

# INTEGRATION MODEL OF SUPPLY-CHAIN MANAGEMENT PERFORMANCE MEASUREMENT SYSTEM WITH ITS INTERNAL CUSTOMERS

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## Abstract

This paper aims to review, identify gaps, and propose a model of integrating Supply-chain Management (SCM) performance measurement with its internal customer's at PT ABD. In 2013, PT ABD missed its financial and production target. One of its operating units could not achieve its production target due to unavailability of critical materials for new wells to be put into service. On the other hand, SCM Team met its inventory level target by reducing the inventory level. The departmental and functional silos becomes a major barrier to company strategy implementation. Senior management realized the need for better performance measurement system. Organizational performance is more than the sum of its parts; individual strategies must be linked and integrated. SCM performance measure has different perspectives: strategic and tactical focus, cost and non cost, business process and financial. Successful SCM should use integrated measurement system as a vehicle to achieve its overall organizational goals.

**Key words:** Performance measurement system, Supply-chain management, Integration, Alignment.

## 1. Introduction

PT ABD is a major oil and gas partner in Indonesia and has been active for decades in Indonesia. It is the significant producer of Indonesia's crude oil. The data in this paper is real case data. Because of company's confidentiality, the name of the company in this paper is renamed as PT ABD.

### Sumatra Operations

PT ABD operates more than 10 fields in Sumatra. Additionally, PT ABD manages wharf, the final terminal for oil transport. The majority of its Sumatran production comes from 5 major fields. Part of its fields has been using tertiary technology to improve production.

PT ABD continues to implement projects designed to sustain production, increase recovery and improve reliability from existing reservoirs. On average, more than 260 wells are drilled in a year. Field development and drilling new wells are a key success factor for PT ABD to meet its financial and production target. Missing development and drilling target will directly impact its business performance.

## Supply-chain Management Team

Supply Chain Management Team manages aspects of physical distribution and materials management. It includes:

- Inventory management
- Transportation service procurement
- Materials handling
- Transportation operations management
- Warehousing management

## 2. Conceptual Framework

The environment in which the organizations nowadays operate is dynamic, and success depends upon meeting the changing needs of all stakeholders. An organization cannot build a self-centered performance measurement system. An organization needs to evaluate performance from an external perspective, listening to customers, and other stakeholders.

There are various Performance Management systems that try to overcome shortcomings of traditional measurement systems. The most widely adopted PM systems are the Balanced Scorecard - BSC (Kaplan and Norton 1996). The BSC is a tool used for describing, implementing and managing strategy at all levels in the organization. The BSC assists organizations in developing a better performance measurement system than one solely dependent on financial measures. There are several weak points of BSC: it does not express the interest of all stakeholders and lack of relationship quantification. Other system is The Performance Prism that was developed by a team of experienced researchers and consultants in PM area Neely, Adams, and Kennerley (2001). Performance prism builds on the strengths of existing measurement system on shareholder value and brings innovation based on free premises. In the first place, the organizations should think about the wants and needs of all of their key stakeholders as well as how to deliver value to each of them. Secondly, organizations have to harmonize and integrate strategies, processes, and capabilities in order to deliver real value to its stakeholders. Thirdly, the relationship between organizations and their stakeholders is reciprocal – stakeholders expect the fulfillment of their wants and needs on the other hand they have to contribute to organizations. Therefore the Performance Prism consists of five interrelated facets, i.e. Stakeholder satisfaction, strategies, Processes, Capabilities and Stakeholder contributions. There are several weak points of The Performance Prism: offer little about how the performance measures are going to be implemented and no sufficient link between the results and drivers. Other system is Integrated Performance Management System – IPMS developed by Dermawan Wibisono (2003). It relates performance of the shop floor to company strategy.

The frame proposed to solve the alignment and integration at PT ABD is an Integration model of Supply-chain management performance measurement system with its internal customers. It is a modified-IPMS, customized for the need of PT ABD. It introduces a Govern Council which has main function to align and integrate SCM performance measure with its customers. The proposed model is elaborated in section 7.2 in this paper.

### 3. Methodology

Methodology of this paper is presented in Figure 1 below.

