Decision Support System Using Data Warehouse For Top Marketer

Abba Suganda Girsang, Sani Muhamad Isa, Sherly Oktafiani, Gannisnahayu Dinda

Abstract: Marketing is an important thing that greatly influences the growth of the company. If marketing performance is good, then the company will also develop well. But in today's conditions, we often find that marketing motivation is often overlooked or not too cared for. So that performance decreases and will be very detrimental to the company. However, marketing motivation needs to be improved by determining the top marketers through a bonus system. Where the use of data warehouse will be carried out as the best Decision Support System (DSS) for manager in determining the top marketers. With the use of data warehouses, large amounts of data can be prayed in such a way as to produce information that is useful for managers in decision making.

Keywords: Marketing, Data Warehouse, Bonus System, Decision Support System.

1 Introduction

Today the existence of marketing in a company cannot be ignored. Where marketing can be likened to the spearhead of the company. Which certainly will greatly affect the growth of a company. If the marketing performance is good, then the growth of a company will also be much better and if the marketing performance is bad, it will also reduce the quality of the company. Indirectly we can see that marketing performance has played an active role in helping to widen the network of a company, develop a company's business, reach market targets of a company and so on. Marketing is a very close medium to build business relationships as a support for the growth of a company. So that a company should give motivation and encouragement to the marketing team to continue to improve their performance at work. Unfortunately, there are still companies that don't pay too much attention to this marketing section. So that their performance and performance decreased and the achievement was low towards the targets set by the previous company. This will certainly have a very bad impact on the company, considering that marketing is very important for the development of a company. In helping to increase marketing motivation, there are several companies that implement top marketing systems. By choosing the best marketing that can later be used as a promotional path or additional commission for the selected. Of course this will foster more enthusiasm and motivation for the marketing. But unfortunately this is still running manually and is less effective to implement. Then also requires a long analysis time and seems not objective, causing a sense of social jealousy with each other because it seems there is an element of favoritism and so on. Based on the problem that I have as the writer suggests a solution that is able to improve performance for marketing. That is by developing a decision-making system related to top marketing determination. In order to implement the data warehouse, it is expected to be able to help the selection of top marketing more effectively and efficiently. Later, giving bonus points to top marketing that can achieve the best performance in each month will be easier to do. This is certainly expected to be the motivation of one another to continue to compete to do the best so that the better the performance of the marketing. Which certainly will have a good impact on the company.

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2 Related Works

2.1 Data Warehouse

The data warehouse is a series of decision support technologies that aim to assist in faster and better decision making [3]. To handle large amounts of data, the data warehouse is made of historical repositories, time variants, non-volatile data about products, product classification, regional marketing, etc. Because traditional data usage does not produce satisfactory results as DBMS and RDBMS to process basic queries [1]. Operational databases tend to be hundreds of megabytes to gigabytes in size. Database consistency and recovery are very important, and maximizing transactions is the main thing. As a result, databases are designed to reflect known application operational semantics, and, in particular, to minimize concurrency conflicts [3]. The data warehouse is indeed used as a computing machine to replace and make other cubes. Then based on the application of the data warehouse, the pattern was analyzed and to provide the best solution in determining the top marketers in this health equipment distributor company [2].

The generic data warehouse architecture consists of three layers. To build a data warehouse we must run an ETL tool that has three tasks: (1) data extracted from different data sources, (2) distributed to the data staging area where it is transformed and cleaned, and then (3) loaded into the data warehouse. ETL tools are a category of specialized tools with the task of handling data warehouse homogeneity, cleaning, transformation, and problem loading [4]. The ETL process is periodic in accordance with the refresh cycle and business needs. It also captures only data that has changed since the last extraction using many techniques as an audit column, database log, system date, or delta technique [4].

2.2 Modeling Dimension

Its complex spatial hierarchy affects the query process in OLAP. Where spatial OLAP depends on the spatial index to determine whether it is necessary to exploit existing cubes [5]. Research in the field of modeling ETL processes can be

categorized into three main approaches:1. Modeling based on mapping expression and guidelines. 2. Modeling-based on conceptual constructs. 3. Modeling based on UML environment [4].

