Supply Chain Framework at the Rubber Company with a Profit Sharing approach in ensuring Material Availability

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Abstract. This research was conducted in rubber factory in Indonesia. Today, businesses need a more efficient supply chain that is able to resolve complex challenges in the present. This research is aimed at increasing the company's competitive advantage by designing supply chain framework with profit sharing system to ensure material availability. This research is conducted by using data reduction method in determining quantitative data for input Stream Value Mapping and Supply Chain Management. Determination of rubber material purchase price is done by using the average trend of rubber price so that the purchase of rubber material is done flat. In order to create trusts in the supply chain, profit-sharing systems are used so that suppliers will supply the right, consistent quantity, quality, and timing of delivery. The results obtained supply chain frameworks are better able to ensure process efficiency and material availability. If applied, this framework will save up to 29.17% processing time.

1. Introduction

In its development, the industrial world especially in the field of manufacturing is very dependent on one aspect of production that is raw materials, the availability of raw materials become one of the important factors and also become one of the fundamental aspects of the company in carrying out production activities and financial management. In this case the supplier is very important in the process of procurement of raw materials [1-3].

Supply chain management has gained more attention from the business world because of its interdepartmental integration aimed at minimizing the overall cost of the system [4]. The study conducted by Wu Lifang mentioned that the need for more efficient business processes and able to respond quickly to the increasingly complex supply chain conditions [5]. A tried model is composed by Duarte which combines relationships between various parties related to [6].

Rubber companies have special characteristics such as material, material availability, competition with other factories [7]. Inconsistency resulting from unpredictable supply causes supply to be inefficient, so a supply chain design is needed to ensure it [5]. In this research, we will use Supply Chain Management.
(SCM) method in system design (framework) between supplier and factory to solve the raw material availability.

2. Method
In preparing the supply chain framework in the rubber industry, data reduction methods are used to obtain quantitative data so as to provide an overview of possible improvements. The steps taken in carrying out this research are: [1, 8]

1. Paper review
   In this state, descriptive research is carried out on references and articles in the draft discussion of the supply chain framework.

2. Creating draft framework
   After obtaining adequate information, drafting a supply chain framework is made possible in the rubber company.

3. Focused Group Discussion (FGD)
   At this stage, FGDs are carried out with top-level management of rubber companies so that information can be obtained such as the time needed in the documentation process, manufacturing, to delivery to distributors. To facilitate understanding, this stage is mapped in value stream mapping (VSM) so that it clearly shows the sequence of processes carried out in terms of material flow, information flow, and financial flow.

4. Data Collection
   At this data collection stage, quantitative and qualitative data are collected. Quantitative data obtained for example is processing time data, ordering costs, storage costs, number of material, efficiency and effectiveness of the process at each stage through. Whereas the qualitative data obtained are historically competent supplier information, ability to supply, material flow, financial and information on existing conditions.

5. Framework Design
   The framework is designed with consideration of the information that has been obtained in the previous step to obtain the proposed framework that results in better process efficiency.

6. Analyze
   Analyze the framework obtained by considering the material, information, and financial aspects of the flow. At this stage, provide notes where there is a risk during the stages in this supply chain. This will be an input in the preparation of cooperation contracts with suppliers and distributors.

7. Design Contract in term of Supply Chain
   At this stage, designing the required contract framework is required so that some of the risks identified in the previous step can be mitigated.

8. Evaluation
   A block diagram showing the stages of the work in building the supply chain framework can be seen in Figure 1.
3. Result and Discussion

The activities mapped in terms of rubber companies consist of rubber material purchasing activities, material preparation, the initial rubber production process, rubber drying, final production, and packaging, and sales activities to distributors. It is mapped to the existing condition and the design obtained after the repair is done. Value Stream Mapping for actual conditions can be seen in Figure 2 and the design of supply chain framework can be seen in Figure 3.

![Block Diagram in Developing Framework](image1)

**Figure 1.** Block Diagram in Developing Framework

![Existing Value Stream Mapping in Rubber Company](image2)

**Figure 2.** Existing Value Stream Mapping in Rubber Company
As shown in the pictures above, we can see that in the designed framework for supply chain, there are no changes in the production process. The changes are in the time needed for supplier to supply and time needed for the manufacturer to supply distributor. When supply chain framework is applied, in the supplying side, there’s reducing process in purchasing, bidding, and bidding acceptance. This is because suppliers selected based on the best competencies have historically been fixed within a specified interval (minimum of one year) at mutually agreed prices. Determination of rubber material purchase price is done by using the average trend of rubber price so that the purchase of rubber material is done flat. It will cause no longer a long administrative process as can be seen in Table 1.

### Table 1. Change of Material Flow Activity for supplying material.

| Activities              | Time needed (hours) | Before | After |
|-------------------------|---------------------|--------|-------|
| Inform Purchasing       | 4                   | ✓      | ✗     |
| Bidding process         | 12                  | ✓      | ✓     |
| Bid acceptance          | 8                   | ✓      | ✓     |
| Purchase Order issue    | 24                  | ✓      | ✓     |
| Material logistics      | 48                  | ✓      | ✓     |

On the sales side, with this supply chain framework will cause the manufacturer to supply the amount required by the distributor at a price level that has also been agreed flat (flat price) within a certain time interval (minimum of one year) thus causing reduced activities that are not needed in market their products as can be seen in Table 2.

### Table 2. Change of Material Flow Activity for product sales.

| Activities         | Time needed (hours) | Before | After |
|--------------------|---------------------|--------|-------|
| Sales information  | 72                  | ✓      | ✗     |
| Sales input        | 12                  | ✓      | ✓     |
| Sales confirmation | 48                  | ✓      | ✓     |
| Sales Order        | 12                  | ✓      | ✓     |
| Sales Deal         | 12                  | ✓      | ✓     |
| Delivery confirmation | 84              | ✓      | ✓     |
| Material logistics | 240                 | ✓      | ✓     |
Based on Table 1 and Table 2, it can be seen that the savings from time side is 29.17% because some non value-added activities can be eliminated. Cooperation contracts related to supply chain framework is very necessary to be prepared because some aspects need to be supported by suppliers and distributors as in terms of quantity, quality, and delivery time. This includes the profit sharing that will be carried out must also be ensured so that all parties involved in the supply chain can be approved.

For further research, it is necessary to calculate the total cost of supply chain. In addition, a mature contract design is needed so that the supply chain framework can be run better. Thus, in terms of costs and operations will be more visible impacts generated before and after running the supply chain framework in question.

4. Conclusion
The results obtained supply chain frameworks are better able to ensure process efficiency and material availability. If applied, this framework will save up to 29.17% processing time.

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