# *DEVELOPMENT MANAGEMENT INFORMATION SYSTEM OF PRODUCT DISTRIBUTION IN PT. SOKA CIPTA NIAGA*

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## *ABSTRACT*

*PT. Soka Cipta Niaga is a company in the field of distribution of socks. The regular customers are located in several cities in Java island. Based on the results of the interview, the field of distribution have a difficulty in scheduling the distribution process of shipping products to customers who are often hampered when the existence of orders from customers. And it is difficult to determine the capacity of the route as well as the occurrence of the delay of delivery to the customer.*

*Based on problems occurred, the solution is how to build a management information system for the distribution of the product. Forecasting product procurement is done using Single Moving Average calculation, the method of information system management Plan Do Check Action (PDCA), determine the route as well as the capacity of the delivery method using Algorithms Clarke and Wright Savings, scheduling distribution also based on business rules that used by the company.*

*Based on Blackbox, and Beta testing the invalidated the results that the system had enough help in determining the amount of product procurement and distribution scheduling.*

*Keywords: management information systems for the distribution of products, Single Moving Average Forecasting, Plan Do Check Action (PDCA), Algorithms Clarke and Wright Savings.*

## *1. INTRODUCTION*

*PT. Soka Cipta Niaga is a company engaged in the field of distribution in Indonesia with Socks that have the trademark SOKA, where the trademark is strong and recognised global market, supported by technology, science and management. SOKA is also the socks Socks that have a Halal certificate first in Indonesia, has 20 kinds of motives. Sales of products in one dozen has 1 good motives and some color. Customers are now scattered in several cities in Indonesia.*

*Based on the results of the interview with Ulli Amalia Rachmawati Lubis as Logistics Manager stated that the company accepts product socks average 1500 dozen per day. PT. Soka Cipta Niaga only have 2 cars, engkel box and mini car bus with a capacity of each car, engkel box can accommodate 1000 dozen socks, while the mini car bus can only accommodate 500 dozen socks. Part delivery of sending the order products one day after the booking, as at 30 September 2016 delivery company received orders with a number of different products and locations, make part deliveries are experiencing difficulty in submitting products to each customer, due to the currently shipping do not use scheduling, this part should send delivery orders in advance order products to the company. So customers often order products exceed the agreed time.*

*In the process of shipping products to customers obstructed socks when total shipments exceeded the capacity of the car, it causes the delivery should be performed two times of delivery, so that the occurrence of the addition of the time. In addition part of the submissions sent outside the province often occurs late delivery, due to the great distances of the company thus causing customers not getting certainty as to when the product will reach the hands of pernerimaan customers.*

1. *Based on a problem that's been presented before, then the company PT. Soka Cipta Niaga requires a means by which to manage distribution management information system in order to facilitate PT. Soka Cipta Niaga in determining procurement of stock in the warehouse, and can help part delivery to be able to schedule the delivery of the product so that it is not obstructed when there are orders from customers. Therefore this research was named Construction*

*Management information system in PT distribution of product Soka Cipta Niaga. The existence of this system, is expected to help provide solutions to the problems faced by PT. Soka Cipta Niaga.*

*Based on the above background for the purpose will be achieved in the research and development of management information systems are:*

1. *Assist the Manager of Logistics for the menjadwalk-Ness process product delivery to consumers so as not obstructed when the existence of orders from customers.*
2. *Help the Manager to determine Logistical capacity so as to minimize the occurrence of the delay in delivery.*

## *2. RESEARCH OF CONTENT*

### 2.1 *Management Information System*

*Management information systems can be defined as a set of it interconnected subsystems, gather together and form a unity, mutual interaction and cooperation among one another with certain ways to perform data processing, accept input in the form of input data, then offer it processing, and produce output as a basis for decision making that is useful and has a real value that can be felt as a result of good at that time or in the future, support the activities of operational, managerial, strategic and organiasasi, by utilizing a variety of resources that exist and are available for these functions in order to achieve the goal.[1]*

### 2.2 *Distribution*

*The distribution of these products is sending out in order to arrive at the hands of the customers at the time and the right place. Product delivery to customers or end users would of course involve the activities of transfortasi. Companies that provide service delivery, warehousing, and so forth are often named with a 3PL or thrid party logistic service providers. The scope of activities of distribution, the company should be able to devise a proper distribution network. Decisions about the distribution network design must consider the tradeoff between the cost aspect, the aspect of flexibility, and the speed of the response to the customer.[2]*

### 2.3 *Algoritma Clarke and Wright Saving*

*Algorithm of clarke and wright Savings is a step that was discovered by Clarke and Wright in 1964. This method is often referred to as a method of saving.*

*Algorithm of clarke and wright savings measured savings doing the calculations of how much mileage reduction can be done and time spent with hooking existing nodes and routes based on the value of the the biggest savings i.e. mileage between the initial node and the destination node. The steps are:*

1. *Determine the amount of the maximum capacity of the vehicle is available and allocation of vehicles that are used for shipping goods to customers, assuming that each node requests at the start of a route of the vehicle separately. Where each node forming its own routes served by different vehicles. As shown in Figure 2.1. that is the route i-o-o is served by one vehicle, and route o-j-o is served by another vehicle, in this case o for the depot, i and j to node ang other.*
2. *Create a distance matrix is a matrix that is the distance between the depot with nodes and between nodes. The measurement of the distance from node A to B equals the distance from B to A matrix so that this distance including symmetric matrix.*

***Table 2. 1 Common forms of Distance Matrix***

| | $V_0$ | ... | Vi | ... | Vj | ... | Vn |
|---|---|---|---|---|---|---|---|
| Vo | 0 | | | | | | |
| ... | | 0 | | | | | |
| Vi | $C_{0n}$ | | 0 | | | | |
| 1.... | | | | 0 | | | |
| Vj | $C_{0n}$ | | $C_{0n}$ | | 0 | | |
| ... | | | | | | 0 | |
| Vn | $C_{0n}$ | | $C_{0n}$ | | $C_{0n}$ | | 0 |

