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# Sales and Operation Analysis: A Case Study in Pt. Berkat Popok Bahagia

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**ABSTRACT:** The purpose of this paper is to help solve one of the current existing issues of PT. Berkat Popok Bahagia which is SKUs being out of stock. It turns out that there are several reasons for this. The first reason is the amount of the stock of each SKU in the system differs from the amount of stock in the warehouse. The second reason is the demand from the distributors is not in sync with the sales and operational planning team, making it when the distributors order products (SKU) from the factory, the product is not available because it might not be in the production process. The third reason is the forecasting method that is currently being used is less suitable. Author compared the forecasting accuracy of each forecasting method in the top 2 SKUs of baby care category from simple moving average method, simple exponential smoothing method and exponential smoothing with trend method. The results of the forecasting accuracy is based on the MAPE value in which lower value indicates better method. The forecasting accuracy measurement result when comparing the 3 methods between the 2 SKUs are respectively 24.3% and 20.24% for simple moving average, 20.28% and 16.19% for simple exponential smoothing and 18.07% and 15.65% for exponential smoothing with trend. The results indicate that exponential smoothing with trend provides the best performance among the three which therefore author recommend this method compared to the current simple moving average method.

**KEYWORDS:** Diaper Market, Forecasting Method, Sales and Operation Planning.

## INTRODUCTION

PT. Berkat Popok Bahagia is a company that operates in the category of tissue and hygiene paper. Currently, this company's position in terms of market share is one of the biggest in the industry according to the data from Nikkei Asia [1]. In Indonesia, there are 275.77 million people with the number of babies and toddler (under 4 years old) reaching 22.09 million people [2]. Comparing to the neighboring countries in terms of market population, Indonesia has the most potential in the baby diapers market as the usage of diapers in Indonesia is considered low based on the data from Euromonitor International in 2018 with only an annual usage of 282 diapers/disposable pants while the usage of diapers/disposable pants in Malaysia and Thailand averages at 430 annually. Japan's usage of diapers/disposable pants reached 1735 in the same period [3].

In terms of product category within the company, products are divided into 4 categories which are baby care products, feminine napkin, adult care and family care which is also part of the analysis in this paper.

The objectives of this paper are to assess and analyze the current existing process of the sales and distribution in DKI Region, to figure out the root cause that affect the current sales and distribution situation and to finally propose and recommend a solution that can improve the current situation. In this research, author combine both qualitative and quantitative research methods. Qualitative research is derived from interview and observation while quantitative research is derived from the internal data that is obtained from the company before the data is processed.

In this research, author will focus more on the KPI of distribution because one of the issues that occur lately in the company is that several stock keeping units (SKU) being out of stock. There are 5 distributors in the region which caters 4 segments which are baby shops, wholesale, retailer, and local key account. Author will analyze the performance of each of the distributors in the region before conducting a deeper analysis on one of the distributors. Author's priority is to then find out and analyze who the key customers are, what SKU that they frequently order, how much is the contribution of their orders towards the total revenue of the SKU they ordered. Then author also propose 3 solutions to address the out-of-stock issues. The company's stakeholders are involved in deciding one of the three solutions that they think are the most feasible to implement in the future so that this paper will be more objective. Once the solution is formulated, author will focus on that solution. The goal is to reduce the probability and risk of SKUs being out of stock in the future.

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## LITERATURE REVIEW

### *A. Optimization*

Optimization in business is the automated improvement of business processes using prespecified quantitative measures of performance [4]. Optimization is needed because there is a gap between the current capabilities and the expected capabilities or result. There might be a bottleneck in the current system that inhibits the firm, business unit, or company to run at its full potential. This optimization process is often overlooked or ignored as to achieve significant improvements, a business has to undergo fundamental changes which is not easy to do [5]. The objective of optimization is to improve the processes and ultimately to reduce costs [6]. When a company manages to implement this optimization in every step of the processes, efficiency is bound to be achieved.

### *B. Distribution*

Distribution can be defined as the transportation of products from the point of production to the point of demand in order to satisfy the expectations of both producers and consumers [7]. Distribution is a part of supply chain, with the purpose to deliver goods to consumers to the demand points with the right place, time and quantity with the lowest possible amount of cost. Fisher (1997) stated that the most decisive factor that leads to the selection of the distribution channel and the SCM in general [8]. Also, the nature of product whether it is functional with predictable demand or innovative with unpredictable demand like high-tech electronic devices. Every distribution system have objectives that must be achieved such as:

1. The management of the distribution channel with the lowest possible cost through certain procedures [9]: a) planning financial resources to be used within the supply chain, b) planning of the distribution networks and routes of which it is composed, c) selection of partners within the distribution channel, and d) control of the system performance.
2. Ensuring that the products being distributed are of high quality. Namely the maintenance of quality in a stable manner and the ability to respond to consumers' needs and desires.
3. Ensuring the highest level of customer service, with the aim to convert them into loyal customers.
4. Ensuring maximum flexibility in the distribution network even in cases where problems like adverse weather conditions occur, in order to maintain the credibility of the company. [10]

### *C. Simple Moving Average*

Simple moving average is one of the forecasting methods that practitioners like to use. Various surveys were conducted by Ali and Boylan shows that simple moving average was ranked as the top choice of in most surveys that is conducted. These surveys are conducted to ensure the usage, familiarity, and satisfaction of forecasting methods among practitioners [11]. According to Makridakis et al, the accuracy of simple moving average forecasting method is similar to single exponential smoothing forecasting method [12]. However, the limitation of simple moving average is that this method is not compatible for products with seasonal demand patterns, or in other words it is not suitable for seasonal products [13].This below is the formula of the current inventory forecasting method which is simple moving average.

