

IMPLEMENTATION OF STOCK INVENTORY POLICY IN INDONESIA PSC CONTRACT:A CRITICAL REVIEW TO MINIMIZE SURPLUS AND DEAD STOCK INVENTORY IN ORDER TO OPTIMIZE GOVERNMENT OF INDONESIA REVENUE

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Abstract— Upstream oil and gas industry is vital to Indonesian economy, more than 30% of states revenues generated from the sale of crude oil and natural gas. Government of Indonesia (GOI) is the holder of mining rights and in practice can delegate the mining rights to both local and foreign contractors to be managed in the form of production sharing. This model known as Production Sharing Contract (PSC). One of the feature of PSC contract is the reimbursement on costs incurred by the contractors in their oil and gas operations. Since 2000, oil production continues to decline, while the number of cost recovery for producing oil and gas continue to climb. The higher the cost recovery, the lower GOI share will be. Therefore, controlling the number of cost recovery needs to be done comprehensively so that the savings can be distributed to the welfare of Indonesian people. So far, BPMIGAS has made many efforts, such as joint-rig procurement, reduction of the number of expatriates, reduction of employee benefits, and many others. But there is one function that often overlooked, which lies in logistics function. This study attempts to identify the causes of surplus and dead stock material arise from logistics function in contractors, and to find the most appropriate solutions to reduce excessive buildup of materials in the future. Studies conducted using surplus and dead stock balance as of December 2011 to describe the actual condition. The combination of primary data, (field observation and interviews to respondents from the contractor and BPMIGAS) and secondary data (journals, books, papers, annual reports, monthly report) was performed to obtain comprehensive analysis. Based on data collection, there are two main causes of surplus and dead stock which are PSC contracts provision that allow non-capital inventory to be charged at the time the materials arrive in Indonesia, the other main cause is the lack of integrated system in material management combined with no uniform material codification among the contractors, thereby reducing the effectiveness of material transfer as a mean of optimizing the movement of assets. Subsequently, several alternative solutions are examined to obtain the optimal solution for controlling the rate of surplus and dead stock in the future. These include: consignment/vendor managed inventory, parts pooling, application of bar code and Radio Frequency Identification (RFID), to outsourced the logistics function, implementation of OEM parts, etc. Of the many alternatives that were examined, change the PSC term at the contract-renewal proposal by the contractor and, and develop an integrated material management application which include codification can be implemented as the most effective way to mitigate the build up of excess materials in the future. In the end, savings from cost recovery will be greater because procurement of new material can be reduced.

Keywords: inventory management, cost recovery, the oil and gas industry

1. Introduction

With the spread of prosperity, world demand for energy is increasing. Fossil fuels (oil, natural gas and coal) still dominate energy consumption in 2011, with a market share of 87%. The remaining market share came from the use nuclear energy, hydro electricity and renewables. Oil continues to be the world's most important source of energy. It met 33% of global energy needs while its nearest rivals, coal and natural gas, met only 30% and 24% respectively. In the majority of cases, national governments own hydrocarbon assets. Exploration acreage is auctioned at regular intervals and

generally sold to the highest bidder in the form of a lease. The bid often takes the form of a package of commitments to the host country. When acreage is awarded, the fiscal regime often incorporates some form of production sharing contract and is usually fixed. The upstream oil and gas sector represents a major component of the Indonesian economy. In terms of industry value added, oil and gas extraction contributed US\$ 34, 4 billion in 2011 equivalent to 21 percent of state revenue in 2010-2011. The industry has also provided job opportunities for 300.000 Indonesian workers directly and many others indirectly. Every year, oil and gas industry has contributed almost 16 billion USD in the form of direct investment. Management of oil and gas in Indonesia adopts the Production Sharing Contract which according to this system, the mining rights owned by Government of Indonesia (GOI). Because of limited financial and technical capability, GOI giving operation rights of oil and gas blocks to both national and foreign contractors with production sharing mechanism. The general concept of the PSC is that the contractor bears all risks and cost of exploration until commencement of commercial production. If production does not proceed, these costs are unrecoverable. If production does proceed, the contractors receive a share of production to meet cost recovery, an investment credit (where granted) and an after tax equity interest of the remaining production. The cost recovery amount is based on actual expenditure, and if the costs are lower than the revenue from production, then unrecovered costs of may be recovered in the following year.