*Calculate the value of the savings (Sij) in the form of mileage from one vehicle that replaces two vehicles to serve the nodes i and j.*

*SI, j = Coi + Coj – Cij..... (2.1)*

*The value of savings is the distance that can be saved if the route i-o-o-o route was merged with j-o single o-route became i-j-o is served by one vehicle (shown in Figure 2.1)*

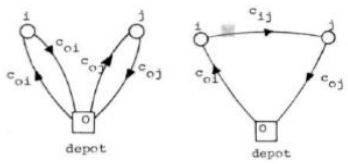



***Figure 2. 1 Distance Savings***

3. *Create a matrix of thrift, where the General form of the matrix the savings developed by Clarke and Wright served on the table 2.2.*

***Table 2. 2 two common forms of Saving Matrix***

| | $V_0$ | ... | Vi | ... | Vj | ... | Vn |
|---|---|---|---|---|---|---|---|
| Vo | - | | | | | | |
| ... | | - | | | | | |
| Vi | $S_{li}$ | | - | | | | |
| ... | | | | - | | | |
| Vj | $S_{lj}$ | | $S_{ij}$ | | - | | |
| ... | | | | | | - | |
| Vn | $S_{ln}$ | | $S_{in}$ | | $S_{jn}$ | | - |

4. *Choose a path where the two routes can be combined into a single route. The highest savings value is taken, then choose the distance that is closest to the previous line. The iteration will stop when all the entries in the rows and columns are already selected.[3]*

**2.4 *Plan Do Check Act (PDCA)***

*Plan Do Check Act (PDCA) cycle is to undertake a continuous process improvement and control. PDCA model of continuous improvement is developed by Edward Deming. This cycle was developed to connect between operations with customer needs and focus the resources of all parts within the company (research, design, operations, and marketing) are integrated and synergy to meet customer needs.*

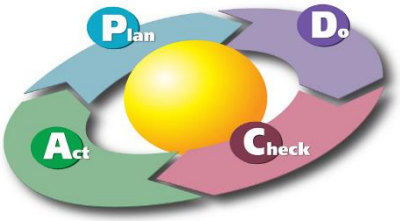



***Figure 2. 2 Cycle Plan Do Check Act (PDCA)***

*Plan Do Check Act (PDCA) cycle is a process improvement performed continuously without stopping. There are 4 stages in the PDCA, namely:*

*1. Stages of planning (Plan). It must be determined which processes need to be improved, that is the process which is closely related to the Organization's mission and the demands of the customers. Determine what repairs will be performed against the selected process. Determine the data and information necessary to choose the most relevant processes with the company.*

*2. Stage of implementation (Do). Gather basic information about the course of the ongoing process. Make any changes that are required to be applied, by adjusting the real circumstances that exist, so as not to cause turmoil. Back collecting data to find out whether the change has brought an improvement or not.*

*3. The stage of the examination (Check) Interpreting changes by arranging data already accumulated in the graph. Common chart used in large qualities, namely analysis, 15 summarizes and interprets the data and information to make conclusions.*

*4. Stage corrective actions (Action) Decide which peubahan will be implemented, if changes made successfully for improvements.[4]*

**2.5 *Forecasting***

*Needs analysis is a step aimed to see or predict the prospect of economic or business activities as well as the influence of the environment against such prospects. Forecasting (Forecasting) is an activity that seeks to predict sales and usage of products so that these products can be made in the exact quantity or amount (Vincent Gasperz, 2001).*

*Forecasting is not synonymous with prediction, because forecasting is based on past data processed with statistical techniques. Forecasting is done when the foretold is uncertain. If a condition can be planned or can be calculated (are for sure), then there is no need to use the forecasting.*

*In a manufacturing forecasting is the first step in the preparation of Production Inventory Management, Manufacturing Planning and Control, and Manufacturing Resource Planning, where objects are foreseen are a necessity. In addition there is some important information to be had from forecasting the scheduling information, namely production, as well as information about expansion plans a good amount of effort or resources.*

*Forecasting is an important tool for conducting an effective planning and efficient. Forecasting will need is required for:*

*1. Estimated needs of what will be needed in the future.*

*2. Basis of decision makers to make planning.*

*In an industry that has Make to Stock forecasting is the major input. While the industry embraced a Make to Order forecasting only a material consideration in determining the needs of the machine.[5]*

***2.5.1 Single Moving Average***

*Moving average methods of single actual data using a number of new requests to raise the forecast value for the request in the future. This method will be effectively applied if we can assume that the market demand for the products will remain stable over time. This method has two special properties to make the forecast data.*

*Historically within a certain period, the length of the moving averages will produce a moving average of the increasingly subtle, systematically moving average can be calculated with the equation 2.2.*

$$St + 1 = (xt + xt\text{-}1\ xt + \cdots + n + 1)/n \quad (2.2)$$

*Description:*

*St + 1 = Forecast for the period to t + 1.*

*XT = Data in the period t.*

*N = period Moving Averages [6]*

***2.5.2 Measurement of forecasting errors***

*1. The Mean Squared Error (MSE)*

*The mean Squared Error (MSE), namely the average of the squared forecasting errors and can be seen in the equation 2.5.*

$$MSE = (\Sigma\ (xt\text{-}Ft))/n$$

*Description:*

*Xt = the actual Data in the period t*

*Ft = Data forecast from models used in period t*

*n = a lot of data results forecasts.[6]*

**2.6 *Safety stock***

*Security or safety stock inventory serves to protect the errors in predicting demand during lead time. Lead time is the time it takes between the raw materials were ordered up to the company. Inventory security will function when the actual request is greater than the value of the average. To get an idea of how uncertain demand during lead time, companies need to collect data to get distribution. The formula for finding the value of safety stock. Here's the formula in determining the Safety stock can be seen in equation 2.4 and 2.5 [3].*

