

Application of Business Intelligence for Banking Performance Based on Products Analysis

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Abstract – Bank ABC in Indonesia that became the object of research is the National the aim of this research is to improve the quality of decision making in analyzing products in the banking industry for the development of superior product of the bank. A very large bank operating transaction database is not easy to manage, databases are stored in multidimensional data, and are it financial data, credit, demand deposits, deposits, savings, customer identities. The solution of the problem uses Business intelligence (BI) as a stable analytical tool and able to display complete bank detailing information for each product. BI conducts banking product analysis using dashboards, OLAP and reporting. The type of research is applied, where the test using Descriptive method, that is with explain and describes an object with reality. Data comes from secondary data that has been stored in core banking for 3 years (2013 - 2015). ETL is used to extract operational data, transformation and load data to target data warehouse. The results of this research, by applying Business Intelligence can show the performance of the bank from various perspectives during a certain period, based on the analysis of various banking products. This research is expected in the future to contribute to improve the quality of decision making in the banking industry in developing superior products significantly.

Keywords – Product Analysis; Bank; Performance; Data Warehouse; Business Intelligence

I. INTRODUCTION

The development of the banking world continues to move forward with a very active and dynamic. Socialization activities of bank products are made from urban to various corners of the region by offering various products in banking, of course with various ease of access to open account, and also added by giving of attractive prize in return to become new customer. IT in the banking world today cannot be separated, all the banking needs in running its business is strongly influenced by the development of Information and Communication Technology (ICT) used [9], [11].

Private Non-Foreign Exchange Commercial Bank. The bank has been operating over 15 years, so it has a huge database of operational transaction results from all services provided to its customers, with huge data making decision making slow [9]. Below is the ABC Bank product, which is Savings Products, Savings Accounts, and Deposits. There are two kinds of savings, namely ABC Savings and Super

Savings. As for Giro, there are two kinds also namely Giro Pure and Giro Maxima; while for the deposit is a Time Deposit. Loan products offered by ABC Bank are Loan Current Account (CRP) and installment loan, Acceptance loan, Home Ownership Loan (KPR), and also Car Ownership Credit (KPM). Bank ABC intends to expand its business in all aspects, primarily on products that are superior in running their business.

The development of business competition is so sharp, requires an analysis tool capable of displaying information from multidimensional data as a whole from various perspectives [1], be it financial data, credit, gyro, deposition, customers, employees or other data, Then a model business intelligence platform was developed for analysis with dashboards, OLAP, data mining [5], [7], provided in the form of static reports and detailed reports accessible to all units of each division. The number of multidimensional report types required by the leadership in a relatively quick

time, so that decisions are also taken quickly, then the tool called business intelligence is able to support those needs

and information technology that transforms separate operational data into centralized to gain meaningful and useful information for business purposes [14], [16]. BI can handle a large number of databases with different patterns and structures that make useful information to help identify

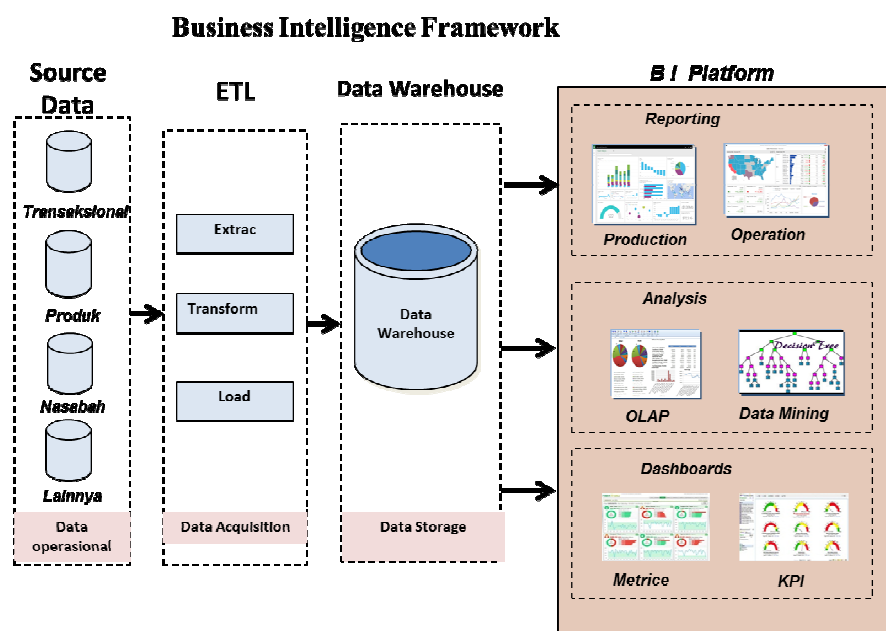


Figure 2.1. Business Intelligence Framework

Reports can be made on a regular or daily, weekly or monthly basis. Examples of reports generated by the application are Savings Balance Reports, Giro, Deposits, Outstanding Credits, and others. Reports at the request of Bank ABC management may be provided by the user of the available application. Dashboard generated by the application in the form of reports tables, text, graphics, geographic maps, with indicators that can explain in detail. Various forms of output generated Business Intelligence will greatly assist management to analyze products owned by banks, so that the Bank can develop products in accordance with the form of output system that the results of course more precise and in accordance with the size of customer demand.

