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AN EVALUATION OF ACCOUNTING INFORMATION SYSTEM AND DEVELOPMENT OF FINANCIAL QUATERLY REPORT (FQR) REPORTING PROCESS

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ABSTRACT

This study aims to evaluate the results of the implementation of an Accounting Information System (AIS) which has been implemented by a consulting firm, focusing on the reporting processes at a Joint Venture company named Blue Water. Blue Water is an oil and gas exploration company. The evaluation method used is a Fit/Gap Analysis. The evaluation is only performed for the exploration and development stage of petroleum operations. From the results of the Fit/Gap Analysis, a gap in meeting the reporting requirements of the Indonesian Host Government (HG) was identified. Specifically, the HG requires that oil and gas contracting companies submit FQR to the Special Taskforce for Upstream Oil and Gas Business Activities, named SKK Migas. To overcome this gap, the author has constructed a business intelligence platform which extracts information from the AIS into a data model and enables reporting in the format required by the FQR. The data model also includes information which is outside the AIS. The data model is updated automatically with real-time information; it uses a powerful formula language for the analytics and uses the familiar user interface of Microsoft Excel.

Keywords: *Accounting Information Systems (AIS), Financial Quarterly Report, Fit/Gap Analysis, Business Intelligence*

INTRODUCTION

In this era of globalization, information has become a necessity to support company performance. Accounting Information System (AIS) is used by companies to provide good control within the company. The AIS is one of the most important parts of all information required by management (Muda et al., 2017). The information in the AIS is used by management to make decisions. The implementation of an AIS can support all company activities, especially in supporting decision making, maintaining internal control, and planning and budgeting activities. If the internal control of company is good, the company can issue accurate financial reports. Moreover, the budget information stored by the information system and used in reports is designed to compare budget amounts with actual amounts. Budgeting is an important component in management within a company. In preparing a budget, a plan is needed so that the funds spent are done so in accordance with the approved needs and do not deviate from authorized plans.

The oil and gas industry has some key differences from other industries. Ikatan Akuntan Indonesia (2007) and Wright (2017) stated that the oil and gas industry has a high level of risk, a long-time span before a return on investment is received, a high level of regulation, complex tax rules, and specialized financial accounting rules. The search for oil and gas during the exploration stage carries high risk and uncertainty, because even if exploration is carefully prepared at great expense, there is no guarantee that the activity will result in the discovery of commercial quantities of hydrocarbon reserves. With these characteristics, investors generally collaborate with other parties and participate using an agreement in the form of a Joint Operating Agreement (JOA). This agreement is used by two or more

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oil and gas companies when seeking oil reserves and managing oil and gas in a government licensed working area.

The Joint Venture (JV) structure is generally used in the oil and gas industry. A JV is a collaboration of several parties to organize a joint business for a certain period of time. The government has a contractual agreement with one of the parties in the JV. This party is referred to as a contractor. In Indonesia, the contractual agreement is usually called a Production Sharing Contract (PSC). The PSC provides that the cost of a project can be reimbursed by the government from the oil and gas reserves discovered and produced. If no oil and gas reserves are produced, there is no reimbursement to the contractor. Under this PSC, the Indonesian Host Government which is represented by SKK Migas must ensure adequate cost control by comparing the actual cost incurred against the approved budget. This approved budget is known as the Work Program and Budget (WP&B). Major projects within the WP&B must be approved by the JV partners in using an Authorization for Expenditure (AFE). This AFE states that every expense has been approved and is incurred in accordance with the plan. Supervision of these costs is monitored through the Financial Quarterly Report (FQR). The FQR must be reported to SKK Migas by the JV on a quarterly basis.

In this case study, there is an AIS that has been implemented by a consulting firm on behalf of the client company. The client company is the Operator of the JV. The AIS program is called OGSQL, developed by Oil & Gas Information Systems, Inc. (also known as OGSys) from the United States. OGSQL is a core accounting system designed to meet the specific and unique needs of companies in the upstream oil and gas industry. The business requirement for reporting the FQR and submitting to SKK Migas has not been fully met by the OGSQL system. Previously, this requirement was fulfilled manually via an Excel Spreadsheet without a computerized accounting system. The accounting system must meet the needs of stakeholders, including reports and billings to partners and reports to the government. SKK Migas has set a reporting standard listed in the Work Procedure Guidelines number 63 of 2017 regarding the Financial Budget and Reporting Manual of Production Sharing Contracts and Chart of Accounts. One of the items in the Work Procedure Guidelines includes account classification in the FQR Chart of Account (COA) into the major categories of Asset, Liability, Equity, Revenue, and Expenses.

When reporting the FQR manually, several inefficiencies have been identified, such as classification inconsistency because actual and budget amount come from two different divisions, specifically the accounting and budgeting sections. Additionally, there were delays in submitting the FQR report. Preparing the report manually certainly takes longer. For example, to get a combination of the revised AFE budget and the original AFE budget, the original budget had to be compiled and revised separately, then it had to be combined with the revised budget. In addition, the manual process requires double checking to ensure the correctness of the numbers, which certainly takes longer.

As outlined above, this case study has two main objectives. First, evaluating the results of the OGSQL system in terms of meeting the business requirements using the Fit/Gap Analysis method. This is to ensure conformity with regards to meeting internal management reporting, partner reporting, and host government reporting requirements. Second, developing a process for meeting the FQR report requirements using Business Intelligence alternative tools in the form of additional programs, such as SQL Query, Power Query, Power Pivot, and Data Analysis Expressions (DAX) in combination with the database of the OGSQL system.

Oil and Gas Industry

In the oil and gas industry, there are 2 sectors, namely: Upstream and downstream. The upstream sector includes exploration, development, and production activities. Meanwhile, the downstream sector includes processing in oil refinery, transportation, marketing, and distribution (PwC, 2019). According to Wright (2017), the stages of upstream sector activities consist of:

1. Conduct geological, geophysical, and seismic surveys to find hydrocarbons to prove oil and gas reserves found.
2. Well drilling activities. In general, the largest cost in upstream activities is at the drilling stage. The drilling activities are divided into two types: Exploratory drilling, which aims to determine

the presence of hydrocarbon reserves and appraisal drilling, which determines whether the reserves are economically feasible to develop.

3. Oil and gas development, which is an activity performed in developing proven reserves of oil and gas that are ready to produce economically. At this stage, well drilling is called development drilling.
4. Production, which is an activity in lifting oil and gas to the surface of the earth from proven reserves and transporting it to a collecting station.

SKK Migas (2015) identifies costs associated with the upstream activities stage. These costs are included in the Work Procedure Guidelines number 59 of 2015 regarding the Accounting Policies in Cooperation Contracts for Upstream Oil and Gas Business Activities.