*Safety Stock Z x Sdl..... (2.3)*

*Description:*

*Z = Service Level*

*SDL = uncertainty of demand and Lead time uncertainty.*

*Reorder point or the point of booking again is when inventory reaches a point where the booking has to be done again. Here's the formula in determining reoder point can be seen in the equation 2.5.*

$$SDL = \sqrt{((d\ ^\ sl\ 2\ x\ ^\ 2 + sd\ ]\!]\ \ [\![l\ x\ ^\ 2))} \quad (2.4)$$

*Description:*

*d = the average Consumption*

*SL = Standard deviation of Lead time*

*l = Lead time*

*SD = standard deviation average Usage [3]*

*Analysis of PDCA (Plan, Do, Check, Act) is a follow-up of the analysis of a system that is running. This section will be analyzed how a procedure which will be implemented in the system to be built. Analysis of PDCA process include:*

*a. the process of procurement of Products*

*b. the process of Shipping Products [3]*

**2.7 *Analysis Plan Do Check Act (PDCA)***

*Analysis of PDCA (Plan, Do, Check, Act) is a follow-up of the analysis of a system that is running. This section will be analyzed how a procedure which will be implemented in the system to be built. Analysis of PDCA process include:*

*a. the process of procurement of Products*

*b. the process of Shipping Products*

*Analysis of PDCA management information system Product Distribution At PT. Soka Copyright Commerce, can be seen in Figure 3.4*

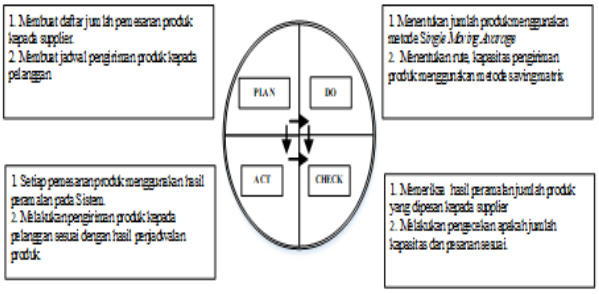



***Figure 2. 3 Analysis PDCA***

***2.7.1 Procurement Product***

*Analysis of PDCA process product procurement management information system Product Distribution At PT. Soka Copyright Commerce. The following stages of the analysis of PDCA using product procurement..*

***1. Stages of Planing***

*At this stage carried out the identification of problems, namely how many products must be reserved to the supplier so that orders from customers can be met. Procurement planning product to the supplier is done using the method of*

*divination based on the results of the previous period of product delivery in March 2016 until August 2016.*

*Soka jempol pendek made as samples in doing analisisa forecasting the amount of product that must be reserved to the supplier which is performed by the Manager of Logistics at PT. Soka Cipta Niaga. Data delivery product soka a thumbs up in a short period of 6 months can be seen in table 2.3*

***Table 2.3 Data Delivery Soka Jempol Pendek***

| Period | Quantity of deliveries Soka Jempol Pendek (Dozen) |
|---|---|
| Maret 2016 | 9275 |
| April 2016 | 9539 |
| Mei 2016 | 9741 |
| Juni 2016 | 9607 |
| Juli 2016 | 9834 |
| Agustus 2016 | 9534 |

### 2. Stages of Do

*Method the method used a Single Moving Average method for forecasting inventory product at PT. Soka Copyright Commerce. Following are the results of the forecasting method using Single Moving Average forecasting, product forecasting Results Soka a thumbs up for the next period with moving 5 months, then PT Soka Copyright Commerce recommended procurement products Soka The thumb Short in September 2016 with the number of dozen 9651. Obtained as a result of the calculation below by using the equation 2.2*

$$St_{september} = \frac{Xt_{april} + Xt_{mei} + Xt_{juni} + Xt_{juli} + Xt_{agustus}}{n}$$

$$= \frac{9539 + 9741 + 9607 + 9834 + 9534}{5}$$

$$= \frac{48255}{5} = 9651\ dozen$$

*After the calculation is performed then the mind that demand estimates Soka a thumbs up Short in September 2016 i.e. as many as a dozen 9651.*

*Measurement errors in forecasting used method of MSE (Mean Square Error). This method is a way to measure and evaluate the errors in forecasting techniques. Based on the results of a comparison of 3 months and 5 months by using Single Moving Average forecasting then that is taken is a period of 5 months, because the value of the smallest error there is in a period of 5 months.*

***Table 2.4 The Value Of The Error MSE For Forecasting Product Soka Short Thumbs***

| Period | Quantity of deliveries Soka Jempol Pendek (Dozen) | Period 3 Months | Period 5 Months |
|---|---|---|---|
| Maret 2016 | 9275 | | |
| April 2016 | 9539 | | |
| Mei 2016 | 9741 | | |
| Juni 2016 | 9607 | 7861.777778 | |
| Juli 2016 | 9834 | 42025 | |
| Agustus 2016 | 9534 | 37377.77778 | 13689 |
| MSE | | 29088.18519 | 13689 |

### 3. Stages Checking

*This stage is the stage of the pemeriksaaan are already forecasting results matching applied according to what is planned at this stage of the Plan. This inspection is carried out by means of checking the results of an evaluation of the results of forecasting with what was planned at the planning stages using the technique of monitoring. Monitoring phase conducted Logistics Manager to conduct procurement control products with tujuun avoid product shortages, then performed the calculation of Safety stock. Safety stock is a stock seat or the determination of inventory storage addition as a benchmark to overcome the presence of fluctuations in demand (demand). Formula safety stock can be seen in the equation 2.3 and 2.4*

