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Supply Chain Digitalization Strategy for Coconut Shell Charcoal to Reduce the Risk of Loss in International Trade

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Abstract

International business involves trade activities conducted between countries. To ensure the production of the best products, a company must have effective supply chain management. Digitalization is being widely adopted as a solution to address the challenges in international trade, keeping pace with technological advancements. This research aims to analyze the financial risks arising from the effectiveness of supply chain management in a company that produces coconut shell charcoal, utilizing digitalization. The research methodology includes a literature review, drawing data from various expert sources and readings. The findings of this research identify the challenges faced by coconut shell charcoal companies in their international supply chains and propose digitalization strategies to minimize financial risks. The results demonstrate that leveraging digital technology can enhance operational efficiency, reduce logistical barriers, and improve responsiveness to market demands. Implementing digitalization strategies offers significant benefits by enhancing overall company performance and customer satisfaction levels.

INTRODUCTION

In the era of globalization and evolving international trade, international business has become strategic and crucial for companies to expand their market reach and increase their profits. However, international trade also brings significant challenges, especially in terms of supply chain management. The differences in distance between countries, trade regulations, and high risks in the international trade process can hinder operational efficiency and cause financial losses for companies. It is important for companies to gain profits and minimize losses in the process of international trade.

Companies involved in international trade must face various potential losses if their supply chain management is not appropriate. These losses include high costs in logistics processes, inefficient inventory increases, delayed product deliveries, customer loss, and decreased company profits. Therefore, it is important for companies to implement the right strategies in supply chain management to minimize potential loss risks. (Steve, 2020)

One approach that is being developed to address challenges in the supply chain is the utilization of digitalization. Digitalization is a key element in supply chain management in the era of the global economy. This technology can help

improve visibility, efficiency, and collaboration throughout the supply chain, leading to cost reduction, improved customer service, and increased competitiveness.

This research focuses on companies that produce coconut shell charcoal and are involved in international trade. The supply chain of this company faces specific challenges, including geographical distance differences, complex international trade regulations, and high risks in the international trade process. Therefore, this research aims to determine the appropriate digitalization strategies in the supply chain process of this company, with the goal of minimizing potential loss risks.

With this background, this research holds significant relevance in the context of international business and provides an important contribution to the development of effective supply chain strategies with the utilization of digitalization. It is hoped that this research can provide answers for companies to enhance their supply chain management, optimize operations, and reduce loss risks, thereby achieving better company performance.

RESEARCH METHOD

The research method used in this study is a literature review, where the author conducts a study, review, and analysis of relevant literature from various written sources such as books, scholarly journals, previous research, and other academic sources. This approach helps the author develop theories or research hypotheses that are relevant to the research objectives. The data used in this study are obtained from the literature sources.

RESULTS AND DISCUSSION

Supply Chain Management (SCM) in Coconut Shell Charcoal Companies

Supply Chain Management (SCM) is an integrated approach to plan, execute, and control the flow of goods, information, and resources from the beginning to the end in the supply chain of a coconut shell charcoal company.

Figure 1. Supply Chain Management Flow
Source: Kledo.com

In supply chain management, a Coconut Shell Charcoal production company can undertake several stages, starting from product specification, the incoterm used, and so on.

A. Procurement Process

To obtain high-quality goods, a company needs to determine suppliers that meet the specified product requirements and industry standards. Here are several specifications suitable for the produce of coconut shell charcoal.

Tabel 1. Coconut Shell Specifications

No	Characteristic	Value/Indicator
1.	Shape	Cube
2.	Size	2,5 x 2,5 x 2,5 cm
3.	Weight	1 kg/piece
4.	Moisture Content	7%
5.	Ash Content	2 - 2,1%
6.	Fixed Carbon Content	16-17%
7.	Ignition Time	2 minutes
8.	Combustion Time	5-6 hours
9.	Ash Color	Light gray

Based on the product data above, it can be explained that this coconut shell briquette charcoal has good standards and meets customer needs. This charcoal is made from genuine coconut shells, has good size standards, low moisture content, and high fixed carbon content.