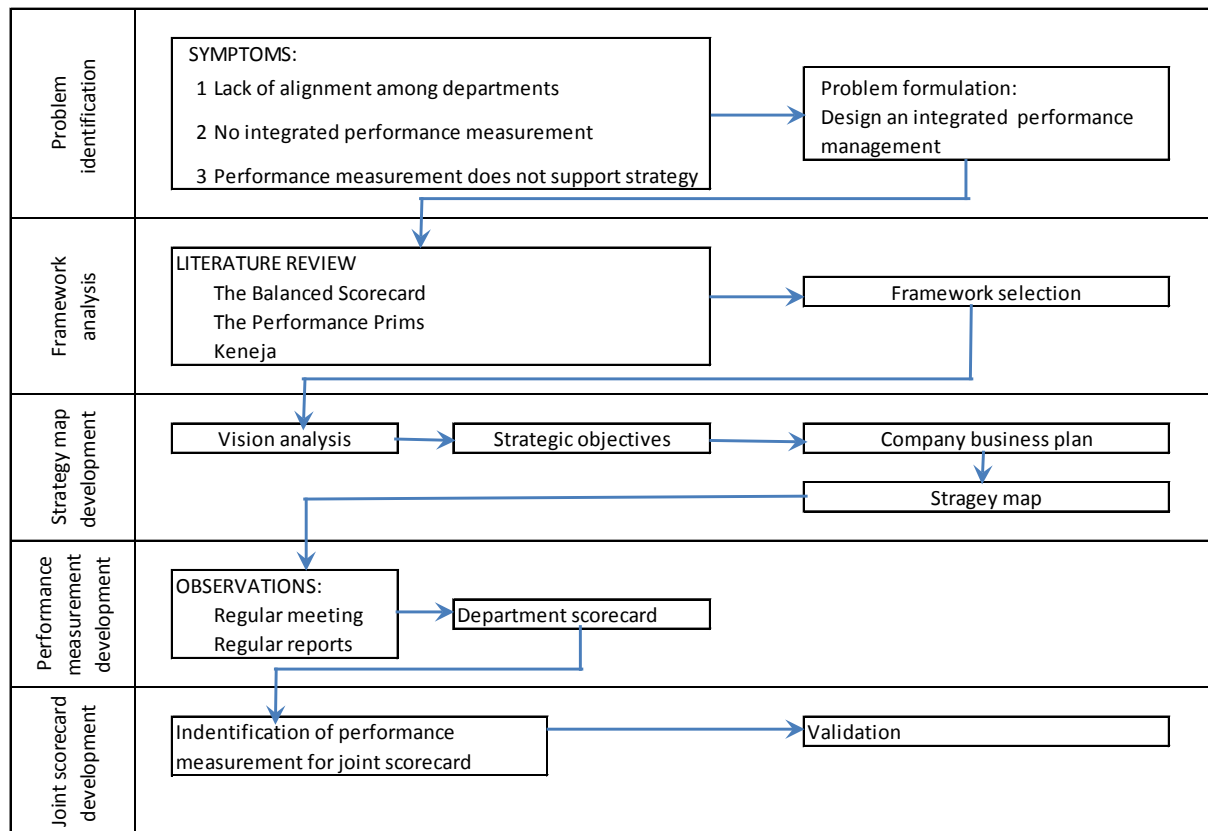


Figure 1 Research methodology <sup>1</sup>

1) Adopted from Wibisono D., Hoa Hong Mee, and Untea, Pungkas, “*Design of Corporate Performance Management System. Case Study at PT X in Indonesia.*”

### 4. Inventory Management

SCM Team manages aspects of physical distribution and materials management. Its vision and mission are as follows:

**Vision**

To be a reliable team which provides materials and associated services in respect of safety, compliance, and service level

**Mission**

Manage and provide materials required with the right quantity, quality, on time at any time, and associated services in a safe and efficient manner to all customers.

Each year, SCM collects material request/demand forecast for the following year. Users are requested to input their demand by submitting Material Usage Plan to SCM Team. The process is show in figure-2.

SCM Team reviews and analyzes the request. In reviewing the demand, SCM conducts validation and then develop a plan to acquire the material if the material is not available or the stock is less than the demand (see Figure 3).

