DEVELOPMENT OF INFORMATION SYSTEM SUPPLY CHAIN MANAGEMENT (SCM) IN PT. INDONESIA VICTORY GARMENT (IVG) PURWAKARTA

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ABSTRAK

PT. Indonesia Victory Garment is a company engaged in the manufacture of apparel from textiles. In the process raw materials purchasing section has been using sales data in the previous month, which is then used to estimate the amount of raw materials to be purchased. Unknown product sales every month is uncertain so causing the purchasing difficulty in determining the amount of raw materials that must be ordered to the supplier every month. In the process of selling the product, if the product is available it will be directly processed delivery, if not available then the consumer can wait until the product is available, this causes often the exim and countainer section wrong in providing information when the product can be sent .Supply Chain strategy used is push supply chain, because the purchase of raw materials and production will continue to be done although there is no demand from consumers. Planning of raw materials purchasing using double exponential smoothing method, and shipment scheduling that is adjusted to the number of working days and production capacity of the company. Based on the problems that exist in PT. Indonesia Victory Garment hence required an information system development of Supply Chain Management. Based on the test results concluded that the built system can help manage purchases from consumers, helps Purchasing in estimating how much raw material to buy, and can assist the exim and countainer in providing information when the product ordered by the consumer can be sent.

keyword: Supply Chain Management, push supply chain, double exponential smoothing

1. INTRODUCTION

PT. Indonesia Victory Garment (IVG) is a company located in Jln.Cisatri RT.010 / RW.001 Desa Cilandak Kec. Cibatu Kab.Purwakarta, West Java. PT. Indonesia Victory Garment is a company engaged in manufacturing, its main activity is to process raw materials of cloth into various garments which can be seen in Appendix A (product data in PT IVG).

The company caters to corporated consumers. The actors in the supply chain activities in this company are the marketing, purchasing, warehouse spearpart, factory manager, and the exim & countainer parts. While the outside of the company are consumers, shipping companies and suppliers. Finished products will then be delivered to consumers located in several countries such as America, Malaysia, Canada, China and Mexico using counters shipped by sea.

Based on the interview with Mrs. Eva Filda as the head of purchasing section, stated that the activities undertaken in upstream by PT. Indonesia Victory Garment is to procure raw materials to suppliers to meet production needs. Purchase of raw materials will be done once a month, ie in the first week or second week of the month. In the process of determining the amount of raw materials to be purchased, the purchasing department uses product sales data in the previous month, which is then used to estimate the amount of raw materials to be purchased for the next period. PT. Indonesia Victory Garment has eleven types of products, Top and Jacket products will be produced at least 3000 pcs per day, while nine other products, each product will be produced at least 1200 pcs in every day, from eleven such products require several kinds of raw materials in the production process.

From sales data known PT. Indonesia Victory Garment has a total sales of 2,203,559 pcs of products with the highest number of sales is Top product with total sales of 427,456 pcs. Based on the facts obtained in the period of time the sale of each month is known uncertain, resulting in

purchasing difficulty in determining the amount of raw materials to be ordered to suppliers to meet the production process in the next month period. This is a problem when product sales increase, causing shortages of raw materials in warehouses, so the production process can not run smoothly, and cause the purchase of products from consumers can not be fulfilled.

Based on the results of interviews with Mr. Era Exim and Countainer section, the activities are downstream that is receiving product purchases from consumers and product delivery to consumers. Consumers can make a product purchase by phone or come directly to the office during working hours is at 08.00-16.00 Wib. In the process of selling the product, if the product is available it will be immediately shipping, if not available it will be returned to the consumer whether to wait until the purchased product is met or cancel the purchase. In sending the product, the company uses the service of counter delivery package, which is in cooperation with PT. Gateway Countainer Line. Information when the product will be sent to the consumer often experience problems because the number of products to be sent often have a mismatch with the number of requests from consumers, because the stock of available products in the warehouse often experience shortages. It causes exim and countainer difficulties in determining when ordered products can be sent to consumers.

Based on the problems that have been presented, then PT. Indonesia Victory Garment (IVG) needs a means that can manage information, therefore it is needed Information System Development at PT. Indonesia Victory Garment (IVG) using a web based Supply Chain Management approach.