3 PROPOSED METHOD

Based on the Kimball Methodology, the first thing to do in the datawerhouse concept is to describe the top marketer's business processes. Understanding business processes is a very important basic thing. By understanding business processes and their requirements, we will be able to engage businesses, prioritize efforts and provide business value. The process of defining business requirements is done by doing business with stakeholders to gain insight and a better understanding of the business itself and the purpose of further regulation of the data warehouse implementation. Star schema as shown Fig 1 consists of 4 dimension tables, 1 snowflake and 1 fact table:

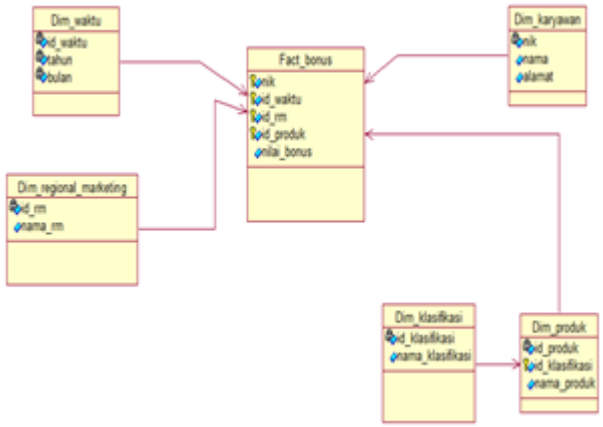

Fig.1 *Star Schema*

1. Time Dimension.The time dimension contains information about when marketing gets a bonus. Inside is information about the month and year.
2. Regional marketing dimensions. Regional marketing dimensions contain information about the branch or region of each marketing.
3. Employee Dimensions. The employee dimension contains all information related to employees. Whether it's address, telephone number, e-mail and so on.
4. Product Dimensions. Product dimensions contain information on the types of products offered by marketing to customers.
5. Snowflake Classification. Snowflake classification is a grouping of the types of products sold by marketing.
6. Fact Bonus.The fact bonus table contains a set of foregin keys from each dimension that are mutually related. Where the interrelationship will display information on the value of bonus marketing at certain times and branches.

3.1 Extract Transform Load (ETL)

ETL is the process of transferring data from the original database to the database data warehouse, in this process is divided into three main stages, namely the data retrieval process (Extract), the data adjustment process, the addition / subtraction according to the desired data (Transform) and the data storage process to the database (Load). In this project the ETL process is divided into 2 main parts namely ETL to the dimension table and ETL to the fact table. The steps taken are explained in detail in the stages as shown Fig.2

Fig.2 *ETL Customer bonus*

Input Table. The first to create a table input, where data is taken from the original database by first making a connection between the input tables in Pentaho and the MySQL database as shown Fig.3

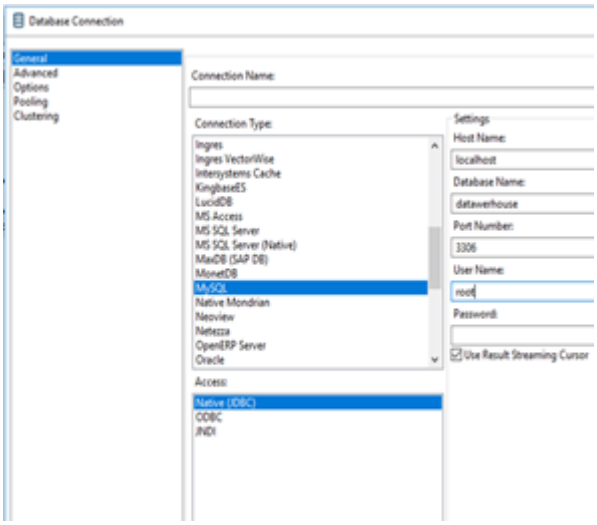

Fig.3 *Connection input table*

Then choose the data we will use in the ETL process as shown Fig 4

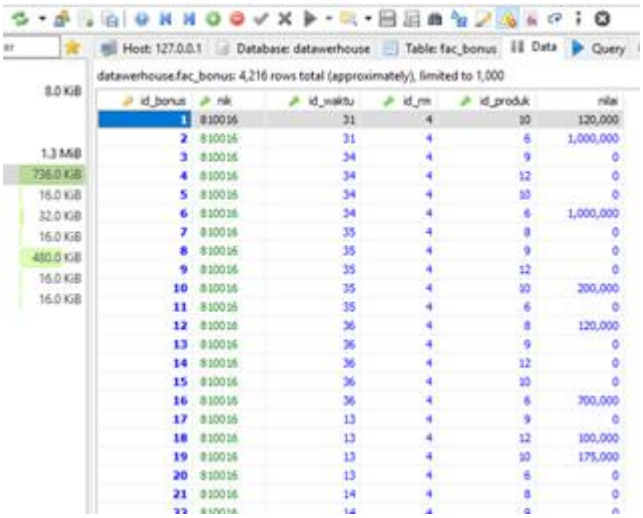

Fig.4 *Input table*

Database Value Lookup. At this stage, we take the related table dimensions to be included in the fact_bonus table as shown Fig 5.