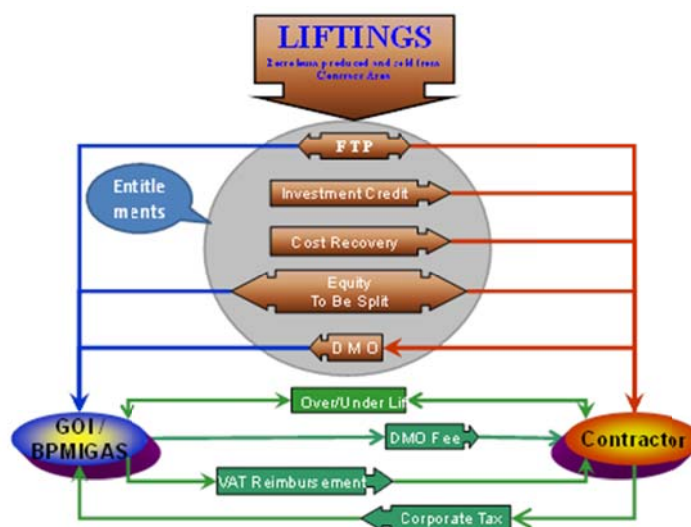


Figure 1. Chart of Segments and Participant in Oil and Gas Business Activities

There has been several efforts by BPMIGAS and Ministry of Finance to reduce the number of cost recovery but there is one area of potential cost saving that has not got much attention which lies in the logistics function. BPMIGAS data as of 31 December 2011 has shown that the amount of surplus materials in all contractors has reached \pm 130 million USD and the dead stock materials of \pm 162 million USD. According to BPMIGAS handbook of supply chain management, surplus are the materials with no movement within 2 to 5 years, while dead stock are materials with no movement more than five (5) years or the parent equipment is no longer used (or exist), except for insurance spare items. Dead stock usually consisted of general items that are obsolete due to age, deterioration, changing operational needs and/or specification.

The main goal of this research is to investigate the cause of surplus and dead stock materials, the efforts to optimize the movement of existing surplus and dead stock materials and to prevent the increase of the surplus and dead stock materials in the future so that the savings from cost recovery can be distributed for the welfare of Indonesian people. This is also inline with BPMIGAS efforts to employing a range of methods and policies to improve efficiency in upstream oil and gas industry.

2. Business Issue Exploration

The supply chain of the petroleum industry is divided into two different major segments: the upstream and downstream supply chains. The upstream segment is subject to the highest risk and return factors within the oil and gas industry. Logistics in the petroleum industry contains various challenges, that are not present in most other industries. The sheer scale of operations, multitude of suppliers, challenging locations, range in size and complexity and lack of standardization make oil and gas supply chain unique. (Hussain, 2006) stated that the petroleum industry supply chain is considered to be inflexible and the most complex industry relative to other industries. However, there is a lot of room for improvement and cost reduction, specifically in its logistics area. Companies have recognized that improved supply chain efficiencies represent a huge area for cost savings, specifically in the logistics area; they are estimated to be an average between 10 and 20 percent of revenues (Hamilton, 2003).

According to PSC Contract Section X, regarding Title of Equipment stated that all goods and equipment purchased by Contractors become the property of the Government of Indonesia. Management of goods and equipment rests with BPMIGAS. Any excess supply of goods and equipment that no longer be used in the future may be transferred to other Contractors with the transfer price must be at its carrying cost. If a contractor can not dispose of the equipment, a write-off proposal ("WOP") must be submitted to BPMIGAS for approval. Once approved, the material is usually charged to cost recovery (if not yet charged) and transferred to Ministry of Energy and Mineral Resources warehouse or facility for further auction process.

Given the background of problems above, the problem of this research can be defined as : Increase in surplus and dead stock materials in upstream oil and gas industry are burdening state budget and reduce potential welfare of Indonesian people.

In connection with problem statement, the key research questions of this research will be : (1) What are the cause(s) of surplus and dead stock materials ? (2) What are BPMIGAS and contractors effort to reduce the number of surplus and dead stock materials ? (3) What are the efforts that can be implemented to mitigate the potential of surplus and dead stock materials in the future ?

