



SELF-SERVICE BUSINESS INTELLIGENCE AS A DECISION-MAKING SUPPORT TO MINIMIZE STOCKOUT AT RY MART MINIMARKET

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Abstract

Some of the problems found in this study include : (1) Stockout happens at RY Mart 1 and RY Mart 2 (2) Inappropriate decision-making because it is not based on data and in-depth analysis. This study aims to minimize stockout based on data and in-depth analysis using Self Service business intelligence at RY Mart.

The research method used in this study is Nine Step Kimbal with Online Analytical Processing (OLAP). The data obtained from 2023-2025 transaction record of RY Mart 1 and RY Mart 2.

The result of this study is Stockout Dashboard and order planning for RY Mart. The Dashboard shows that the amount of stockout influenced by the increase of sales because of holiday and demography around the mart. Only in RY Mart 1 stockout of Ice Cream happens and the amount of Cigarette and Beverage stockout is greater at RY Mart 2 than RY Mart 1. Safety Stock, Minimum stock, and Minimum Order Quantity are calculated to minimize the stockout.

Keywords: Stockout, Self-Service Business Intelligence, Dashboard.

INTRODUCTION

In 2022, Metro City's economic growth increased compared to 2021 from 2.91% to 4.51%. This shows an increase in the value of GDP in Metro cities. One of the factors for increasing economic growth is the increase in people's purchasing power, such as in minimarkets/supermarkets (Siradjuddin, 2023). Based on BPS data from Metro City, there are 25 supermarkets that are actively operating. Minimarkets/supermarkets are self-service systems, selling various types of goods at retail, and all goods have price tags, with a building area of less than 400 m² (BPS Kota Metro, 2023). Referring to this definition, RY Mart is a store with a self-service system that sells daily necessities and is managed by families. The products sold are very diverse such as food, drinks, household appliances, stationery, and fuel oil.

RY Mart 1 began operations in January 2021, and in August 2023, RY Mart 2 was established. All things related to data such as the number of goods, stock, sales amount and financial records are still using manual methods with recording in the store book. Because the Store's warehouse is centered on RY Mart 1, there are problems related to the stock in the Warehouse. Average Stockout at both stores every month for the 2023-2024 period is 11. In August, RY Mart 2 began operations and the number of stockouts began to be recorded. Seeing these similarities, there needs to be a data visualization that makes it easier to track inventory and sales and can predict the number of orders based on accurate historical data, so that there is no more stockout and it is easier to conduct market analysis based on data, not just the owner's intuition. So that this can increase RY Mart's sales results.

Data related to RY Mart's business activities is constantly evolving and requires special management, both in terms of its utilization and in terms of storage. The data can be processed into important information so that the owner can decide on a strategic policy and make business decisions. Because the use of data to support decision-making is still not optimal and strategic decisions are often only based on the owner's estimates and intuition by briefly paying attention to the consumption patterns of the people in the area. This is in line with the results of research by Watson & Wixom (2007), that lack of access to information, some decisions are made based on instinctive knowledge, which in the current information age can lead to catastrophic consequences, because premonitions cannot be a determining factor for strategic decision-making.

The competence of resources in each store is one of the causes of the lack of information management. For Ry Mart to be able to develop its business, a digital-based information system is needed and uses the concept of Self-Service Business Intelligence so that workers and owners are able to manage the business in each store and do not depend on IT experts.

Business intelligence (BI) is defined as the ability of an organization to adapt to all business processes and its ability to become knowledge, thereby generating a large amount of important information that can lead to better business decisions as well as improved business processes and new opportunities (Kumari, 2013). BI is used to support strategic planning, operations, marketing, and Customer Relationship Management (CRM) by providing a more comprehensive view of the business environment (Laudon et al., 2016). Self-Service Business Intelligence (SSBI), makes it easier for users to be able to interactively access and explore the data they need, analyze and draw insights from their own data, customize their reports and dashboards, and quickly respond to business opportunities without the direct involvement of BI specialists (Abelló et al., 2013; Alpar et al., 2015; Imhoff & White, 2011; Meulen & Rivera, 2015; Schlesinger & Rahman, 2016; Stodder, 2015) with one of the tools used for this research is Power BI.