Examine preview data

Rows of step: Database lookup (1000 rows)

#	reward_id	nik	bulan	tahun	nilai	kat_produk	rm
1	1	810016	7	2016	120000	INFUSION SET	RM 04
2	2	810016	7	2016	1000000	SYRINGE	RM 04
3	3	810016	10	2016	0	I.V.CATHETER	RM 04
4	4	810016	10	2016	0	ID BAND	RM 04
5	5	810016	10	2016	0	INFUSION SET	RM 04
6	6	810016	10	2016	1000000	SYRINGE	RM 04
7	7	810016	11	2016	0	BLOOD SET	RM 04
8	8	810016	11	2016	0	I.V.CATHETER	RM 04
9	9	810016	11	2016	0	ID BAND	RM 04
10	10	810016	11	2016	200000	INFUSION SET	RM 04
11	11	810016	11	2016	0	SYRINGE	RM 04
12	12	810016	12	2016	120000	BLOOD SET	RM 04
13	13	810016	12	2016	0	I.V.CATHETER	RM 04
14	14	810016	12	2016	0	ID BAND	RM 04
15	15	810016	12	2016	0	INFUSION SET	RM 04
16	16	810016	12	2016	700000	SYRINGE	RM 04
17	17	810016	1	2017	0	I.V.CATHETER	RM 04
18	18	810016	1	2017	100000	ID BAND	RM 04
19	19	810016	1	2017	175000	INFUSION SET	RM 04
20	20	810016	1	2017	0	SYRINGE	RM 04
21	21	810016	2	2017	0	BLOOD SET	RM 04
22	22	810016	2	2017	0	I.V.CATHETER	RM 04
23	23	810016	2	2017	0	ID BAND	RM 04
24	24	810016	2	2017	0	INFUSION SET	RM 04
25	25	810016	2	2017	1000000	SYRINGE	RM 04
26	26	810016	3	2017	0	BLOOD SET	RM 04
27	27	810016	3	2017	0	I.V.CATHETER	RM 04

Fig.5 *Database Value Lookup*

Table Output. Table output contains the data we need in the process of generating marketing bonus data. Where from this output table we create a new table whose contents correspond to the ETL process we have done in the MySQL database. also see pie diagrams that describe product classifications that affect the bonus value in the current month and year. By looking at the data as presented, it will certainly make it easier to do data analysis than having to look at large amounts of data as separate lists on the Excel.

4 Analysis Result

By using a data warehouse, the resulting report can be processed more quickly when compared to the manual method. Allows report results to be generated based on different parameters. By looking at the results of the bar graph analysis on Fig 6 and Fig 7, we can see sales bonus reports within a particular month and year period.