*Here is the calculation of safety stock for Soka a thumbs up short:*

*The results of the forecasting September 2016 = 9651*

*The number of working days in a month = 26 hari*

*Procurement lead time product to the supplier (l) = 7 hari*

*The average booking in one month (d) = 9651/26 = 371.19*

*Standard deviation number of forecasting September 2016 (sd) = 371.19/10 = 37.119*

*Standar deviasi from lead time (sl) = 7/10 = 0.7*

*Service level 95% (Z) = 1.645*

*Safety stock = Z x Sdl*

$$Sdl = \sqrt{(d^2 x\ Sl^2) + (l\ x\ Sd^2)}$$

$$Sdl = \sqrt{(371.19^2 x\ 0.7^2) + (7\ x\ 37.119^2)}$$

$$Sdl = \sqrt{(137782{,}01 x\ 0.49) + (7\ x\ 1377.82)}$$

$$Sdl = \sqrt{(67513.18) + (9644.74)}$$

$$Sdl = \sqrt{77157.92} = 277.77$$

*Safety stock = 1.645 x 277.77 = 456.93 => 457 dozen (result rounding).*

*Based on the* results of calculation of safety*stock, then companies should provide safety stock for soka a thumbs up short is 457 dozen.*

***Table 2.5 Monitoring Product***

| No | Nama Produk | Safety Stock | Stok Akhir | Status |
|---|---|---|---|---|
| 1 | Soka Wudhu | 80 | 21 | Tidak Aman |
| 2 | Soka Jempol Pendek | 457 | 2873 | Aman |
| 3 | Soka Jempol Panjang | 83 | 39 | Tidak Aman |
| 4 | Soka Original | 6 | 7 | Aman |
| 5 | Essentials Variant | 16 | 666 | Aman |
| 6 | Essentials Tribal | 8 | 1340 | Aman |
| 7 | Essentials Variant | 3 | 187 | Aman |
| 8 | Essentials Mega Mendung | 6 | 485 | Aman |
| 9 | Essentials Flower | 8 | 593 | Aman |
| 10 | Essentials Henna | 7 | 86 | Aman |

| | | | | |
|---|---|---|---|---|
| 11 | Essentials Aztec | 10 | 562 | Aman |
| 12 | Essentials Batik Classic | 4 | 233 | Aman |
| 13 | Essentials Zebra | 4 | 1282 | Aman |
| 14 | Essentials Stripe | 9 | 1513 | Aman |
| 15 | Essentials Sakura | 9 | 339 | Aman |
| 16 | Essentials Combination | 11 | 481 | Aman |
| 17 | Essentials Square | 7 | 116 | Aman |
| 18 | Essentials Butterfly | 8 | 967 | Aman |
| 19 | Essentials Polkadot | 16 | 513 | Aman |
| 20 | Essentials Batik Parang | 5 | 438 | Aman |

*Status is not secure if the final stock less than safety stock. Based on the monitoring of supplies on the table 3.5 in stock preparation product at PT. Soka Cipta Niagais not secure then the company should conduct the procurement of products.*

### *4. Stages of Action*

*This step is done in determining the ordering of the product to the supplier based on forecasting and the amount of safety stock is to make improvements in the procurement of products. Logistics managers ordered a product that is the result of reduced inventory forecasting end then added a safety stock.*

***Table 2.6 The Results Of The Evaluation Of The Number Of Products***

| Nama Produk | Hasil Peramalan | Stok Akhir | Safety Stock | Jumlah yang harus dipesan | Satuan |
|---|---|---|---|---|---|
| Soka Wudhu | 1617 | 21 | 80 | 1676 | Dozen |
| Soka Jempol Pendek | 9651 | 2873 | 457 | 7235 | Dozen |
| Soka Jempol Panjang | 1677 | 39 | 83 | 1721 | Dozen |
| Soka Original | 205 | 7 | 6 | 204 | Dozen |
| Essentials Vintage | 540 | 666 | 16 | -110 | Dozen |
| Essentials Tribal | 281 | 1340 | 8 | -1051 | Dozen |
| Essentials Variant | 116 | 187 | 3 | -68 | Dozen |
| Essentials Mega Mendung | 215 | 485 | 6 | -264 | Dozen |
| Essentials Flower | 296 | 593 | 8 | -289 | Dozen |
| Essentials Henna | 259 | 86 | 7 | 180 | Dozen |
| Essentials Aztec | 339 | 562 | 10 | -213 | Dozen |
| Essentials Batik Classic | 139 | 233 | 4 | -90 | Dozen |
| Essentials Zebra | 139 | 1282 | 4 | -1139 | Dozen |
| Essentials Stripe | 324 | 1513 | 9 | -1180 | Dozen |
| Essentials Sakura | 317 | 339 | 9 | -13 | Dozen |
| Essentials Combination | 378 | 481 | 11 | -92 | Dozen |
| Essentials Square | 245 | 116 | 7 | 136 | Dozen |
| Essentials Butterfly | 271 | 967 | 8 | -688 | Dozen |
| Essentials Polkadot | 554 | 513 | 16 | 57 | Dozen |
| Essentials Batik Parang | 178 | 438 | 5 | -255 | Dozen |

*From the results of the evaluation of the number of products then the amount that must be reserved to the supplier can be seen in table 3.6, if the end result there should then be ordered minus not, depending on the company's corporate policy.*

### *2.7.2 Product Delivery Process*

*Analysis of PDCA process delivery management information System product distribution of the product at PT. Soka Copyright Commerce. The following stages of the analysis of PDCA cycle using product delivery.*