A. Conceptual Framework

Miles and Huberman (1994) defined a conceptual framework as a visual or written product, one that "explains, either graphically or in narrative form, the main things to be studied—the key factors, concepts, or variables—and the presumed relationships among them." Conceptual framework for this research are described below :

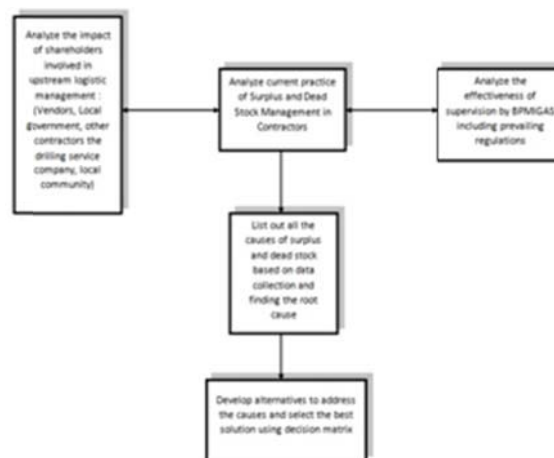


Figure 2 : Conceptual framework for the research

B. Method of Data Collection and Analysis

The data used consisting of primary and secondary data. Data collection methods used for collecting primary data is through field observation and in-depth interview with the relevant personnel from contractors and BPMIGAS. Secondary data collection is by studying the literature and material report from contractors to BPMIGAS.

The main reason why qualitative method and more in detail case study method was chosen to be used because case study method enables insightful research relationships and connections which have not yet been studied much. This research using surplus and dead stock material submitted by contractors based on their stock on hand at 31 December 2011.

Table 1. Contractors Surplus Material Value – 31 December 2011

No.		Surplus Value (US\$)	% Absolut	%Accum. Absolut
1	PT D	35,239,710.81	27.19	27.19
2	PT K	24,756,144.08	19.10	46.29
3	PT U	18,035,721.68	13.92	60.21
4	PT W	11,177,748.42	8.63	68.84
5	PT Q	9,174,457.64	7.08	75.92
6	PT G	8,457,676.63	6.53	82.44
		Total Surplus Value All Contractors : US\$ 129,597,067.65		

Table 2. Contractors Dead Stock Material Value – 31 December 2011

No.		Dead Stock Value (US\$)	% Absolute	% Accum. Absolute
1	PT F	62,621,310.90	38.49	38.49
2	PT D	31,668,256.12	19.47	57.96
3	PT U	17,036,277.08	10.47	68.43
4	PT W	15,735,854.05	9.67	78.10
5	PT G	8,756,796.68	5.38	83.49
		Total Dead Stock Value All Contractors : US\$ 162,680,886.95		

C. Results of data collection

During the interview it was found out that all contractors had already made several attempts to minimize the amount of surplus and dead stock on hand. Such as : periodic disposal plan, applying First In First Out (FIFO) method which according to this method, the first materials that were stored will be the first materials to be used or shipped out. All contractors had already conducted regular physical inventory minimal once a year as mandated by BPMIGAS handbook of Supply Chain Management. During this activity, contractors perform periodic location auditing and preventive measures are implemented to reduce location discrepancy. All contractors also implemented consignment system for some type of material. In consignment system, vendors are required to store materials in contractor's warehouse and will invoice contractors only for materials which are consumed. The main benefit is that the contractor can avoid unnecessary purchases.

Some big contractors also developed Enterprise Resource Planning (ERP) which come with features such as dynamic inventory planning parts cataloguing and E-procurement, which also allow all users to instantly access a central repository to find the current status of all operations. State-owned oil company, PT Q have gone further. They are currently reviewing the use of barcode and RFID which purpose is to reduce inaccurate physical inventory. By applying these two technologies, PT Q try to improve the accuracy of material identification and handling, and reduce manual work which often resulted in human error. So far, the most popular method for material optimization is material-transfer. Material transfer is seen as the most effective way to reduce the number of stock on hand. By transferring out materials, service level and turn-over ratio will increase as materials will be issued

from the warehouse and will no longer recorded on inventory balance. For receiving-contractors, getting the materials from transfer will be much cheaper and lead time is shorter.

