

GREEN ACCOUNTING: BUSINESS STRATEGY TECHNIQUES: A COMPARATIVE STUDY OF JUST IN TIME AND ECONOMIC ORDER QUANTITY APPROACH

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ABSTRACT

The disclosure of green accounting regarding environmental conservation activities of companies and other organizations, including public interest organizations and local public entities, provides a means for stakeholders to understand, evaluate, and give their support to such efforts. Green accounting continues to take root as part of the social system. Bell and Lehman (1999) also describe that “ Green accounting is one of the contemporary concepts in accounting that support the green movement in the company or organization by recognizing, quantifying, measuring and dis-closing the contribution of the environment to the business process”. a philosophy of manufacturing based on planned elimination of all waste and continuous improvement of productivity. JIT inventory systems expose hidden cost of keeping inventory, and are therefore not a simple solution for a company to adopt it. In short, the Just-in-Time inventory system focuses in having “the right material, at the right time, at the right place, and in the exact amount”, without the safety net of inventory. The JIT system has broad implications for implementers. A comparative study of Just In Time and Economic Order Quantity approach has given a solutions for a company to implement the green accounting concept in a proper way. The indications that the implementation of JIT method could increase the efficiency of the material inventory cost compare with the implementation of EOQ. The concept of Just In Time method (JIT) has give approximately to 20 % efficiency compare to the use of EOQ. It is suitable with the parameters concept of green accounting.

Keyword: Green Accounting, Just in Time, Inventory, Economic Order Quantity, environmental accounting

INTRODUCTION

Successful business strategies depend on the quality and comprehensiveness of information available to decision-makers. The practice of generating management information such as cost of sales is well established, and the systems employed to produce conventional management reports generally ensure timely availability of high-quality data to management.

However, competitive advantage is gained by generating and capitalizing on business information not generally investigated by one’s competitors. Comprehensive management information, including information on environmental costs and opportunities, can yield competitive advantage. Typically, environmental costs and associated opportunities are buried in various overhead accounts. By distorting costing and pricing across the business, this practice can result in poor investment and strategic decisions (Epstein et al, 1996). Methods are now available to measure, report and manage current and future environmental costs and opportunities. These management tools and techniques can help management isolate the sources and magnitude of previously hidden and misallocated environmental costs and facilitate better business decisions

The disclosure of green accounting regarding environmental Conservation activities of companies and other organizations, including public interest organizations and local public entities, provides a means for stakeholders to understand, evaluate, and give their support to such efforts. Green accounting continues to take root as part of the social system.

GREEN ACCOUNTING

Green accounting (also known as environmental accounting) seeks to better measure sustainability by expanding gross measures of national welfare (product, investment, etc.) to include non-market values, in particular ones associated with environmental goods and services. In addition, green accounting seeks to incorporate costs and benefits of environmental protection and depletion of natural capital – two measurements not typically included in national accounting systems such as gross domestic product. Environmental accounting is the identification, measurement and allocation of environmental costs, the integration of these environmental costs into business decisions, and the subsequent communication of the information to a company's stakeholders (Epstein et al, 1996).

Bell and Lehman (1999) also describe that “ Green accounting is one of the contemporary concepts in accounting that support the green movement in the company or organization by recognizing, quantifying, measuring and dis-closing the contribution of *the environment* to the business process”. Other term of its green accounting are *Sustainability Accounting* (McHugh, 2008); *Environmental Accounting Disclosure* (Lindrianasari, 2007); *Social and Environmental Reporting* (Susilo, 2008); *Social Responsibility Accounting* (Harahap, 2002); And, *green accounting* also related with *Triple Bottom Line Reporting* (Raar,2002). Therefore, in the environmental activities towards the green accounting term are also described that “*Environmental accounting collects, analyzes, assesses and prepares reports of both environmental and financial data with a view toward reducing environmental effect and costs. This form of accounting is central to many aspects of governmental policy as well. Consequently, environmental accounting has become a key aspect of green business and responsible economic development*”.

