

# Designing Process Improvement of Order Fulfillment in an Indonesian Lubricant Company Using Business Process Reengineering Method

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## ABSTRACT

Order fulfillment is one of the core competencies which required by lubricant company. High coordination in order fulfillment, complexity of product portofolio, market and distribution, with limited resource in production and planning resulting company has not been able to meet the costumer demand for lubricants. This indicated by low performance of in full on time delivery in 2012 up to 2014. To improved order fulfillment performance, flow of internal information need to improved to be more effective & efisien. The focus of the study is to design process improvement order fulfillment process using Business Process Reengineering method. In the study, six scenario improvements are built using Oracle BPM software. From all scenarios, scenario numer six showing the best result, this scenario reduces order fulfillment time by 44% to 5 days and 17 hours, with performance increasing from 61% to 97%.

**Keywords:** Business Process Reengineering, Information Systems, Business Process Simulation, Supply Chain Management, Order Fulfillment.

## 1. Introduction

Lubricants industry is one of the growing industries in the world. In 2011, total volume of lubricant is predicted at 274.060 KB growing at 2% compared with 2010. The total volume is predicted will increase to 280,000 KB in 2020. Asia is the largest market for lubricant industry. Asia has volume contribution at 42% in 2010, and predicted to keep growing to 48% by 2020 (Kline & Company, 2012). High volume of lubricant market creates a high level of competition in the industry, which currently is dominated by three companies (contributing 31%), Shell, ExxonMobil, and Castrol (Kline & Company, 2012).

The market potention of lubricant industry in Indonesian and high competition, make a lubricants company needs to have strong competence to meet customer demand, and order fulfilment is one of the basic requeriment for this Industry. It is important for company in lubricant industry to accelerate order fulfilment time and improve the performance of order fulfilment process.

## 2. Literatur Review

Order fulfillment is part of supply chain management process. The study use business process reengineer method, to improve

order fulfillment performance.

### 2.1 Supply Chain Management

Supply chain is a series of organizations, facilities, functions, and activities which involve the production and delivery of goods and services (Stevenson & Chuong, 2010). Jacobs defines supply chain as a process that removes material and information to production and service processes of a company (Jacobs, 2011). Supply chain management (SCM) is a strategic coordination of business functions within an organization in the supply chain that aims to integrate supply and demand management (Stevenson & Chuong, 2010).

The purpose of SCM is to provide a flow of quality, relevant information that allows the supplier to provide the movement of materials to customers in a timely manner and without any interruption. There are five main processes in supply chain management (Jacobs, 2011), planning, sourcing, making, delivering, and returning.

### 2.2 Order Fulfillment

Order fulfillment one of the key to increase customer satisfaction with ensuring delivery time, delivery quantity, and quality of product is as per requested by the customer. Yousef Amer in his research defines order fulfillment is part of the eight core processes in SCM (Amer, Luong, Lee, & Ashraf, 2008). Order fulfillment not only refers to the provision of customer request (order and agreed time), but also involve back office operations, such as packing, shipping, accounting, inventory management, and delivery. It is also strongly associated with the operation of the front office, or activities related to dealing with customers, advertising, and customer orders.

### 2.3 Business Process Reengineering (BPR)

Business process is a series of related work to achieve corporate objectives, the process of which there are two characteristics that have customers and interconnected between divisions (Davenport & Short, 1990). Business Process Reengineering (BPR) is a philosophy of performance improvement with rethink and redesigns the business processes (Hammer & Champy, 2001).

### 2.4 BPR Method

There are various methods in BPR, in several research journals also discussed the advantages and disadvantages of the methodologies developed at this time.

- Hammer / Champy (Hammer & Champy, 2001).

- Davenport dan Short (Davenport & Short, 1990).
- Process Analysis and Design Methodology (PADM) (Wastell, White, & Kawalek, 1996).
- Obejct Oriented BPR (Martín & Cechich, 2003).
- Muthu, Whitman, dan Cheragi Method (Erkan, 2009).

### 3. Reseach Methodology

In this study, there are five steps of BPR that is being used: Prepare for Engineering, Map and Analyze AS-IS Process, Design TO-BE Process, Reengineered Process, and Improve Continuously. Prepare for engineering is the identification main process to be redesigned. The second step, Map and Analyze AS-IS Process, is the mapping of initial state of order fulfillment process, Data Flow Diagrams (DFD) and IDEF 0 is the business process mapping technique that is being used, the current process of AS IS is being analyze further. The third phase is to map the improvement process: TO-BE Process. TO-BE process is design by removing non-value added activities, create automatic replenishment of order fulfillment, and create improvement process of local production and imports product planning. The fourth step is develop reengineered process and implementation plan. And the final stage Improve Continously applied to the new process of order fulfillment has been built. The results BPR stage will be simulated using Oracle BPM software. Simulation of the AS-IS and six scenarios of TO-BE processes will be compared in terms of processing time, and the performance in order fulfillment.