Interviewees also pointed out that longer lead time has forced procurement department to buy excessive stock to anticipate delay in shipping. The sea, the large distances and remoteness to vendors, has forced contractors to order to vendors as earlier as possible to avoid stockout. As an impact, materials will be stored in the warehouse longer than needed. According to most interviewee, material transfer is not an obligation and initiative seldom came from BPMIGAS, therefore they only do that when they needed to. In fact, there is no integrated system between BPMIGAS and the contractor to share the level of surplus and dead stock that can be utilized. Without a system, contractors normally use email to offer the surplus among them. The lack of integrated system has made the surplus and dead stock materials in contractors 'non visible'.

Despite material transfer has became the most popular means of optimization, it is also hampered by the lack of uniform material numbering in place so that each item of materials has different numbers in each contractor. The huge numbers of materials in oil and gas industry and the lack of 'common language' have made material identification very difficult. As an illustration, in one large contractor, variants of materials can be reached 60,000 items or Stock Keeping Unit (SKU). Therefore, it is understandable that material transfer mostly occurred in contractors who are in the same group / holding company as they use the same system.

Further, it was noted by BPMIGAS management and expert in oil and gas logistics that PSC Contract Exhibit C regarding Accounting Procedure has allowed non capital materials to be charged directly to cost recovery upon landed in Indonesia. As a consequence, the contractors do not have to worry about cost limitation and timing. With the reason to anticipate stock out, there is tendency of over-spending which leads to build up of surplus and dead stock. Based on field observation, drilling engineer also implement higher buffer stock than needed in order to anticipate the stock out which can lead to extensive downtime and bring operations to halt.

Also in interviews it was highlighted that there is no rationalization and standardization of equipment among different contractors. Each contractor has own preference for a particular brand, type and specifications of each machine and equipment. As a consequence, the spare parts can not be substituted or transferred because of mismatch between those equipment. In addition, some interviewee stated that many times, equipment renewal/upgrade had conducted too early while the spare part of replaced equipment still maintained in the warehouse. Procurement process of equipment seldom take into account the possibility of equipment renewal/upgrade in the future.

All interviewee also stated that some MRO dead stocks came from spare parts of heavy equipment and automotive parts. Before year of 2000, contractors are allowed to own heavy equipment, cars, trucks and other means of transport. This means they have to stock the spare parts in order to maintain the operation. This wasn't became a problem until each contractors has their own brand preference, usually they choose a brand from its country of origin. This problem also originated from third party drilling-service company such as Schlumberger and Halliburton which reluctant to use supporting products made by their competitor even though the materials (explosives and chemicals) can still be used.

Contractors are allowed to write off their surplus and dead stock after their WOP proposal has been approved by Ministry of Finance. PT F and PT U stated that before the year of 2009, the WOP process facing significant delay in the Department of Finance. The process could take a year even longer. In fact, all interviewee complained that WOP materials which has been approved by Ministry of Finance was not taken out of the warehouse because auction base-price is too high so there is no interested bidders. Consequently, they still need to keep those materials in their warehouses. However, since 2009 WOP proposal processed faster since the establishment of DJKN (*Direktorat Jenderal Kekayaan Negara*) which have sufficient manpower and transparent Key Performance Indicator.

It was mentioned several times in interviews that operation frequently obstructed by non-technical issue such as delay in permit by local government, social issue, security disruption, problem in land clearing, etc. All of these disruption resulted in delayed operation despite the drilling program has been approved by BPMIGAS. As the effect of pending drilling-program, materials that have been purchased can not be used immediately and the risk of expiration/deterioration increase.

Table 3. Summary the cause of surplus and dead stock materials

No	Cause	Effect
1	PSC Contract Provision: inventory charged to cost recovery when landed	Over spending, too much safety stock
2	Conservative spending to anticipate long lead time	Too much safety stock
3	Too many sources of equipment	Difficulty for transfer and deterioration
4	Equipment can cause if too early	Materials becoming obsolete
5	Automobile and heavy equipment suppliers	Materials becoming obsolete
6	No integrated system in material transfer	Difficulty for material transfer
7	No order/inventory code	Difficulty for material transfer
8	Inaccurate physical inventory	Increased chance of stockout or material deterioration
9	Natural Disaster	Materials can not be utilized because drilling program cancelled/postponed
10	Social and security issue	Materials can not be utilized because drilling program cancelled/postponed
11	Delay in permit	Materials can not be utilized because drilling program cancelled/postponed
12	Slow SOP Process	Materials stored longer and increasing the cost of our company
13	Materials left from previous contractor	Dead stock materials difficult to new operator
14	Willing service company reluctant to use new old stock (NOS) materials	Materials becoming obsolete