The environmental accounting and reporting (EA/ER) is a proposed discipline that deals with the consideration, and ultimately the inclusion into the customarily accounting procedures, general and specific issues related to environmental and social impacts, regulations and restrictions (Rahim & Rahim, 2003)

Functions & Role of Environmental Accounting

Internal Function

As one step of a company's environmental information system, internal function makes it possible to manage environmental conservation cost and analyze the cost of environmental conservation activities versus the benefit obtained, and promotes effective and efficient environmental conservation activities through suitable decision-making. It is desirable for environmental accounting to function as a business management tool for use by managers and related business units.

External Functions

By disclosing the quantitatively measured results of its environmental conservation activities, external functions allow a company to influence the decision-making of stakeholders, such as consumers, business partners, investors, local residents, and administration. See. Figure1 Internal & External Functions of Environmental Accounting

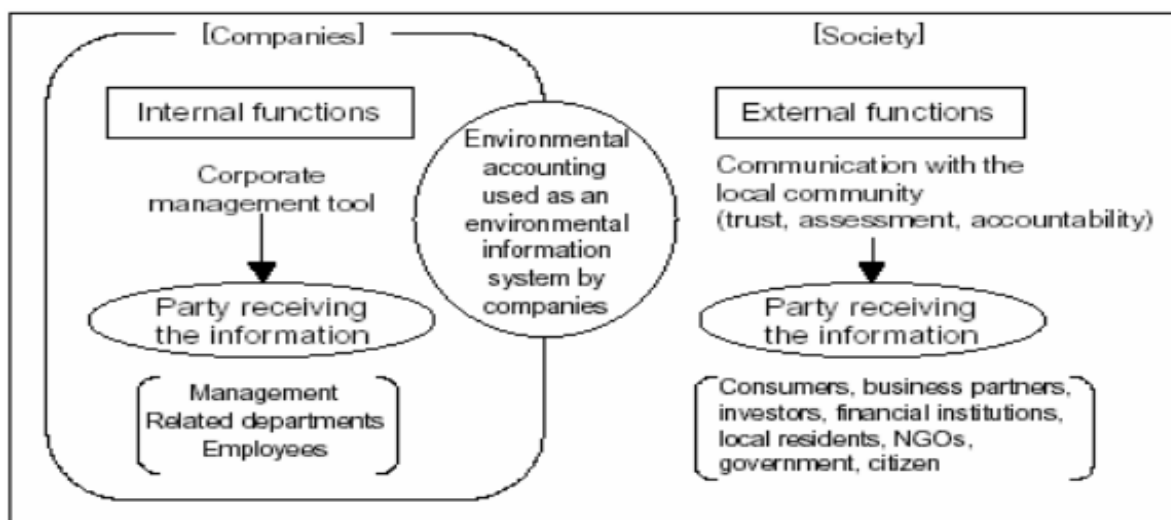


Figure 1: Internal & External Functions of Environmental Accounting

THE PHILOSOPHY OF JUST IN TIME

The philosophy of JIT is simple: the storage of unused inventory is a waste of resources. JIT philosophy means getting the right quantity of goods at the right place and the right time (Reid & Sanders, 2010). JIT originated in Japan at Toyota Motor Co, fueled by a need to survive the devastation post WWII. JIT gained worldwide prominence in the 1970s. Often termed “Lean Production” or “Lean Systems”.

The American Production and Inventory Control Society (APICS) has the following definition of JIT:

"a philosophy of manufacturing based on planned elimination of all waste and continuous improvement of productivity. It encompasses the successful execution of all manufacturing activities required to produce a final product, from design engineering to delivery and including all stages of conversion from raw material onward. The primary elements include having only the required inventory when needed; to improve quality to zero defects; to reduce lead time by reducing setup times, queue lengths and lot sizes; to incrementally revise the operations themselves; and to accomplish these things at minimum cost."

JIT inventory systems expose hidden cost of keeping inventory, and are therefore not a simple solution for a company to adopt it. Inventory is seen as incurring costs, or waste, instead of adding and storing value, contrary to traditional accounting. This does not mean to say JIT is implemented without awareness that removing inventory exposes pre-existing manufacturing issues. This way of working encourages businesses to eliminate inventory that does not compensate for manufacturing process issues, and to constantly improve those processes to require less inventory. Secondly, allowing any stock habituates management to stock keeping. Management may be tempted to keep stock to hide production problems. These problems include backups at work centers, machine reliability, and process variability, lack of flexibility of employees and equipment, and inadequate capacity.