These costs can be detailed as follows:

1. The Geological and Geophysical (G&G) costs are the costs for conducting geological, survey, topographic, seismic, geographic, and geophysical studies including labour wages and other expenses related to the study.
2. Costs related to exploratory, appraisal, and development drilling. The costs that occur during drilling activities consist of 2 categories, namely: Tangible drilling cost and intangible drilling cost. Tangible drilling cost include casing and tubing, surface and subsurface well equipment and so on. Meanwhile, the intangible drilling cost include: (1) Preparation and termination, such as survey, foundation preparation, site access, rig installation and removal, and communication network; (2) Drilling operations, such as rig contracts, rig workers, chemical purchases, mud, drilling bits, equipment rental, and diving services for offshore activities; (3) Formation evaluation, such as mud logging services to evaluate mud fluid taken from wells to analyse geological formations and determine the presence of oil and gas reserves; (4) Settlement, includes costs related to well completion; (5) In the case of wells, development activity includes costs for casing liner and tubing installation, cementing, pump fees, and wireline services including perforation and well as production tests; (6) General costs, such as insurance, permits, transportation costs, charter of ships and other marine equipment for offshore, fuel, lubricants, camp facilities, and others.

Joint Operating Agreement (JOA)

According to AIPN (2012), the JOA is one of the key agreements used in the oil and gas industry. The costs and risks involved in these projects are usually too high for any company to bear alone, so it is common for oil and gas companies to join forces with other companies through a joint venture. Pereira (2017) stated that the parties in the JOA are generally referred to as partners and can be classified as: (1) Operator, is the partner who has control over all operations as defined in the JOA; (2) Non-operator, who is a partner who agrees to share the risk with the operator to do those activities which have been mutually agreed upon in the JOA.

Association International Petroleum Negotiators (AIPN) has a standard agreement which is recommended to be followed by the parties involved as partners in the JOA. This uniform JOA discusses the fundamental concerns in the agreement such as the term of the agreement, the parties involved in the agreement, the percentage of participation in the JV (called Working Interest or Participating Interest), procedures for appointing the operator, cost control methods such as the need for a WP&B, and so on. The JV operating costs are usually controlled through mechanisms such as the WP&B and AFEs. The WP&B is submitted by the operator and approved by the host government and non-operator(s). All financial controls are exercised through agreed accounting procedures. Generally, these accounting procedures are covered in the Accounting Procedure section of the JOA. The accounting procedure is very detailed and clear to avoid confusion or misunderstandings which may result in conflict between partners.

The most important things in the accounting procedure have been covered in AIPN (2012), specifically:

1. There is accounting record called Joint Account which is managed by the operator, usually maintained in US Dollar currency and other currencies as required by the host government.

2. Joint Interest Billing (JIB) is a mechanism to collect JV activity costs from non-operators according to their Working Interest. In the JIB, operators must record expenses correctly and calculate the amount of costs that can be charged to non-operators based on the working interest that has been agreed in the JOA.
3. Advance requests or cash calls. Based on the approved WP&B, the operator has the right to ask each partner (non-operator) to meet the funding requirements for the following month's operation. Each request for funds, called a cash call, is expected to be sufficient to meet the costs required to run the approved WP&B. This cash call is recorded in the operator's Accounts Receivable. In exploration and development stages, Accounts Receivable only relates to receivables to support operations, not receivables from sales of oil or gas.
4. Non-operators have the right to audit the Joint Account and other operator records for each calendar year typically after giving the operator 60 days written notice prior to the audit.

Production Sharing Contract (PSC)

The Indonesian host government represented by SKK Migas must ensure that the contractors can control the costs. One way of controlling costs is to compare actual costs with an approved budget called the WP&B. An additional control within the WP&B is a budgeting tool called an AFE. This is a detailed budget at the project level. For example, the AFE is approved by the JV Partners before a well can be drilled. The AFE budget includes a timeline to track progress during the life of the project. An additional management control process includes Technical Committee Meetings (TCM) which are held to make key decisions. These are carefully recorded in the meeting minutes to document key decisions. SKK Migas monitors these costs through the use of these tools and the FQR. The FQR report guidelines are covered in the Work Procedure Guidelines number 63 of 2017 regarding the Financial Budget and Reporting Manual of Production Sharing Contracts and Chart of Accounts.

The PSC is a contractual agreement made between an oil and gas company (contractor) to conduct oil and gas exploration and exploitation within an authorized working area in accordance with the rules of the agreement (Yuniza et al., 2020; Ogunleye, 2015). According to SKK Migas (2017), things that need to be considered in implementing the AIS are listed in the Work Procedure Guidelines number 63 of 2017, which includes:

1. Budget amounts that are inputted into the AIS because the demand for reports of actual costs as compared with the budget is needed.
2. The currency used is US Dollar, reported in thousands, except for certain attachments, the FQR must be in USD.
3. In the FQR COA, there is an order for cost classifications including: Cash in Bank and Accounts Receivable, Other Current Receivable, Work in Progress (WIP), Liabilities, Equity, Revenue, Operating Expenses, and Taxation. For the exploration and development drilling stages, the WIP account is an account of the accumulated operating costs of an ongoing drilling activity.
4. The FQR also requires reporting volumes of oil or gas produced. For this study, volumes will not be discussed because the scope of discussion is only for exploration and development activities where production has not yet started. However, a full system implementation would consider the ability of the software to present reports in production volume.

Internal Control

An internal control evaluation involves an examination of the effectiveness of the company's system of internal control. A robust system of internal control can reduce the risk of fraudulent activity. Internal control is a process effected by the board of directors, management and other entities, which aims to provide reasonable assurance regarding the achievement of objectives in the effectiveness and efficiency of company operations, reliability of financial reporting and compliance with applicable laws and regulations (Johnstone et al., 2016; Nurdin et al., 2019; Palungan et al., 2015). In particular, internal control is an important factor to ensure the quality of accounting information (Cheng, 2018).

According to Johnstone et al. (2016), the main elements of the system of internal control include the control environment, risk assessment, control activities, information and communication, and monitoring. The control environment is critical to other components because it sets the culture for an

organization, upon which all other activities are based (Lansiluoto et al., 2016). This component includes the organizational structure and the appropriate responsibilities in achieving the goals set by management. The control activities include the segregation of duties and control of information technology related to user access. Risk assessment is a process for identifying and assessing the risks that may limit the achievement of organization objectives. Information and communication systems capture and exchange information needed to manage and control the operational activities of the organization. In the monitoring component, the entire process must be monitored and modifications made as necessary so that the system can change accordingly.

Concept of Business Intelligence

A Business Intelligence (BI) system can play a critical role in an organization to support decision making and improve organizational performance. BI is a process to improve a company's competitive advantage by utilizing a variety of data, information and knowledge owned by the company as raw material in the decision-making process (Gowthami and Kumar, 2017; Miranda, 2018; Visinescu et al., 2016). Additionally, Self-Service Business Intelligence (SSBI) is an approach where users independently develop BI solutions to meet specific (not enterprise wide) report or analysis objectives. Aplar and Schulz (2016) stated that SSBI should empower business users to perform custom analytics and to derive actionable information from large amounts of multifaceted data without having to involve BI or IT specialists. In particular, the business users can accomplish their tasks with SSBI more easily and quickly than before.