B. Product Production Process

In this process, the company is required to determine all product production processes starting from the preparation of raw materials, namely coconut shells, so that they are produced with a certain method to become quality charcoal, including also the calculation of costs that will be incurred during the production process. The method commonly used in the production process of coconut shell charcoal is the pyrolysis method.

Here are the production processes that are carried out:

a. Drying
   Fresh coconut shells have a high moisture content, about 60-70%. This high moisture content will make the carbonization process difficult. Therefore, coconut shells need to be dried first until the moisture content reaches about 10-15%.
b. Carbonization
   Dried coconut shells are then placed in a pyrolysis furnace. This furnace has a controlled temperature, about 1000 degrees Celsius. The carbonization process will take several hours, depending on the size of the coconut shells.
c. Compression
   The charcoal produced from the carbonization process is then ground into powder. The charcoal powder is then pressed into briquettes using a press machine.
d. Drying
   The briquettes that have been pressed are then dried again until the moisture content reaches about 10-15%. This drying process is intended to remove any residual water that is still contained in the briquettes.

The pyrolysis method is the most commonly used method in the production process of coconut shell briquette charcoal. This method produces briquettes with high quality, namely having high carbon content and low moisture content.

Calculation of the Cost of Goods Sold (COGS) of Coconut Shell Briquette Products

Next is the process of calculating the costs incurred by the company in the production process for one month in order to meet the sales target of 1000-1500 tons per month. In the Cost Accounting book (Fauziyyah, et al., 2021), it is mentioned that Cost of Goods Sold (COGS) is the cost incurred by the company to produce a product. COGS includes material costs, labor costs, and factory overhead costs. The calculation of COGS can be done using the following formula:

COGS = Direct Materials + Direct Labor + Manufacturing Overhead

Before calculating the cost of goods sold (COGS), there are a few components that need to be determinerd or calculated first.

Calculating the cost of raw materials

The cost of raw materials can vary depending on the market price of coconut shells. The price of coconut shells typically ranges from Rp 200/kg to Rp 250/kg. To produce 1,500 tons of coconut shells, the cost of raw materials required is:

1,500 tons = 1,500,000 kg

Rp250 × 1,500,000 kg = Rp375,000,000

The cost of raw materials required to produce 1,500 tons of coconut shell charcoal is approximately Rp375,000,000

Calculating Direct Labor Costs

Direct labor costs are the costs associated with the labor used to directly produce a product. These costs can be calculated using the following formula:

Direct Labor Costs = Hourly wage rate x Number of hours worked

In the case of coconut shell briquette production, the direct labor costs would include the wages paid to workers who operate the machinery used to dry, carbonize, and compress the coconut shells.

In the example provided, the following assumptions are made:

- Hourly wage rate: Rp100,000
- Number of hours worked per month: 176 hours

- Number of workers: 100

Using these assumptions, the direct labor costs for producing 1,500 tons of coconut shell briquettes in a month would be:

Direct labor costs = Rp100,000/hour x 176 hours x 100 workers = Rp1,760,000,000

However, the direct labor costs can vary depending on the hourly wage rate, number of hours worked, and number of workers. If the hourly wage rate is increased, then the direct labor costs will also increase. Conversely, if the hourly wage rate is decreased, then the direct labor costs will also decrease.

In addition, the direct labor costs can also vary depending on the productivity of the workers. If the workers are more productive, then they can produce more coconut shell briquettes in a shorter amount of time, so the direct labor costs per ton of coconut shell briquettes will be lower.

Calculating Factory Overhead Costs

Factory overhead costs are costs that are not directly attributable to the production of a product. These costs are divided into two categories: fixed factory overhead costs, which do not change in amount with changes in production volume, and variable factory overhead costs, whose volume changes with changes in production volume.