In summary, Inventory Management process is as follows:

- Material requirements are communicated to SCM via Material Usage Plan (MUP).
- The MUP is developed by the user
- SCM loads the MUP data into MUP Tracking Tool.
- MUP Tracking Tool combines forecasted material needs with existing inventory data and provides information such as on-hand quantities, buffer stock levels, average demand, monthly demand, on-order quantity, etc.
- Inventory is evaluated on an ongoing basis with a 4-6 month outlook.
- The 4-6 month outlook represent the historical replenishment cycle time (total time to receive material following order date).
- The 4-6 month replenishment cycle is based on making releases against Blanket Purchase Agreements (BPAs).

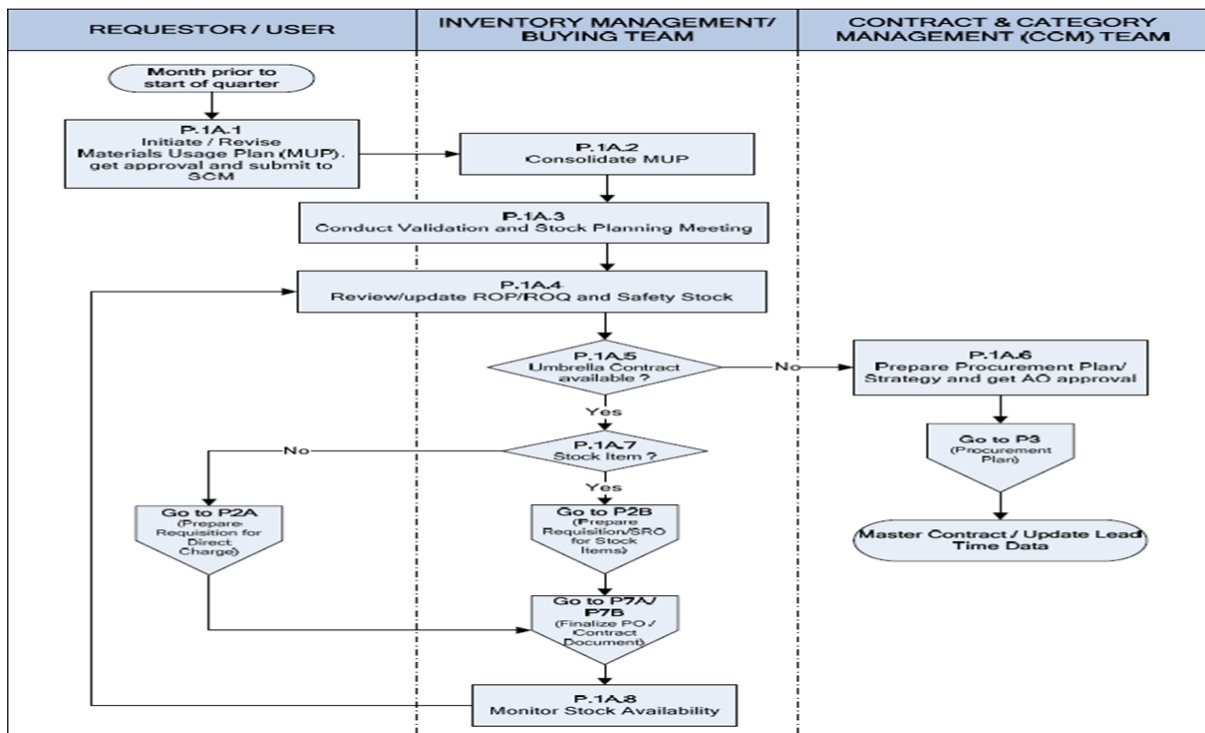


Figure 2. Material Usage Plan (MUP) Process Flow