METHODS

The system evaluation method proposed in this study is the Fit/Gap Analysis. Before using the Fit/Gap Analysis, an internal control evaluation is carried out related to Accounts Payable, JIB, Accounts Receivable, WP&B, AFE, and General Ledger modules to ensure that the reports generated from those process are based on suitable internal control. Reports generated related to internal management reporting, partner reporting, and host government reporting are also evaluated using the Fit/Gap Analysis. Evaluations using this method will identify system components that are a good fit, partial fit, or a gap. If the gap is found, a recommendation must be made, so that a work-around for the gap can be developed and therefore meet the existing user requirement.

The first step in this study is to conduct interviews with experts to identify user requirements and the current system business processes. The knowledge experts in this study are the implementation consultants who have implemented and operated OGSQL system for many years. In other studies, the knowledge experts may be from the operating company. From the user requirements, a priority ranking will be carried out by giving a rank of High (H), Medium (M), and Low (L) values. The next step is to determine the degree of fit between the AIS business process and user requirements to show whether the OGSQL system business processes is a good fit, partial fit, or gap.

ANALYSIS

In this case, there are two companies which join in a joint venture. In the joint venture, there are partners or investors who are categorized as operator and non-operator. The operator is Blue Water, and the non-operator is Green Energy. Each partner has a working interest which is a percentage for the sharing of operating costs. The controlling agreement between partners is called the JOA (Joint Operating Agreement). The controlling agreement between the partners and the government is called the PSC (Production Sharing Agreement). Figure 1 shows the structure of JV and its relationship with the government involved in this case.

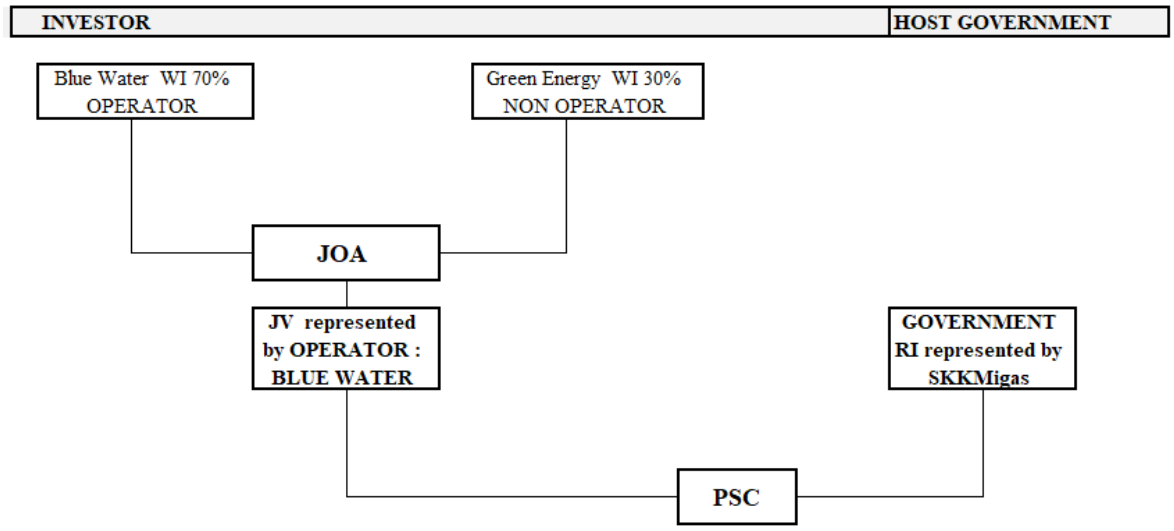


Figure 1. The structure of JV and relations with government

Based on the proposed method, this present study will be divided into three stages of processing:

1. Stage 1:
   Evaluating internal control. According to Neogy (2014), accounting system is an integral part of the internal control structure of an organization. Table 1 shows the four components of internal control that are fulfilled in JV Blue Water:

Table 1 Internal Control

Internal Control Component	Description
Control Environment	The organization structure chart serves to describe duties and responsibilities clearly, and this has been well structured in the JV. The organizational structure used in this case is a Finance Department in JV Blue Water which is led by a Finance Manager who is responsible for providing direction and approval of the performance of the Finance Department.
Control Activities	There is a segregation of duties. Examples of the segregation of duties in the Accounts Payable business process are: a. The Account Payable Analyst records purchases of goods or services in a payable journal. b. The General Accounting Supervisor approves transactions from accounting staff and confirmation is received from the User Department. In this case, User Department is responsible for exploration, subsurface (G&G) and Project Manager activities.
	There is control over access to the system. In the current system, the Finance Manager acts as the party which applies restrictions on access or functions as a System Supervisor. For example, Account Payable Analysts have access to Accounts Payable Processing except for Posting Accounts Payable Invoices, because the Final Post process must be separated from those who give approval, namely the General Accounting Supervisor.
Information and Communication	With internal control over the database in JV Blue Water, reports are generated from valid transactions in each period. Indirect communication with the Partner will be conveyed by JV through official media, such as letters or e-mails. When there is important information which requires direct communication, an Operating Committee (OPCOM) meeting will be held with the Partner.

	Routinely, the General Manager and the JV management will convey information regarding the direction of planning and the progress of its implementation through internal meetings with all departments.
Monitoring Activities	The budget is a cost control tool used to authorize and measure the actual activities of the JV. Furthermore, auditors from the stakeholders (non-operator and SKK Migas) conduct periodic audits to ensure that the activities and costs are done in accordance with the JOA and PSC.

Source: Author

Evaluation of Accounting Information System and Development of Financial Quarterly Report (FQR) Reporting Process

2. Stage 2:
   Evaluating the report generated from the modules using Fit/Gap Analysis. Fit indicates that the business processes in the system are in accordance with existing user requirements. While the gap indicates that the business processes in the system are not in accordance with existing user requirements.

Table 2 Fit/Gap Analysis

Process	Rank of Require-ment	Degree of Fit					
		Fit		Partial Fit		Gap	
		Total Require-ment	%	Total Require-ment	%	Total Require-ment	%
Internal Management Reporting							
General Ledger detail	H	1	5.56%	-	0%	-	0%
Trial balance	H	1	5.56%	-	0%	-	0%
Voucher Audit	H	1	5.56%	-	0%	-	0%
Financial Report	H	1	5.56%	-	0%	-	0%
Property Sub Ledger	H	1	5.55%	-	0%	-	0%
Property Report	H	1	5.55%	-	0%	-	0%
Accounts Payable detail	H	1	5.55%	-	0%	-	0%
Cash Requirement Report	H	1	5.55%	-	0%	-	0%
Excel Report	M	1	5.55%	-	0%	-	0%
Aged Accounts Receivable listing	H	1	5.55%	-	0%	-	0%
Accounts Receivable Delinquency Analysis	H	1	5.55%	-	0%	-	0%
Gross and Net	H	1	5.55%	-	0%	-	0%
Partner Reporting							

Final Posting Cash Call	H	1	5.56%	-	0%	-	0%
JIB Prelist and JIB Print	H	1	5.56%	-	0%	-	0%
Advance Close Out	H	1	5.56%	-	0%	-	0%
Host Government Reporting							
Report the budget amount which can be AFE budget or WP&B	H	1	5.56%	-	0%	-	0%
Financial Quarterly Report	H	-	0%	-	0%	1	5.56%
Report the volume in barrels for crude oil	H	1	5.56%	-	0%	-	0%
Total		17	94.44%	0	0%	1	5.56%

Source: Author

The above table shows that from the results of the Fit/Gap Analysis, the OGSQL system has met the user requirements in the categories of internal management reporting and partner reporting. There is one requirement related to host government reporting which shows the degree of fit at the gap level because the current system does not support the business process. For the calculation results obtained, the fit level is 94.44%, partial fit is 0%, and the gap is 5.56%. Even though the percentage at the gap level is smaller, it is very important because it is relates to the JV's responsibility to report FQRs to the government. This requirement is a necessary business process, so it has a high impact on the company. Recommendations should be made to address the identified gap because the analysis indicates that the OGSQL system does not meet this business process need and therefore requires an alternative solution to fulfil the business requirement.

