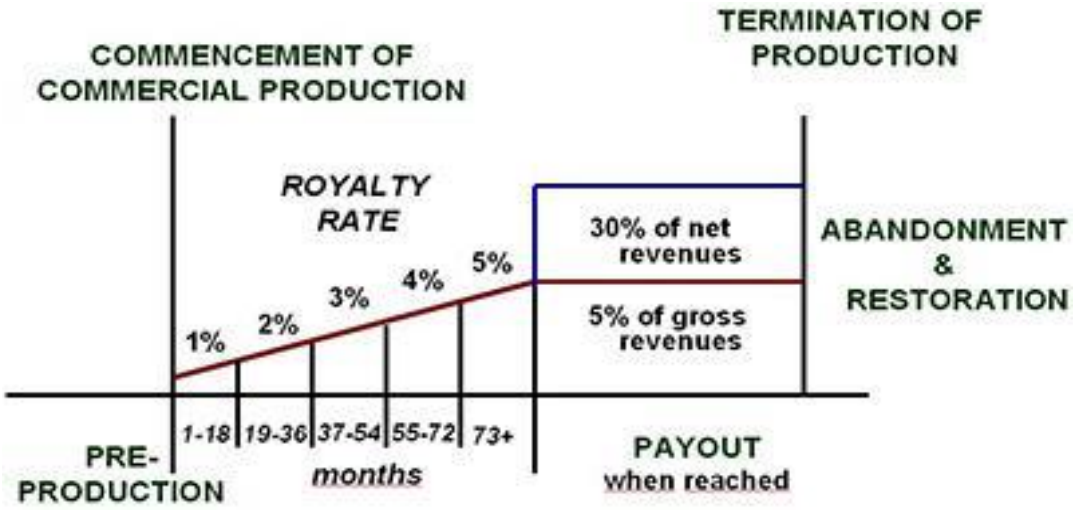
- Total hours for the month = 30 * 24 = 720 hours
- Total downtime hours for the month = 24 + 24 + 12 = 60 hours
- Total uptime hours for the month = 720 - 60 = 660 hours

Considering all the well tests for the month, the well tests on 6/15/2010 and 6/30/2010 are chosen. Since all the well tests are performed for 12 hours, an average is taken:

- For 12 hours = (75 + 125) / 2 = 100 BBL
- For 660 hours = (100 / 12) * 660 = 5500 BBL

So the estimated production of the well completion for the month 6/30/2010 is 5500 BBLs

A royalty calculation figure:



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15. GLOSSARY

- Venture - A risky or daring journey or undertaking.
- GIS - Geographic information system
- Tenure - The conditions under which a land or buildings are held or occupied
- Tract - A large area of land
- Lease - A place you use for a period of time and paying for it
- Liaison - Mediator who makes a relationship between the people and organization
- Acquisitions - An asset or object bought or obtained.
- Divestiture - Process of selling off subsidiary business interests or investments
- Obligations - A contract or agreement/ legal bond
- Allocation - An amount of resource assigned to a particular recipient
- Recipient - A person or thing that receives
- Hierarchy - A system
- Allocate - Distribute resources or duties for a particular purpose
- Seismic - Relating to earthquakes or other vibrations of the earth and its crust
- Refraction - The change in direction of propagation of waves
- Tomography - A technique for displaying a representation of a cross section through a solid object using X-rays or ultra sound
- Downtime - Time during which a machine, especially a computer, is out of action or unavailable for use
- Uptime - Time during which a machine, especially a computer, is in operation
- Resonance - The reinforcement or prolongation of sound by reflection from a surface or by the synchronous vibration of a neighboring object.