



Paper 57

Proposed Materials Management Improvement for Newly Operated Oil and Gas Company (Case - Black Gold EP)

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Abstract - In order to remain competitive, oil and gas companies differentiate themselves by being able to efficiently produce their product. Therefore, ability to manage supply chain becomes one of differentiation factors to gain competitive advantage in industry, including materials management. This research aimed to propose the improvement in Black Gold EP's materials management. The improvement process was done through qualitative approach of one-on-one interviews that compared the findings with the literature review. The results of the process found there were 6 (six) challenges that are considered as the root causes of materials management issue, they consisted of (i) lack of quantity control, (ii) no standard operating procedures, (iii) incompetent personnel, (iv) insufficient integration of information, (v) no materials preservation, and (vi) no quality inspection. Furthermore, there were 6 (six) proposed solutions that were built out of these root causes to answer the research question. Finally, to ensure the success of the implementation and enablement of continuous improvement, stakeholder engagement, early strategy development and deployment of principal of materials management were recommended.

Keywords - Materials management, oil and gas, supply chain management

I. INTRODUCTION

Materials management (MM) is one of main important aspects in company's supply chain management (SCM). According to Reference [1], materials management is an end-to-end process of flow of materials that includes planning the required materials, releasing purchase orders, providing transportation to the sites, storing materials and shipping them to operational sites when they are required, and, when necessary, disposing of unutilised or obsolete materials. Materials management in upstream oil and gas company covers finished goods used in both the day-to-day production facilities and construction of large capital projects [1]. Its functionality serves many purposes in facilitating the company's activities since it is able to communicate information regarding required material throughout the supply chain, whether it is to ensure material availability for execution and define the required materials in planning process, provide materials handling, conduct inventory control, and determine the procurement strategy and facilitate transportation [15].

Reference [11] identified the materials management the scope as depicted in Figure 1.

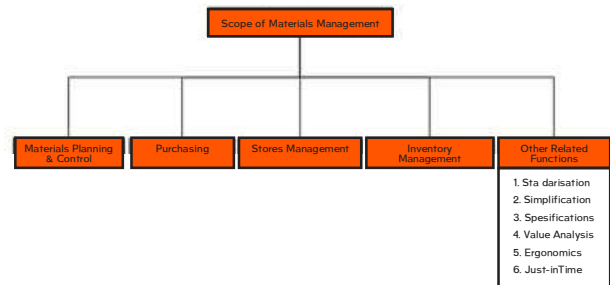


Fig. 1. Scope of Materials Management (Kumar & Suresh, 2008)

Black Gold EP is a newly established upstream oil and gas company that has been actively developing and exploring its working area. In the last couple of years, the production has been continuously growing. The company has established functional departments however each of them still doesn't have established management system including its disorganised materials management. As the consequences the company failed to establish the flow of materials to record and report the status and condition of materials then eventually led to the materials availability issue.

Materials availability is seen to have significant impacts in the operation because its critical presence for the operations to avoid costly down times/ interruptions in the operation. Therefore, to ensure the availability of materials it is important for the company to improve materials system that is able to provide accuracy in flow of information and manage physical flow of materials which allow uninterrupted activities.

This research aimed to design suitable improvements to establish materials management system that can address existing materials management practice in the company. The improvement in materials management system was conducted by initially identifying the issues contributing to the failure to perform materials management. These issues were then analysed and used to design appropriate improvement in existing practice. Through the establishment of organised materials management, it was expected that the activities carried out in the company can be well defined to perform materials management and issues associated with flow of materials/ materials management can be reduced or even further eliminated.

II. METHODOLOGY

The research deployed qualitative method approach which is seen to be more suitable to facilitate the data collection and obtain reliable information on individual meaning and complexity of the problem [5]. The one-on-one interviews were inducted to gather information from people within the organisation (see TABLE I). The questions were manufactured to cover all aspect of materials management in the company that can lead to the solution of research question: *What are the necessary solutions to improve materials management in the company?*

Furthermore, the analysis of these interviews was carried out by essence-capturing the associated issues found in transcripts of interviews into keywords/ codes. To keep the analysis focused, the number of keywords/ codes were reduced by selecting some of the codes. Due to the establishment of principal of a "commonality", the keywords were selected based on the highest number of respondents that mentioned a particular keyword/ Code, where they share the similarity between them, rather than how frequent the keyword was mentioned [14]. Furthermore, analysis and discussion towards selected keywords were conducted before categorising them as the root causes of materials management issue. Finally, solutions that were built out of these root causes were proposed to provide the improvement in materials management for the company.