3. Stage 3:
   In the previous Fit/Gap Analysis results, it has been identified that there is a gap regarding host government reporting of the FQR. In order to overcome this gap, a recommendation is made in the form of the system process design below.

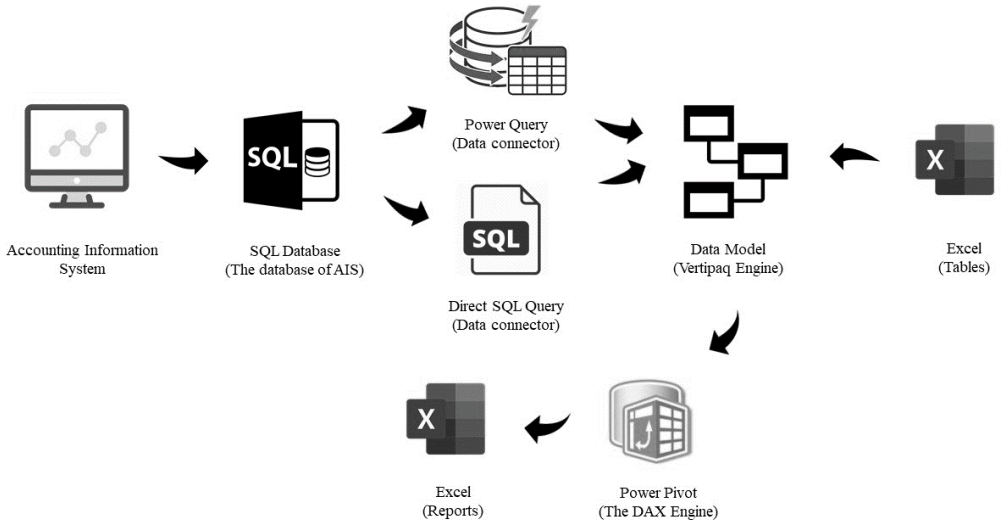


Figure 2 The system mechanism for the proposed recommendation

To create the FQR, several alternative tools were used. These tools use Microsoft Excel as a front-end. The primary tool is the Power Pivot add-in for Microsoft Excel. Power Pivot creates a local instance of SQL Server Analysis Services (SSAS) Tabular which is embedded in the Microsoft Excel workbook. With this, a relational data model was built from the OGSQL system database. The data model consists of fact tables and dimension tables which are then related to one another. The fact table contain the transaction or quantitative data related to the business or process. For example, the AFE_Budget table contains measurable aspects of the AFE budget, such as the AFE original and revised budgets in gross and net values. Meanwhile, the dimension tables are lookup tables containing qualitative data and attributes about the event. For example, the Date table can show when a transaction occurred and it is possible to roll up the data to the month, quarter, or year level (Allington, 2015; Clark, 2020).

The Power Pivot data model can connect to numerous data sources in multiple ways. In this study, two methods are used, namely Power Query and direct SQL Queries. These query tools allow the selected data to be *extracted* from the Accounting Information System, *transformed* into a format suitable for analytics and reporting, and then *loaded* into the SSAS/Power Pivot data model. In the business intelligence context, this process is known as 'ETL' for Extract, Transform and Load. From the Power Pivot data model, DAX is used to analyze and report the information needed for the business solution. DAX is not a programming language. Rather it is a formula language designed to organize, analyze, and understand data for analytical and reporting purposes.

Using the method described above, the author has constructed a self-service business intelligence platform which is automatically updated with real time information, uses a powerful formula language for the analytics and which has the familiar user interface of Microsoft Excel.

The steps for creating an FQR using the proposed recommendation are:

1. Determine the data model
   In this step, the tables that the user wants to input into the data model must be categorized. The data model is a collection of tables that are interconnected through relationships. The data is extracted from the SQL database using SQL Query. The table can be sourced from Power Query or SQL Query right into Power Pivot. One table named GL_Balance is extracted using Power Query because this table must be unpivoted in order to get the amounts into a single column. This makes it easier to write DAX measures against this table. Afterwards, the data is loaded into the data model from either SQL Query or Power Query. These queries 'shape' the data into a format which makes it easier to write the DAX measures. Table 3 shows a detail of the table categories that have been inputted into the data model. It should be emphasized that the data may be extracted with either Power Query or SQL Query, the method depends on user preference.

Table 3 Table categories in the data model

Table Name	Sources		Description
	Power Query	SQL Query	
Company	-	√	The company table is a dimension table that lists the JV code and JV name.
Account	-	√	The account table is a dimension table which is related to the detail of the account in the OGSQL system.
Currency	-	√	The currency table is a dimension table that contains currency data used in the OGSQL system.
Vendor	-	√	The vendor table is a dimension table that contains the seller data of services or goods to support oil and gas activities.
Well	-	√	The well table is the dimension table that contains the cost center collection data for the department.
AFE	-	√	The AFE table is a dimension table that contains several wells or cost centers.
Owner	-	√	The table owner is a dimension table that contains several partner – operators and partner – non operators.
GLD_USD	-	√	The GLD_USD table is a fact table that contains the detailed general ledger in USD currency.
GL_Balance	√	-	The GL_Balance table is a fact table that contains the account balance at the end of each period which is stated in USD. This table is extracted using Power Query because it has to be unpivoted to get the amounts into one column. Unpivot is to turn a column into a row.
AFE_Balance	-	√	The AFE_Balance table is a fact table that contains the actual balance.
AFE_Budget	-	√	The AFE_Budget table is a fact table that contains the AFE Budget by project after AFE is approved by SKK Migas and inputted into the General Ledger module.