The creation of a dashboard that can monitor Stockout and the construction of SSBI is one way to be able to extract important information from all RY Mart stores. The success rate of a company depends on how well they analyze the available data and extract meaningful knowledge (Zdravevski et al., 2020). The company, in this case RY Mart, needs further data processing to predict, know consumer demand and taste, and make decisions and actions that can maintain and improve its business processes.

With the existence of SSBI, inventory management and decision-making by owners for Ry Mart development and store integration will be easier to do because there is a data warehouse that handles external data, the data source is clear, and can see data in detail and outline, so that this is the basis for this research conducted and outlined in the title "Self-Service Business Intelligence System as a Decision Making Support (RY Mart Case Study).

LITERATURE REVIEW

Business Intelligence

Business Intelligence (BI), was first used by IBM researcher Hans Peter Luhn in 1958 to explain the ability to understand the interrelationships of existing data so that it can be used to help efforts achieve desired goals. Then, in 1989, Howard Dresner said that Business Intelligence is a concept and method that can be used to support decision-making based on facts so that the level of accuracy is higher (Elena, 2011). Forrester Research in 2008 defined BI as a methodology, process, architecture, and technology that is able to transform raw data into useful information to support decision-making, more effective strategies, and operational insights (Elena, 2011). So it can be concluded that Business Intelligence is a method that allows researchers to access data in real time, to be analyzed so as to create insights to help make more accurate business strategy decisions.

Self Service Business Intelligence is an innovation in the field of Business Intelligence that provides convenience and benefits for business people to become more independent in processing and analyzing data (Daradkeh & Al-Dwairi, 2017). With SSBI, business people can interactively access and explore the data needed, analyze and draw conclusions from the data, create reports and dashboards, and quickly make business decisions without being directly assisted by BI specialists. According to (Imhoff & White, 2011) there are four main focuses in SSBI: (1) Easy Access to data sources for reporting and analysis (2) Easy-to-use and improved support for data analysis (3) Fast-to-deploy and easy-to-manage data warehouse (4) Simple and customizable user interface

Data Warehouse

According to (Vercellis, 2009), data warehouse is the main repository for data availability in the development of business intelligence and decision support systems. The main purpose of creating a data warehouse is to bring diverse data together into a repository where users can easily run queries, generate reports, and perform analysis. One of the advantages obtained from the existence of a data warehouse is that it can increase the effectiveness of decision-making. Extract, Transform, and Load (ETL) aims to collect, filter, process, and combine relevant data from various sources/databases to be stored in a data warehouse. The following is an explanation of each process in ETL:

1. Extraction is the operation of extracting data from the source system for further use in a data warehouse environment and extraction is the first step of the ETL process (Paul, 2010).
2. Transformation is a stage of changing data which includes data coding, data merging, data separation, data calculation with the aim of improving data quality (Veldriani & Anisha, 2019)
3. Loading is the stage to physically enter data into the Enterprise Data Warehouse (EDW) environment after going through the extraction and transform process (Veldriani & Anisha, 2019)

Online Analytical Processing

According to (Chaudhuri & Dayal, 1997), to facilitate complex analysis and visualization, the data in the warehouse is usually modeled multidimensionally. For example, in sales warehouse data, sales time, sales districts, salespeople, and products may be some of the interesting dimensions. Often, these dimensions are hierarchical; Sales time can be set as a hierarchy of days-months-quarters-years, products as a hierarchy of industry-category-products. Common OLAP operations include roll-up (increasing the aggregation rate) and tracing (decreasing the aggregation rate or increasing detail) along one or more dimensional hierarchies, slice_and_dice (selection and projection), and pivot (redirecting multidimensional views of data).