## 4. Result

### 4.1 Prepare for Reengineering

At this stage, observation and interviews are conducted to determine the business process which will be main object of research. Order fulfillment process is selected due to below reasons:

- The Company has not been able to meet the demand for lubricants with either indicated by the low in full on time delivery in 2012 until 2014.
- The flow of internal information in order fulfillment process is not effective as indicated by the frequent occurrence of miss communication between divisions in order fulfillment.

### 4.2 Map and Analyze AS-IS Process

From interviews and observations that conducted, order fulfillment process consists of:

1. Receiving order from distributor.
2. Checking credit status.
3. Checking the stock availability in warehouses 1 and 2 warehouse.
4. Loading and delivery product.
5. Invoicing and payment.

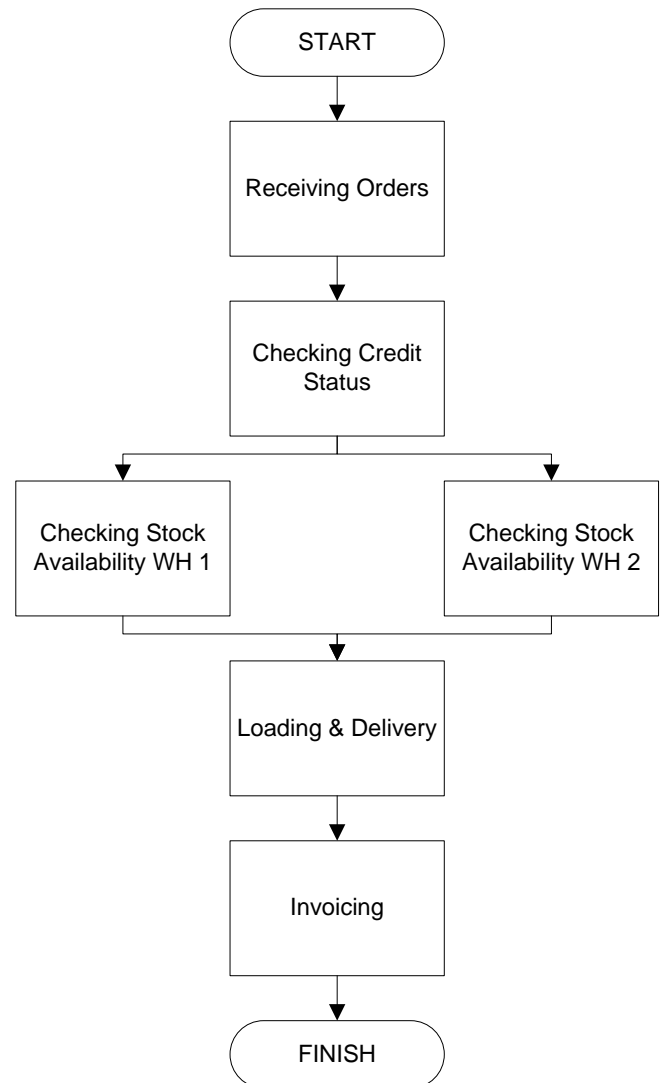


Figure 1 Order Fulfillment Process

### 4.3 Design To-Be Process

Root cause analysis is conducted to find the main issues of order fulfillment. There are six main issues from current process:

- [1] Only one person in operational and planning role.
- [2] Local and import production planning is calculated manual using Microsoft Excel.
- [3] PO from distributors comes at the last week of the month and not aligns with stock holding and production planning.
- [4] Uneffective flow of process and sub-process in order fulfillment.
- [5] Local and imports production planning calculated in monthly buckets.
- [6] Limited delivery capacity at the end of the month.

There are four strategies that are reviewed for order fulfillment issues:

- Deleting or combining non-value added activities [4].
- Creating automatic replenishment purchase order

from distributors based on real time stock position at distributors and minimum order quantity (MOQ) [3,6].

- Crease local and import planning system which integrated with distributors replenishment and forecasting systems in weekly buckets and daily bucket [2,5].
- Additional resources for planning [1].

To implement above strategies, there are business requirement that are needed from company. Detail of the business requirement is describe on below sub bab.

#### 4.2.1 Non Value Added Process Elimination

This stage identifies non-value added processes that need to be eliminated order fulfillment. The elimination of non-value added activities create changes in sub-process flow of order fulfillment.