1.1. Information Sistem

System there are two approach groups, that is system which more emphasis on procedure and its element. Procedures are defined as a clear sequence of instruction processes that explain what to do, who does, when and how to do it. While the element approach defines the system as interrelated parts that operate together to achieve multiple objectives [1].

While the definition of information is data that has been processed into a form that is more meaningful and useful for the recipient in taking a decision at this time and the future. The function of information is to reduce the uncertainty in the decision-making process of a situation. Information used in an information system is generally used for several purposes. Information is used not only by one party within the organization. The value of an information is determined from two things: the benefits and costs to get it. An information is said to be valuable if its benefits are more useful than the cost of obtaining the information itself [1].

So it can be concluded that information systems can be interpreted as a collection of interconnected components and work together to collect, process, store and distribute related information to support decision-making, coordination and control in it. The purpose of the information system is to provide and systematize information from all events or activities necessary to control the operation of an organization. Activities in this information system include taking, processing, storing, and conveying the necessary information in running all the activities of the organization concerned [1]

1.2. *Supply Chain Management* (SCM)

Understanding Supply Chain Management according to some sources is as follows: According to "I Nyoman Pujawan and Mahendrawati" Supply Chain Management is an integrative method or approach to manage products, information, and money in an integrated manner involving parties ranging from upstream to downstream from suppliers , factories, distribution networks and logistics services [2].

Supply Chain is a network of companies that work together to create and distribute a product into the hands of end users. These companies include suppliers, manufacturers, distributors, stores or retailers, as well as support companies such as logistics services companies. while Supply Chain Management is a method, tool or management approach that not only focuses on the internal affairs of the company, but also the external affairs of the relationship with the partner companies [2].

Supply Chain Management is a system for applying an overall approach to managing all the flow of information, materials, and services from raw materials through factories and warehouses to end users. Supply Chain Management is an integrative method or approach for managing an integrated flow of products, information, and money involving parties from upstream to downstream. An important principle in SCM is the transparency of information and cooperation between the internal functions of the company and with the parties in the company along the supply chain. Supply Chain is the physical network, ie companies involved in supplying raw materials, producing goods, or sending them to end users. These companies usually include suppliers, manufacturers, distributors, retailers as well as support companies such as logistics service companies [2].

Supply chain usually there are 3 kinds of flow that need to be managed. Three kinds of flow that need to be managed on the supply chain are as follows: [2]

a. First is the flow of goods flowing from upstream (downstream) to downstream (downstream).
b. The second is the flow of money and the like that flows from downstream to upstream.
c. Third is the flow of information that can occur from upstream to downstream or vice versa.

1.3. Componen in supply chain

Supply Chain Management has 3 main components that support the running of a business process as follows [3]:

a. Upstream Supply Chain

The overall activities of the manufacturing company and its distribution or relationship with the distributor can be expanded to several levels. The main activity in Upstream Supply Chain is the purchase of the product.

b. Internal Supply Chain

Internal Supply Chain is the process of delivering goods to the warehouse. The main activities in Internal Supply Chain are production management, manufacturing, and inventory control.

c. Downstream Supply Chain

Downstream Supply Chain activities involve the delivery process to end users. The main activities in the Downstream Supply Chain are the distribution of goods, warehouses and transport vehicles.

1.4. Supply Chain Coverage Area

Supply chain management basically covers the scope of work and responsibilities are very broad. All activities related to the flow of materials, information, and money along the supply chain are activities within the scope of supply chain management. [2]

Supply chain management involves many parties both inside and outside the company and has a wide range of activities. In the face of the uncertainties that exist along the supply chain and the increasing competition in the market, supply chain management requires a robust management approach and model to survive in the business world. Some of the challenges that companies must face in managing supply chain are:

a. The complexity of the supply chain structure A supply chain is complex and involves many parties inside and outside the company that has each of the different interests, and often even contradict each other. Conflict is a major challenge in managing the supply chain. The complexity of a supply chain is also influenced by language, time zone, and cultural differences between a company and another company. [2]
b. Uncertainty is a major source in the management of a supply chain. Uncertainty leads to a lack of confidence in the plans that have been made so that companies need to create security anticipations along the supply chain in the form of inventory (Safety Stock), time (Safety Time), or production uncertainty. Uncertainty in Supply chain management can come from three sources that include demand uncertainty. supplier direction in the form of uncertainty in waiting time of delivery, price of baking material, uncertainty of quality, as well as material capacity sent, and internal uncertainty