II. RESEARCH METHODS

A. Business Intelligence

The opinion of Indian writers in their writings BI for banking defines Business Intelligence (BI) is a set of theories, stages of integrating data, processes, architecture,

B. ETL (Extract-Transform-Load)

and develop new opportunities. Can be exploited to seek new opportunities and implement effective strategies to gain profit opening new business areas in winning competition and long-term stability. (BI) consists of a variety of applications to analyze, collect, store and make data accessible to help users create better business processes [6], [7]. A good Business Intelligence (BI) definition should include business objectives and technical functionality. The widely used Business Intelligence (BI) tools are Data Warehouse, Data Mining, Extraction Transformation Load (ETL) and On-Line Analytical Processing (OLAP) [5], [8], [15]. Likewise what is delivered by Loshin [14], conveys Business Intelligence is a process, technology, and tools that are able to transform Data into information, information into meaningful knowledge used to plan corporate strategy for profit. The advantages gained by using Business Intelligence are: Increased profitability, Decrease costs, improves Customer Relationship Management (CRM), reduced business risk [6].

In the figure below describes the ETL application process in pulling data from various sources to be entered into the data warehouse.

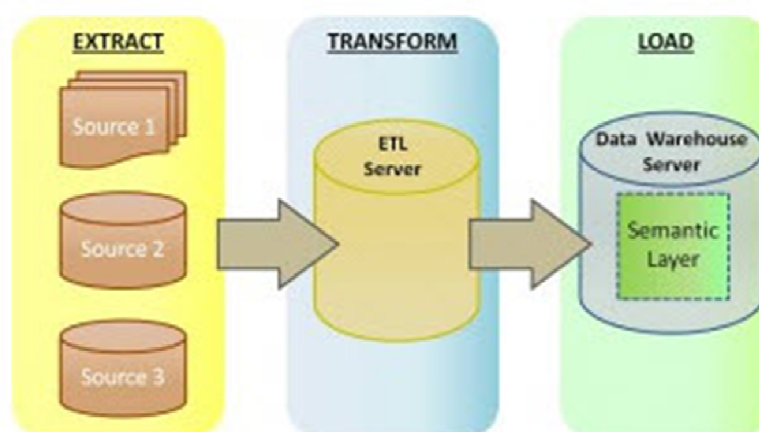


Figure 2.2. ETL Process (<http://www.iri.com>)

ETL is a set of processes for retrieving and processing data from one or many sources into new sources. The ETL (Extract, Transform, and Loading) process is divided into 3 [8], namely:

1. Extract

Extract is the process of determining the source to be used as a data source for the data warehouse. In this process we determine what data is needed, what tables are used as sources. The first step in the ETL process is to extract data from the data sources.

2. Transform

Transform is a process for converting inconsistent data from existing data sources; therefore a transformation

process is necessary. Inconsistencies can be in unequal naming or encoding unequal data. In this process also the data cleaned and minimized data errors.

3. Load

Load is the process of entering data that has been transformed into the data warehouse to be stored as a summary or archive.

C. Previous Research

Previous research related to the use of Business Intelligence

No	researcher	years	object Research	Results of research
1	Eka Miranda	2008	Retail companies	BI is a process that collects and converts large amounts of existing data within an organization into information used for the analysis of business activities and growth
2	Zaky Nur Husni dan Imam Mukhlash	2014	Bank XYZ	BI uses a data warehouse for multi-dimensional analysis presented with a chart report useful for business analysis

3	Bernhard Wieder and Maria-Luise Ossimitz	2015	senior IT managers in Australia	Large data support has been well structured and stored in data warehouses, BI provides important support to produce good quality management in decision making
4	Mohammad Atwah Al-ma'aitah	2013	The Jordanian customs department	BI has a significant influence of using business intelligence tools decision-making process, business intelligence systems and these tools have a close relationship with the decision-making process

D. Correlation This research with the previous one

Several studies using business intelligence concepts and methods suggest that BI can assist in providing complete information for the leadership of multidimensional data, so that decision-making strategies to improve the company's business can be realized. As Eka Miranda and other researchers Zaky Nur agreed to state that BI makes it easy to analyze data and monitor business growth [6], [9], while Bemhard concludes that BI provides important support for Resulted in good management quality in decision making [18], and the last research conducted by M. Atwah concluded about the use of BI is to facilitate the leadership of the company in making decisions [1], [2].

Research that researchers do is more emphasis on the use of BI with the method of report and dashboard that had never been done before. This is important to examine, with BI able to present the ratio of superior products, and this can help the bank in developing the right product target in every province that there is branch of bank ABC, so that in the development of business can be more target and give maximal advantage to bank ABC, This has not been done before.