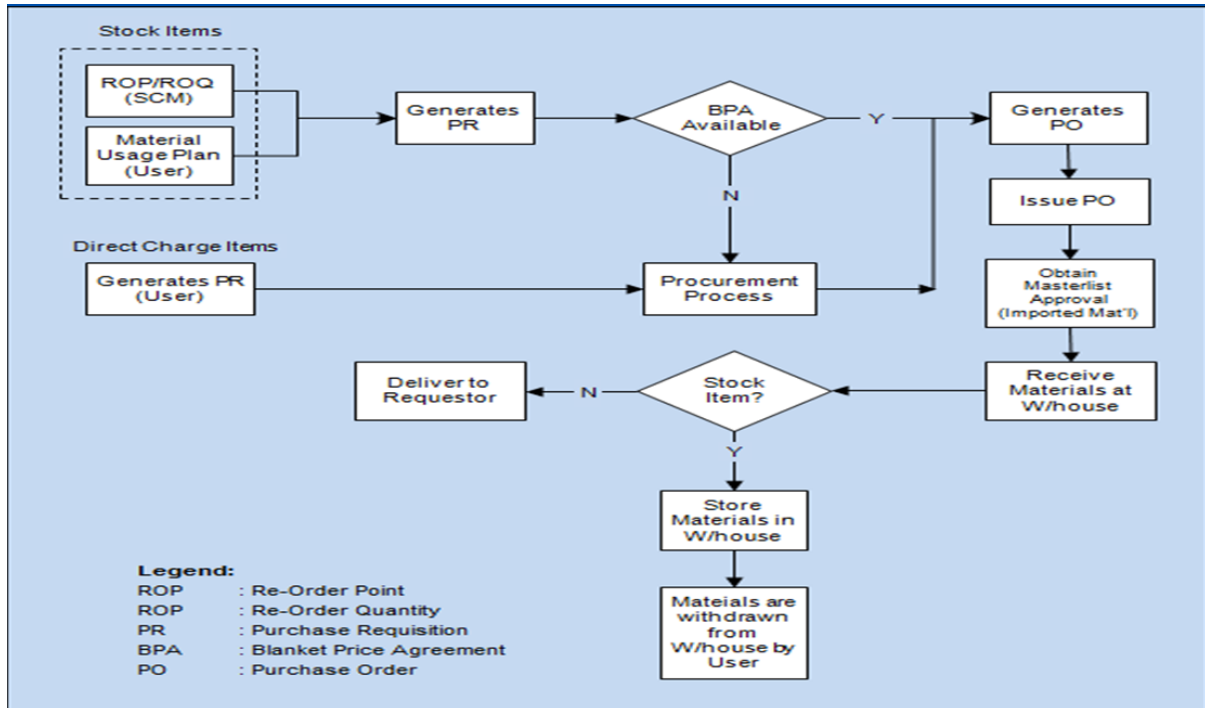


Figure 3 Material Order Process Flow

## 5. Findings

Inventory level is one of SCM key performance measures. SCM Team launched an initiative to reduce the inventory level to reduce the cost. The inventory level could be reduced from \$183 million in 2008 to \$111 in 2013 (see Figure 4).

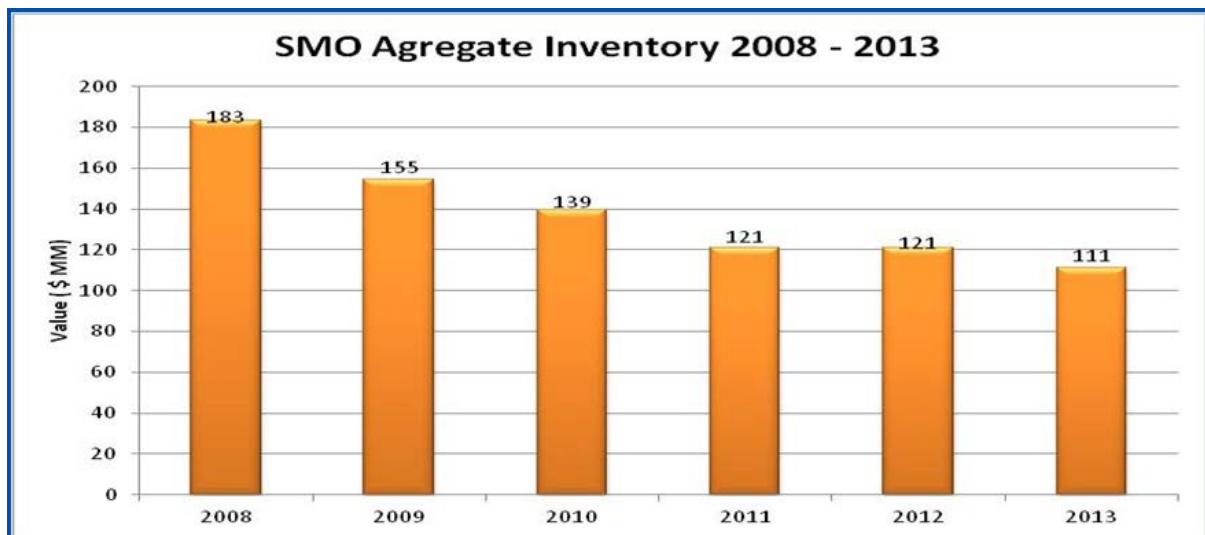


Figure 4 Inventory Level Reductions 2008 – 2013

However, the reduction impacted its users significantly. Sumatra Operations missed millions dollar of profit and cash flow target mainly because of fall short in putting into service new wells timely. Putting into production new wells timely is a key success factor in meeting its financial and production target. Number of new wells drilled met the target. However, part of