$$F_t = \frac{A_{t-1} + A_{t-2} + A_{t-3} + \cdots + A_{t-n}}{n}$$

Where

$F_t$ = Forecast for this period

$n$ = Number of periods to be averaged

$A_{t-1}$ = Actual occurrences in the past period

$A_{t-2}, A_{t-3}, A_{t-n}$ = Actual occurrences two periods ago, three periods ago, and so on

### *D. Simple Exponential Smoothing*

Exponential Smoothing Forecast is a forecast method that utilizes weights. This method allocates the most weight to the most recent data and the weight declines in an organized way when older data are included [14]. Exponential smoothing methods are very popular in supply chain management and business analytics due to their simplicity, transparency, and accuracy [15]. Since the exponential smoothing places a higher focus on recent data, this results in a significant reduction in the error in the forecast. Unlike simple moving average which needs a lot of historical data, this method requires less data in computing [14]. This method is suitable

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for forecasting series that reveal trend, seasonality, or both [16]. According to Jacobs, there are exponential smoothing are well accepted for 6 reasons as follows [17]:

1. Exponential Models are surprisingly accurate.
2. Formulating an exponential model is relatively easy.
3. The user can understand how the model works.
4. Little computation is required in using the model.
5. Small computer storage requirements because less historical data is used
6. The accuracy of the model can be calculated easily

This is the equation for a single exponential smoothing:

$$F_t = F_{t-1} + \alpha(A_{t-1} + F_{t-1})$$

Where:

$F_t$ = The exponentially smoothed forecast for period t
$F_{t-1}$ = The exponentially smoothed forecast made for the prior period
$A_{t-1}$ = The actual demand in the prior period
$\alpha$ = The desired response rate, or smoothing constant

There are no consistent guidelines on what the appropriate value of the smoothing constant $\alpha$ is, but introductory treatments of forecasting suggested that the smoothing constant be kept small between the 0.1 to 0.3 range [18] and [17].

***E. Exponential Smoothing with Trend***

Similar with the previous exponential smoothing, but with an additional variable of trend. Research from Pujiati stated that this method is useful when the data shows trend both upward and downward [19]. Trend is smoothed estimate based on the average growth at the end of each period [20]. According to Jacobs, exponentially smoothed forecasts can be corrected by adding in a trend adjustment. There is also an additional constant $\delta$ for trend adjustment. Both $\alpha$ and $\delta$ are used to reduce the error that occurs between the actual and the forecast. [17]

This is the equation of exponential smoothing with an additional variable of trend [17]:

$$F_t = FIT_{t-1} + \alpha(A_{t-1} - FIT_{t-1})$$
$$T_t = T_{t-1} + \delta(F_t - FIT_{t-1})$$
$$FIT_t = F_t + T_t$$

Where:

$F_t$ = The exponentially smoothed forecast that does not include trend for period t
$T_t$ = The exponentially smoothed trend for period t
$FIT_t$ = The forecast including trend for period t
$FIT_{t-1}$ = The forecast including trend made for the prior period
$A_{t-1}$ = The actual demand for the prior period
$\alpha$ = Smoothing constant (alpha)
$\delta$ = Smoothing constant (delta)

***F.* Measurement of Forecast Accuracy**

Measurement of forecast is necessary to compare the forecasting methods. Hartini stated that here are 3 parameters that will be measured which are Mean Absolute Deviation (MAD), Mean Square Error (MSE), and Mean Absolute Percentage Error (MAPE). The forecasting method is chosen based on the smallest value of those 3 parameters.

***Mean Absolute Deviation (MAD)***

MAD is the average value of the difference between the actual data and the forecast result over the number of period that is calculated. As the term 'absolute', if the error number is negative (actual data greater than forecast), it is still calculated as a positive result. Systematically, this is the formula for MAD [21]:

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$$MAD = \frac{1}{n}\sum_{i=1}^{n}|actual - forecasting|$$

***Mean Square Error (MSE)***

MSE is calculated by the average of squaring the number of absolute error (actual – forecasting) of each period which is then divided by the number of periods. This is the equation used to get the MSE results [21]:

$$MSE = \frac{\sum_{i=1}^{n}(actual - forecasting)^2}{n}$$

***Mean Absolute Percentage Error (MAPE)***

MAPE is a more useful method compared to MAD because it can give a clearer representation in the form of percentage. The lower the amount of percentage means that the forecast is more accurate. Before MAPE is calculated, there is APE (Absolute Percentage Error) which can be seen at every period [21]. Chang also categorize the MAPE into four categories as shown in table 1 [22].

**Table 1. MAPE Category**

| MAPE | Signification |
|---|---|
| <10% | Excellent forecasting ability |
| 10–20% | Good forecasting ability |
| 20–50% | Reasonable forecasting ability |
| >50% | Bad forecasting ability |

***G. Pareto Analysis***

Pareto analysis is one of the most common tools and one of the easiest tools to use in decision making. It is a statistical technique in decision making that is used for the selection of a limited number of tasks that produce significant overall effect. [23] Pareto analysis is used to determine the tasks or factors in an organization that will have the most significant impact. [24]

Factors or tasks (data) that are gathered are then ranked in descending order from the highest frequency of occurrences to the lowest frequency of occurrences which in total summed up to 100%. The vital few with the highest occurrences occupy about 80% of the cumulative occurrences while the rest 'useful' factors occupy the rest 20% of the occurrences. This is known as the 80-20 rule which is developed by Italian Economist Vilfredo Pareto. [25]

The results of a pareto analysis are presented in the form of a chart. The chart is in the form of a bar graph consisting of factors or tasks that is ranked in descending order from the most vital (highest frequency of occurrences) to determine which factors are vital and can provide the most benefit by providing a clear indicator through superimposing a line graph that cuts an 80 percent cumulative percentage. The line graphs can determine those factors which have least amount of benefits and vice-versa. [23]

The pareto chart is used to determine which customers has the biggest impact and also to determine the major factors that have been causing the delivery of products to consumer to be delayed. The analysis of the pareto chart will be discussed further in the results and discussion section of this paper.