2. CONTENT OF THE STUDY

2.1. *Supply Chain Management model* in PT. Indonesia Victory Garment

Suppli chain at PT. Indonesia Victrory Garment starts from ordering of raw material by purchasing part to supplier, before ordering part of purchasing will request document penjulan to marketing section which used as reference in determining raw material to be purchased along with amount, then raw material will be sent to company, the next process the company will make a check on the quality and suitability of the amount of raw materials ordered with the raw materials that come, when it is sesaui will be paid raw materials by Adm Purchasing. After the raw materials are obtained then raw materials will be used for production activities.

For purchasing receipts managed by the marketing department, which will receive purchases from consumers, then marketing will check the availability of product stocks, if the product is available then the marketing will provide the documents to the leadership for approval.

When the product release documents have been approved then the exim and countainer parts will do the shipping scheduling, When the shipping scheduling has been done then the exim and countainer will contact the expedition to place the order countainer then after that the expedition will send the product in the message to the consumer. SCM process in the company can be seen in the picture below:

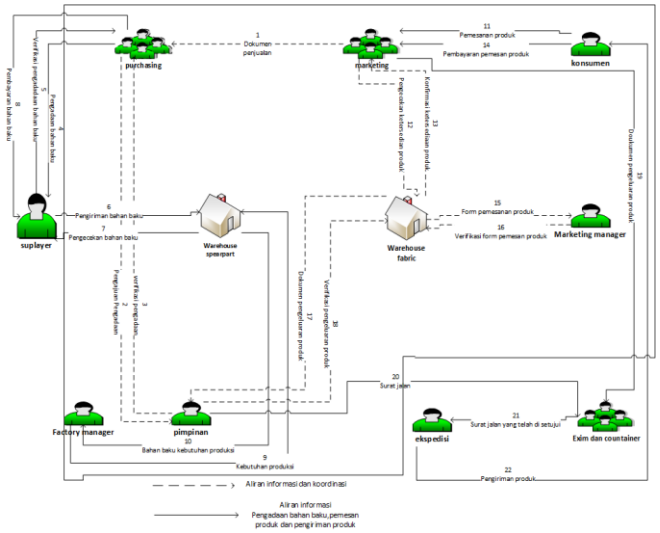


Image 1 Supply Chain Management Model at PT. Indonesia Victory Garment

2.2. Analysis SCMiin PT. Indonesia Victory garment

Supply chain analysis is done to see the supply chain management process that will be built based on the supply chain model in Figure 1. The supply chain analysis in Indonesia Hangers clothes can be seen in Figure 2 below:



Image 2 Analysis SCM in PT. IVG

2.3. Analysis Determine The Amount of Raw Material

Forecasting demand for raw materials based on actual data ordering of products in the previous month. The results of forecasting obtained used to determine the amount of procurement to be done and as a basis for consideration to make purchases of raw materials to suppliers. Analysis of the forecasting stage that will be done is to predict the need for raw materials for the procurement process.

Forecasting the needs of raw materials aims to meet production needs. Based on data from the sale of Products at PT. Indonesia Victory Garment in January to May 2016 then got the data as follows:

No	Nama produk	Januari	Februari	Maret	April	Mei	Total
1	Jacket	81369	53994	86029	47493	53252	322.137
2	Pants	21197	35413	44688	25534	19555	146,387
3	Tie	38978	27215	32100	51665	22132	172.090
4	Top	72113	63220	86713	113065	92345	427.456
5	Collar Slider	34322	27418	31383	24321	32876	150.320
6	Shirt	59475	35760	28812	46851	27653	198.551
7	Short	34418	49330	32096	37562	23090	176.469
8	Polo Body and Sleeves	40048	24210	34802	20386	35890	155.336
9	Placket Polo	27924	33003	33893	25964	35762	156.546
10	Bodysuit	38189	21281	20400	33582	32478	145.930
11	Pocket	36677	25360	32052	22480	35768	152.337

Image 3 sales data januari-mei 2016 in PT.IVG

From sales data in January to May 2016, the highest selling product [4] is the Top clothing model, so that the Top model can be used as reference data pattern for sales forecasting. Here is a graph of sales data of Top clothing models from January to May 2016.