E. Types Of Research

The type of research using applied research, where the test using descriptive method (Description Methods), which describes and describes an object with reality. The data source is the data derived from core banking. After the data passes through the extraction process, the data is transformed and loaded through the system into a single data warehouse table so that it is lighter in reading the data

in the analysis process. After data is transformed into data warehouse, the data is made of logical data modeling from one dimension (data warehouse) to multidimensional (product dimension, city dimension, customer dimension, etc.) In the form of data mart or cube to make it easier in the process of analysis later [5]. The results of BI's platform analysis in the form of Reporting (production and operation) and Dashboard form the most facilitate management to take decisions [3].

III. RESULTS AND DISCUSSION

1. RESULTS

A. Description Of Research Object

The data to be analyzed is all data in the data source of the various divisions in the Bank, then will be restructured data through several stages, which will then be stored in large data storage with a standard data that is in accordance with the needs of the analysis. The analysis is conducted to find out which products are able to provide maximum benefits and potentially to be developed as the company's flagship product, so that the leader in decision making has been supported with complete information, clear, directed and presented in various display models that will make it easier to understand and understand, and This is part of Business Intelligence (BI) that will be built for the needs of leaders in strategic decision making or corporate strategic planning (Bank ABC). BI display that presents models with various report formats called dashboard. Dashboard and report creation cannot be done if data has not been set up in the data warehouse. The stages are as illustrated below.

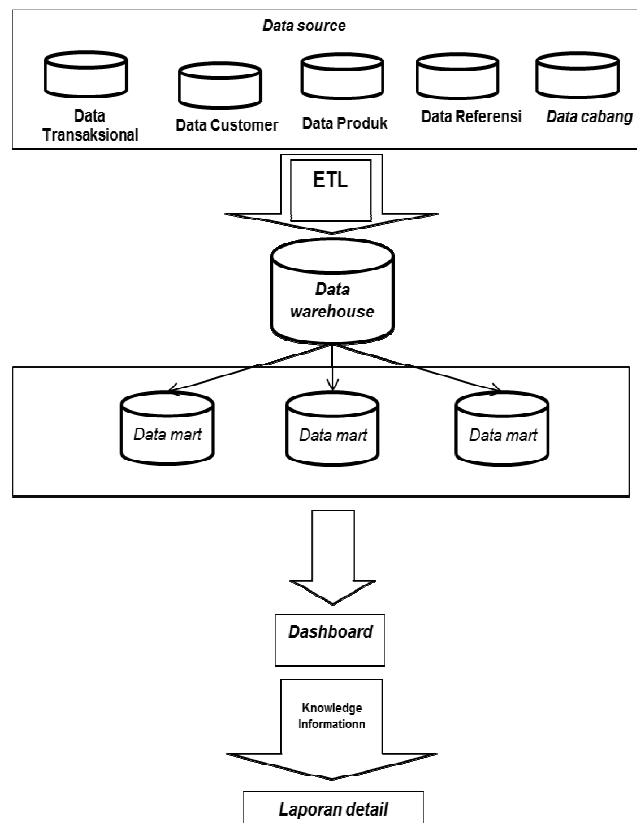


Figure 3.1 Stages create BI in the form of Dashboard (www.learnbi.com)

Figure 3.1 above explains that the data source of data recorded on the application or bank transactions information system is incorporated into a large storage (data warehouse) that has been well structured.

B. Data Set

Build data set is done to find out the product which become the mainstay of Bank ABC and which is less desirable, that is the product with the most customers or the value of the asset and the least the customer's interest or the little income. Required analysis from analysis based on customer's work, gender, to geographical location. The analysis is expected to simulate the margin or profit of ABC bank in the following years based on historical data already stored in the bank database (core banking).

Stages of building a system to generate reporting of the BI applications can be used as information to assist the bank's leaders in accordance with their duties and functions in determining decisions in business policy. Starting from the ETL stage, where one step of the data is transformed and loaded into a data warehouse, the data is made logical data modeling from one dimension (data warehouse) to multidimensional (product dimension, provincial dimension, customer dimension, etc.) in Form of data mart or cube to

make it easier in the process of making reports and dashboard later

C. Data source

The data source to be processed into the data warehouse is data that has been recorded in the core banking database. The dimension table contains attributes or fields that provide specific information, used to refine the existing data in fact tables or explain in more detail and the data is a collection of characters. A fact table is a table in a data warehouse that describes the size of business data. The facts contain the value of an event or a particular transaction such as the deposit of money in a bank, the sale of a product, or an order. Storage media for operational transaction data source in the form of dimension table below.