## METHODS

***A. Data Collection Method***

For this paper, data will be collected through several ways. There are three methods that will be used in collecting the data, which are interviews, observation, and internal data obtained from the regional sales manager. In this final project, interviews and observation serves as the primary data while the internal data serves as the secondary data.

***1. Interview Method***

Interviews are a qualitative research method that follow a deceptively familiar logic of human interaction: they are conversations where people talk with each other, interact and pose and answer questions [26]. Interviews will often be used as a standalone method or combined with other qualitative methods, such as focus groups or ethnography, or quantitative methods, such as surveys or experiments [27].

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In this final project, there are two interviews be conducted. The first is with the newly appointed regional sales manager. The type of question that the author is going to ask will be open-ended questions, which allow the subject to be flexible in answering the questions and may somehow provide the author with data that the author needs in accomplishing this final project. The questions that the author ask to the regional sales manager started from trivial questions like whether the total sales target is achieved for the period, the KPI that is used and several other questions. The author also requested internal data like actual sales data and the target of the period to strengthen the validity of the interview and to measure how often the company reached the sales target that is predetermined in the previous period.

The second interview that author conducted is with the distributor supervisor at one of the distribution centers under the same area with the regional sales manager. the questions that are asked to the supervisor is mostly related to the distribution process starting from when the products (SKUs) that are ordered arrived at the warehouse up to when the products (SKUs) is received by the customers. The author also asked about things like the KPI within the distributor, the fleets that are used in distributing products to customers, the quality of the product when the product first reached the warehouse, and several other questions.

***2. Observation Method***

Observation is one of the oldest and most fundamental research methods approaches [28]. Observation involves collecting data using one's senses, especially looking, and listening in a systematic and meaningful way [29].

Observation is done on the basis of observing the day-to-day operation of the company related to the sales and distribution aspects. So, the observation is not conducted in the headquarters, but more on the distribution centers before the product is shipped to retailers and wholesalers. The goal of this observation is to find out the parts of the operation related to distribution activities that both the company and distributor can improve in the future.

***B. Data Analysis Method***

The method that will be used for the data analysis is both qualitative and quantitative methodology. The interviews that are conducted will be backed by internal data to verify the validity of the interview. The author will also utilize Pareto Analysis as a qualitative methodology to determine which consumer segment are the most vital few.

As for the quantitative methodology, the author will utilize the internal data (secondary data) the author need that are given by the company because all the internal data are related with numbers which therefore have to be analyzed further. Author will analyze which distributor have the biggest issue from calculating whether the amount of actual sales distribution reached the target that have been set previously. This can be used as a material that the author can study before proposing a strategy with the hope to increase the number of actual sales distribution of the company.

From that point, author will do a pareto analysis do find out the customers which stand at the top. Pareto will be conducted twice to determine customers that stand at the top of the top in each of the segments. From those top customers, author will check and analyze which products (SKUs) that they frequently order to find out which SKUs are the income generator for the company. Author will also focus on the top 2 SKU of products that fall in baby care category and family care category. From here, author will finally propose a solution that can be of help to the company through AHP method which involves the related stakeholders to vote on the solutions that have been proposed so that the proposed recommendation is not subjective based on only the author's opinion. Author will also create an implementation plan for the solution that have been proposed to function optimally.
Diagram 1 describes about the flow of data analysis that will be conducted in the results and discussion segment.

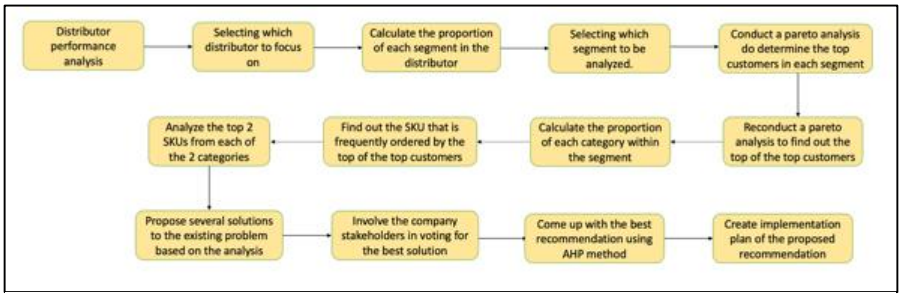


**Figure 1. Flow of Data Analysis**

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## RESULTS AND DISCUSSION

This chapter comprises of three main parts, the analysis, proposed solutions, and the result of the accepted solution. The analysis part starts from the distributor analysis to determine which distributor is the weakest by utilizing the internal data (secondary data) that have been provided by the company.

After that, the next phase is to analyze the key customers and SKUs in that distributor that contributes the most income before proposing several solutions and come up with the best recommendation for the company by using voting with ranking by the company's stakeholders and the final part of this chapter is to propose the implementation plan that can be followed by the company in their future planning.