TABLE 1 - RESPONDENT PROFILING

Cluster	Department	Respondent	Role in MM
1	Engineering	R1	Planning and End User
		R2	Planning and End User
		R3	Planning and End User
2	SCM at Office	R4	Procurement
		R5	Procurement
		R6	Procurement
3	SCM at Site	R7	Inventory Handling
		R8	Inventory Handling
		R9	Inventory Handling

III. RESULTS

The findings found the following root causes of existing implementation of materials management that contribute to the materials availability issue in Black Gold EP.

A. Lack of Quantity Control

This issue captured issue in inventory control activities because of the lack of management in quantity of the inventory. This issue was conveyed by all 9 respondents

with total mention of 16 times.

"It doesn't help my work as user because no one manages the inventory and controls quantity of tubular materials, casing and everything at site" (R2)

Furthermore, the interview shows one of noticeable challenges where the situation led to extra work done by the user to re-calculate availability of materials prior the execution as per statement by R3.

"It is the same, there is no inventory control so every time we want to drill, we ask our company man to check, the drilling supervisor. So, every time we finish with 7' section, after the cementing since the tubular activity is the most important one, we always instruct to our drilling supervisor to do inventory on the number of casings left" (R3)

B. No Standard Operating Procedures

The keyword was mentioned 27 times among 8 respondents. The issue often was linked to non-optimal materials management and non-existence of standardised material management activities and appeared when the respondents were asked about their opinion regarding the standard operation of material management procedure in the company.

"Ok, if I see what is here it is not well structured, I mean there is no SOP so the process flows just based on the ability of each individual for example if it has the ability in SCM or in User." (R5)

"Nothing that I am aware of. In planning we don't have Standard Operating Procedure (No SOP), everything just flows according to our technical experience" (R2)

The statements of No SOPs occurred in every scope of materials management and it was recognised either by the designated practitioner such as R2, R4 and R8 or by personnel from other department or function such as R3.

C. Incompetent Personnel

The keyword came up 17 times from 8 respondents. This keyword often appeared when people were expression the dissatisfaction of personnel performance due to ineffective execution and inability to perform the work that they were tasked to.

Following is the situation faced by the procurement person as R4 was asked for helping the user to determine the scope of work.

"All of them comes out of the sudden or sometimes unclear, for example they need items for certain activity but they don't know how much it is and instead they hand

it over to procurement to look for, which is not supposed to work like that.” (R4)

Another one was associated with behavioural that was referred by two statements from R7 below.

“But there are ones that are lazy (Incompetent personnel) and do irrelevant work and sometimes he is not there when we need him. I personally feel lack of support from the team.” (R7)

“I think it is behaviour, I think he is not that capable, the work is not satisfying (Incompetent personnel) I am now working alone more.” (R7)

D. Insufficient Integration of Information

This keyword was mentioned by 7 respondents with total mention of 13 times. The Insufficient Integration of Information can be interpreted as the absence of inclusive distribution of materials information throughout the chain causing incomplete or unavailable information to the people or functions that need such information in a timely manner related to the flow of materials.

“What I experienced, sometimes it is only based on the call informing that the material will come without giving exact time of arrival. The document available is only the delivery slip by the driver.” (R9)

“Interestingly I am always be the last person who get information on materials coming to site (Insufficient integration of information). Supposedly I have to be the one to be noticed because we need to prepare the tools for materials mobilisation such as forklift. And I usually get the information by WhatsApp because the utilisation of email is not really intense here.” (R7)

From R7 explanation, it is noticeable that the company was lacking in proper information distribution between departments which hindered the preparation for the handling of materials movement at the site.

E. No Materials Preservation

This was found to be mentioned 13 times among 7 respondents. This keyword was likely to be the root cause of defective and indecent materials found before performing the work due to the absence of materials preservation.

“Some materials are moving as the drilling activity moves but there are some of them that stay, the items that stay are just put like that, without one who preserves and looks after.” (R2)

“There is no such a thing and no preservation of materials

because it is not our responsibility, this should be included in material management person’s responsibility for the warehouse.” (R9)

During the interview, this keyword was mainly mentioned by the users concerning the preservation and lack of dedicated person to perform the job.