Image 4 Grafik sales product Top

If seen from the graph that has been obtained then the data pattern is Trend cycle data pattern, because of the pattern can be seen the tendency of increasing demand. Besides that from the graph we can know that the forecasting model that is suitable for the data pattern is time series mode (quantitative) , as seen from past data or previous periods [4]. Next will be done analysis methods that will be adapted to the problems and data patterns in accordance with the research. Pattern data obtained from the calculation of product sales in January 2016 that has been attached.

Forecasting the double Exponential Smothing method is used to forecast data with Trend data patterns [5]. From the sales data of Top Clothing products with alpha value 0.3. To get sales

forecasting in June we will calculate by using sales data in May and April 2016 as reference. In calculating forecast by using double technique Exponential Smothing Formula used are as follows:

At= wYt +(1-w) At-1

A't= wAt + (1-w)A't-1

At=2At-A't

Bt=$\frac{w}{1-w}$(At-A't)

Ft+p = Yt+p = at-btp

Here are the steps in calculating forecast using Double Exponential Smothing technique. First of all we will calculate sales forecasting in June by using sales data 2 month before that month of May and month of April 2016

At = wYt +(1-w) At-1

At = (0.3x92345) + ((1-0.3) x 113065)

= 106849

Where w is the alpha value used, multiplied by the actual value of product sales in May 2016 then added with 1-alpha multiplied by actual sales data of april 2016. After obtained the result of previous calculation result will be used for next calculation process.

A't= wAt + (1-w)A't-1

= (0.3x 106849) + ((1-0.3) x 113065))

= 96696,2

Same as the previous step but this time the value used is not wYt (alfa x actual data of May month) but using wAt (previous calculation result) The next step is to calculate at as follows:

At=2At-A't

= (2x106849) – 96696,2

=117001,8

Next we will calculate bt as follows:

Bt= $\frac{w}{1-w}$(At-A't)

= 0.42 x (117001,8-96696,2)

= 8528,352

Next we will forecast the sales of the top products in June 2016 by using the formula

Ft+p = Yt+p = at-btp

= 117001,8+(8528,352*1)

= 125530,152 = 125530

P = 1 is the distance from the current month with the month to be predicted. From the above forecasting results it is found that the sales of Top products in June 2016 is expected to sell 125530 Pcs. then we can calculate the need of raw materials in need to meet the needs of production of top products in June, by looking at the table Top raw material composition.

Table 1 Top product composition

Product name	Raw material name	Amount of raw materials	unit
TOP	Polybag MPP	1	Pcs
	Carton MPP	1	Pcs
	Thread THR-001	3	Yard
	Button	3	Pcs
	HTR label C1	1	Pcs
	Barcode sticker	1	Pcs
	Sizer	1	Pcs
	Viscose	2	Yard

Having known the Top composition, then the raw material needs to meet the results of forecasting in June 2016 can be seen in the table below:

Table 2 Raw material requitments

forecasting	Raw material name	calculations	Amount of raw materials
125530 Pcs	Polybag MPP	1 x 125530	125530 Pcs
	Carton MPP	1 x 125530	125530 Pcs
	Thread 0001	3 x 125530	376590 Yard (753 Roll)
	Button	3 x 125530	376590 Pcs (2615 Gross)
	HTR label C1	1 x 125530	125530 Pcs (251 Pack)
	Barcode sticker	1 x 125530	125530 Pcs (126 Roll)
	Sizer	1 x 125530	125530 Pcs (209 Roll)
	Linen	2 x 125530	251060 Yard (5021 Roll)

2.4. Analysis of the Monitoring Of product and raw materials

After doing the forecasting stage, the next step is to monitor raw material inventory and determine the safe boundary of raw materials that must be in the raw material that aims to avoid the occurrence of deficiencies or void raw materials using the method of Safety Stock. Examples of safety stock calculations are as follows.