### A. Distributor Analysis

Based on the interview, there are 5 distributors under the same group in region DKI-1, which all of these distributors are located in Jakarta and Tangerang area. Each of the distributors have its own targets which are different compared to the other distributors in the area. The author have been given data which are used in analyzing each of the distributor's performance. These below are the targets and actual sales achieved by each of the distributors for the year 2023 (January – November). These distributors are respectively named A, B, C, D and E. There is no target set for the month of May therefore the company set the target to be equal to the actual sales. Author measures the cumulative difference of each of the distributor's performance. Difference is obtained from the actual data subtracted by the target in each period before cumulated from January to November. Negative cumulative difference means that the distributor is performing below the predetermined target and vice versa.

***Overall Distributor Performance***

**Table 2. Overall Distributor Performance**

| Distributor | Total Actual | Cumulative Difference |
|---|---|---|
| Distributor A | **Rp86,716,896,413** | **-Rp3,554,735,751** |
| Distributor B | **Rp28,224,250,512** | **-Rp1,465,615,673** |
| Distributor C | **Rp16,869,637,236** | **Rp1,457,766,269** |
| Distributor D | **Rp141,084,328,080** | **Rp2,720,583,547** |
| Distributor E | **Rp29,987,708,916** | **-Rp4,236,132,907** |

From table 2, it is clearly shown that there are three distributors that are performing lower than the target which is shown by the negative amount in cumulative difference. However, this thesis will only cover a deeper analysis of distributor A instead of distributor B and E based on three reasons. The first reason is because when the table above is sorted in a descending order based on the total actual, distributor A is the biggest distributor with negative cumulative difference. Distributor B is not picked because this distributor has the lowest amount of cumulative difference of all compared to distributor A and E. Despite having the biggest negative cumulative difference, distributor E is not picked because unlike distributor A and B, distributor E have always reached the target set by the company since June while distributor A and B experience negative difference for three consecutive months (September-October-November). Therefore, with these three reasons, author picked distributor A to be analyzed further.

### B. Customer and SKU Analysis

After determining which distributor to focus on, customer analysis is conducted to find how big the contribution of those key customers (outlets) towards the actual revenue of the distributor. The goal of the customer analysis is to retain those key customers on the operational level like for instance delivery delay that leads to poor customer experience which might ultimately prompt customers to move to competitor brands. The customers of the distributor and company are not end customers but outlets that sell the products (SKUs) that have been ordered from the distributors which leads to the 3 segments that distributor A caters, which are baby shops, wholesale, and retailer.

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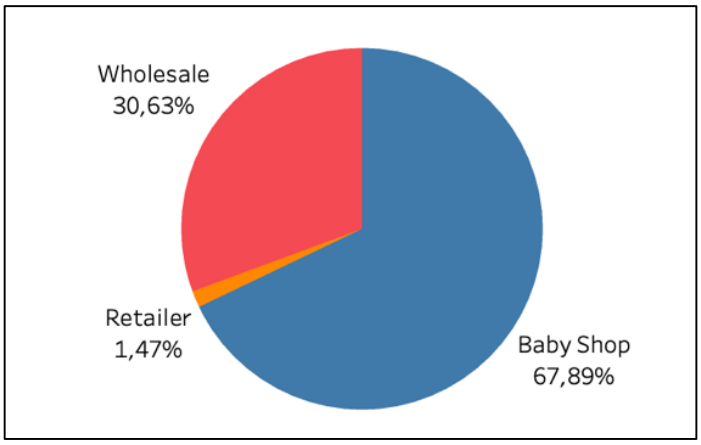


**Figure 2. Segment Proportion in Distributor A**

The pie chart in figure 2 describes the revenue proportion of each segment in distributor A. From the pie chart above, author decided to analyze 2 out of the 3 segments which are baby shop and wholesale segment because the proportion of the retailer segment is very small and less significant compared to the other two.

***Baby Shops Segment***

As one of the company's products are baby diapers that come in various sizes and packaging for babies of all ages, baby shops become one of the most vital segments that generates income for the company. According to the pie chart above, in the region for the year 2023 (period January-November) specifically in distributor A, baby shops attributed 67.89% of the total revenue which is Rp58.88 billion.

In total, the revenue generated by the top 20% customers for this segment is Rp57.77 billion which is 98.12% of the total revenue of the baby shop segment. Distributor A caters 79 baby shops in its jurisdiction. According to the Pareto rule which is the 80-20 rule, both the company and distributor haven't reached the ideal pareto equilibrium. Author conducted a pareto analysis to determine who the top 20% customers are, resulting in 16 customers. Author decided to reconduct a pareto analysis of the top 16 customers, resulting to 4 key customers shown in figure 3 to narrow down the SKU that the 4 key customers ordered and check whether the SKUs that they ordered correspond with the top 2 SKUs of each of the categories to be analyzed.