JIT usually identifies 7 (seven) prominent types of waste to be eliminated:

- a. Waste from Overproduction
- b. Transportation Waste
- c. Processing Waste

- d. Waste from Product Defects
- e. Waste of waiting/idle time
- f. Inventory Waste
- g. Waste of Motion

In short, the Just-in-Time inventory system focuses in having “the right material, at the right time, at the right place, and in the exact amount”, without the safety net of inventory. The JIT system has broad implications for implementers.

INDONESIA GOVERNMENT RULES RELATED WITH GREEN ACCOUNTING

Management Environmental Law No. 23, 1997

The Law regulates all the individual public to have an effort to keep, manage and deliver the proper information accurately related with environment. The legal impacts has been ruled to any violation against the acts, Any activities related with the cause of the pollution and disaster of environment.

Capital Investment Law No. 25, 2007

The law set any individual public investor or capital investment of business entity or individual companies to follow up the rules in executing the company social responsibility, keep effort the environmental conservation and respect the culture and its tradition surrounding community. Any violation against it, it is possible to be subjected of any sanctions of written monition, restriction, retraction of any business activities or facilities of its capital investment.

Law on Limited Private Company No. 40, 2007

The law has set that all of companies should take as much as attention as possible given to items to be taken into consideration in the disclosure of any natural resources use in a business activities. The obligation to put the calculation f company social and environmental as a costs budget in properly and accurately. Any violation against the rules, it will have subjected of any sanctions according to the law acts.

The letter of decision of the chairman of Capital Market Supervisory Board (BAPEPAM) No: KEP-134/BL/2006. The law has set the obligation of the issuers of its public company on annual reporting disclosure. The reporting also contained with the annual reporting of its corporate governance with the complete details of description of its activities and costs charges related with the corporate social responsibility to its communities and environment.

Financial Accounting Standard Statements (PSAK) No. 32 (Forestry Accounting) and No. 33 (General Mining Accounting)

It set the obligation of the company from its mining sector and the proprietary of Forestry Business Right to report the items of its environment on the financial report.

The regulations of Central Bank of Indonesia No. 7/2/PBI/2005 that set out the determination of Asset Quality Level towards the Banks. The regulations also sets out the environment aspect as one of the requirement in the Credits Provision Clauses to the companies. The company should able to disclose the environment management concerns.

ENVIRONMENTAL CONCERNS

During the birth of JIT, multiple daily deliveries were often made by bicycle. Increased scale has required a move to vans and trucks (lorries). Cusumano (1994) highlighted the potential

and actual problems this causes with regard to gridlock and burning of fossil fuels. This violates three JIT waste guidelines:

- a. Time—wasted in traffic jams
- b. Inventory—specifically pipeline (in transport) inventory
- c. Scrap—fuel burned while not physically moving

The implementation of JIT, a company should follow and implement the sequence of seven steps:

1. Make quality improvements
2. Reorganize workplace
3. Reduce setup times
4. Reduce lot sizes & lead times
5. Implement layout changes
6. Switch to pull production
7. Develop relationship with suppliers

The three groups of environmental impacts of JIT, based on sources (Nathan, 2007), are as follows:

- a. **Production:** decrease waste and emissions due to increased efficiency and reduce over production;
- b. **Personnel:** increase ability to make environmental improvements due to better integration, and training of personnel; and
- c. **Suppliers:** increase energy use and emissions due to increase transportation requirements.

A COMPARATIVE STUDY OF ANALYSIS OF JIT VS EOQ

Analysis of Material Handling Efficiency in the use of Economic Order Quantity (EOQ) approach versus Just in Time (JIT) approach (a Case Study on PT. Siantar Top)

PT Siantar Top Tbk manufactures a variety of snack food products. The Company produces snack noodles, crackers, and candies under the brand names Fuji Mie, Mie Goreng, Olala, Tamiku, Twistko, Tic-Tic, Twistball, Fuji Chips, Tovie Candy, Balico-Kelapa, and XUXU

Inventory Cost

Generally a component of inventory cost in the PT. Siantar Top company are consist of as following:

Carrying Cost

Carrying cost depending to the number of quantity stock order. The more quantity of stocks are ordered, the highest the carrying cost. The Carrying cost of PT. Siantar Top has applied with the following components:

- 1) Salary/ Wage Cost
- 2) Facility Storage Cost
- 3) Cost of Capital

Order Cost

The typical behavior of *Order Cost* are the opponent of the Carrying cost whereas the more quantity of stocks ordered, the lower the order cost. The Order Cost of PT. Siantar Top has applied with the following components:

- 1) Salary/ Wage Cost of Purchasing Department
- 2) Telephone Cost
- 3) Cargo handling cost
- 4) Warehouse administration cost

Table 1. Carrying Cost and Order Cost for the period of January – December 2014 of PT. Siantar Top

<i>Carrying Cost and Order Cost PT. Siantar Top Tbk. Period of January – December 2014</i>		
<i>Period</i>	<i>Carrying Cost</i>	<i>Order Cost</i>
January	133	422.000
February	100	133.500
March	125	415.000
April	117	305.500
May	144	535.000
June	178	675.000
July	105	300.500
August	170	635.000
September	134	525.000
October	120	400.500
November	132	523.000
December	142	530.000
Total	1.600	5.400.000

Lead Time

A **lead time** is the latency (delay) between the initiation and execution of a process. For example, the lead time between the placement of an order and delivery.

Table 2. Lead Time of Materials the period of January – December 2014 of PT. Siantar Top

<i>No</i>	<i>Materials</i>	<i>Lead Time</i>
1	Wheat Flour	7 days
2	Tapioca Flour	7 days
3	Soft Gatokaca Flour	7 days
4	KMCP Oil	3 days
5	Salt	3 days

Production Budget

The production budget of PT. Siantar Top are based on the sales forecasting budget. Below on table 4.4 is the Production Budget of PT. Siantar Top, the period of December – January 2012 and also the Material Budget of PT. Siantar Top, the period of December – January 2012.

Table 3. Production Budget for the period of January – December 2014 of PT. Siantar Top

<i>Production Budget</i>		
<i>PT. Siantar Top Tbk.</i>		
<i>Period of January – December 2014</i>		
<i>Period</i>	<i>Dry Noddle (box)</i>	<i>(Kg)</i>
January	24.885,00	89.586,00
Pebruary	25.735,00	92.646,00
March	24.465,00	88.074,00
April	25.903,00	93.250,80
May	22.769,00	81.968,40
June	31.115,00	112.014,00
July	26.406,00	95.061,60
August	25.064,00	90.230,40
September	26.114,00	94.010,40
October	27.930,00	100.548,00
November	26.142,00	94.111,20
December	27.054,50	97.396,20
Total	313.582,50	1.128.897,00

Material Handling Efficiency using Economic order Quantity Method

Economic order quantity (EOQ) is the order quantity of inventory that minimizes the total cost of inventory management. Two most important categories of inventory costs are ordering costs and carrying costs. Ordering costs are costs that are incurred on obtaining additional inventories. They include costs incurred on communicating the order, transportation cost, etc. Carrying costs represent the costs incurred on holding inventory in hand. They include the opportunity cost of money held up in inventories, storage costs, spoilage costs, etc. The EOQ formula are as follow:

$$EOQ = \sqrt{\frac{2 DP}{C}}$$

$$TC_{EOQ} = \sum \text{Ordering Cost } EOQ + \sum \text{Carrying Cost } EOQ + ESOC$$

$$TC_{EOQ} = (P \times Ni) + C \times EOQ = \text{Expected Stock Out Cost}$$

Figure 2. : The EOQ Formulations

Where the variables of D is material quantity in a period, P is ordering cost in a period and C is Carrying Cost in a period.

Tabel 4. Quantity of the Economic Order Quantity of PT. Siantar Top

<i>Materials</i>	<i>EOQ</i>	<i>Harga/Kg (Rp)</i>	<i>EOQ (Rp)</i>
1. Wheat Flour	87.293	4.400	384.089.200
2. Tapioca Flour	71.274	4.400	313.605.600
3. Gatotkaca Soft Flour	50.399	3.300	166.316.700
4. KMCP Oil	50.399	7.500	377.992.500
5. Salt	10.080	1.500	15.120.000
<i>Total</i>	<i>269.445</i>	<i>21.100</i>	<i>1.257.124.000</i>

Material Handling Efficiency using Just In Time Method

JIT exceeds the concept of inventory reduction; it is an all-encompassing philosophy geared to eliminate waste, anything that does not add value