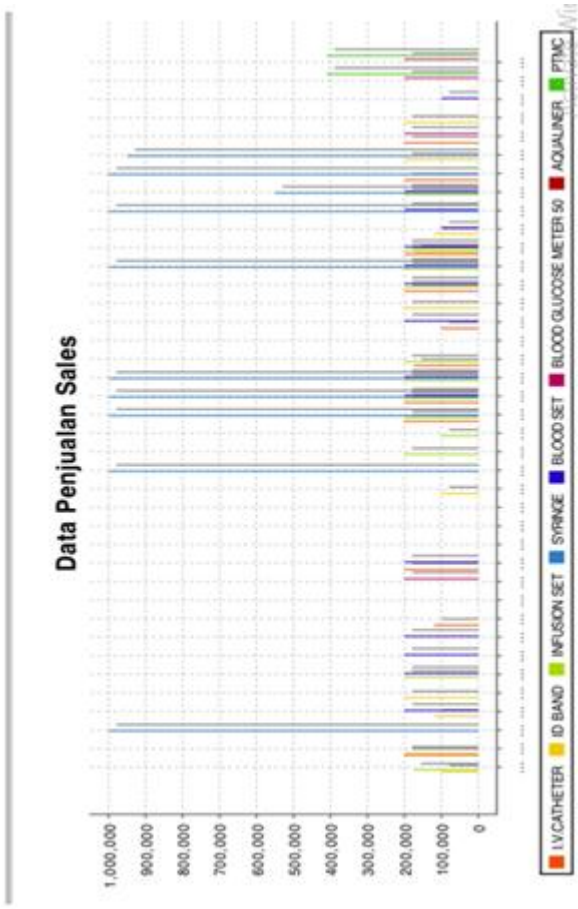

Fig. 6 *Report marketing sales*

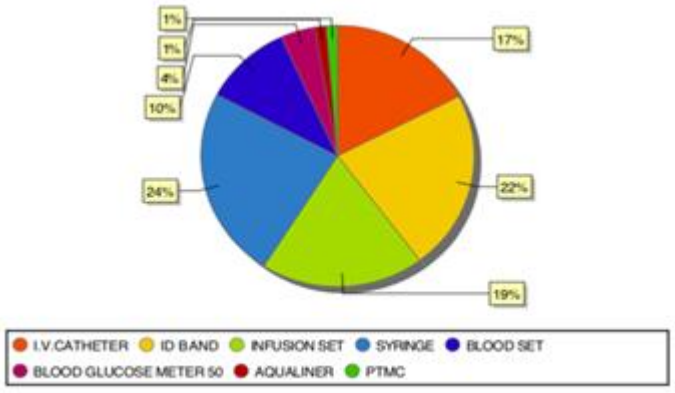

Fig.7 *Report marketing regional*

***Fig 8** Dashboard Sales*

Based on the report as shown Fig 8, of course the manager will get a lot of information that is useful to assist in making the best decisions. This ETL process will be carried out every month to see the best performance of each marketing. Then the performance comparison or performance on each month will be evaluated to produce a decision.

5 Conclusion

The implementation of a data warehouse in this company, clearly seems very helpful in decision making. Reports are able to be delivered faster, accurately and efficiently. The form of the report can be adjusted to the needs, there are various kinds of reports that can adapt to your needs. Much information is produced to support decisions. Where this will have an extraordinary influence or influence in a large company. Large amounts of data can be used to produce information that is useful for developing the company in a better direction.

References

[1] IYER, Sailesh S.; LAKHTARIA, Kamaljit I. Proposed Healthcare Model using Data Warehouse, OLAP and Data Analytics. 2017.

[2] CHEN, Qiming; HSU, Meichun; DAYAL, Umeshwar. A data-warehouse/OLAP framework for scalable telecommunication tandem traffic analysis. In: Data Engineering, 2000. Proceedings. 16th International Conference on. IEEE, 2000. p. 201-210.

[3] CHAUDHURI, Surajit; DAYAL, Umeshwar. An overview of data warehousing and OLAP technology. ACM Sigmod record, 1997, 26.1: 65-74.

[4] EL-SAPPAGH, Shaker H. Ali; HENDAWI, Abdeltawab M. Ahmed; EL BASTAWISSY, Ali Hamed. A proposed model for data warehouse ETL processes. Journal of King Saud University-Computer and Information Sciences, 2011, 23.2: 91-104.

[5] RAO, Fangyan, et al. Spatial hierarchy and OLAP-favored search in spatial data warehouse. In: Proceedings of the 6th ACM international workshop on Data warehousing and OLAP. ACM, 2003. p. 48-55.

[6] KIMBALL, Ralph; ROSS, Margy. The data warehouse toolkit: The definitive guide to dimensional modeling. John Wiley & Sons, 2013.

[7] TRUJILLO, Juan; LUJÁN-MORA, Sergio. A UML based approach for modeling ETL processes in data warehouses. In: International Conference on Conceptual Modeling. Springer, Berlin, Heidelberg, 2003. p. 307-320.

[8] WHITE, Mason. Big Data vs. Data Warehousing. 2018.

[9] ANDERSEN, Ove; THOMSEN, Christian; TORP, Kristian. SimpleETL: ETL Processing by Simple Specifications. In: 20th International Workshop on Design, Optimization, Languages and Analytical Processing of Big Data co-located with 10th EDBT/ICDT Joint ConferenceInternational Workshop on Data Warehousing and OLAP. 2018.

[10] MUKHERJEE, Rajendrani; KAR, Pragma. A Comparative Review of Data Warehousing ETL Tools with New Trends and Industry Insight. In: Advance Computing Conference (IACC), 2017 IEEE 7th International. IEEE, 2017. p. 943-948.

[11] GEORGE, Joseph; KUMAR, V.; KUMAR, S. Data warehouse design considerations for a healthcare business intelligence system. In: World congress on engineering. 2015.

[12] MEEHAN, John, et al. Data Ingestion for the Connected World. In: CIDR. 2017.

[13] NARRA, Lekha; SAHAMA, Tony; STAPLETON, Peta. Clinical data warehousing: A business analytics approach for managing health data. 2015.

[14] KHAN, Shahidul Islam; HOQUE, Abu Sayed Md Latiful. Towards development of health data warehouse: Bangladesh perspective. In: Electrical Engineering and Infor-

mation Communication Technology (ICEEICT), 2015 International Conference on. IEEE, 2015. p. 1-6.

[15] WARNARS, Harco Leslie Hendric Spits; RANDRIATOAMANANA, Richard. Datawarehouser: A Data Warehouse artist who have ability to understand data warehouse schema pictures. In: Region 10 Conference (TENCON), 2016 IEEE. IEEE, 2016. p. 2205-2208.