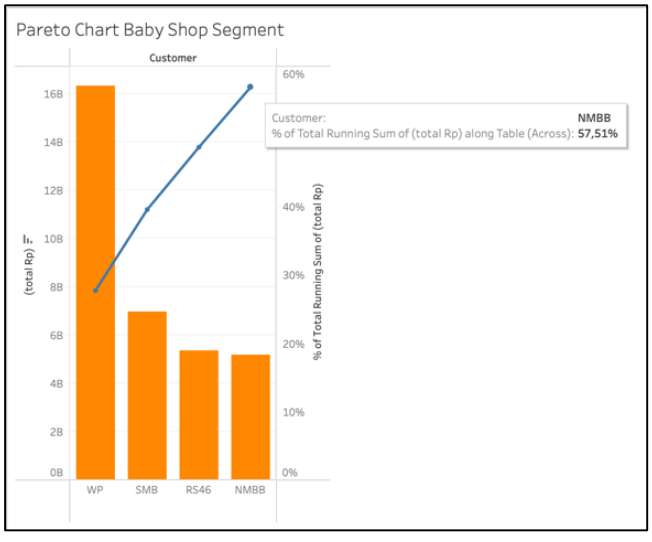


**Figure 3. Double Pareto Chart of Baby Shop Segment in Distributor A**

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The pie chart in figure 4 describes the proportion of each category for this segment specifically for the key customers. In terms of product category in baby shop segment, the biggest income generator comes from baby care category which consists of baby diapers which comes in various types and sizes suitable for babies of all ages up to 4 years old as shown in the pie chart above with 76.30% which is then followed by family care. Family care with the proportion of 20,70% consists of products like hand sanitizers, antiseptic tissues and masks of various types such as daily masks, surgical masks etc. Next, feminine napkin with proportion of 1.56% consists of products specifically made for female hygiene. Last, with the least proportion for this segment is adult care which of only adult diapers of different types, sizes, and packaging. In short, baby care products become the backbone in the baby shop segment.

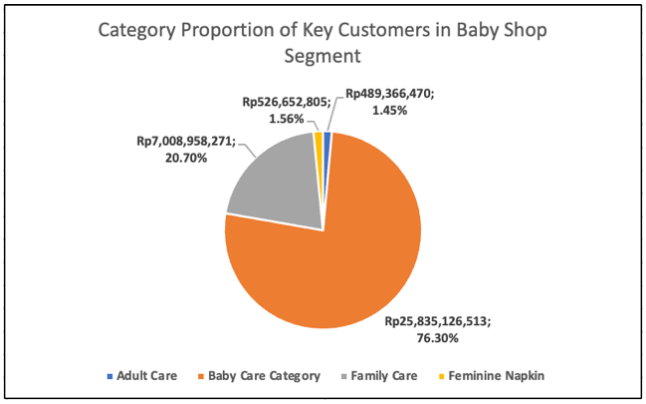


**Figure 4. Category Proportion of Key Customers in Baby Shops Segment in Distributor A**

After further exploration, author also conducted an analysis whether the products (SKUs) that generated the most revenue for this segment are the same with the products that the key outlets in the segment ordered from the distributor. The top 2 SKUs are shown in figure 5.

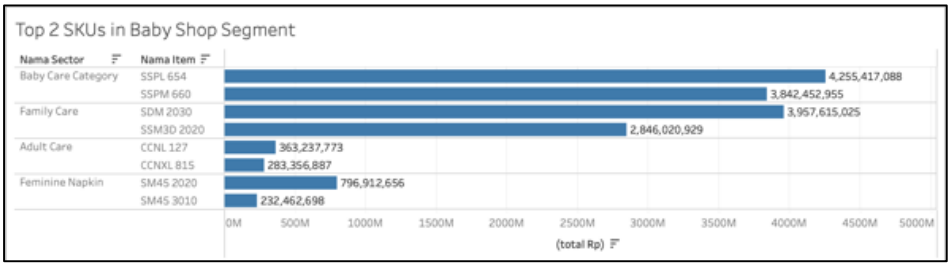


**Figure 5. Top 2 SKUs in Baby Shop Segment in Distributor A**

The bar graph above describes the top 2 products (SKUs) that generates the most income in which for this thesis, author will only focus on the top 2 SKUs both in baby care category and family care category because these SKUs generate the most income for the company. Based on the findings, not all of the top 2 SKU in each category are ordered by each of the key customers. These below are the analysis results for baby care category and family care category.

In the baby care category, for the first SKU which is "SSPL 654", generates the most income for the company. Within the top 5 SKUs of those 4 key customers this SKU was ordered by 2 of them with the accumulation of Rp2.831 billion or 66.52% of the total revenue of this SKU. The second SKU "SSPM 660" is also ordered by two key customers based on the list of the top 5 SKU of key customers. Within the key customers, the income generated by this SKU adds up to Rp2.357 billion or 61.35% of this SKU's total revenue.

Both of these SKUs experienced trouble in September and October not because this SKU suddenly became less popular within the customers, but because the products became out of stock because of the unavailability of raw materials in the factory. Therefore,

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author would like to propose a solution for the sales and distribution department that can prevent these top SKUs to be out of stock in the future because just these 2 SKUs within distributor A generate Rp8.097 billion.

For the next category which is family care, the same analysis is conducted, and bears results as follows. In this segment, out of the 4 key customers, only 2 of them sell the products that fall in this category. For the first SKU in this category which is "SDM 2030", is ordered by both of them based on the list of the top 5 SKU of key customers. The total income earned from the 2 key customers amounts to Rp3.492 billion or 90.89% of the total revenue generated by this SKU. Moving on to the second SKU which is "SSM3D 2020", this SKU are also ordered by both key customers. Only within the key customers, this SKU accumulates to Rp2.616 billion which is equal to 91.91% of the total revenue of this SKU in this segment.

Nevertheless, these top 2 SKUs within distributor A generate Rp14.31 billion which makes these SKUs become the company's priority SKU.

***Wholesale Segment***

Wholesale segment also caters products to its outlets in four categories which are baby care, family care, adult care, and feminine napkin. In this segment for distributor A, for this year up to November 2023, the revenue that is generated by this segment is Rp26.56 billion which is 30.63% of the total revenue in distributor A.