D. Selection of Root Cause

The Cause and Effect diagram (also called the Fishbone diagram) is a tool for identifying the root causes of quality problems. The root cause has to fulfill several criteria : (1)The cause has high financial impact to cost recovery 2) Time frame of the impact is long 3) The cause impact all contractor, rather than several of them. Fishbone diagram for this research can be depicted below :

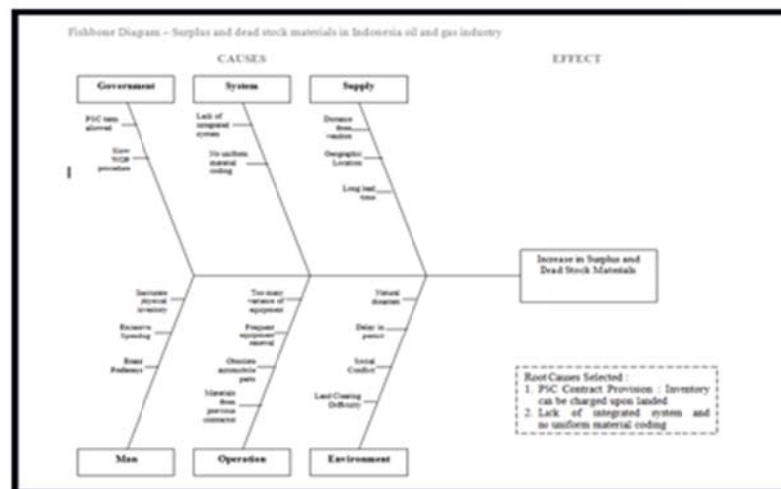


Figure 3 : Fishbone diagram – Surplus and Dead Stock Materials

3. BUSINESS SOLUTION

E. Alternative of Business Solution

There are several alternatives that can be considered in order to reduce the number of surplus and dead stock in the future : (1) Consolidating and rationalizing vendor base which will keep the number

of vendors low and gain better prices and service, including reduced lead time (2) Standardization and variety control of equipment and machines which resulting in interchange-ability, better spaces management and inventory reductions. The disadvantage is the exposure of product standardization is limited to some contractors only because each contractor has different production characteristic, well depth and location (3) Vendor buy back which allow transfer of title of materials via buy back mechanism from vendors. This solution has many weaknesses, such as vendors will definitely buy the materials at much lower price than the initial sale price (4) Material transfer to company-affiliates abroad in which contractors are allowed to offer excess material to their affiliates abroad which can reduce excess material in their domestic operation.

The main weakness of this practice is the possibility of contractors to misuse importation facilities granted from government of Indonesia which consisted of exemption of import duty and other levies on import (5) Change PSC contract provision for inventory charging method from initially "When landed" to "When Used" so that the contractor is only allowed to charge upon the material issuance from warehouse. Excess stock can not be charged to cost recovery and becoming contractor's sole risk. (6) Transfer to other industries where materials can be utilized in other industry, such as geothermal. But this solution is only suitable for certain types of material, such as vehicles spare-parts and pipeline. So the benefits from material transfer will be low. (7) Consignment : Ownership of the inventory typically is presumed to transfer from the vendor to the buyer at the time the inventory is removed from the inventory location for consumption, use or benefit of the buyer.

Consignment only effective for certain types of materials and major vendors usually reluctant to engaged in this system because the cost to produce the material already high so it will not be economical to sell under consignment system (8) Vendor Managed Inventory : transfer or assignment of responsibility for managing and/or replenishing inventories from the buyer (typically an end-user) to the supplier/vendor (typically a distributor or manufacturer) (9) Parts Pooling : Contractors with multiple warehouses and same sets of assets can reduce inventory of expensive parts and increase service level by leveraging parts pooling (10) Automated Data Collection which can be facilitated with the use of barcode and RFID scanner. Barcode and RFID methods offer accurate identification of material receiving and issuing but also very costly so that the benefits from better identification are written off by the cost of installation on each unit of material. (11) Third Party Logistic (3PL) : Outsourcing some or all logistic operations.