Safety Stock Calculation Total forecast for June 2016 = 125530 pcs

The numbur of working day in the mont = 24 day

Lead Time (i) = 4 day

Avarage procurement in one month (d) = 125530 /24= 5230,41

Standar Deviasi Lead Time (sl) = 0.4

Standar Deviasi booking (sd) = 2.4

Servis Level 96% (Z) = 1.75

Safety Stock = Z x Sdl

Sdl = $\sqrt{(d2 \text{ x } sl2 + l \text{ x } sd2)}$

Sdl = $\sqrt{5230,41^2 \text{ x } 0.4^2 \text{ x} 4^2 \text{x} 2.4^2}$

Safety Stock = 7044,48

Safety Stock = 1.75 x 7044,48 = 12327,84= 12328 pcs

Table 3 monitoring of raw material availability

Raw material name	Stok in warehouse	Safety stock	Status
Polybag MPP	23400 pcs	35145 Pcs	Not secure
Carton MPP	54323 Pcs	35145 Pcs	secure
Thread 0001	75 Roll	105445 yard (211 Roll)	Not secure
Button	213 Gross	105445 Pcs (599 Gross)	Not secure
HTR label C1	207 Roll	35145Pcs (732 Roll)	Not secure
Barcode sticker	32 Roll	35145 Pcs (70 Roll)	Not secure
Sizer	78 roll	35145 Pcs (59 roll)	secure
Linen	63 Roll	70297 Yard (1406 Roll)	Not secure

If the status of raw materials is not safe, it will be procured raw materials to suppliers.

2.5. Analysis of raw material procurement

Supplier selection is done by PT. Indonesia Victory Garment by way of procurement of raw materials to suppliers who have the raw materials that sesauai with production needs, or close to the needs of production. If the supplier with the most amount of raw materials can not meet the amount of raw material needs, then the amount of raw material needs that have not been realized will be ordered to the supplier with the second most number.

In the analysis of procurement of raw materials, purchasing parts make reservations when raw materials that have been ordered to come will be handled by the warehouse. The warehouse section checks that the raw material meets the standards. If the goods that come meet the standards, it will enter into the warehouse inventory of raw materials and if not meet the standards will be directly informed to the supplier.

PT.Indonesia Victory Garment must make procurement with the amount of raw materials ordered ie forecasting results plus safety stock and minus stock in the warehouse

2.6. Production analysis

In production analysis, the production department scheduling the production plan to fulfill the order. The number of products produced is calculated based on forecasting results divided by the number of working days in a month. Here is an example of calculating the amount of production of a top product.

Forecasting amount in June 2016 = 125530 pcs

The number of working days in a month = 26 days

Total Production = 125530/26 = 4828.07 = 4828 pcs (rounding) Based on the calculation of production quantity, Top product will be produced as much as 3510 pcs per day and need requirement of raw material for production

Table 4 Needs of material for the produstions process of top product per day

Raw material name	calculation	The calculations result	Amount raw materials	Status
Polybag MPP	3510 x 1	3510 Pcs	3554 pcs	available
Carton MPP	3510 x 1	3510 Pcs	3554 pcs	available
Thread 0001	3510 x 3	10530 yard (21,06 Roll)	35140 yard (70,28 Roll)	available
Button	3510 x 3	10530 pcs (74 Gross)	10662 Pcs (75 Gross)	available
HTR label C1	3510 x 1	3510 Pcs (7 Roll)	3554 pcs (8 Roll)	available
Barcode sticker	3510 x 1	3510 Pcs (1 roll)	3554 pcs (1	available

			Roll)	
Sizer	3510 x 1	3510 Pcs (6 Roll)	3554 pcs (6 Roll)	availab le
Linen	3510 x 2	7020 yard (78 roll)	7064 yard (78,48 Roll)	availab le

If the need for raw materials for production is not available or less, then production will be made of some raw material availability and unfulfilled amount of production will wait until raw material is available.