When accumulated, the income generated by the top 20% wholesale segment is Rp24.7 billion. In this segment, there are 110 outlets that fall in the wholesale segment in the area that is covered by distributor A. 20% of the outlets means there are 22 outlets that are the key customers. these 22 outlets represent 98.11% of the total revenue.

Author decided to reconduct a pareto analysis of the top 22 customers resulting in 5 key customers in this segment as depicted in figure 6 to narrow down the SKU that is ordered by those key customers and check whether the SKUs that they ordered are in sync with the top 2 SKU of each of the product categories to be analyzed.

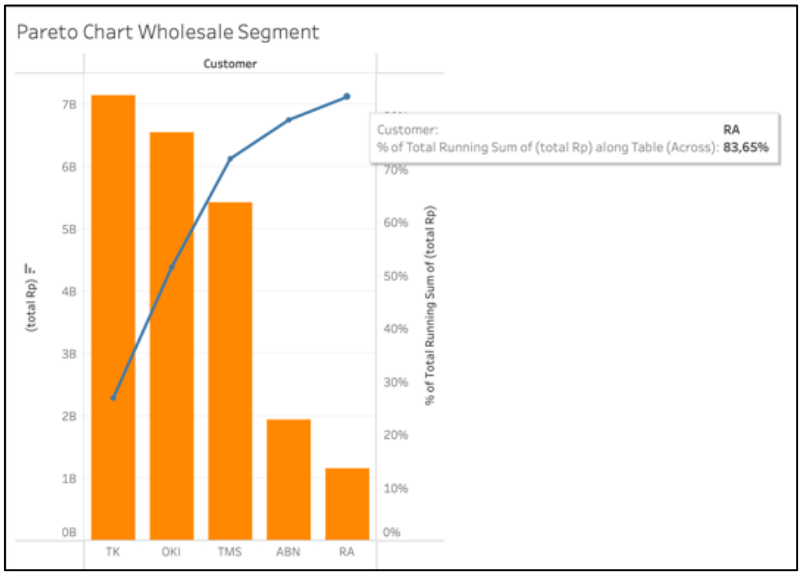


**Figure 6. Double Pareto Chart of Key Customers in Wholesale Segment in Distributor A**

From the pie chart in figure 7, the category that generates the most income for this segment comes from the family care category with the proportion of 96.37%. All the products that are sold in this category are various types of masks. Then followed by feminine napkin with the proportion of 1.87%. The products under this category are specifically for female hygiene. The next category is baby care category with the proportion of 1.67% which the focus of this category is baby diapers. Last, the category with the least proportion is the adult care category with only 0.09%. The products in this category are adult diapers in various types and sizes.

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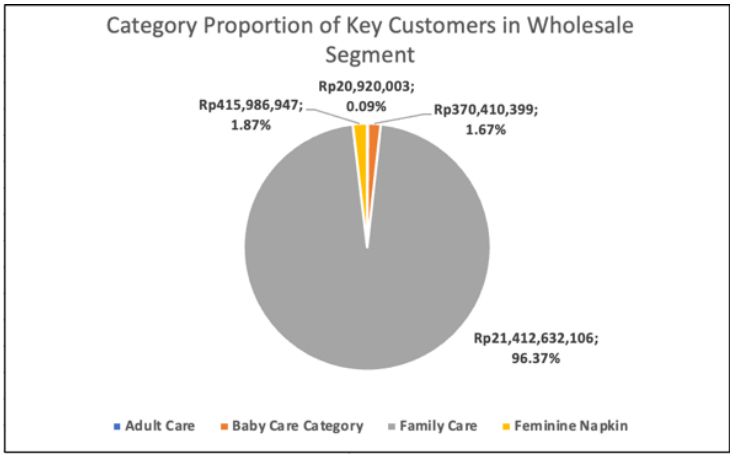


**Figure 7. Category Proportion of Key Customers in Wholesale Segment**

Same with the analysis on the baby shop segment, author also conducted an analysis whether the products (SKUs) that generated the most revenue for this segment are the same with the products that the outlets in the segment ordered from the distributor. The top 2 SKUs are shown in figure 8.

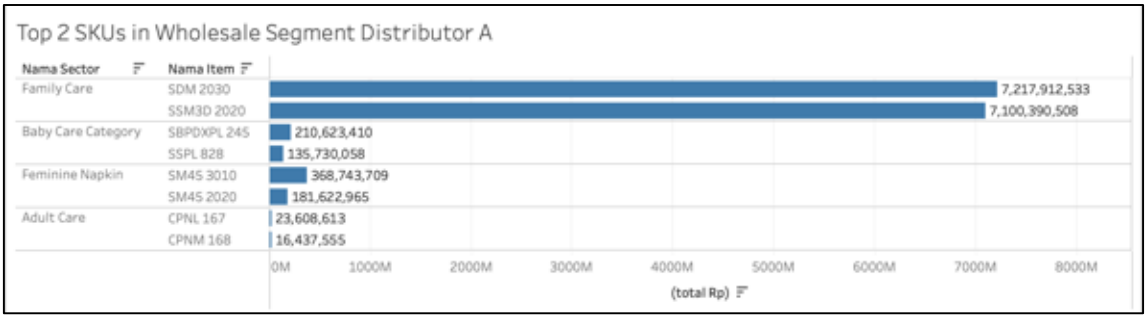


**Figure 8. Top 2 SKUs in Wholesale Segment**

The graph above provides details of the top 2 products (SKUs) that contributes the most income. Based on the findings, not all of the top 2 SKU in each category are the same with the top 2 SKU in each key customer. These below are the analysis results for each category. Author will only focus on the family care category because this category represents majority 96.37% of the revenue generated by the key customers based on the pie chart above.