The most compelling reason to let another party take over logistic functions is the decision to focus on core competencies. The risks with 3PL is that contractors have to giving up control over some or all aspects of that function therefore it may be more difficult to develop a comprehensive logistics strategy. (12) Four Party Logistic (4PL) Arrangement : a logistic specialist take over the entire logistics operation and subcontracts some or all specific functions. 4PL carries high risk for less effective or more costly operations if the 4PL writes biased contracts with favorite vendors rather than seeking out the most efficient partners (13) Using Original Equipment Manufacturer (OEM) spare parts which warranty date has been expired in order to reduce high maintenance cost and variety of materials (14) Develop an integrated material management system to make surplus and dead stock management in contractors becoming 'visible' (15) Create uniform material coding in order for contractors to talk to each other in common and simple 'language'. Material number will be unique for each item/Stock Keeping Unit and duplication of number for two identical material will be avoided and immediately handled to minimize excess materials

F. Analysis of Business Solution

Selection of business solution is conducted using Pugh matrix which is a criteria-based decision matrix which uses criteria scoring to determine which of several potential alternatives should be selected. In this research, selection of alternatives will be evaluated using selection-criteria as follows : Compliance to existing regulation, Coverage, Time and Risks. Only alternatives which comply to existing regulation will be evaluated further. Although vendors consolidation and equipment standardization offers high potential savings from reduced variety of materials and reduced lead

times, at the moment these alternatives are not comply to Law number 5 of 1999 concerning the prohibition of monopolistic practices and unfair business competition. Transfer to other industry will not be evaluated as well because there is unlikely the practice will be allowed in the future and the potential savings derived from this practice will be small.

Table 4 : Decision Matrix

Weight	25%	50%	25%	100%		
Alternatives	Time	Coverage	Cost	Score		Ranking
Change PSC contract term	80	100	100	95		1
Consignment/VMI	40	25	60	38		6
Parts Pooling	90	25	80	55		5
Barcode & RFID	60	66.67	50	61		4
Outsource (3PL/4PL)	50	33.33	20	34		7
Applying OEM Parts	100	41.67	70	63		3
Develop material management information system and codification	70	100	90	90		2

In this decision matrix, exposure assigned the biggest weight because the solution that will be chosen must be able to cover a wider variety of materials, thus the saving of cost-recovery will be much greater.

Based on the table above, the chosen solution will be :

1) Long Term Solution

Changing PSC-contract provision is the simplest way to control the number of dead stock in the future but government has to wait until PSC-contractors submit the proposal for extension. Republic of Indonesia Government Regulation Number 35 of 2004 on Upstream Oil and Gas Business Activities, Article 25 stated that Minister of Energy and Mineral Resources shall determine the forms and the basic provisions of cooperation contracts that are to be put into effect for particular work areas, with consideration to the level of risk, the greatest possible benefit to the State, and the provisions of prevailing laws and regulations. The Minister shall determine the forms and basic provisions of cooperation contracts after receiving the considered opinions of the Head of BPMIGAS.

BPMIGAS Legal Division data showed that by the end of 2021, there are 29 blocks that will be approaching their end dates. Most of them are big contractors with high number of surplus and dead stock materials. To amend PSC-contract provision in the middle of the contracts period is not a wise solution because sanctity of the contract. To terminate the contract unilaterally and give the operatorship to state owned company (PT Pertamina) is not a better solution either. Therefore, government can extend with new provision that will be more favorable to the state but at the same time must recognize the capital and technology requirements to optimize production and development of remaining reserves and resources. The new provision that will be useful to reduce the number of dead stock in the future is to revise PSC contract exhibit C article 3.5 regarding accounting method to be used to calculate recovery of operating cost, which previously stated that "the costs of non-capital items purchased for inventory are recoverable at the time the items arrive in Indonesia" to "the costs of non-capital items purchased for inventory are recoverable at the time the items issued from warehouse with necessary documentation such as good issue, dispatched note, etc"

2) Immediate Solution (Less than 3 years)

Develop an integrated material information system and creation of uniform material number is chosen as immediate solution because it fast, high potential for cost reduction, comply to existing regulation, and low risk. The main purpose of this application is to increase the visibility of surplus and dead stock material in contractors so that optimization of material can be achieved. This application will capable of managing all material data on contractor and subsequently create material

codification which can be integrated with existing information system in contractors. Material number will be unique for each item/Stock Keeping Unit and duplication of number for two identical material will be avoided.