2. Create a Calendar table
   In this step, the user is required to perform time intelligence calculations and will automatically use the Date Table function. This table has calculated columns which then group the dates by periods such as by month, quarter and year. The purpose is to be able to easily report values for various reporting periods. The Date Table property used must be complete from the earliest date to the end date recorded in the database. Otherwise, time intelligence will not work. In this case, the author uses dates from 1st of January to 31st of December 2019.
3. Create tables that come from outside the OGSQL system database
   Some data may need to come from outside the OGSQL Server database. The source may be Microsoft Access, Oracle, Excel File, and many other sources. However, in this case the author took the data from an Excel File. In the data model, the Account1 and AFENotes tables have been retrieved from the Excel File. The Account1 table comes from the COA classified according to the provisions of SKK Migas. Meanwhile, the AFENotes table contains information which exists outside the OGSQL system, such as budget approval date, percentage of project completion, completion date and so on. The table is prepared in an Excel Spreadsheet which will be inputted into the data model.
4. Create relationships between tables in the data model
   In this step, one-to-many relationships between tables are created. The tables and their relationships may be viewed in a diagram view. In general, the 'one' side of the relationship

will be the dimension table, such as Company, Account and Vendor. The 'many' side of the relationship will be the fact or data table, such as AFE_Balance and AFE_Budget.

5. Write the DAX measures

DAX is the Power Pivot formula language used to create calculated columns and measures in the Power Pivot model (Clark, 2014; Collie and Singh, 2016). For the needs of quarterly report, the author uses several DAX measures that can support the FQR preparation process. These measures include:

a. General Ledger Detail Quarter to Date Gross Value

This formula is used to calculate the sum of the actual gross value of AFE in USD currency which is shown in the GLD_USD table. The time intelligence of DATESQTD function is used to return the value in a table that contains the date column for the specified quarter.

Formula:

```
=CALCULATE
    ([GLD_Sum_GrossValue]; DATESQTD ('Calendar'[Date]))
```

b. AFE Budget Running Total Original

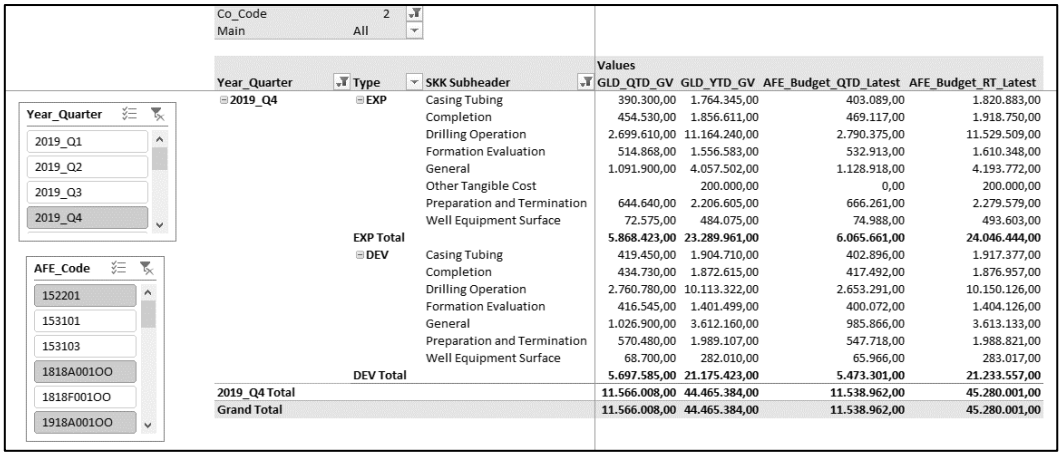
This formula is used to sum all the original budget amounts to the maximum date in Power Pivot to give the total budget up to that date. The ALL function is used to return the value for all table rows. This formula also applies to the revised budget. Running total is not required for AFE actual because the table stores the balance at the end of each month.

Formula:

```
=VAR MaxDate = MAX ('Calendar'[Date])
  VAR Result =
    CALCULATE(
      [AFE_Budget_GV_Orig] ;
      'Calendar'[Date] <= MaxDate;
      ALL ('Calendar')
    )
  RETURN
    Result
```

6. Creating a Pivot Table to summarize the report data addressed to SKK Migas

Figure 3 shows that in the General Ledger Detail Pivot Table, there is a Year Quarter slicer which is useful for filtering quarter year and AFE_Code slicer which is useful for filtering selected AFE.



Co_Code	2						
Main	All						
			Values				
Year_Quarter	Type	SKK Subheader	GLD_QTD_GV	GLD_YTD_GV	AFE_Budget_QTD_Latest	AFE_Budget_RT_Latest	
2019_Q4	EXP	Casing Tubing	390.300,00	1.764.345,00	403.089,00	1.820.883,00	
		Completion	454.530,00	1.856.611,00	469.117,00	1.918.750,00	
		Drilling Operation	2.699.610,00	11.164.240,00	2.790.375,00	11.529.509,00	
		Formation Evaluation	514.868,00	1.556.583,00	532.913,00	1.610.348,00	
		General	1.091.900,00	4.057.502,00	1.128.918,00	4.193.772,00	
		Other Tangible Cost		200.000,00	0,00	200.000,00	
		Preparation and Termination	644.640,00	2.206.605,00	666.261,00	2.279.579,00	
		Well Equipment Surface	72.575,00	484.075,00	74.988,00	493.603,00	
	EXP Total		**5.868.423,00**	**23.289.961,00**	**6.065.661,00**	**24.046.444,00**	
	DEV	Casing Tubing	419.450,00	1.904.710,00	402.896,00	1.917.377,00	
		Completion	434.730,00	1.872.615,00	417.492,00	1.876.957,00	
		Drilling Operation	2.760.780,00	10.113.322,00	2.653.291,00	10.150.126,00	
		Formation Evaluation	416.545,00	1.401.499,00	400.072,00	1.404.126,00	
		General	1.026.900,00	3.612.160,00	985.866,00	3.613.133,00	
		Preparation and Termination	570.480,00	1.989.107,00	547.718,00	1.988.821,00	
		Well Equipment Surface	68.700,00	282.010,00	65.966,00	283.017,00	
	DEV Total		**5.697.585,00**	**21.175.423,00**	**5.473.301,00**	**21.233.557,00**	
2019_Q4 Total			**11.566.008,00**	**44.465.384,00**	**11.538.962,00**	**45.280.001,00**	
Grand Total			**11.566.008,00**	**44.465.384,00**	**11.538.962,00**	**45.280.001,00**	

Figure 3. Pivot Table - General Ledger Detail

A report has been prepared based on 3 AFE projects, namely:

1. AFE 152201, AFE Exploration well, Bumi South #1 Drilling

This AFE received approval from SKK Migas with letter number 26XX/SKKA0001/2018 on November 9, 2018 and with a budget of $24,046,444. Well drilling started in January 2019,

previously planned for December 15, 2018. Well drilling was completed in December 2019. Placed into Service (PIS) submissions are being processed.

2. AFE 1818A001OO, AFE Development well, Bumi South #3
   This AFE received approval from SKK Migas in December 2018 with a budget or budget of $11,745,292. In April 2019 there was an amendment to the budget, where a revised budget of $13,868,083 was approved by SKK Migas letter number 28XX/SKKA000/2019 on April 12, 2019. Well drilling began in January 2019, previously planned for December 19, 2018. Well drilling was completed in August 2019. The JV has submitted a request to place this well in service to SKK Migas.
3. AFE 1918A001OO, AFE Development well, Bumi South #4
   This AFE received approval from SKK Migas with letter number 28XX/SKKA0002/2019 on June 9, 2019 and with a budget or budget of $7,365,474. Well drilling started in September 2019 and finished in December 2019. PIS submissions are being processed.