Moving on with the analysis, the top 2 SKUs are "SDM 2030" and "SSM3D 2030". An interesting fact is that the top 2 SKU in this segment are all the same with the baby shop segment, meaning that it can be claimed that these 2 SKUs are indeed popular. "SDM 2030" is the SKU in this category that generates the most income in this segment. This SKU is ordered by all 5 key customers. Based on the list of the top 5 SKU of key customers, this SKU contributes Rp6.947 billion which is equal to 96.26% of the income generated by this segment. The second SKU that generates the most income is "SSM3D 2030". This SKU is also ordered by all of the key customers. Just within the key customers, "SSM3D 2030" contributes Rp5.931 billion which is 83.53% of the total revenue of this SKU in this segment.

Another SKU that is worth to note which is not on the list of top 2 SKUs is "SDMP 230". This SKU is ordered by 4 out of 5 key customers and those 4 contributed Rp6.284 billion. This is equal to 94.77% of the total revenue generated by this SKU in this segment.

**C. SKU Treatment Analysis**

Starting with the order process, the distributor will conduct a monthly order booking (MOB). The ordering process to the factory or suppliers start from the 25th of each month until the 1st day of the next month. It will take approximately 5 days from the time the

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products (SKUs) are ordered until the products (SKUs) reached the warehouse before distributing to the customers. The sales and distribution department will also do an additional order booking under two conditions. The first condition is when there is an unexpected demand from consumers and the amount of products (SKUs) left that is ordered by the customers is not enough to cover the unexpected demand. The second condition is for products like masks because masks are deemed as seasonal products with unpredictable demand which leads to instability in income. Masks are only ordered to the factory (producers) when there is a demand or order from customers therefore orders for products like masks are always counted as an additional order.

Based on the interview that is conducted, every SKUs whether the SKU is fast-moving or slow-moving use the same method for the inventory management of the warehouse. Currently, the inventory forecasting method that the distributor is using is based on the 3-months moving average. So, the amount of each of the SKUs that the distributor ordered are based on the average of the actual sales of each SKU for the past 3 months.

However, different from the usual simple moving average, the amount of each of the SKU that is supposed to be ordered based on the forecasting is added by another 20% which is termed as buffer stock to prevent the chance of products (SKUs) to be out of stock.

Therefore, author would like to propose a method that can be used by the sales and distribution department. The solution that will be proposed will be explained in the next subchapter.

**D. Solutions Proposed**

In this subchapter, author will propose solutions that can overcome the current existing issue of SKUs being out of stock. These solutions are then processed with the help of the company's stakeholders to determine the most recommended solution that is feasible to be done by the sales distribution department. After the recommended solution is formulated, author will also propose an implementation plan that can fit the current distribution system of the sales distribution department.

In total, there are 3 solutions that the author can propose to resolve the current issue involving the SKUs. The goal of the solutions that are proposed is to reduce the probability of the SKUs being out of stock. Here are the solutions that author would like to propose.

***Bridging System***

The first solution is to create a bridging system that is separated from the two existing systems that can easily support in adjusting the data regarding the stock of each of the SKUs in the company's stock monitoring system. Currently, there are dual systems that are utilized, the first one is the company's system to monitor the amount of each SKUs that go in and out of the warehouse and the second one is the distributor's system to also check the amount of each SKU in the warehouse. There are dual systems because the distributor that is used by the company does not belong to the company but third-party distributors therefore it is impossible to integrate two systems to become one. These might cause a difference in the amount of stock between the company's data and the actual amount of products in the warehouse based on the distributor's system and leads to a failure in order by the distributor sales representative if the actual amount of products (SKUs) in the warehouse is less than the amount of each SKU that is ordered. Figure 9 shows a simple visualization on the bridging system that is meant by author.

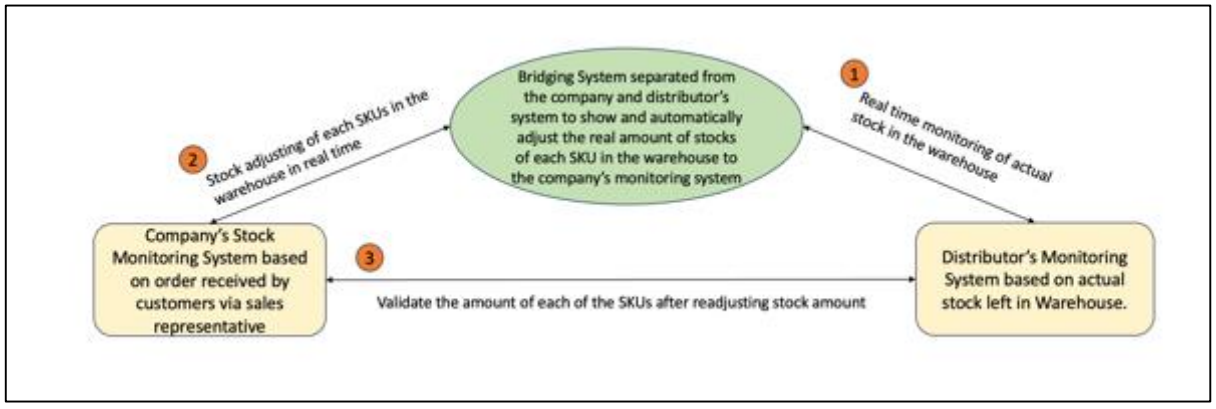


**Figure 9. Illustration of Bridging System Mechanism**

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Figure 9 describes on how the bridging system can work without having to integrate or combine two systems from two different parties. However, author will not explain regarding on how to create the bridging system is made as it is beyond the scope and limitation for this paper. This solution can be considered as a future study.