Nine Step Kimball Methode

The Nine Step Kimball method is the process of creating a data warehouse, introduced by Ralph Kimball who formulated this method to be used in the formation of a data warehouse (Suni, 2018). According to Prajena (2013), the following are nine steps of methods to build a data warehouse, namely:

1. Choose the Process: This stage identifies the problem and the data that will be used to be ready for processing and will be analyzed for operational processes.
2. Selection of the grain: Grain is the level of detail of a data in a data warehouse. The more detailed, the lower the granularity level. For example, in a table of product sales facts is the status of distributors, then a dimension contains the number of networks and customers.
3. Identify and conforming the dimensions: Define and identify relevant dimensions. Dimensions are a collection of points of view that are important for describing the facts found in the fact table.
4. Identify the Facts: Identify and select the fact table to use. Facts are numerical in nature that can be calculated and represented in the form of visualization reports.
5. Storing pre calculation in the fact table: After the selection of facts, the fact table must be properly reviewed to minimize the possibility of recalculation.
6. Rounding out the dimension tables: A dimension table is identified, and then a description is created that puts the information into the dimension table for deeper analysis
7. Choose the duration of the database: The duration is needed to measure the length of database retention according to the company's needs.
8. Tracking slowly changing dimension: Data on dimensions can change over time, so recording is required so that users can know which data or dimensions have changed.
9. Determining the query priorities and the query models: The last step is to solve the problems that occur in physical design. The main problem with physical design is that it affects the perception of the end-user of the data mart.

The positioning of this study that distinguishes from the above research is that the object of the research is two stores located in Metro City, namely RY Mart 1 and Ry Mart 2, where the two stores are located in the same city but have different demographics and Point of interest (POI), and there has

been no similar research in Metro City. So that it can be a reference for other retail store owners in Metro City regarding stockout management based on actual data.

METHOD

This study uses historical data from the research object (RY Mart) to create a dashboard using the Nine Step Kimball and OLAP Methods. The data is then analyzed to produce decisions so that stockout can be minimized.