In this case, the FQR made is only for Report 4 and Report 15. According to SKK Migas (2017), the Report 4 regarding Exploration and Development Expenditures reports an overview of actual expenditure on exploration and development drilling, both capital and non-capital, in the current quarter and the current year for a working area. Meanwhile, the Report 15, the Project Status Report, reports an overview of the status of all main projects and AFE's projects on a quarterly basis based on their AFE number.

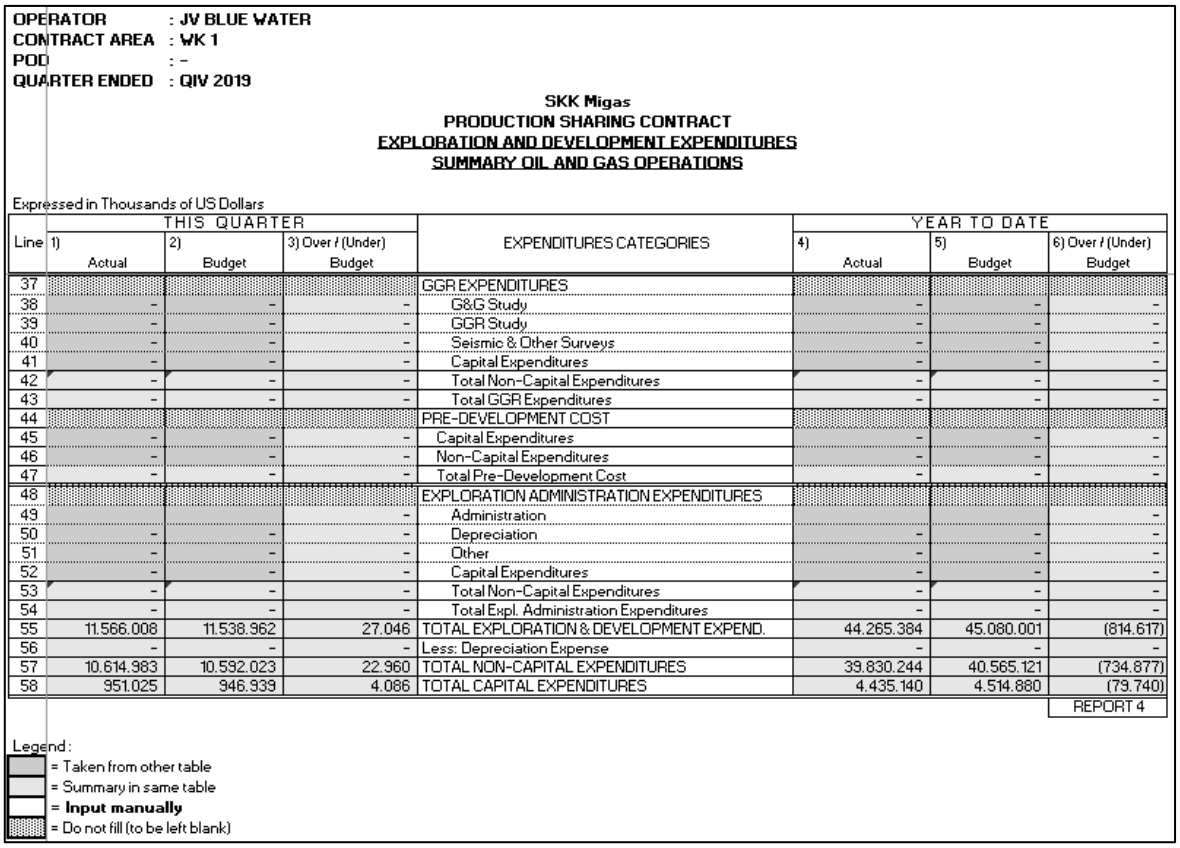
OPERATOR : **JV BLUE WATER**
CONTRACT AREA : **WK 1**
POD : -
QUARTER ENDED : **QIV 2019**

SKK Migas
PRODUCTION SHARING CONTRACT
EXPLORATION AND DEVELOPMENT EXPENDITURES
SUMMARY OIL AND GAS OPERATIONS

Expressed in Thousands of US Dollars

Line	THIS QUARTER 1) Actual	2) Budget	3) Over / (Under) Budget	EXPENDITURES CATEGORIES	YEAR TO DATE 4) Actual	5) Budget	6) Over / (Under) Budget
1				DRILLING EXPENDITURES			
2				Development Drilling :			
3				Tangible Costs			
4	419.450	402.896	16.554	Casing & Tubing	1.904.710	1.917.377	(12.667)
5	68.700	65.966	2.734	Well Equipment - Surface	282.010	283.017	(1.007)
6	-	-	-	Well Equipment - Subsurface	-	-	-
7	-	-	-	Other Tangible Costs	-	-	-
8	488.150	468.862	19.288	Total Tangible Costs	2.186.720	2.200.394	(13.674)
9				Intangible Costs			
10	570.480	547.718	22.762	Preparation & Termination	1.989.107	1.988.821	286
11	2.760.780	2.653.291	107.489	Drilling Operation	10.113.322	10.150.126	(36.804)
12	416.545	400.072	16.473	Formation Evaluation	1.401.499	1.404.126	(2.627)
13	434.730	417.492	17.238	Completion	1.872.615	1.876.957	(4.342)
14	1.026.900	985.866	41.034	General	3.612.160	3.613.133	(973)
15	-	-	-	Other Intangible Costs	-	-	-
16	5.209.435	5.004.439	204.996	Total Intangible Costs	18.988.703	19.033.163	(44.460)
17	5.697.585	5.473.301	224.284	Total Development Drilling	21.175.423	21.233.557	(58.134)
18				Exploration Drilling :			
19				Tangible Costs			
20	390.300	403.089	(12.789)	Casing & Tubing	1.764.345	1.820.883	(56.538)
21	72.575	74.988	(2.413)	Well Equipment - Surface	484.075	493.603	(9.528)
22	-	-	-	Well Equipment - Subsurface	-	-	-
23	-	-	-	Other Tangible Costs	-	-	-
24	462.875	478.077	(15.202)	Total Tangible Costs	2.248.420	2.314.486	(66.066)
25				Intangible Costs			
26	644.640	666.261	(21.621)	Preparation & Termination	2.206.605	2.279.579	(72.974)
27	2.699.610	2.790.375	(90.765)	Drilling Operation	11.164.240	11.529.509	(365.269)
28	514.868	532.913	(18.045)	Formation Evaluation	1.556.583	1.610.348	(53.765)
29	454.530	469.117	(14.587)	Completion	1.856.611	1.918.750	(62.139)
30	1.091.900	1.128.918	(37.018)	General	4.057.502	4.193.772	(136.270)
31	-	-	-	Other Intangible Costs	-	-	-
32	5.405.548	5.587.584	(182.036)	Total Intangible Costs	20.841.541	21.531.958	(690.417)
33	5.868.423	6.065.661	(197.238)	Total Exploration Drilling	23.089.961	23.846.444	(756.483)
34	951.025	946.939	4.086	Total Tangible Expenditures	4.435.140	4.514.880	(79.740)
35	10.614.983	10.592.023	22.960	Total Intangible Expenditures	39.830.244	40.565.121	(734.877)
36	11.566.008	11.538.962	27.046	Total Drilling Expenditures	44.265.384	45.080.001	(814.617)