***New Forecasting Method***

The second solution that author would like to propose is to change the current formulation in the forecasting method. As of now, the method that is used by the distributor in formulating the forecast of each of the SKUs regardless of how slow or fast moving the SKU is the simple 3 months moving average method. The result is then added with an additional 20% buffer to prepare for in case there is an unpredictable spike in demand from the customers. This method is less suitable because the weight that is used to measure the average is all the same.

Before author proposes a new forecasting method, author compare 3 different methods by using the data of the top 2 SKUs in the baby care category to find out which method is the most suitable for forecasting in the future. The three methods that author compare is the current 3 months simple moving average with additional 20% for buffer stock, simple exponential smoothing, and exponential smoothing with trend with the goal to reduce the error in forecasting in the future.

***Reevaluating SKU***

The third solution which author would like to propose is reevaluating SKU. There are two things that author mean by reevaluating SKU. First, there are hundreds of SKUs that the company produce which are then categorized into slow moving and fast moving. Author would like to recommend to both the sales team and distributor to not only anticipate from the demand side, but also anticipate from the supplier side. As the company experienced out of stock due to insufficient raw materials in the factory and the current sales and operation planning is different compared to the demand of distributors, therefore a stock ups of certain top SKUs in advance are necessary in case issues like this might happen again in the future.

The second thing that author mean by reevaluating SKU is to evaluate each of the SKUs at the end of every period. As explained above, the SKUs are divided into two which are fast moving and slow moving. With this, author would like to propose that SKUs that are slow moving to no longer be ordered as a monthly order booking but based on the demand from customers, making those orders are inputted as an additional order booking to prevent dead stock in the warehouse which leads to higher inventory cost.

**E. Solution Proposal Result**

The solutions that have been proposed are then evaluated by the company's related stakeholders. The decision for which solution to be recommend is based on the solution that is ranked the highest between the three proposed solutions. The stakeholders that took part in voting and deciding are the regional sales manager that have been interviewed, the area sales manager, the sales HR, and sales administrators. Stakeholders will vote each of the solutions that are proposed by ranking. The solution that they think is the most suitable is ranked as 1, 2 for the solution that is suitable and 3 is the solution that is least suitable. Author determines the weight difference of each of the ranking to be consistent to keep the objectivity. Therefore, author assume the weight of the 1st place is 1, 2nd place is 0.8 and 3rd place is 0.6. The results of the solution ranking are compiled in table 3.

**Table 3. Stakeholders Voting Result**

| Solutions | Solution 1: Create a Bridging System | Solution 2: Utilize new Forecasting Method | Solution 3: Selecting SKUs |
|---|---|---|---|
| Rank | 3rd | 1st | 2nd |

From table 3, the best solution that have been voted by the stakeholders based on the rankings is using new forecasting method. The results of the forecasting simulation are based on the top 2 SKUs. Author uses MAPE as a measurement result because it represents the error in terms of percentage. Author uses Microsoft Excel to calculate and simulate the result. An additional tool called "Solver" is used in determining the minimum value both smoothing constant α and δ to get the least amount of MAPE. The goal is to get the minimum MAPE value because the smaller the MAPE value means the smaller the error rate. Table 4 shows the MAPE result of each method in both SKUs.

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**Table 4. MAPE Calculation Comparison**

| SKU(s) | Simple Moving Average with additional buffer | Simple Exponential Smoothing | Exponential Smoothing with Trend |
|---|---|---|---|
| SSPL 654 | 24.3% | 20.28% | 18.07% |
| SSPM 660 | 20.24% | 16.19% | 15.65% |

Based on the result in table 4, from both calculations of both SKUs, the method that shows the minimum MAPE value is by using Exponential Smoothing with Trend method. This shows as proof that the new forecasting method is more accurate and can be proposed to the company.

## CONCLUSION

Based on the results achieved in chapter 4, there are few things that author can conclude. First, based on the distributor performance analysis, there are three distributors that have been performing below the predetermined target, which is distributor A, B, and E. For this thesis, author decided to focus on distributor A because distributor A is the biggest distributor that is performing under the target.

Second, the segment within distributor A that generates the most amount of income is baby shops and wholesale segment. Income generated from baby shops segment in distributor A is Rp58.88 billion while wholesale segment generates Rp26.56 billion. The top 2 SKUs in baby shops segment, “SSPL 654” and “SSPM 660” in which both SKUs are baby diapers in total generate Rp8.097 billion and the top 2 SKUs in wholesale segment “SDM 2030” and “SSM3D 2020” in which both SKUs are masks products in total generate Rp14.31 billion, making both of these SKUs in each segment a priority for the company for this product to always be available. All SKUs outside of masks have the same treatment which therefore author decided to focus on the top 2 SKUs in the baby care category in baby shops segment.

Third, the solutions to overcome the issue of SKUs being out of stock that author propose after involving the company’s stakeholders in giving rank to each solution come to a result of proposing a new forecasting method. Author compared 3 different forecasting methods in the top 2 SKUs and come to an end result that exponential smoothing with trend is by far the best solution that can be proposed with a result in a MAPE value of 18.07% and 15.65% which is lower compared to the current forecasting method which is 24.3% and 20.24%. Author have also proposed an implementation plan for this solution when the company decide to implement the new forecasting method.

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