Table 2. Overhead Cost of Coconut Shell
Overhead Costs of Coconut Shell Charcoal Factory

Fixed	Variable
Depreciation Costs of coconut shell charcoal factory	Building and equipment rental costs
Insurance Costs	Electricity cost
Telephon Costs	Fuel Costs
Auxiliary material costs	Machine maintenance and repairs costs
Indirect labor costs	

Here is the calculation of factory overhead costs using the assumption of fixed factory overhead costs of Rp150,000,000 and variable factory overhead costs of Rp50,000/ton. Therefore, the factory overhead costs to produce 1500 tons/month of coconut shell charcoal amount to Rp750,000,000.

Factory overhead costs = Rp150,000,000 + Rp75,000,000
= Rp225,000,000

However, these factory overhead costs can vary depending on the production scale and the assumptions used. If the production scale is larger, the factory overhead costs will also increase accordingly, and vice versa.

Calculating Cost Of Goods Sold (COGS)

COGS= Rp375,000 +
Rp1,760,000,000 +
(Rp225,000,000/1500 tons)
COGS = Rp11,700,000/1000 kg
COGS = Rp11,700/kg

The calculation of the cost of goods sold (COGS) is important as it can be used to determine the selling price of a product, calculate profit and loss, and control production costs. By knowing the COGS, a company can manage production costs, direct labor costs, and factory overhead costs to produce high-quality products and achieve good profitability.

Product Warehousing Process

In this process, the company is required to determine how to store the products after the production process has been completed. Coconut shell charcoal itself contains activated carbon that can be harmful if not processed properly. Activated carbon can degrade and release substances that can pollute water and air. Here is an example of good warehouse management for storing the produced coconut shell charcoal:

a. **Safe and Dry Storage Area**
   The ideal storage place for coconut shell charcoal is a warehouse with waterproof walls and a flat floor. The warehouse should be located in a dry and cool area, far from heat sources or fire.
b. **Airtight Packaging**
   Coconut shell charcoal should be packaged in airtight containers to prevent it from absorbing moisture and odors. The ideal packaging containers are made of plastic or metal.
c. **Clear Labeling**
   Each package of coconut shell charcoal should be clearly labeled, indicating the production date, expiration date, and storage instructions. Clear labeling will help ensure that coconut shell charcoal is stored and used safely.
d. **Effective Inventory System**
   The producer should have an effective inventory system to track the stock of coconut shell charcoal. An effective inventory system will help ensure that coconut shell charcoal is stored in good condition.
   By implementing good warehousing processes, it is expected that the company can also implement Occupational Health and Safety (OHS) procedures in the warehouse properly, avoiding any unintended hazards.
e. **Product Distribution Process**
   In this process, the company will start with packaging and continue with other processes until the products reach the hands of consumers. The delivery process of coconut shell charcoal uses a 40'HQ container. This container has a capacity of 7,058.43 cubic meters, which is sufficient to hold 1000 tons of coconut shell charcoal. The 40'HQ container is also a standard container used in international shipping, making it easier to transport and unload.

In this delivery process, transportation and insurance costs are borne by the buyer. This is in line with the CIF Incoterm, which stipulates that transportation and insurance costs until the goods arrive at the destination port are the buyer's responsibility.

Financial Risk Analysis Related to Supply Chain Management in Coconut Shell Charcoal Company

A coconut shell charcoal production company is one type of business that has a significant profit potential. However, on the other hand, this business also carries a high potential for losses. One of the most common risks faced by coconut shell charcoal production companies is financial risk.

Factors of Financial Risk

This risk can be caused by various factors, such as the following:

1. **Fluctuation in Selling Price**: The selling price of coconut shell charcoal is one of the most influential factors on the company's profit. Fluctuations in the selling price can lead to losses for the company, especially if the selling price significantly decreases.
2. **Changes in Production Costs**: Production costs are one of the main components that determine the selling price of coconut shell charcoal. Changes in production costs can lead to losses for the company, especially if the production costs increase significantly.
3. **Natural Disasters:** Natural disasters such as floods, fires, and earthquakes can cause losses for coconut shell charcoal production companies. This is because natural disasters can damage the company's production facilities and raw materials.