2.7. Finance Analysis

In this financial analysis is the process of checking the financial entry into the company and the finances that come out for the procurement of raw materials. Checking the company's financial income can be seen in the picture Below:

Invoice	Tanggal Pemesanan	Konsumen	Jumlah ($)
IDEI-1612044	1-2-2016	The Genuine Canada	$ 118.562
IDEI-1612045	6-2-2016	TCP	$ 227.853
IDEI-1612047	13-2-2016	Li-Fung	$ 15.409
IDEI-1612048	15-2-2016	Li-Fung	$ 123.034

Image 5 financial income PT. IVG

For Company expenses can be seen in the picture below

ID pengadaan	Tanggal Pengadaan	Jumlah	Status pengadaan
IVG-0017351	12-03-2016	Rp 125.000.000	Disetujui
IVG-0017352	3-04-2016	Rp 379.000.000	Disetujui
IVG-0017353	7-05-2016	Rp 147.350.000	Disetujui

Image 6 Financial expenses PT. IVG

2.8. Product Distribution Analysis

Pada analisis pendistribusian produk ini yang done is the process of monitoring so that the company knows with certainty the ordered product is up to the customer's hand. Delivery of products to consumers mengunkan third party, namely PT. Gateway Countainer Line. In this case the delivery is done using a countainer. The following Capacity of each load container used in product delivery.

a. Countainer size 20 Feet :
Size in: 6.058 X 2.438 X 2.591 M
Size out : 5.919 X 2.340 X 2.380 M
Volume : 33 kubik
Maxsismum weight : 20 TON (Equal to 50.000 Pcs)

b. Countainer size 40 Feet :
Size in : 12.19 X 2.43 X 2.59 M
Size out : 12.04 X 2.30 X 2.37 M
Volume : 67 kubik
Maxsismum weight: 27 TON (Equal to 100.000 Pcs)

c. Countainer size 45 Feet :
Size in : 13.71 X 2.43 X 2.89 M
Size out : 13.55 X 2.35 X 2.69 M
Volume : 75 kubik
Maxsismum weight: 32 TON (Equal to 110.000 Pcs)

And here is an example of productt delivery that has been done by PT.Indonesia Victory Garment

Tanggal Pembelian	Konsumen	Produk	QTY	Negara	Status	Tanggal Kirim	Countainer
1-2-2016	The Genuine Canada	Top + Short	27804(2) pcs	Canada	Lunas	3-2-2016	MSKU1090895 1X20 HU
6-2-2016	TCP	Top + jacket	39.000 (2) pcs	China	Lunas	8-2-2016	MSKU3225551 3 1X20 HU
8-2-2016	Gyeemborre	Top	45.000 pcs	amerika	Lunas	10-2-2016	TCNU5471015 1X40 HU

Image 7 Distribution product In PT. IVG

3. Cover

3.1. Consculusion

Based on the results obtained in this test and discussion, the following conclusions can be drawn:

1. Supply chain management system can help the purchasing department in estimating how many products will be sold in the next month. From the prediction of products to be sold, then purchasing can find out how much raw materials they have to buy to meet the production process in the next month.
2. Supply chain managemet information system can assist the exim and countainer to find out the exact schedule of completion of each order to inform the customer, no longer rely on intuition in calculating the completion of the order, so that no more complaints from customers because the information submitted will be sure and timely .

3.2. Suggestion

Suggestions for the development of this information system there are several suggestions that can be done, among others:

1. Make it look more interesting because the display is still used now simple, And need the development and better maintenance of the system that has been built, so the system can be used in accordance with the needs in the future.
2. Distribution system needs development such as production scheduling to be more monitored production process

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REFERENSI

[1] Ladjamudin, Al-Bahra, *Analisis dan Desai Sistem Informasi.* *Yogyakarta*: Graha Ilmu, 2005.

[2] I. N. Pujiawan and ER. Mahandrawan , *Supply Chain Management Edisi Kedua*, Surabaya : Guna Widya, 2010.

[3] I. N. Pujiawan, *Supply Chain Management*, Surabaya : Guna Widya, 2005.

[4] Assauri Sofjan, *Teknik & Metoda Peramalan Penerapannya Dalam Ekonomi Dunia Usaha Edisi Satu*, Jakarta : Lembaga Penerbit Fakultas Ekonomi Universitas Indonesia, 1984.

[5] S. Yuli Permani, *Analisis Runtun Waktu Expontial Smoothing*, https://www.academia.edu/24552468/Exponential_Smoothing, 12 November 2017 .13.45