#### 4.2.2 Creating Automatic Replenishment System for Distributors

Automatic replenishment is build as Vendor Managed Inventory (VMI) systems. In VMI suppliers or manufacturers will make supply decisions for distributors. Producers will monitor and control the distributor inventory, and make periodic decisions about ordering, delivery quantity, and delivery time. VMI will improve coordination with distributor trough data integration.

#### 4.4 Reengineered Process

Reengineered process is the implementation of improvement business processes. Authors will submit the project implementation to the company. In this regard company need follow below requirement:

- Provide training for new order fulfillment system.
- Documented the new business processes into standard operating procedure (SOP) and socialize to all employees.

#### 4.5 Improve Continously

At this stage of process, Key Performance Indicator (KPI) is designed to monitor performance of order fulfillment in the new system; targets for order fulfillment are also set to be able to improve performance of order fulfillment.

#### 5. Analysis

Current AS-IS process is not running effectively and efficiently, this indicated by the long process time of order fulfillment. AS-IS total process time is 10 days and 6 hours with ability to meet in full on time delivery is at 61% rate. In improvement process (TO-BE), order fulfillment process improved to 5 days and 17 hours, with performance in full on time delivery at 97% rate. Six scenarios improvement are developed and simulated in Oracle BPM. In scenario one non-value added activities are eliminated and probability of having the product increase to 74%. In scenario two non-value added activities are eliminated; production planning process and credit checking process are improved, probability of having the product ready increase to 90%. In scenario 3 non-values

added activities are eliminated, production planning process and credit checking process, and MOQ checking process are improved; probability of having the product ready increase to 90%. Scenario 4 non-values added activities are eliminated, production planning process and credit checking process, and MOQ checking process are improved; replenishment requirement for the next two weeks probability of having the product ready increase to 92%.

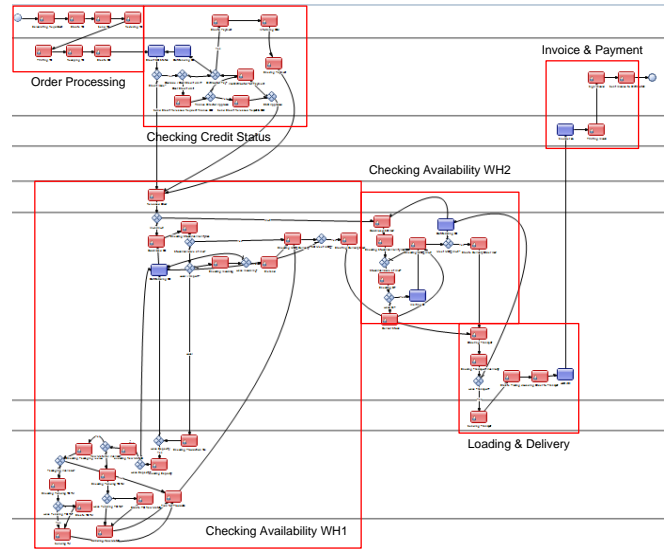


Figure 2 AS IS Process Order Fulfillment

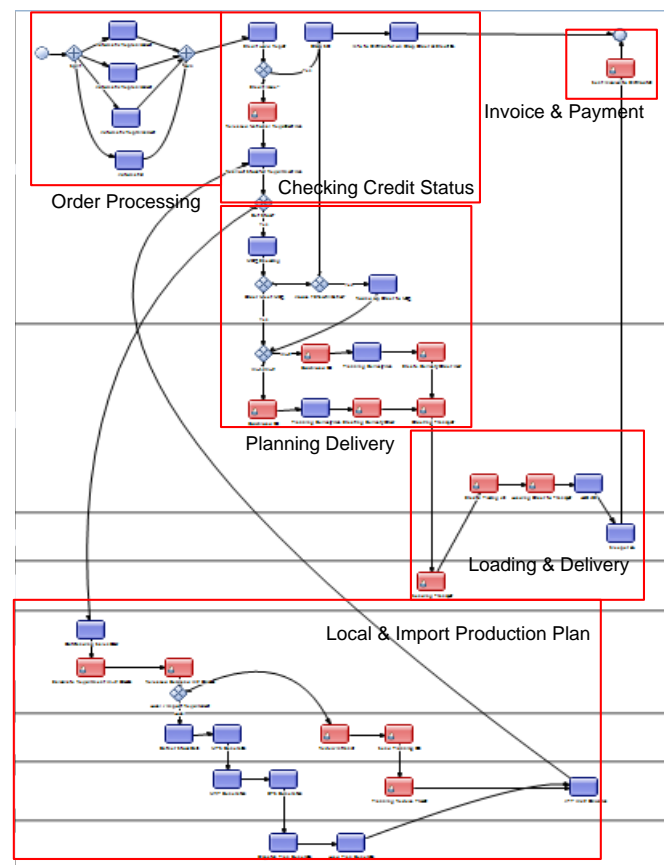


Figure 3 TO BE Process Order Fulfillment

Scenario 5 non-values added activities are eliminated, production planning process and credit checking process, and MOQ checking process are improved; replenishment requirement for the next three weeks, probability of having the product ready increase to 94%. Scenario 6 non-values added activities are eliminated, production planning process and credit checking process, and MOQ checking process are improved; replenishment requirement for the next four weeks, probability of having the product ready increase to 96%. Comparison of each scenario is shown in Table 1.