Figure 4. The partial result of Report 4



OPERATOR : JV BLUE WATER
CONTRACT AREA : WK 1
POD : -
QUARTER ENDED : QIV 2019

SKK Migas
PRODUCTION SHARING CONTRACT
EXPLORATION AND DEVELOPMENT EXPENDITURES
SUMMARY OIL AND GAS OPERATIONS

Expressed in Thousands of US Dollars

Line	THIS QUARTER 1) Actual	2) Budget	3) Over / (Under) Budget	EXPENDITURES CATEGORIES	YEAR TO DATE 4) Actual	5) Budget	6) Over / (Under) Budget
37				GGR EXPENDITURES			
38	-	-	-	G&G Study	-	-	-
39	-	-	-	GGR Study	-	-	-
40	-	-	-	Seismic & Other Surveys	-	-	-
41	-	-	-	Capital Expenditures	-	-	-
42	-	-	-	Total Non-Capital Expenditures	-	-	-
43	-	-	-	Total GGR Expenditures	-	-	-
44				PRE-DEVELOPMENT COST			
45	-	-	-	Capital Expenditures	-	-	-
46	-	-	-	Non-Capital Expenditures	-	-	-
47	-	-	-	Total Pre-Development Cost	-	-	-
48				EXPLORATION ADMINISTRATION EXPENDITURES			
49			-	Administration			-
50	-	-	-	Depreciation	-	-	-
51	-	-	-	Other	-	-	-
52	-	-	-	Capital Expenditures	-	-	-
53	-	-	-	Total Non-Capital Expenditures	-	-	-
54	-	-	-	Total Expl. Administration Expenditures	-	-	-
55	11.566.008	11.538.962	27.046	TOTAL EXPLORATION & DEVELOPMENT EXPEND.	44.265.384	45.080.001	(814.617)
56	-	-	-	Less: Depreciation Expense	-	-	-
57	10.614.983	10.592.023	22.960	TOTAL NON-CAPITAL EXPENDITURES	39.830.244	40.565.121	(734.877)
58	951.025	946.939	4.086	TOTAL CAPITAL EXPENDITURES	4.435.140	4.514.880	(79.740)
							REPORT 4

Legend :
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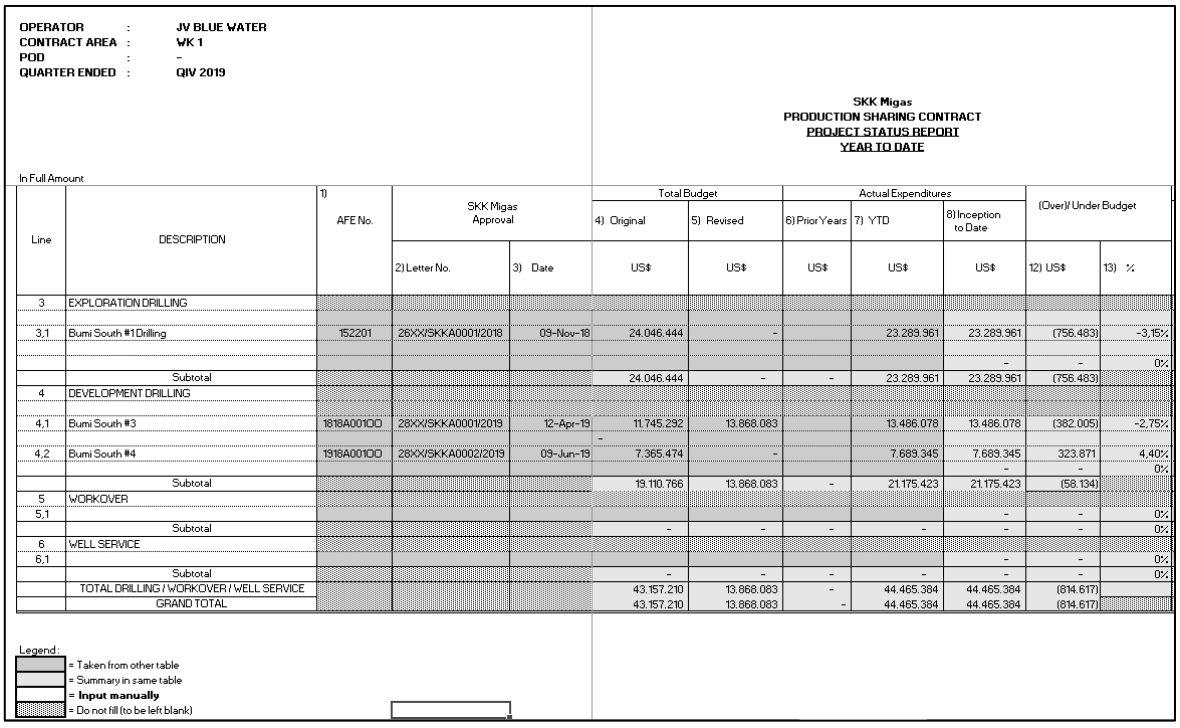
Figure 5. The partial result of Report 4 (Cont.)



OPERATOR : JV BLUE WATER
CONTRACT AREA : WK 1
POD : -
QUARTER ENDED : QIV 2019

SKK Migas
PRODUCTION SHARING CONTRACT
PROJECT STATUS REPORT
YEAR TO DATE

In Full Amount

Line	DESCRIPTION	1) AFE No.	SKK Migas Approval 2) Letter No.	3) Date	Total Budget 4) Original US$	5) Revised US$	Actual Expenditures 6) Prior Years US$	7) YTD US$	8) Inception to Date US$	(Over)/ Under Budget 12) US$	13) %
3	EXPLORATION DRILLING										
3,1	Bumi South #1 Drilling	152201	26XX/SKKA0001/2018	09-Nov-18	24.046.444	-		23.289.961	23.289.961	(756.483)	-3,15%
									-	-	0%
	Subtotal				24.046.444	-	-	23.289.961	23.289.961	(756.483)	
4	DEVELOPMENT DRILLING										
4,1	Bumi South #3	1818A00100	28XX/SKKA0001/2019	12-Apr-19	11.745.292	13.868.083		13.486.078	13.486.078	(382.005)	-2,75%
4,2	Bumi South #4	1918A00100	28XX/SKKA0002/2019	09-Jun-19	7.365.474	-		7.689.345	7.689.345	323.871	4,40%
									-	-	0%
	Subtotal				19.110.766	13.868.083	-	21.175.423	21.175.423	(58.134)	
5	WORKOVER										
5,1									-	-	0%
	Subtotal				-	-	-	-	-	-	0%
6	WELL SERVICE										
6,1									-	-	0%
	Subtotal				-	-	-	-	-	-	0%
	TOTAL DRILLING / WORKOVER / WELL SERVICE				43.157.210	13.868.083	-	44.465.384	44.465.384	(814.617)	
	GRAND TOTAL				43.157.210	13.868.083	-	44.465.384	44.465.384	(814.617)	