F. No Materials Quality Inspection

The quality inspection during receiving materials was found to be unavailable. This was mentioned 11 times by 7 different respondents.

“We have receiving but we don’t have quality inspection, so when personnel do the receiving, they never check what the materials are, whether it is correct or not, how the condition of the materials are” (R3)

“In here, it seems we don’t have one for such process (materials quality inspection). Supposedly, if we want to conduct procurement, we have to include the inspection, especially goods, but here even massive goods we don’t inspect because of time constraint requiring immediate use of materials” (R4)

Findings showed that this issue was consistently brought up by procurement team and field team were observed to be the clusters that they were asked about quality inspection in material receiving process.

IV. DISCUSSION

A. Lack of Quantity Control

In general, the lack inventory control represented the absence of inventory quantity monitoring has failed the company to achieve the objectives of inventory itself. The association made through the findings showed that lack of quantity control affects other chain of materials management including inaccurate materials data, materials planning, purchase, storing and even materials distribution.

Further implication of this leads to inaccurate inventory data that lead to the failure to keep the availability of inventory, monitor inventory levels and determine what levels the inventory should be maintained, when items should be replenished and how much the orders should be, as per objective of inventory system [10].

B. No Standard Operating Procedures

From the interviewees’ responses it was indicated that No SOPs led to people working based on experiences they knew indicating different approaches done among the personnel. The missing of standards led to variations

in materials management execution. These absences were observable in inefficient practice done by personnel creating some wastes such as redundancy in execution, extra motion in process execution, waiting time by personnel.

On the other hand, standardisation enables process stability whose objective is to establish a basis for consistency to further create a fundamental of true improvement. Having stable process also allows higher flexibility and ability to meet costumers' requests [2]. SOPs don't only serve as the basis of continuous improvement [13] in the company but also provide to reduce downtime and wastes, increase efficiency in operation as well as upgrade job satisfaction within personnel [8].

Therefore, it is important to have standard operation documents in the form of standard procedure, flow process and/ or standard work etc. as guideline to execute materials management. The deployment of these standards is not only able to create standardised and efficient practices but also serve as benchmarking baseline for continuous improvement due to standardisation of the practice [13].

C. Incompetent Personnel

The statements from interviewees show that Incompetent Personnel are related to capability of personnel in terms of behaviour and their deliverables when performing their responsibilities. The impacts of this issue created disadvantage to the involved stakeholders in the chain of materials management process, because of ineffective execution, irrelevant work or out of scope work being performed and as well as lack of support.

Competency of personnel is one of important aspects in materials management in which the framework runs in sequence, therefore the failure to recognise this issue in one activity of materials management will affect other activities as it creates a burden to carry by people or team in subsequent process.

Reference [4] also defined the incompetency as an inability to complete the job according to satisfactory standard created by employer, based on company's standard. The signs of incompetency include late submission of work, over budget, error and help required from others to complete the work [4].

D. Insufficient Integration of Information

Looking back to the findings on Insufficient Integration of Information from some of interviews, it showed that the lack of integrated system hurt the company because the significant amount of information that needs to be exchanged in supply chain of materials. It also seemed a

challenge to get the information of materials distributed to the people in departments where the data was needed. The indication of the absence and incomplete information conveyed by the interviewees created gap for people to take appropriate actions towards materials handling and control.

The issue was triggered due to the utilisation of technology that only informed several people in organisation, such as the utilisation of WhatsApp or call, here information would only be distributed or informed to a person in subsequent department instead of all people in all functions involved in materials management chain of supply. In other words, it required another effort or "duplication effort" to distribute the information to other persons/ departments involved in supply chain of materials management which showed the non-ideal integration system [6].

In addition to that, the practice in the company in utilising EDI (Electronic Data Interchange) was similar to 'inefficient integration' [6]. They described the situation where the companies were equipped with the tools to automate the flow information but they were not able to maximise the utilisation of the tools because the unavailability of standards infrastructure leading to excessive capital investment, redundancy effort, high requirement of personnel and support and lack of organisational flexibility.

Ideally, the data coming from automated sources (software applications, control systems, bar code readers, sensors, analytical instruments) and manual interactions, will be entered once then be accessible to any platform where it needs to be [6]. With that it was suggested that having automatization for high frequency routine data input and information flow transmitted complemented with standard formats should be incorporated [6].