### *1. Stages Planing*

*This stage aims to schedule the delivery of the product to the customer. The stage of the delivery will be carried out in accordance with the already planned before, especially regarding the delivery scheduling based on transport capacity car Car i.e. Engkel box can accommodate 1000 dozen products and Mini car Bus can accommodate 500 a dozen products.*

*On distribution scheduling is done after the order is due on the business rules of the company is carried out in advance, booking orders from customers every month will be different products, quantities and dates. for table reservations are taken from data earlier on September 29, 2016 views on table 2.7.*

***Table 2.7 Booking Data 29 September 2016***

| Tanggal Pesan | No Faktur | Kode | Nama Produk | Qty / Dozen | Total | Customer | Alamat | Kota |
|---|---|---|---|---|---|---|---|---|
| 29-Sep-16 | SJ-1609-53 | SE-08 | Essentials Square | 77 | 590 | Intan Sahara | Perum Pondok Ungu Permai Blok C No.4, Kali Abang Tengah | Bekasi, Jawa Barat |
| | | SE-09 | Essentials Butterfly | 81 | | | | |
| | | SB-03 | Soka Jempol Pendek | 152 | | | | |
| | | SB-01 | Soka Original | 119 | | | | |
| | | SE-04 | Essentials Polkadot | 136 | | | | |
| | | SE-12 | Essentials Batik Parang | 25 | | | | |
| | SJ-1609-54 | SB-02 | Soka Wudhu | 162 | 500 | Wawan | Jl. Wedana No.129 Jaya Giri, Lembang | Bandung, Jawa Barat |
| | | SB-03 | Soka Jempol Pendek | 150 | | | | |
| | | SE-03 | Essentials Stripe | 10 | | | | |
| | | SE-15 | Essentials Sakura | 51 | | | | |
| | | SE-02 | Essentials Combination | 127 | | | | |
| | SJ-1609-55 | SE-05 | Essentials Vintage | 43 | 504 | Rumah Busana Ummu Fatimah | Perum Puri Kosambi Blok DD No.24 Klari | Karawang, Jawa Barat |
| | | SE-06 | Essentials Tribal | 46 | | | | |
| | | SE-10 | Essentials Variant | 30 | | | | |
| | | SE-07 | Essentials Mega Mendung | 10 | | | | |
| | | SB-03 | Soka Jempol Pendek | 100 | | | | |
| | | SB-02 | Soka Wudhu | 200 | | | | |
| | | SE-01 | Essentials Flower | 75 | | | | |
| | SJ-1609-56 | SE-13 | Essentials Henna | 112 | 467 | Indo Busana | Pondok Aren No.105 Tangerang | Banten, Jawa Barat |
| | | SE-14 | Essentials Aztec | 15 | | | | |
| | | SE-16 | Essentials Batik Classic | 10 | | | | |
| | | SB-03 | Soka Jempol Pendek | 100 | | | | |
| | | SB-04 | Soka Jempol Panjang | 200 | | | | |
| | | SE-11 | Essentials Zebra | 30 | | | | |

### *2. Stages of Do*

*The stages being performed on this stage determines the route, the capacity of the product to be sent to customers using Algorithms clarke and wright Savings. To schedule delivery at customers PT. Soka Cipta Niagasends the products a day after the booking. Number of products that are sent to some customers did not meet capacity payload vehicle products not then terangkut will be sent back, but if it is outside the province of delivery will be recommended to use expeditions. Shipping will be sent via the nearest route in advance, using the method of Algorithm clarke and wright Savings.*

*In determining the route to minimize the route done by clarke and wright Algorithm method of Savings. Clarke and wright Algorithm method of Savings is capable of forming a route, the initial step does is identify matrix distance between barn to each customer and the distance between the customer, shed coordinates (0.0).*

*PT. Soka Cipta Niaga using engkel 1 box and 1 minibus for shipping products with a capacity of engkel box 1000 dozen minibuses and 500 dozen. Next up will be the distance matrix entries-it is the distance between warehouse with customers (node) and customers (node). For customers from 1 to 4 the explanation is as follows:*

*i. Customer 1 = Intan Sahara*
*ii. Customer 2 = Wawan*
*iii. Customer 3 = Rumah Busana Ummu Fatimah*
*iv. Customer 4 = Indo Busana*

***Table 2.8 Initial steps of original Distance Matrix-goals (km)***

| | Warehouse | Customer 1 | Customer 2 | Customer 3 | Customer 4 |
|---|---|---|---|---|---|
| Warehouse | 0 | | | | |
| Customer 1 | 154 | 0 | | | |
| Customer 2 | 27 | 148 | 0 | | |
| Customer 3 | 107 | 60 | 98 | 0 | |
| Customer 4 | 186 | 59 | 178 | 95 | 0 |

*The second step performs identification matrix-saving by doing calculations with formula Si, j = Coi + Coj – Cij. Entered value to the distance, then the obtained value of the savings.*

1. $S_{12} = C_{01} + C_{02} – C_{12} = 154 + 27 – 148 = 33$
2. $S_{13} = C_{01} + C_{03} – C_{13} = 154 + 107 – 60 = 201$
3. $S_{14} = C_{01} + C_{04} – C_{14} = 154 + 186 – 59 = 281$
4. $S_{23} = C_{02} + C_{03} – C_{23} = 27 + 107 – 98 = 36$
5. $S_{24} = C_{02} + C_{04} – C_{24} = 27 + 186 – 178 = 35$
6. $S_{34} = C_{03} + C_{04} – C_{34} = 107 + 186 – 95 = 198$