A company can operate well if it has an effective and efficient management system, including supply chain management. By implementing effective supply chain management, the company can improve its efficiency and productivity.

Financial Risks Arising from Poor Supply Chain Management in a Company

Based on several analyses and reviews of literature, the following are some financial risks that can arise when a company's supply chain management is not functioning properly:

1. Increased Costs: The company may experience increased costs, such as raw materials, production costs, shipping costs, and storage costs. This can be caused by various factors resulting from inadequate supply chain management. For example, in the case of a coconut shell charcoal production company, it could be due to delayed delivery of raw materials, increased raw material prices, or damage to raw materials during shipping or storage.
2. Decreased Revenue: The company can experience a decrease in revenue due to its inability to meet customer demand. This can be caused by delayed product delivery, product shortages, or product quality that does not meet customer expectations.
3. Reputational Loss: The company may suffer reputational damage for failing to fulfill commitments to customers. This can lead to customers switching to other companies, which can have a negative impact on the company's revenue.

Other Losses Arising from Poor Supply Chain Management in a Company:
In addition to financial risks, poor supply chain management can also lead to other losses, such as:

1. Missed Business Opportunities: Missing out on business opportunities is one of the most significant losses resulting from poor supply chain management. A company that cannot meet customer demand on time will miss opportunities to sell its products. This can result in decreased revenue and profits for the company. Missing out on business opportunities can also cause the company to lose market share, as it cannot compete with other companies that can better meet customer demand.
2. Delayed New Product Development: Delayed development of new products can also be a loss for the company. A company that cannot obtain the required raw materials or components on time will experience delays in developing new products. This can result in missed opportunities to enter new markets or increase market share.
3. Employee Dissatisfaction: Employee dissatisfaction can also be a loss for the company. Employees working in an inefficient and unproductive environment will feel dissatisfied. This can lead to decreased productivity and performance in the company. Employee dissatisfaction can also result in increased employee turnover costs, as the company has to spend on recruiting and training new employees.

Digitalization of Coconut Shell Supply Chain Management in a Company

Digitalization strategy refers to the plans and approaches adopted by an organization to adopt digital technology and leverage it in operations, business processes, and customer interactions. The goal of digitalization strategy will focus on using digital technology and creating web applications to efficiently utilize the potential of coconut shells, innovate, and create added value for the related organization. Here are some objectives that may be related to the development of a web application for coconut shells:

1. **Enhance Efficiency:** It can help automate processes related to coconut shells, such as inventory management, production tracking, or order management.
2. **Ease of Browsing:** Enable customers to explore products related to coconut shells.
3. **Improve Productivity and Competitiveness**: By utilizing efficient and innovative web applications, organizations can enhance productivity, quality, and competitiveness of coconut shell-related products in the market.

Examples of Digitalization Implementation in International Trade:

1. **Trademap**: An online platform that provides international trade information and global trade statistics. Developed by the International Trade Centre (ITC), Trademap provides access to comprehensive trade data and useful analytical tools for users interested in international trade analysis.
2. **Indonesia National Single Window (INSW):** It is part of a broader INSW system that includes various systems and applications used by various government agencies to support export-import activities. The INSW system aims to improve

the efficiency and effectiveness of service processes and supervision of export-import activities.

3. Use of Web Applications to simplify company supply chain management:
   The use of Web Applications in coconut shell companies is one of the digitalization methods designed to increase efficiency, innovation and create added value. This application has two main features, namely the tracking by supplier feature and the tracking by buyer feature.

Below is the design for the web application of a coconut shell company, aimed at improving efficiency, innovation, and creating added value.

Login Form

The login page will have a login form consisting of two input fields. Users will be prompted to enter information according to their registered accounts.