**Table 1 Comparison of Simulation Results**

Scenario	Days	Hours	Performance
ASIS	10	6	61%
Scenario 1	7	18	68%
Scenario 2	6	15	74%
Scenario 3	7	2	87%
Scenario 4	6	7	91%
Scenario 5	5	19	94%
Scenario 6	5	17	97%

Scenario 6 showing the best result of total process time for order fulfillment (5 days and 17 hours), and performance rate at 97%. There are four improvement step that needs to implement in the company:

1. Elimination of non-value added activities. Detail shown at Table 2.

**Table 2 Elimination of Non Value Added Activities**

Activities	Average Time	Standard Deviation	Decision on Processes
Calculating requirement	2 days	1 day	Process will be eliminated and replaced with automatic replenishment
Creating PO	1 day	6 hours	
Sending PO via email	15 minutes	5 minutes	
Receipt email PO	6 hours	3 hours	
Preparing reports PO received	15 minutes	5 minutes	
Checking type of credit	15 minutes	5 minutes	Process will be eliminated by revisit distributors credit limits
Request of release order to to financial director	1 day	6 hours	
Request of the release order to director of sales	1 day	6 hours	
Request of release order to credit analyst	1 day	6 hours	

Checking production plan	15 minutes	5 minutes	Process will be eliminated, production planning process local and import will be automated and integrated with order replenishment
Checking production capacity	30 minutes	10 minutes	
Checking raw materials	30 minutes	10 minutes	
Checking PO raw materials pending	30 minutes	10 minutes	
PO creation of raw materials	1 hour	30 minutes	
Delivery of raw materials	90 days	45 days	
Checking the packaging material	30 minutes	10 minutes	
Checking pending PO packaging materials	30 minutes	10 minutes	
PO creation of packaging materials	1 hour	30 minutes	
Delivery of packaging materials	7 days	2 days	
Production planning	7 days	2 days	Process will be eliminated and replaced with integrated DRP process
Checking the incoming of imported products	30 minutes	10 minutes	
Checking product intransit	15 minutes	5 minutes	
Request product	30 minutes	10 minutes	
Delivery of products	4 days	1 day	
Checking delivery MOQ	30 minutes	10 minutes	
Creating the delivery order	10 minutes	5 minutes	
Booking transport	1 day	1 day	
Checking availability of transport	1 day	6 hours	
Printing invoices	1 hour	30 minutes	
Signing invoice	1 day	6 hours	Process will be eliminated and replaced with online invoice system
Sending invoice the distributor	2 days	1 day	

2. Improve production planning process. Production planning is improved by using automatic calculation and integrated of data between productions planning, order replenishment, and stock replenishment, raw material and packaging material replenishment.
3. Improve credit checking process. In AS IS process, order free of credit hold and order with credit hold both will get product allocation based on their order. Current process will increase the potential out of

stock. In scenario six, credit checking process is done right after the order calculation is done, and the order can not be released will be issued in the system as unpotential order. Reusing, in the improvement process product will not be allocated in the wrong order.

4. Improve MOQ checking process. At this stage, checking MOQ and delivery is simplified and calculate automatically. Orders that do not meet the MOQ requirement will be issued as unpotential order so the orders will be taken out as not to bind existing products to other orders.
5. Replenishment Vendor Managed Inventory (VMI). VMI will calculate requirement from distributors in the current month. At this stage in full ontime delivery performance is increase to 97%, with average order fulfillment time improve to 5 days and 17 hours.

## 6. Conclusion

Initial order fulfillment processes (AS-IS) in the company is considered not effective and efficient. This is indicated by the long process time of order fulfillment to complete order requirement from distributor. AS IS average process time currently at 10 days and 6 hours, with order fulfillment performance rate to deliver ontime and in full request at 68%. Six scenarios of improvement were simulated by using Oracle BPM software, scenario 6 showing the best improvement result of order fulfillment. Scenario 6 reduces order fulfillment process time by 44% to 5 days and 17 hours, with increase performance to 97%. There are five steps that need to conduct in scenario 6: elimination of non-value added activities, improve production planning process, improve credit checking process, improve MOQ checking process, and automatic replenishment for four weeks requirement.

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