The first step to process calculating the total Cost of inventory by using JIT method, with below formulations:

$$TC\ JIT = (P \times Ni) + C \times JIT + \text{Expected Stock Out Cost}$$

Figure 3: Formulation of JIT

- Note: TC = Total Cost in JIT
 P = Mean Cost of JIT
 Ni = Frequency of Purchase of JIT
 C = Carrying Cost of JIT

Thus, the calculation of above formulation has implemented as below:

$$\begin{aligned}
 \text{Total cost JIT} &= (P \times Ni) + (C \times JIT/2) \\
 &= (1.396.800 \times 300) + (314,60 \times 26.490) \\
 &= 419.040.000 + 8.333.754 \\
 &= 427.373.754
 \end{aligned}$$

The total *cost* optimal JIT of PT.Siantar Top is **Rp. 427.373.754,00**

Table 5. Comparative study: Carrying Cost and Ordering Cost of PT. Siantar Top, Tbk

<i>No</i>	<i>EOQ (Rp)</i>	<i>JIT (Rp)</i>
<i>Carrying Cost:</i>		
1.		
Salary Cost on Warehouse Dept.	101,16	19,89
Cost Storage Facility	134,89	26,52
Cost of Capital	1.363,95	268,19
<i>Total Carrying Cost</i>	<i>Rp.1.600,00</i>	<i>Rp.314,60</i>
<i>Ordering Cost:</i>		
2.		
Telephone Cost	2.767.500	715.860
Warehouse Administration Cost	1.102.500	285.180
Unloading and Loading Cost	1.530.000	395.760
<i>Total Ordering Cost</i>	<i>Rp.5.400.000</i>	<i>Rp.1.396.800</i>

Table is shown as a comparative results of calculation for the effectiveness of the total inventory cost whether for Carrying cost and also Ordering cost of PT. Siantar Top with the Economic Order Quantity approach and Just In Time approach,

Based on the calculation towards the materials inventory by using those two approach which is Just In Time approach and Economic Order Quantity approach, it is clearly define that there are some efficiency has given by those 2 (two) approach applied on PT Siantar Top, Tbk. The percentage of efficiency given as has been described on table 6.

Table 6. Cost Comparative of between EOQ method (Economic Order Quantity) and JIT method (Just In Time)

No	Cost Type	EOQ	JIT	Variance of Efficiency	% of Efficiency
1	Carrying Cost	Rp. 215.556.000	Rp. 48.333.754	Rp. 207.222.246	96,10 %
2	Ordering Cost	Rp. 226.800.000	Rp. 419.040.000	(Rp. 192.240.000)	84,75 %
3	Expected Stock Out Cost	Rp. 96.683.756	Rp. 0	Rp. 96.683.756	100 %

The table has explain that using EOQ approach, ordering is performed in huge quantity, therefore, it bring huge carrying cost to the company, it is about Rp 215.556.000,00. Meanwhile, if the company implement Just In Time approach it brings lowering unit order of quantity of company. Thus, it bring benefit of efficiency towards the company. The decrease of the unit order, it also bring the impact to lower the material storage requisition (material warehouse), whereas, it may cause the decrease of carrying cost to Rp 207.222.246 or it takes *the efficiency of 96.1%*. Order with small lot size on JIT method brought the impact of the increase of the ordering cost, because of the repetitive order with frequently order, and it has already been anticipate by the long term contract with the supplier. As has describe on table 6 the ordering cost with JIT method has increased to the total amount of Rp 192.240.000,00 or *84,76%* compare with the ordering cost on EOQ implementation method which total amount of Rp. 226.800.000,00 and JIT implementation method is Rp 419.040.000,00. Meanwhile the Expected stock out has decrease to almost 100% or which previously on EOQ method implementation was about Rp 96.683.756,00. Therefore, with the perfect JIT implementation method of purchase in a correct number of quantity for productions, completely on the correct time and places, the dissipation and its inefficiency will be removed.

CONCLUSION

Base on the table 6 the implementation of JIT method on PT. Siantar Top, Tbk base on the available overall conditions towards the inventory cost decrease of Rp 111.666.002 or 20.71%. it is the indication that the implementation of JIT method is could increase the efficiency of the material inventory cost compare with the implementation of EOQ.

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