them could not be put into production (POP/POI) timely due to unavailability of pipes, valves, and fittings (see Figure 5)

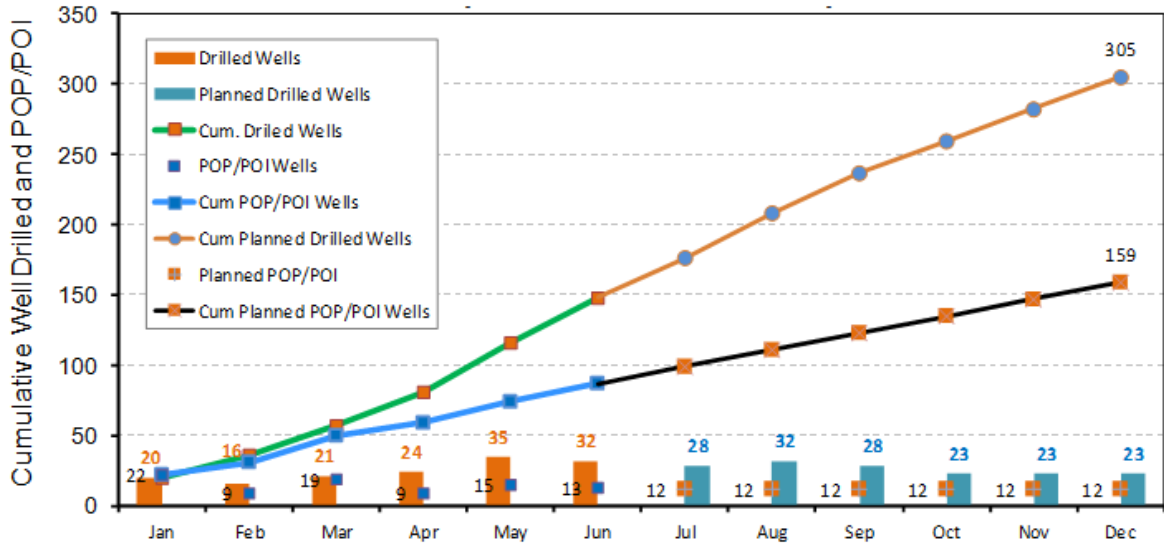


Figure 5 Put on Production and Injection (POP/POI) Target vs. Actual in 2013

As it is shown in the Figure 5, from 305 wells drilled in 2013, only 159 (52%) wells that could be put on production or injection (POP/POI). The impact was that Sumatra Operations lost on average 1,900 barrels/day opportunity in 2013 as shown in Figure 6. That was equivalent to the loss of revenue of \$70.7 million