1. Customer Profile

Table 3.1. Table Customer Profile

No	Table Name	Field Name	Source Data
1	Dim_sektor	Kode_sektor, deskripsi_kode_sektor	Customer
2	Dim_Jenis_Kelamin	Kode_jenis_kelamin, deskripsi_jenis_kelamin	Customer
3	Dim_Golongan_Debitur	Kode_Golongan_Debitur, Deskripsi_Golongan_Debitur	Customer
4	Dim_Hub_bank	Kode_hub_bank, deksripsi_hub_bank	Customer
5	Dim_Nasabah	Kode_Nasabah, Nama_Nasabah	Customer
6	Dim_kolektibilitas	Kode_kolektibilitas, deskripsi_kolektibilitas	Customer
7	Dim_Kode_Pos	Kode_pos, nama_Kode_Pos	Customer
8	Dim_Period	Month, quarter, semester, year, date	Manual
9	Dim_Branch	Branch_code, branch_name	Reff_Company
10	Fact_Customer_Profile	Jumlah_customer	

2. Third-party funds

Table 3.2. Table Dana Pihak Ketiga

No	Table Name	Field Name	Source data
1	Dim_period	Month,quarter, semester, year, date	Manual
2	Dim_branch	Branch_code, branch_name	Reff_company
3	Dim_mata_uang	Kode_matauang, deksripsi_matauang	Account
4	Dim_produk	Kode_produk, group_produk, nama_produk, nama_singkat_produk	Dibuat manual
5	Dim_nasabah	Kode_nasabah, nama_nasabah	Master table nasabah
6	Dim_tanggal_jangka_waktu_mulai	Quarter, semester, year, date	Di fasilitasi dim_period
7	Dim_tanggal_jangka_waktu_Jatuh_tempo	Quarter, semester, year, date	Di fasilitasi dim_period
8	Fact_DPK	Jumlah_nominal	
9	Fact_DPK	Jumlah_Debet	
10	Fact_DPK	Jumlah_Credit	

3. Loan

Table 3.3. Table Loan

No	Table Name	Field Name	Calculations
1	Dim_kategori	Kode_kategori_debitur, deskripsi_kategori_debitur	LD
2	Dim_portfolio	Kode_portfolio, deskripsi_portfolio	LD
3	Dim_sifat_kredit	Kode_sifat_kredit, deskripsi_sifat_kredit	LD
4	Dim_jenis_penggunaan	Kode_jenis_penggunaan, Deskripsi_Jenis_penggunaan	LD
5	Dim_orientasi_Penggunaan	Kode_orientasi_penggunaan, deskripsi_orientasi_penggunaan	LD
6	Dim_jenis_valuta	Kode_jenis_valuta, deksripsi_jenis_valuta	LD
7	Dim_kategori_ukur	Kode_kategori_ukur, deskripsi_kategori_ukur	LD
8	Dim_kolektibilitas	Kode_kolektibilitas, deskripsi_kolektibilitas	LD
9	Dim_suku_bunga	Kode_suku_bunga, deksripsi_suku_bunga	LD
10	Dim_lbu_sektor_Ekonomi	Kode_lbu_sektor_ekonomi, deskripsi_lbu_sektor_ekonomi	LD
11	Dim_lokasi_proyek	Kode_lokasi_proyek, Deksripsi_lokasi_proyek	LD
12	Fact_Loan	Nilai nominal	Diambil dari LD.Amount
13	Fact_Loan	Nilai wajar bulan laporan	
14	Fact_Loan	Pendapatan_Bunga	
15	Fact_Loan	CKPN_Kolektif	
16	Fact_Loan	CKPN Individu	
17	Fact_Loan	Tunggakan_Pokok	
18	Fact_Loan	Tunggakan_Bunga	
19	Fact_Loan	Denda	
20	Fact_Loan	Plafond_Induk	
21	Fact_Loan	Plafond	

4. Collateral

Table 3.4. Table Collateral

No	Table Name	Field Name	Calculations
1	Dim_kategori	Kode_kategori_debitur, deskripsi_kategori_debitur	LD
2	Dim_portfolio	Kode_portfolio, deskripsi_portfolio	LD
3	Dim_sifat_kredit	Kode_sifat_kredit, deskripsi_sifat_kredit	LD
4	Dim_jenis_penggunaan	Kode_jenis_penggunaan, Deskripsi_Jenis_penggunaan	LD
5	Dim_orientasi_penggunaan	Kode_orientasi_penggunaan, deskripsi_orientasi_penggunaan	LD
6	Dim_jenis_valuta	Kode_jenis_valuta, deksripsi_jenis_valuta	LD
7	Dim_kategori_ukur	Kode_kategori_ukur, deskripsi_kategori_ukur	LD
8	Dim_kolektibilitas	Kode_kolektibilitas, deskripsi_kolektibilitas	LD
9	Dim_suku_bunga	Kode_suku_bunga, deksripsi_suku_bunga	LD
10	Dim_lbu_sektor_ekonomi	Kode_lbu_sektor_ekonomi, deskripsi_lbu_sektor_ekonomi	LD
11	Dim_lokasi_proyek	Kode_lokasi_proyek, Deksripsi_lokasi_proyek	LD
12	Dim_Jenis_Agunan	Kode_Agunan, Deskripsi_agunan	Collateral
13	Dim_sifat_Agunan	Kode_sifat_Agunan, deskripsi_sifat_Agunan	Collateral
14	Fact_collateral	Nominal	LD.Amount
15	Fact_collateral	Nilai wajar bulan laporan	filter
16	Fact_collateral	Pendapatan bunga	
17	Fact_collateral	Ckpn_kolektif	
18	Fact_Collateral	Ckpn_individu	