*Obtained the matrix node for all the savings can be seen on table 3.11*

***Table 2.9 The Second Matrix Measures The Savings (1)***

| | Customer 1 | Customer 2 | Customer 3 | Customer 4 |
|---|---|---|---|---|
| Customer 1 | 0.0 | | | |
| Customer 2 | 33 | 0.0 | | |
| Customer 3 | 201 | 36 | 0.0 | |
| Customer 4 | 281 | 35 | 198 | 0.0 |

*After the matrix is formed, subsequent savings determine groups based on the nillai route of the greatest savings to the smallest of the matrix of the savings. This step is a matrix iterations of thrift, where the biggest savings if the value found in the nodes I and j then the row i and column j crossed out, and then i and j are combined in one group of routes, and so on until the last iteration. The next grouping routes based on the value of the savings obtained from the combined results of the node iteration matrix of savings. Then sort the list of destinations/customers in accordance with the route groups based on the value of the savings. The steps for the formation of the route:*

a. *a. choose the value of the biggest savings in the savings, amounting to 1.4 matrix between nodes 1 and 4 nodes. Merge both into one route, then write off all lines in column 1 and write off all of the columns in row 4. The route was formed is: route 1 = 1-4. For this route is the product shipped was 590 + 467 = 1057 dozen, but beyond the capacity of a vehicle that is 1000. Then the route is formed are: route 1 = 4. For this route product sent is 467 dozen and still not beyond the capacity of 1000 vehicles.*

***Table 2.10 Iterasi 1***

| | Customer 1 | Customer 2 | Customer 3 | Customer 4 |
|---|---|---|---|---|
| Customer 1 | 0.0 | | | |
| Customer 2 | 33 | 0.0 | | |
| Customer 3 | 201 | 36 | 0.0 | |
| Customer 4 | 281 | 35 | 198 | 0.0 |
| Kapasitas | 590 | 500 | 504 | 467 |

b. *Select the value of the thrift next in a matrix, i.e. 3.1 saving a route that is formed is: route 1 = 4-3. For this route product sent is 467 + 504 = 971 dozen.*

***Table 2.11 Iterasi 2***

| | Customer 1 | Customer 2 | Customer 3 | Customer 4 |
|---|---|---|---|---|
| Customer 1 | 0.0 | | | |
| Customer 2 | 33 | 0.0 | | |
| Customer 3 | 201 | 36 | 0.0 | |
| Customer 4 | 281 | 35 | 198 | 0.0 |
| Kapasitas | 590 | 500 | 504 | 467 |

c. *Memilih nilai penghematan terbesar selanjutnya dalam matriks penghematan, yaitu 2,1. Rute yang terbentuk adalah : Rute 1 = 3 – 4 – 2 . Untuk rute ini produk yang dikirim adalah 504 + 467 + 500 = dozen, tetapi melampaui kapasitas dari kendaraan yaitu 1000. Maka rute yang terbentuk adalah : Rute 2 = 2. Untuk rute ini produk yang dikirim adalah 500 dozen dan kapasitas dari kendaraan 500.*

***Table 2.12 Iterasi 3***

| | Customer 1 | Customer 2 | Customer 3 | Customer 4 |
|---|---|---|---|---|
| Customer 1 | 0.0 | | | |
| Customer 2 | 33 | 0.0 | | |
| Customer 3 | 201 | 36 | 0.0 | |
| Customer 4 | 281 | 35 | 198 | 0.0 |
| Kapasitas | 590 | 500 | 504 | 467 |

*Next: route Route 3 = 1. For this route is the product shipped was 590 dozen and a capacity of 1000 vehicles.*

### *3. Stages of Checking*

*After the order, then check whether the products will be delivered in accordance with the transport capacity of the car. Secure status means no goods that are not terangkut, otherwise if not secure then it will happen not to transport Products.*

***Table 2.13 Data Delivery 30 September 2016***

| Tanggal Pesan | No Faktur | Kode | Nama Produk | Qty / Dozen | Total | Kapasitas mobil | Status |
|---|---|---|---|---|---|---|---|
| 30 sep 16 | SJ-1609-53 | SE-08 | Essentials Square | 77 | 590 | 1000 | Aman |
| | | SE-09 | Essentials Butterfly | 81 | | | |
| | | SB-03 | Soka Jempol Pendek | 152 | | | |
| | | SB-01 | Soka Original | 119 | | | |
| | | SE-04 | Essentials Polkadot | 136 | | | |
| | | SE-12 | Essentials Batik Parang | 25 | | | |
| | SJ-1609-54 | SB-02 | Soka Wadhu | 162 | 500 | 500 | Aman |
| | | SB-03 | Soka Jempol Pendek | 150 | | | |
| | | SE-03 | Essentials Stripe | 10 | | | |
| | | SE-15 | Essentials Sakura | 51 | | | |
| | | SE-02 | Essentials Combination | 127 | | | |
| | SJ-1609-55 | SE-05 | Essentials Vintage | 43 | 504 | 1000 | Aman |
| | | SE-06 | Essentials Tribal | 46 | | | |
| | | SE-10 | Essentials Variant | 36 | | | |
| | | SE-07 | Essentials Mega Mendung | 10 | | | |
| | | SB-03 | Soka Jempol Pendek | 100 | | | |
| | | SB-02 | Soka Wadhu | 200 | | | |
| | | SE-01 | Essentials Flower | 75 | | | |
| | SJ-1609-56 | SE-13 | Essentials Henna | 112 | 467 | | Tidak Aman |
| | | SE-14 | Essentials Aztec | 15 | | | |
| | | SE-16 | Essentials Batik Classic | 10 | | | |
| | | SB-03 | Soka Jempol Pendek | 100 | | | |
| | | SB-04 | Soka Jempol Panjang | 200 | | | |
| | | SE-11 | Essentials Zebra | 30 | | | |

*Insecure status of undeliverable due orders sent employee work hours have passed. Then the delivery will be sent to the customer the next day.*