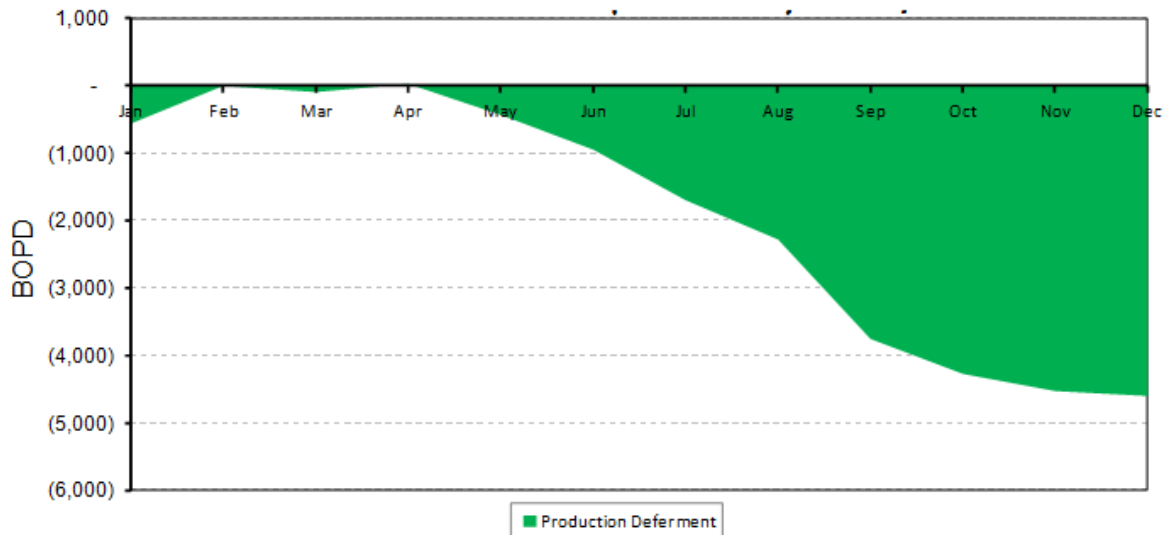


Figure 6. Production Deferment/Loss due to POP/POI Delay in 2013

The production impact did not stop in 2013, it also impacted 1<sup>st</sup> half of 2014 production performance.

## 6. Root Causes

### 6.1 Lack of Alignment between departments

One potential problem was due to lack of alignment between SCM and its users; specifically, the misalignment related to the impact of choices of material stock to be reduced.

As shown in Figure 7, from \$72 million inventory reduction, majority were Drilling & Completion and Well Program materials, whereas Drilling & Completion and Well Program materials accounted only 27% of total stock value. When there is a change that potentially impacts its main users/customers, SCM should discuss it with its customers and assess the potential negative impacts. It should not have been done unilaterally.

When SCM launched the initiative, it did not share it with its customer: which stock of materials that would be reduced and how to ensure the availability of critical materials.