D. Star Schema

1. Star Schema Third Party Funds (Deposits, Giro, Savings)

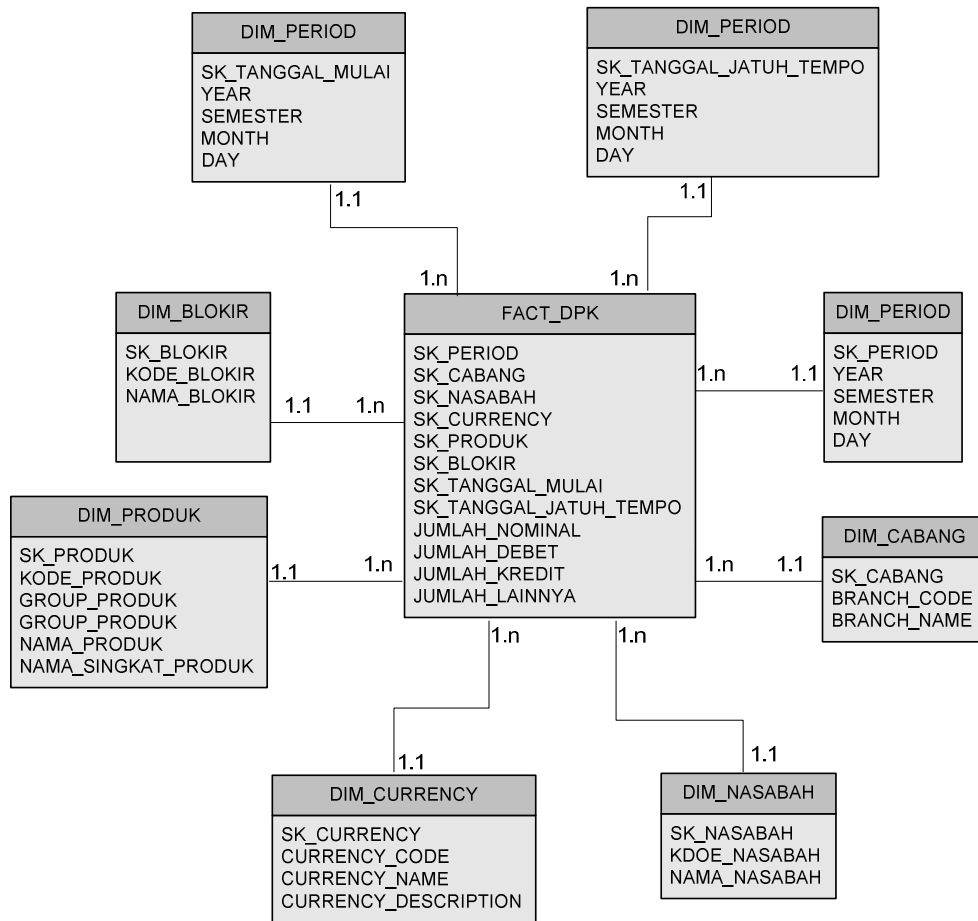


Figure 3. 2 Star Schema Third Party Funds

2. Star Schema Customer Profile

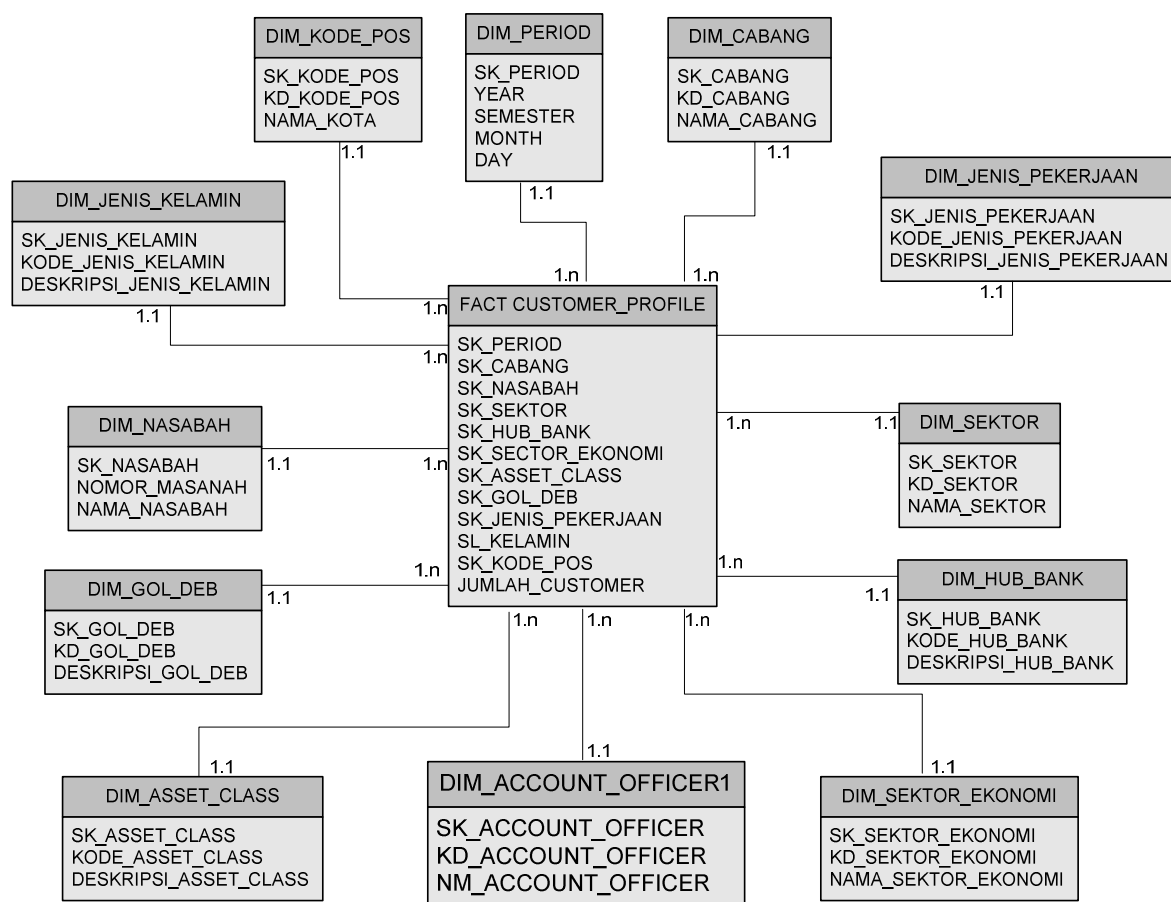


Figure 3. 3 Star Schema Customer Profile

3. Star Schema Loan

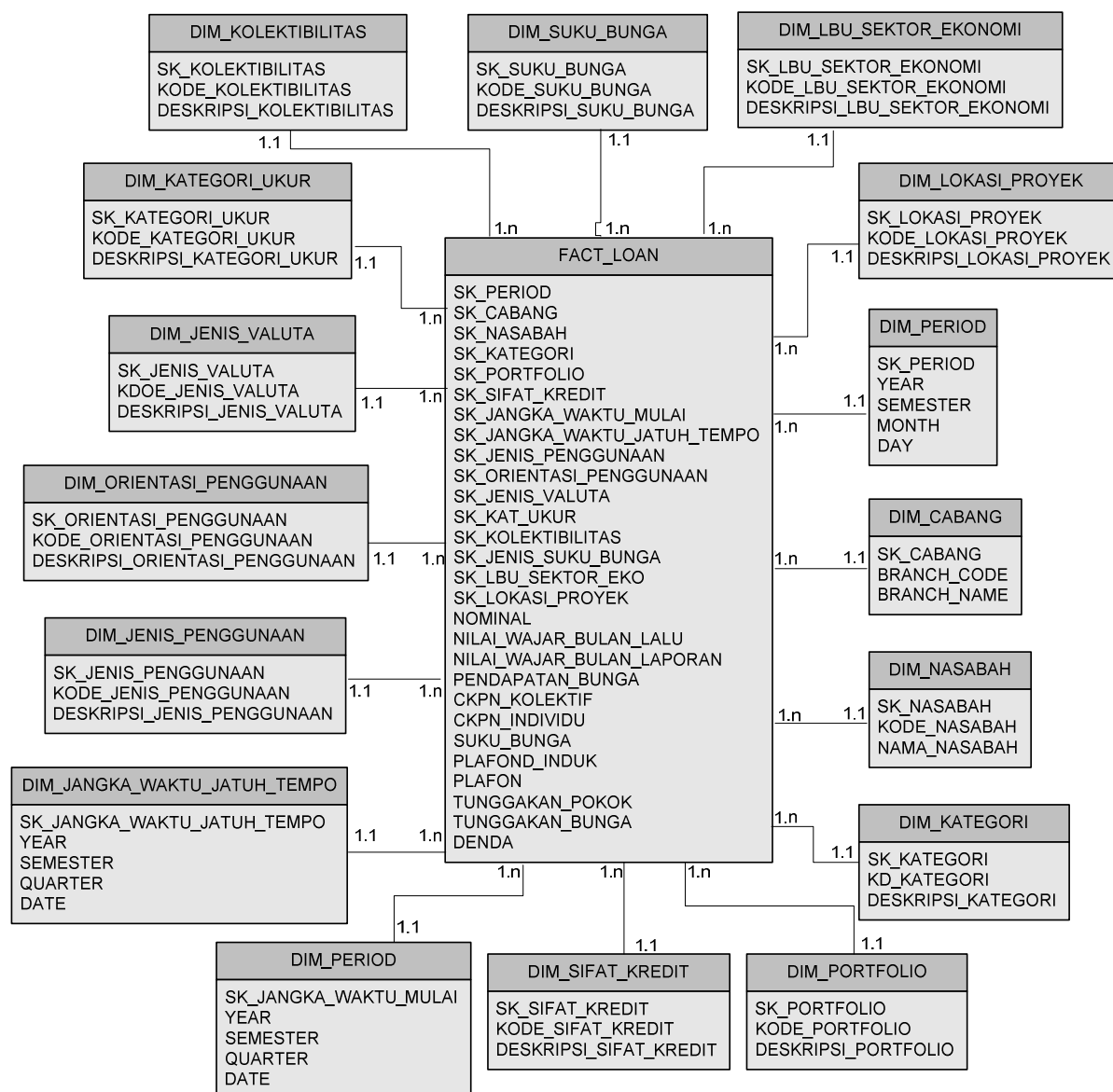