RESULTS AND DISCUSSION

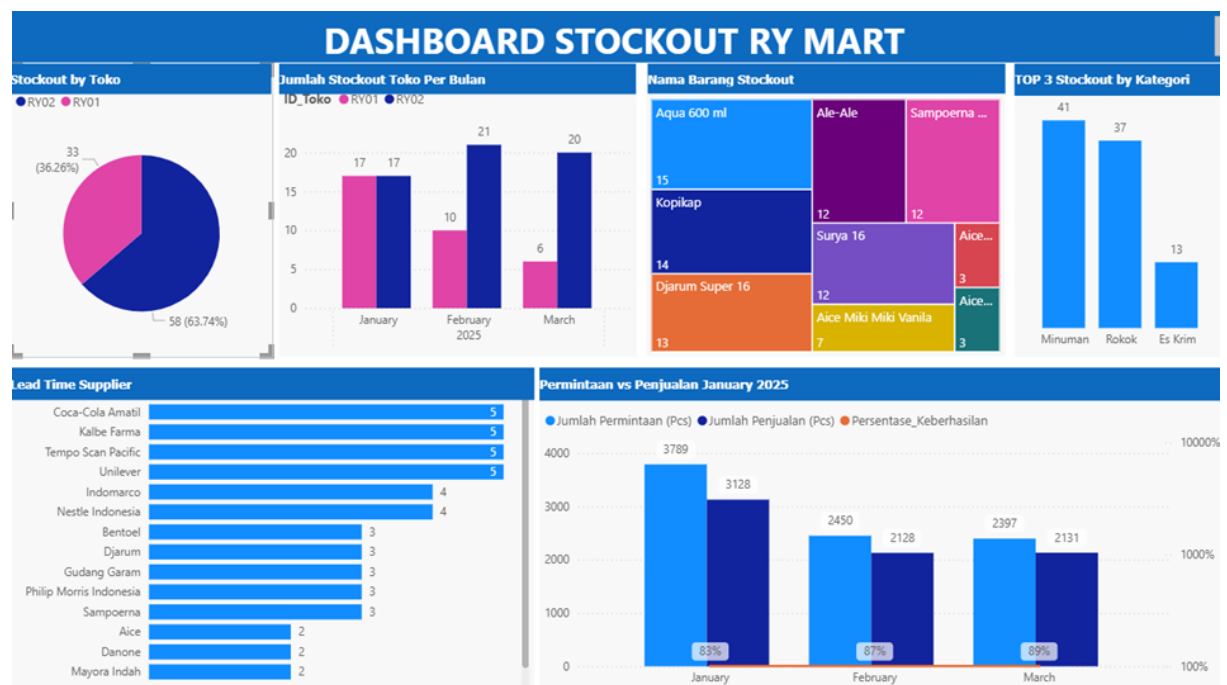


Figure 1 Stockout Dashboard RY Mart

Based on Dashboard, RY02 has a greater number of stockouts than RY01. Where the top 3 items that are stockout are the Beverage, Cigarette, and Ice Cream Categories. Throughout January 2025 to March 2025, both stores were always stocked every month and the success rate of demand fulfillment was 86%. When viewed from the Lead Time Supplier, the top 3 categories with the most stockouts have a Lead Time Supplier of 3 days (Gudang Garam, Sampoerna, Djarum) and 2 days (Aice, Danone, Mayora Indah, Wings Surya).

The number of demand and sales in January 2025 is greater due to the school holiday season and coincides with religious holidays where in the area around RY01 and RY02 there is a celebration culture in each village. This has resulted in a surge in the number of buyers. In February 2025, there will be a decrease in demand and sales because the school holidays have ended and there are no

holidays or joint leave. In March 2025, there will be another decline because it coincides with the Ramadan fast, and has only surged closer to Eid al-Fitr.

From January 2025 to March 2025, the RY02 Store has never experienced stockouts in the Ice Cream category. This is due to the demographic condition of the RY02 Store which is located on the side of the main highway where buyers buy more cigarettes and drinks. In contrast to RY01 which is close to kindergarten, PAUD and housing complexes, so many buyers choose ice cream. So, from some of these aspects, it is necessary to calculate Safety Stock, Minimum Stock Quantity, Order Quantity and marketing strategy for each store so that Stockout can be minimized and increase sales based on market potential.

Table 1 Order Planning

NO	NAMA PRODUK	SAFETY STOCK	PERSEDIAAN MINIMUM (PCS)	PERSEDIAAN MAKSIMUM (PCS)	ORDER QUANTITY (PCS)
1	Surya 16	26	54	82	28
2	Sampoerna Mild 16	23	51	79	28
3	Djarum Super 16	27	54	81	27
4	Aice Mochi Vanilla	18	31	42	11
5	Aice Mochi Chocolate	12	24	36	12
6	Aice Miki-Miki Vanila	16	30	44	14
7	Kopikap	35	70	105	35
8	Ale-Ale	40	70	100	30
9	Aqua 600 ml	26	60	94	34

CONCLUSION

Based on the results of the research conducted, it can be concluded that the application of Self Service Business Intelligence in RY Mart using the OLAP method is able to display Visualization in the form of a Dashboard that can not only monitor store stockout, but can also provide information that Stockout is also influenced by Demographics and Point Of Interest (POI).

There are 3 categories with the highest stockout, namely Beverages, Cigarettes, and Ice Cream. Apart from the fact that the Safety Stock and Minimum Order Quantity have not yet been determined, the location of the store also greatly affects the sales of the two stores. The RY Mart 1 store is located in the city center and is surrounded by schools (Early Childhood, Kindergarten, Elementary) and a housing complex that attracts many children to buy ice cream. The RY Mart 2 store is located on the main highway on the outskirts of the city, which is always crowded with motorized vehicles so that it attracts customers from inside and outside the city who are traveling to buy Drinks and Cigarettes, plus the culture around the RY Mart 2 store which often holds religious celebrations makes the demand soar on certain days.

RY Mart 1 stores are advised to order Ice Cream with a larger amount than the calculation of the Order Quantity as the school holidays approach because demand will surge from school children and housing around the store. RY Mart 2 stores are advised to order Beverages and Cigarettes in quantities larger than the order quantity when approaching school holidays, religious celebrations and

other important days, considering that the store is located on the side of the main highway that attracts customers from inside and outside the city.

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