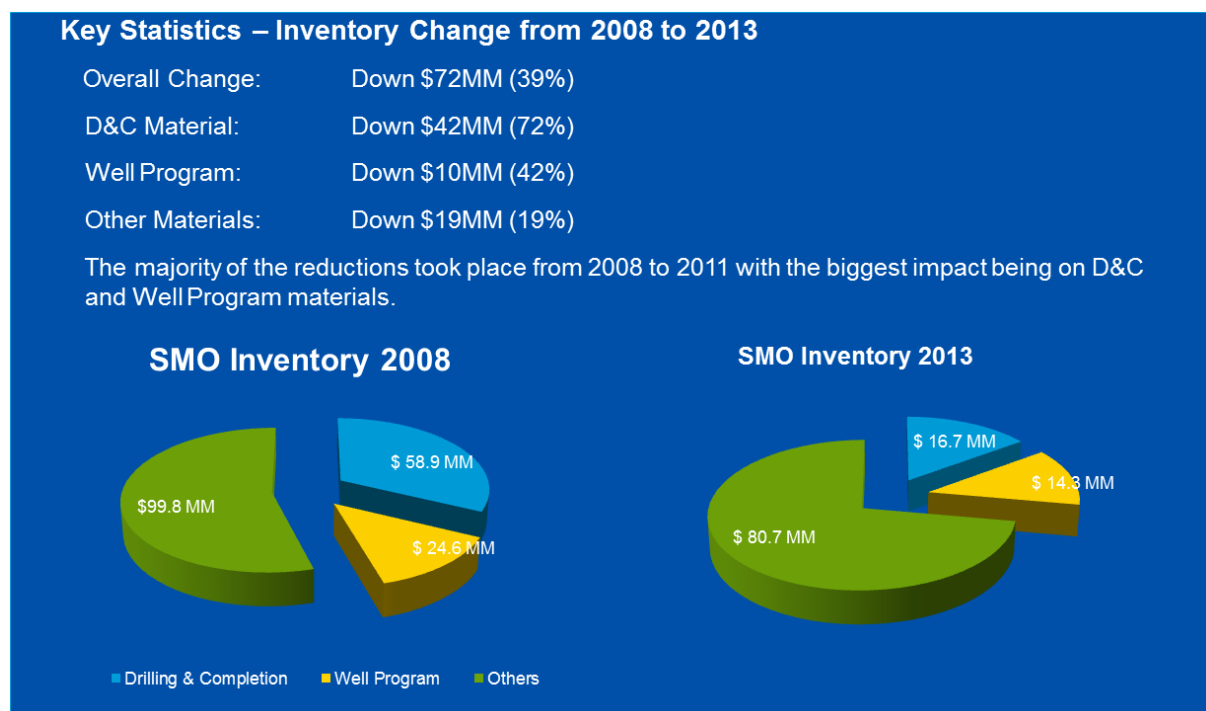


Figure 7 Inventory Level Changes by Category 2008 - 2013

### 6.2 No Integrated Performance Measures

SCM performance measures focus on cost: inventory level, turnover ratio, cycle time, etc. It is essential to have a thorough understanding of users' business strategy and value proposition before selecting appropriate metrics. It should answer the question: "How can we ensure that customers will deliver their plan?" On the other hand, as a main customer, Sumatra operation has performance measure which cost is the lowest priority compared to Safety, Compliance, and Production.

If a support/service department that supports users which have different priority performance measures order, the service department should include the metric of its main customer in its scorecard. It will share the success and the failure of the department achievement.

### 6.3 Performance measurement does not support strategy

PT ABD Strategy: Grow profitably by using our competitive advantages to maximize value from existing assets and capture new opportunities.

Among financial related performance measures, production has the biggest impact while cost has the least impact. Cost reduction initiative is commendable; however, the impact of the initiative to higher priority measures should be assessed, especially to production.

## 7. Proposed solutions

### 7.1 Develop Integration model of Supply-chain management performance measurement system with its internal customers

To have better alignment with its customers/users, an aligned and integrated performance measure needs to be developed. Figure 8 shows how the proposed model can help SCM align and integrate with its customer.

- Govern Council

Govern Council consists of Business/Operating influential leaders and SCM Leadership. The roles of the council are:

1. Drives strategy. Gives direction to and helps align supply chain strategy to be consistent with company strategy
2. Helps in removing barriers within the organization
3. Influences internal decision makers. Fosters internal buy-in from the business units
4. Ensures that the supply chain organization is involved in the early stages of planning and forecasting.

The Council should meet regularly, at least quarterly, to monitor the trend and to help SCM to be on track to support company strategy.

- Joint Accountability Performance Measures

The existing SCM performance measure focuses on cost (inventory level) while its primary customer performance measure focuses on production. To ensure that SCM serves its customers/users' requirement and to ensure that its customers also provide credible material demand and forecast, it needs to have joint accountability scorecard. For example, SCM final scoring can be as follows:

- SCM Final score = 75% Internal SCM score + 25%  $\sum$  key customers performance measures
  - Key customers performance measures can be weighted average of:
    - a. Project performance measure: Achievement of well put on production target
    - b. Operation performance measure: Achievement of equipment reliability target
- Customer Final score = 90% Internal customer score + 10% inventory level achievement



With such final scoring system, each party will be accountable for other team’s scorecard and will contribute to other team’s success. SCM will optimize (not minimize) its inventory level and users/customers will provide credible demand and forecast.