Figure 3. 4 Star Schema Loan

4. Star Schema Collateral

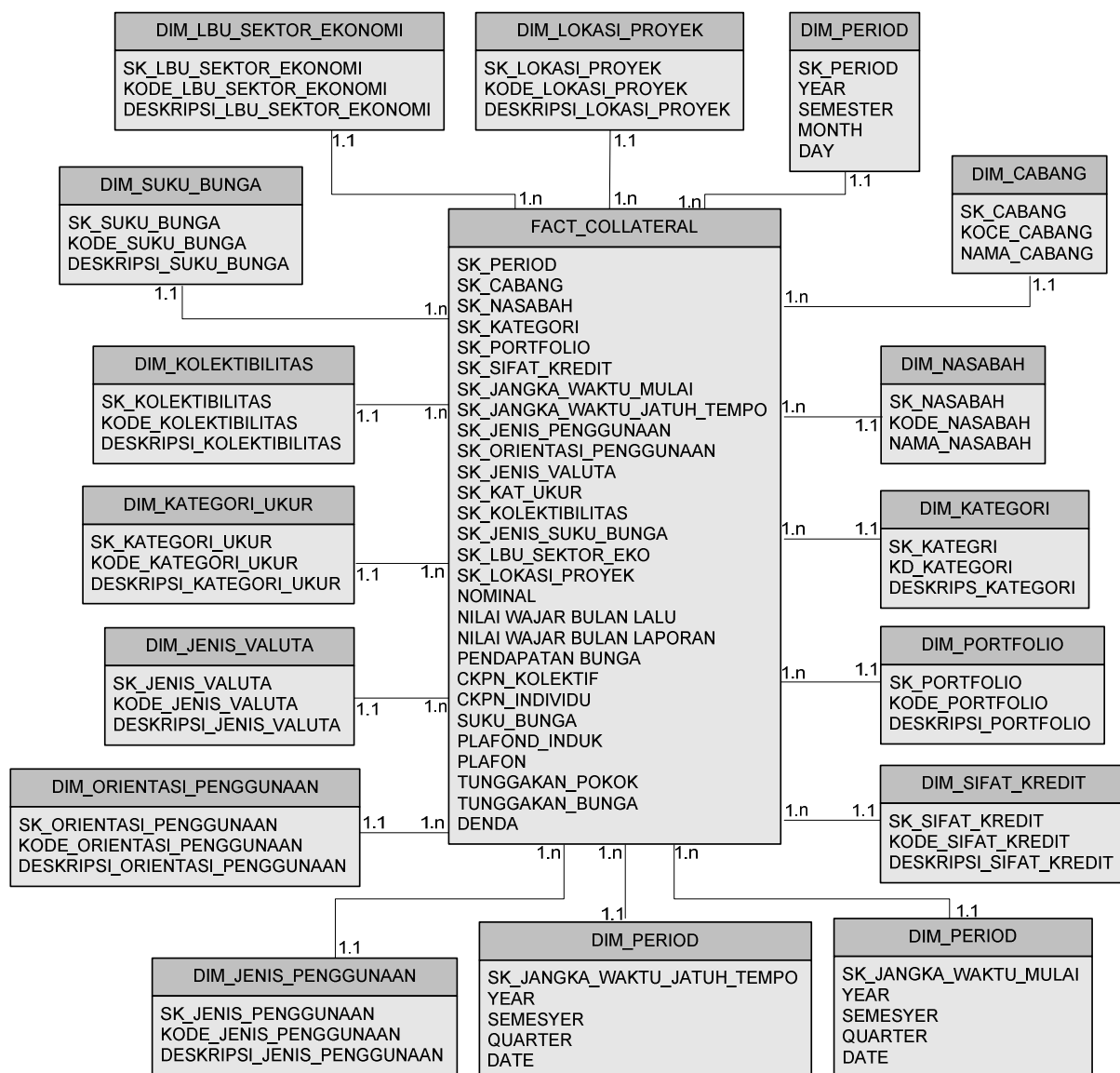


Figure 3. 5 Star Schema Collateral

2. DISCUSSION

A. Dashboard Reporting Creation

In this design used tools that are Cognos V 10.2.1. Cognos is a web service based BI tool, where data, dashboards and reports are displayed on the web accessed through the Cognos tool. In the Home Cognos menu, the user can select a menu to access data through Query Studio and Analysis Studio. Query Studio is a Cognos menu that provides data that can be accessed by the User to pull the required data easily. Users do not need to use SQL Query to display the data in the Database, with drag and drop then the