4. CONCLUSION AND IMPLEMENTATION PLAN

Conclusion

This study has indicate several significant findings :

1. Materials have many associated costs and with the huge numbers and size of materials in upstream oil and gas logistics, these cost will have unavoidable multiplier effect which can not be excluded. The longer the dead stock materials stored in warehouse, the larger the impact to cost recovery from warehouse operations.
2. The root cause of surplus and dead stock problems is provision in PSC contract that allows contractors to charge material purchase to cost recovery immediately upon material received in warehouse. The other root cause is the lack of an integrated material management information system and uniform material coding which makes material-searching process become difficult and complicated.
3. GOI has the privilege to extend or terminate PSC contracts at expiration date. In the effort to reduce surplus and dead stock materials, GOI has the authority to extend the contracts with new terms that will be more favorable to the state. The new terms that will restrain excessive spending is to revise PSC contract exhibit C article 3.5, regarding inventory accounting will be "the costs of non-capital items purchased for inventory are recoverable at the time the items issued from warehouse with necessary documentation such as good issue, dispatched note, etc"
4. The process of material transfer need to be optimized by the implementation of an integrated system and creation of uniform material coding. BPMIGAS and contractors will appoint third-party software developer to build such system that will be integrated into existing IT infrastructure in BPMIGAS and all contractors. At the time all contractors has implement the system, material-searching process will be a lot faster and easier so that material transfer will occurred more often between contractors. This will lead to bigger savings in cost recovery since receiving-contractors need not to procure new materials and will release idle stocks in previous contractors.

Implementation Plan

The development of "Integrated material management information system and codification" will be outsourced to third party application because of many benefits such as reduce unnecessary cost, access to specialist resources, time efficient project accomplishment, reduce human resource cost and control project cost. The whole project will consisted of 7 activities : Preparation and kick off meeting, requirements definition, design, development, integration and test, installation and acceptance, training and socialization. Duration of project is 24 weeks with the expense of Rp 389.000.000 based on Owner Estimate (a document which serves as the reference in evaluating bid price of services from prospective vendors in order to get reasonable offering-price). Proposed project schedule is constructed using Gantt Chart :

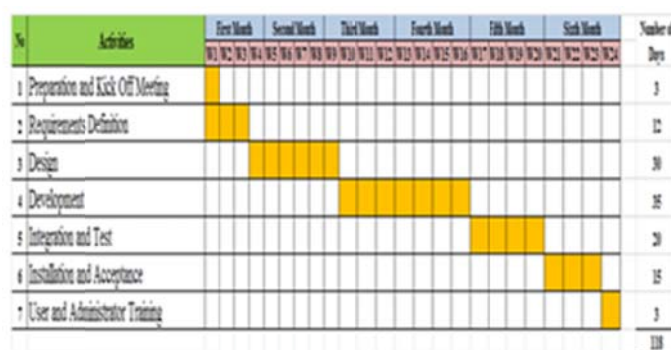


Figure 4. Gantt Chart for Outsourced Application Development

By implement this application, the frequency and value of material transfer will increase since surplus and dead stock materials in all warehouse become 'visible' which allow contractors to utilize them. Nevertheless, the key for successful implementation is the level of enforcement by BPMIGAS. BPMIGAS needs to issue a circular letter that it is compulsory to use integrated material management information system as primary tool for optimizing the use of idle and excess materials. This is in accordance with Government Regulation Number 35/2004 on Upstream Oil and Gas Business Activities, Article 102 (2) which stated that BPMIGAS may further stipulate the provisions regarding the scope of implementation of supervision of Upstream Business Activities.

In an effort to push down the number of excess materials and encourage prudent spending, the implementation needs to be combined with sanction if contractors failed to comply with regulation. BPMIGAS can postpone cost recovery charging from materials if their surplus and dead stock level still beyond certain percentage of stock on hand that has been set. For example : At the end of year-1, the number of surplus and dead stock is maximum 15% of stock on hand. At the end of year-2, the number of surplus and dead stock is maximum 10% and so forth until the number of surplus and dead stock reached 5% of stock on hand at year-3. 5% is general consensus for surplus and dead stock that still can be maintained, because contractors need to stock some type of critical items which is very crucial to anticipate unplanned shut down in operations. The number of type of critical items need to be evaluated regularly by BPMIGAS in accordance with the size and characteristic of project and production which take place.

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