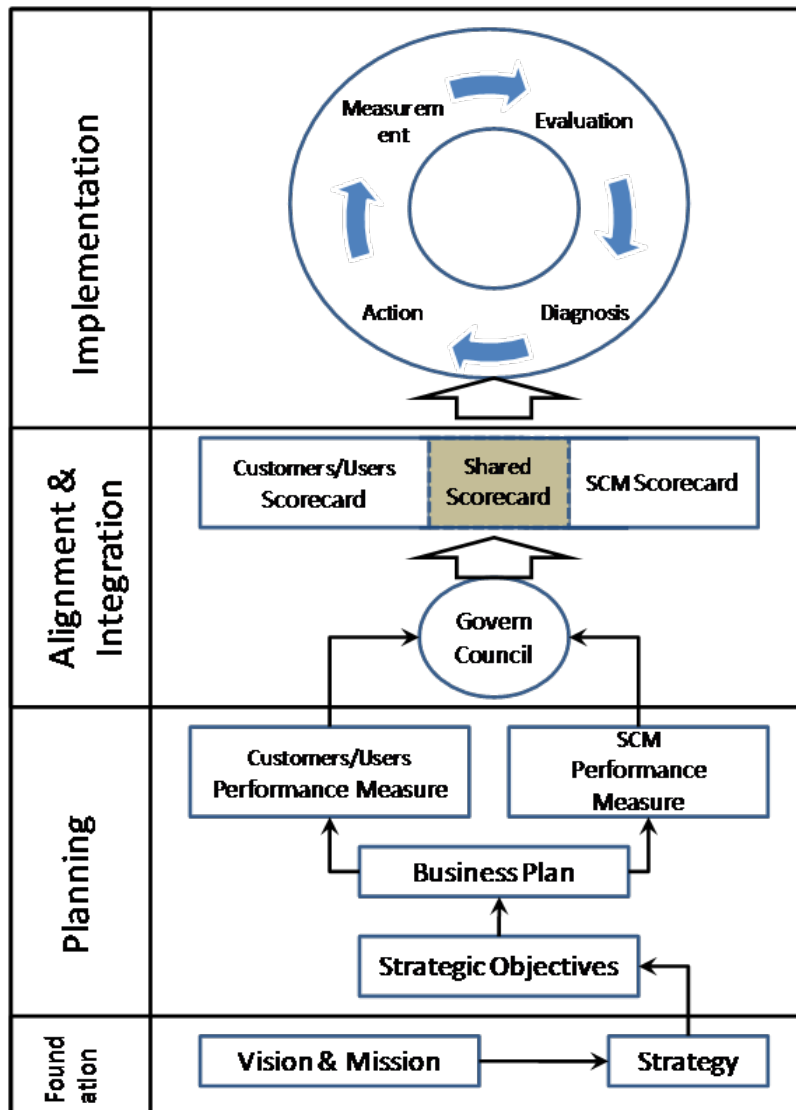


Figure 8 Integration model of Supply-chain management performance measurement system with its internal customers

### 7.2 Manage Total Cost of Ownership (TCO)

SCM Team needs to move away from looking inventory at just cost. It should more focus on value and instill Total Cost of Ownership (TCO) mindset.

$$\text{Total Cost of Ownership} = A + (O+T+M+W+E) - S + L$$

A = Acquisition Cost

O = Operating Costs

T = Training Costs

M = Maintenance Costs

W = Warehousing Costs

E = Environmental Costs

S = Salvage Value

L = Opportunity loss due to unavailability of critical materials

### 7.3 Separate the Critical Few from the Marginal Many

If SCM is adamant about measuring most of its materials, then the less critical materials should receive a basic management.

### 7.4 Develop Monitoring System

Most measurement systems are reactive in that they report what has happened, not what is likely to happen. As with a statistical process control system, an ideal measurement system would be able to “look ahead” to spot troublesome trends and non-random changes before it becomes out of control. An ideal system would notify supply chain managers of potential problems before the impact of those problems is even realized. The system would have predictive and early warning capabilities. In Addition, regular report and meeting with customer should be conducted.

## 8. Discussion

Organizations need to capitalize on Supply Chain Management capabilities and resources to bring products and services at the lowest possible cost, with the appropriate product and service features and the best overall value. Performance measures are important to the effectiveness of SCM. Organizations can no longer focus on optimizing their own operations to the exclusion of their suppliers' and customers' operations.

Fundamental processes of performance measurement according to Neely (2004) are the following.

- Measurement system design.
- Implementation.
- Managing through measurement and
- “Refreshing” the measurement system.

In ‘Measurement system design’, the challenge lies in choosing the right measures; it is identifying what an organization needs to measure so as to concentrate on what is absolutely vital. Most SCM scorecard focuses on cost of inventory. Unfortunately, cost of inventory does not always reflect the total cost of ownership (TCO). As shown in this case, PT ABD lost more than \$70 million opportunity because of misalignment between SCM and its customers. SCM launched an inventory cost reduction initiative without realizing the impact to its customers. Departmental silos become a major barrier to strategy implementation since most organizations have difficulty communication and coordination.

The proposed Integration model of performance measurement system will address the alignment and integration. The establishment of Govern Council which consists of Business/Operating influential leaders and SCM Leadership will ensure that SCM and its customers performance measure are aligned and integrated. With that, SCM will share the

success and the failure of the customer's achievement. The proposed system also facilitates continuous monitoring and communication during the implementation stage. It provides early-warning alert to the organization. Most measurement systems are reactive because it report what has happened. As with selection of appropriate leading indicators, Govern Council can look ahead to spot troublesome trends.

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