### *4. Stages of Action*

*At this stage will be on the schedule in September pengriman on September 30, 2016.*

*Based on the booking, with the right address, capacity, and vehicles that will be used to send the product. After determining the routes and capacity using the algorithm of clarke and wright Savings then obtained the route as follows:*

***1.*** *the first part of the shipping Route will deliver the product to the customer i.e. a fashion House 3 Umm Fatimah which located in Karawang and 4 customers i.e. Indo fashion located in Banten by car Engkel Box.*

*2. the second part of the shipping Route will deliver the product to the customer i.e. the Interview into 2 located in the city of Bandung by car Minibus.*

*3. the third part of the shipping Route will deliver the product to customers to 1 i.e. the Sahara Diamond located in Bakasi by car Engkel Box.*

***Table 2.14 Schedule Delivery 30 September 2016***

| Tanggal Delivery | No Faktur | Nama Produk | Qty / Dozen | Alamat | Kota | Customer | Total | Kapasitas mobil | Jenis Angkutan | Rute |
|---|---|---|---|---|---|---|---|---|---|---|
| 30 Sep 2016 | SJ-1609-55 | Essentials Vintage | 43 | Perum Puri Kosambi Blok DD No.24 Klari | Karawang | Rumah Busana Ummu Fatimah | 504 | 1000 | Mobil Engkel Box | 1 |
| | | Essentials Tribal | 46 | | | | | | | |
| | | Essentials Variant | 30 | | | | | | | |
| | | Essentials Mega Mendung | 10 | | | | | | | |
| | | Soka Jempol Pendek | 100 | | | | | | | |
| | | Soka Wadhu | 200 | | | | | | | |
| | | Essentials Flower | 75 | | | | | | | |
| | SJ-1609-56 | Essentials Henna | 112 | Pondok Aren No.105 Tangerang | Banten | Indo Busana | 467 | | | |
| | | Essentials Aztec | 15 | | | | | | | |
| | | Essentials Batik Classic | 10 | | | | | | | |
| | | Soka Jempol Pendek | 100 | | | | | | | |
| | | Soka Jempol Panjang | 200 | | | | | | | |
| | | Essentials Zebra | 30 | | | | | | | |
| | SJ-1609-54 | Soka Wadhu | 162 | Jl. Wedana No.129 Jaya Giri, Lembang | Bandung | Wawan | 500 | 500 | Mobil Minibus | 2 |
| | | Soka Jempol Pendek | 150 | | | | | | | |
| | | Essentials Stripe | 10 | | | | | | | |
| | | Essentials Sakura | 51 | | | | | | | |
| | | Essentials Combination | 127 | | | | | | | |
| | SJ-1609-53 | Essentials Square | 77 | Perum Pondok Ungu Permai Blok C No.4, Kali Abang Tengah | Bekasi | Intan Sahara | 590 | 1000 | Mobil Engkel Box | 3 |
| | | Essentials Butterfly | 81 | | | | | | | |
| | | Soka Jempol Pendek | 152 | | | | | | | |
| | | Soka Original | 119 | | | | | | | |
| | | Essentials Polkadot | 136 | | | | | | | |
| | | Essentials Batik Parang | 25 | | | | | | | |

## 2.8 *Analysis Database*

*Data base analysis on the infornasi system will be built using the ERD. ERD is a data model that uses some notation to describe the data in the context of the entities and relationships in the data described by the.*

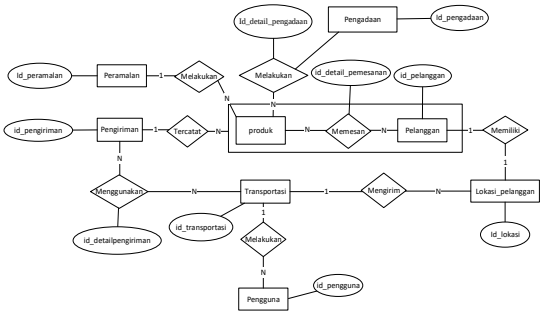



***Figure 2.4 Entity Relationship Diagram***

## 2.9 *Functional Analysis*

*A functional needs analysis including depictions, planning the creation of sketches or settings of some separate elements into a unified whole and functioning in the process of making software that will be built.*

### *2.9.1 Context Diagram*

*Context diagram is a model to explain how data is used globally and is transformed to the process or describe the flow of data into and out of the system.*

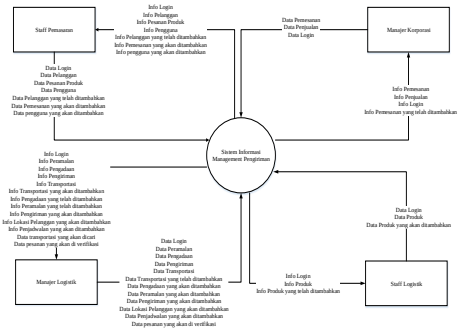



***Figure 2.5 Context Diagram***

### *2.9.2 Data Flow Diagram (DFD)*

*Data Flow diagrams (DFD) shows data flow, data storage, and a process that responds to incoming data and change it. Here is a picture of a data flow diagram for product distribution management information system in PT Soka Cipta Niaga*

#### *1. Data Flow Diagram Level 1*

*DFD level 1 describes in general terms the process of anything that can be done on management information system of distribution on PT. Soka Cipta Niaga.*