E. No Materials Preservation

Maintaining the quality of inventory materials from it is received until it is distributed should be part of materials management. The failure to keep the quality will hinder the objectives of warehousing in providing the materials to deliver the materials in timely manner, provide cost minimisation of moving goods and materials quantity accuracy for execution [3], which also align with materials management objectives in right quantities, right time, right price, right source [12].

The identification in findings showed that the absence of materials quality management failed to maintain the inventory in good condition and did not serve well the costumers' interests. In this case, the objectives fell short because of the failure in delivering a timely costumer service due to defective inventory resulting in additional work and time for the user, the failure in minimising cost of

moving goods due to reselection materials, and the failure in facilitating communication with costumers because of inability to keep the quality of materials that created gap in between planning and execution.

F. No Materials Quality Inspection

In the interviews, despite of noticing the absence of materials quality inspection by some respondents, this keyword was also associated with things such as limited time between procurement and materials utilisation and lack of commitment by management.

In order to prevent undesirable quality of materials entering the inventory, quality inspection as part of materials handling that is conducted during receiving is needed.

The absence of materials quality inspection during receiving scope of storage and warehousing created ineffective and inefficient practices for warehousing activities. These activities were found to potentially be causes of user dissatisfaction about defective materials. Moreover, the absence of these activities results in unattainable objectives of warehousing, as the umbrella of materials handling, which includes the failure in delivering the materials in timely manner, providing cost minimisation of moving goods and materials quantity accuracy for execution [3].

Therefore, the absence of quality inspection during receiving also could indicate that defective materials might come from the absence of inspection instead of unimplemented materials quality management as a part of receiving process (as previously discussed), because both of process are laid out consecutively in the chain of materials management.

V. CONCLUSION

The implementation of materials management in Black Gold EP has been challenging. The issue on materials availability initiated this research to understand the contributing factors and come up with solutions of challenge. Therefore, to provide a clear guideline in achieving it, the research question was established: *What are the necessary solutions to improve materials management in the company?* Qualitative approach is incorporated throughout the process and found that there were 6 (six) materials management challenges in the company consisting of (i) lack of quantity control, (ii) no standard operating procedures, (iii) incompetent personnel, (iv) insufficient integration of information, (v) no materials preservation, and (vi) no quality inspection.

To build the solutions out of these root causes, 6 (six) were proposed solutions which included (i) deployment

inventory control system to support the function of inventory management that is defined as policies and control that monitor inventory levels and determine what levels the inventory should be maintained, when items should be replenished and how much the orders should be [10]; (ii) establishment of standards such as operating procedure, standard work, standard flow process, policy and standard measure (KPI) to achieve stability and consistency in activity thus further create the fundamental of true improvement for the company [13]. In addition to that, standards become part of quality systems which are important to organisation competitive benefit to achieve organisation objectives [2]; (iii) management of competency focused on the personnel to enhance individual's competences. This includes selecting, classifying, and assessing individuals, managing their careers, developing them, and appraising their performance [9]; (iv) implementation of proper tracking and visibility of information about the materials that are consistent, up-to-date, and accessible throughout the cycle of materials management to achieve a comprehensive value chain approach to materials management [1]; (v) determination of suitable preservation method and protection technology to enable the function of storage and warehouse management [11]; (vi) establishment of quality inspection process that records quality damage or discrepancy during materials receiving as part of storage and warehouse management where the received goods are verified against bill of landing and quantities, quality inspection and damage reporting [3].

Furthermore, to implement the proposed solutions, it is recommended to (i) prioritise standardisation/ simplification in varieties of purchased materials/ goods for the operation to create commonality in asset management that reduces the variety of materials and complexity of materials control/ inventory model; (ii) create contractual strategies for critical materials to adopt comprehensive value chain of company and suppliers and to maximise the value of the inventory materials; (iii) develop supply chain strategy involving the whole activities of materials management (planning, procurement, materials receiving, inventory management and storage/ warehousing) at early stage of project that involves all associated stakeholders to determine actions/ approach required for the foreseen and unforeseen events; (iv) apply continuous improvement by identifying the inefficiency and ineffectiveness in materials management practices to address root causes in materials management and achieve stability of company's operation based on pre-determined standard measurement (KPI); (v) engage stakeholders involved on the chain of materials management to gain their expertise an expectation as well as to educate them regarding materials management; and (vi) deploy technological software application to support the proper tracking

system which enables integrated information throughout the chain of materials.

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