Legend :
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= Summary in same table
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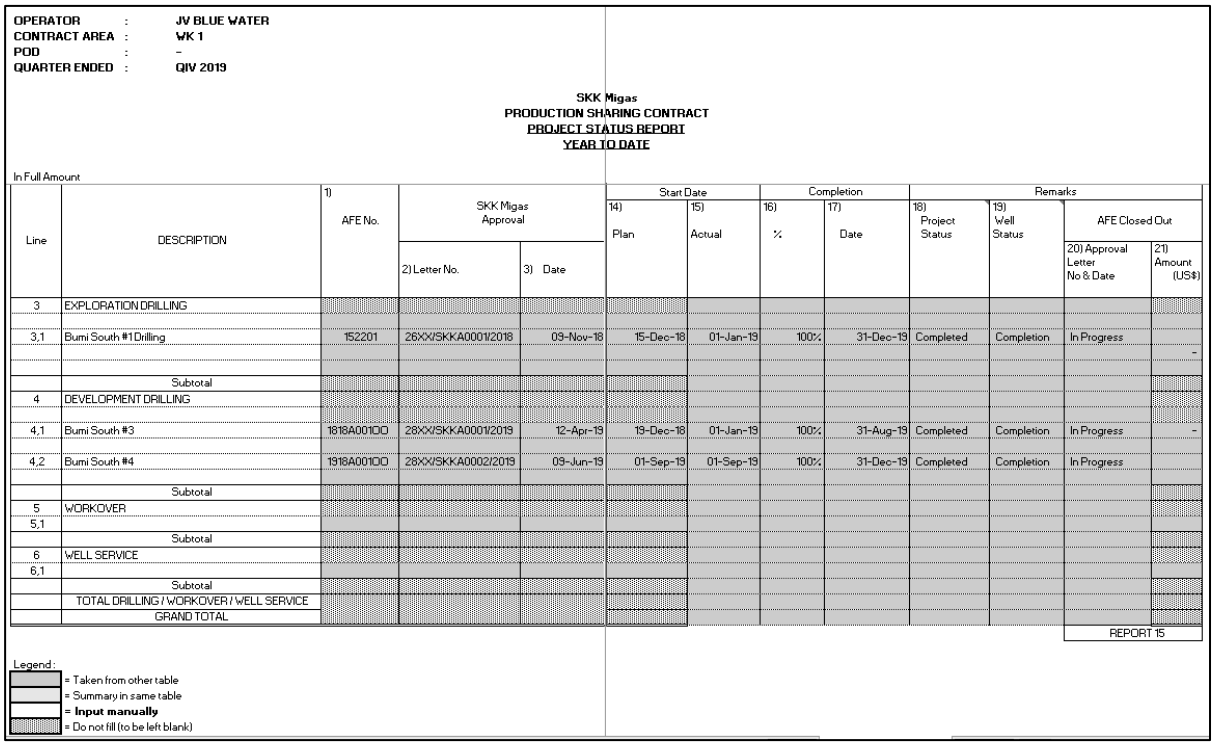
Figure 6. The partial result of Report 15



OPERATOR : JV BLUE WATER
CONTRACT AREA : WK 1
POD : -
QUARTER ENDED : QIV 2019

SKK Migas
PRODUCTION SHARING CONTRACT
PROJECT STATUS REPORT
YEAR TO DATE

In Full Amount

Line	DESCRIPTION	1) AFE No.	SKK Migas Approval		Start Date		Completion		Remarks			
			2) Letter No.	3) Date	14) Plan	15) Actual	16) %	17) Date	18) Project Status	19) Well Status	AFE Closed Out	
											20) Approval Letter No & Date	21) Amount (US$)
3	EXPLORATION DRILLING											
3,1	Bumi South #1 Drilling	152201	26XX/SKKA0001/2018	09-Nov-18	15-Dec-18	01-Jan-19	100%	31-Dec-19	Completed	Completion	In Progress	-
	Subtotal											
4	DEVELOPMENT DRILLING											
4,1	Bumi South #3	1818A0010D	28XX/SKKA0001/2019	12-Apr-19	19-Dec-18	01-Jan-19	100%	31-Aug-19	Completed	Completion	In Progress	-
4,2	Bumi South #4	1918A0010D	28XX/SKKA0002/2019	09-Jun-19	01-Sep-19	01-Sep-19	100%	31-Dec-19	Completed	Completion	In Progress	
	Subtotal											
5	WORKOVER											
5,1												
	Subtotal											
6	WELL SERVICE											
6,1												
	Subtotal											
	TOTAL DRILLING / WORKOVER / WELL SERVICE											
	GRAND TOTAL											
											REPORT 15	

Legend:
= Taken from other table
= Summary in same table
= **Input manually**
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Figure 7. The partial result of Report 15 (Cont.)

CONCLUSION

The current study evaluates the Accounting Information System in the oil and gas industry called the OGSQL system. The use of the OGSQL system gives opportunities for JV Blue Water to perform the accounting functions more effectively and efficiently because the use of an OGSQL system results in significant time and cost savings. The OGSQL system helps record various accounting transactions, processing these transactions and preparing the financial reports, such as financial reporting, property report, cash requirement report, and so on. However, the reports that must be submitted to SKK Migas were still done manually through an Excel Spreadsheet and after evaluating the OGSQL system using a Fit/Gap Analysis, there was a gap in the host government reporting of the FQR. At the fit level, the result was 94.44%, partial fit was 0%, and the gap was 5.56%. Even though the percentage at the gap level was small, it is very important because it concerns the JV's responsibility to report information to the host government.

Based on the results of the internal control evaluation, the OGSQL system in the JV Blue Water is functioning properly. This has been supported by the components of internal control in the normal course of business processes, specifically the control environment as seen from the organizational structure in the JV, control activities as seen from the separation of duties in the system based on their access rights to the system, information and communication as seen from the delivery of information related to reporting, as well as monitoring activities performed in JV Blue Water.

To close the gap that was identified in the Fit/Gap analysis, it was proposed to develop a process using alternative Business Intelligence tools. These included DAX, Power Pivot, and Power Query in Microsoft Excel combined with SQL Query that extracted from the OGSQL system database. With these alternative tools, the data processing for FQR reports became easier, was more accurate and saved time. These Business Intelligence tools can also be used in the future to meet other reporting requirements; they are not limited to only SKK Migas reporting. For example, this reporting mechanism can also be used for internal management reporting needs. Through the use of the one shared data model, many other important reports showing real time information can be developed for senior executives. BI Reports can also be developed for managers and executives in specific departments such

as Treasury, Supply Chain Management (SCM), Drilling, Budgeting and Planning, Operations, and so on. These BI reports could include Key Performance Indicator (KPI) and other business performance metrics specific to each functional area. By giving managers information, which is relevant and timely to their functional area, they will be able to take action to ensure their specific goals, and therefore the goals of the organization, are achieved.

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