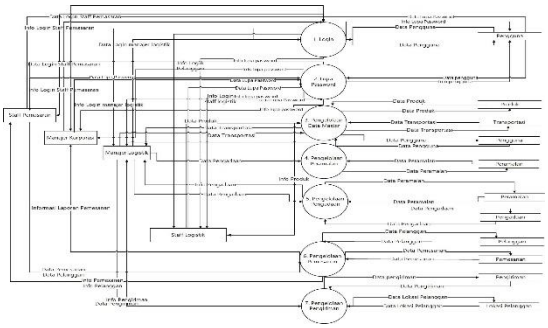


***Figure 2.6 DFD Level 1 Management Information System Distribution of Product***

## 2.10 *Design System*

*The design of the system is described in the form of a multiple-step process where the representation of structure info, program structure, characteristic look and detail procedure.*

### 1.9.1 *Table Relation*

*Table relation is an overview of the relationships between data, meaning data and their boundaries. The process of relationship between attributes is a combination between an attribute that has the same primary key so that these attributes into a single entity linked by the key.*

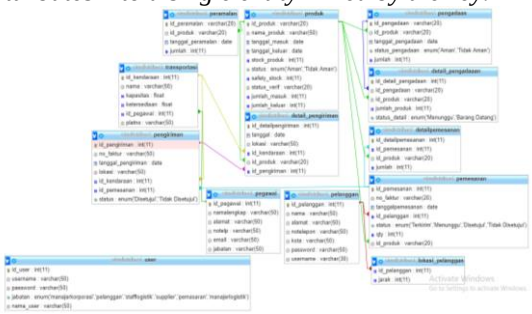


***Figure 2.7 Table Relation***

### 1.9.2 *Design Interface*

*The design of the interface was created to illustrate how the look of the program that will be used by the user to interact with the system to be built. The design of the interface was based on the view, either of the input, output or to be generated when the application that has built it's implemented.*

*1. Login User Interface Overview*

*User login page interface design on management information system of product distribution at PT. Soka Cipta Niaga.*

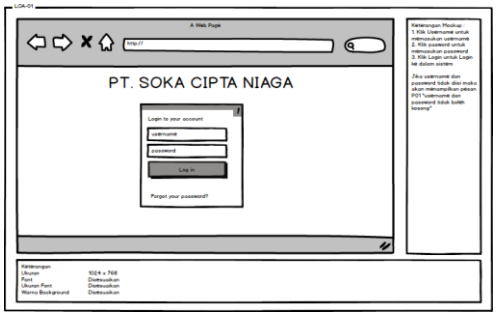



***Figure 2.8 The Login User Interface***

### 1.9.3 *Implementasi dan Pengujian Sistem*

#### *1.9.3.1 Blackbox Testing*

*Black box testing is focused on the functional requirements of the system being built. Black box testing scenarios for product distribution management information system.*

***Table 2.15 Black Box***

| *Kelas Uji* | *Butir Uji* | *Jenis Pengujian* |
|---|---|---|
| *Login* | *Login pengguna* | *Black Box* |
| *Lupa Kata Sandi* | *Lupa kata sandi pengguna* | *Black Box* |
| *Pengolahan data pengguna* | *Menambah data pengguna* | *Black Box* |
| | *Mengedit data pengguna* | |
| | *Menghapus data pengguna* | |
| | *Mencari data pengguna* | |
| *Pengelolaan data Customer* | *Menambah data Customer* | *Black Box* |
| | *Mengedit data Customer* | |
| | *Menghapus data Customer* | |
| | *Mencari data Customer* | |
| *Pengolahan data produk* | *Menambah data produk* | *Black Box* |
| | *Mengedit data produk* | |
| | *Menghapus data produk* | |
| | *Mencari data produk* | |
| *Pengolahan data Transportasi* | *Menambah data Transportasi* | *Black Box* |
| | *Mengedit data Transportasi* | |
| | *Menghapus data Transportasi* | |
| | *Mencari data Transportasi* | |
| *Pengolahan Pengadaan* | *Menambah data pengadaan masuk* | *Black Box* |
| | *Mengubah data penggadaan* | |
| | *Menghapus data pengadaan* | |
| | *Mencari data produk masuk* | |
| *Pengolahan peramalan* | *Menambah data peramalan* | *Black Box* |
| | *Mencari data peramalan* | |
| *Pengolahan pemesanan* | *Menambah data pemesanan* | *Black Box* |
| | *Mengubah data pemesanan* | |
| | *Menghapus data pemesanan* | |
| | *Mencari data pemesanan* | |
| *Pengolahan delivery* | *Menambah data delivery* | *Black Box* |
| | *Mengubah data delivery* | |
| | *Menghapus data delivery* | |
| | *Mencari data delivery* | |

#### *1.9.3.2 Beta Testing*

*Beta testing is testing that is directly in the actual environment. The user to make assessment of the software using the method of interview. From the results of the interview then the conclusion can be drawn if the software has been built according to the purpose or not.*

*The interview was done to the users of the system that has been built is composed of Corporate Managers, Logistics Managers, Marketing Staff, Logistics Staff.Whether the existence of this system, helping you in receipt of report and request approval?*

a. *is the system that is built can make work?*
b. *Whether the display on a system that is built easy to understand?*
c. *whether the system built easy to use?*
d. *whether the system can help companies built?*

## *3. CLOSING*

### 3.1 *Conclusions*

*After doing the analysis, design and testing of the system. Then the conclusion can be obtained as follows:*

*Management information systems for the distribution of these products can help in the Logistics Manager procurement stock estimates for the next period, and helps to schedule distribution to customers not hampered when distributing to the customers do.*

*In addition to product Distribution management information system can also help logistics management to recommend to part delivery for scheduling delivery of the product to the customer so that nothing is too late when the goods till to customer. Scheduling is done by determining the route and vehicle capacity.*

### 3.2 *Advice*

*Based on the conclusions already outlined above, the expected thing or suggestions for the future is for systems that are built can work even better, and can do addition against distribution scheduling analysis products to customers on Product Distribution management information system In PT Soka Copyright Commerce.*

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