Figure 3. Coconut Shell Company Application Login Page

1. Tracking By Supplier Feature

This feature provides important information about coconut shell suppliers. It helps the company monitor and manage relationships with suppliers efficiently. In addition to displaying data, there is a download feature to download all supplier data in bulk. A data table is used for the display to enable searching and to organize the layout for a more beautiful and tidy appearance.

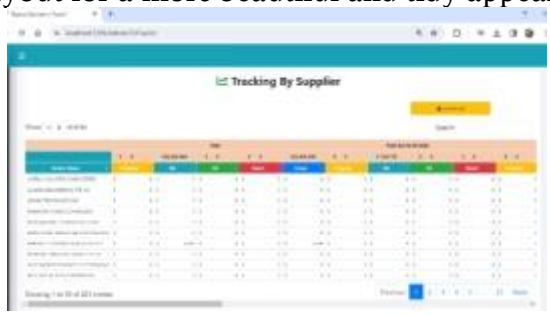

Figure 4. Tracking by Supplier Feature Interface

2. Tracking By Buyer Feature

This feature provides information about customers or buyers of coconut shell products. It helps the company in monitoring and managing customer relationships more efficiently. In addition to displaying customer data, there is a download feature to download all buyer data in bulk. A data table is used for the interface to enable searching and to organize the layout for a more aesthetically pleasing and tidy appearance.

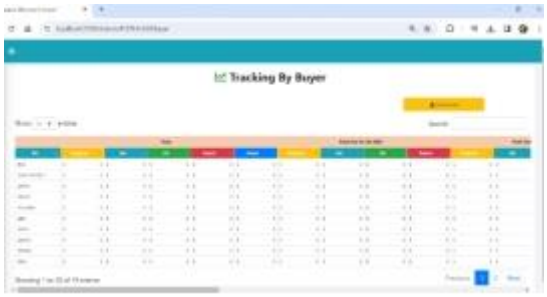

Figure 5. Tracking by Buyer Feature

By combining these features and leveraging the mentioned technologies and frameworks, the web application for the coconut shell company can enhance supply chain management and drive innovation in the industry.

CONCLUSION

This research aims to analyze the financial risks that arise from the effectiveness of a supply chain management process and ultimately determine the appropriate strategies for the supply chain of a coconut shell charcoal production company using digitalization. The author conducted a literature review of several studies on supply chain management strategies, the financial risks associated with these strategies, and the implementation of digitalization in industrial processes. The following are the conclusions drawn from the research:

Supply Chain Management in coconut shell charcoal production companies consists of four main stages, starting from procurement, production, warehousing, and product distribution. The author summarized the financial risks associated with the supply chain management process as follows: the company may experience increased costs, such as raw materials, followed by a decrease in revenue due to the company's inability to meet customer demand. The last financial risk is that the company may suffer reputation loss by failing to fulfill commitments to customers, causing them to switch to other companies, which can have a negative impact on the company's revenue.

The author then conducted research on various literature and cases that applied digitalization strategies to improve company performance. The results revealed several digitalization methods that have been implemented, such as the use of online platforms like Trademap and INSW, an online platform developed by the International Trade Centre (ITC), which provides international trade information and global trade statistics and has proven to be very helpful. The author also cited a company that successfully improved their supply chain management efficiency by implementing a web application called "Tracker for Buyer and Supplier" to facilitate supply chain management.

The author concludes that the use of digitalization is a crucial key for companies and industries in any field, including coconut shell charcoal production. Digitalization strategies in coconut shell charcoal production companies need to adopt digitalization in supply chain management to optimize operations, reduce financial risks, and achieve better profits. The utilization of digital technology and web applications can provide efficiency, innovation, and added value to companies in an increasingly competitive and global business environment. However, this article has several limitations. It is based on a literature review and relies on existing data

and cases. Further research with empirical testing and a broader focus is needed to strengthen the findings of this study. Researchers can consider using frameworks such as the SCOR (Supply Chain Operations Reference) model to analyze and improve supply chain management. Researchers can also explore literature on blockchain and the Internet of Things (IoT) as technologies that can help enhance digitalization in supply chain management.

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