required data will appear in accordance with the data desired by the user.

Analysis Query as well as Query Studio drag and drop. Analysis Studio is used to analyze data from several angles. The data will be displayed according to the needs of the user or as desired by the user. The data available in Analysis Query is data that has been processed into dimensional data or differentiated according to the data level from the highest to the lowest lever.

The dashboard is a report designed as a concise report using the Cognos tool. Reports generated from data

processing produce more detailed information from the dashboard. Dashboard design will display information about

savings balance, current account, deposit, and credit.

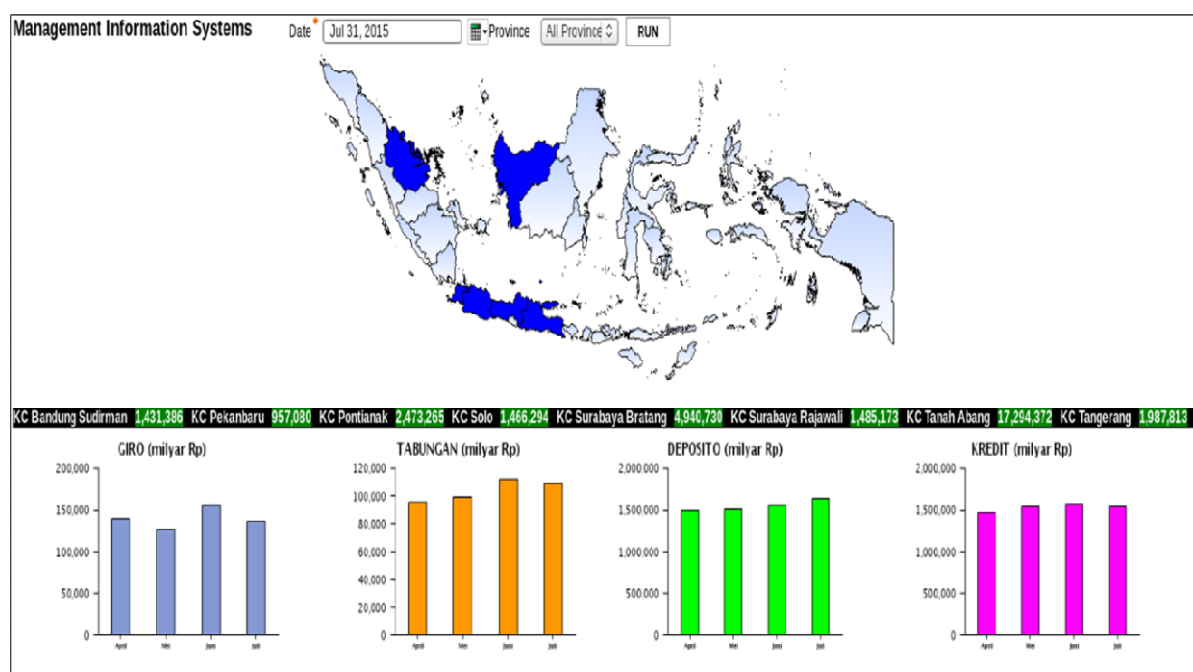


Figure 3.6. Graph of product movement of 4 major products of ABC bank

Explanation Graph 3.6. of product movement 4 main products of bank ABC.

The movement of graphs from existing bank products, ie demand deposits, savings deposits, deposits and credits, it can be concluded that the value of savings has the highest value and grow. For other values of deposits giro can be seen up and down, meaning that its growth from deposits up and down, while for deposits and lending deposits growth despite little movement. The growth of credit scores distributed for various types of credit offered by ABC banks with all types of customer funds deposits is positive, if seen from the picture of the channeling has not been good, that is still far from 50% of the total deposits, however from the visible picture Good enough because credit distribution there is growth. Business Intelligence with the dashboard report displayed can help the Bank Leader to determine which product development a priority scale is considering that it is generally limited to product development costs.

Explanation Graph 3.7. of distribution of credit types in 4 branches of ABC bank.

Of the four types of loans that became the mainstay products of the bank, namely mortgage loans, motor vehicles, working capital and accounts korang, compared from four provinces, namely Bandung, Surabaya, Bali and Yogyakarta can see a comparison of the amount of money on each allotment, in Bandung funding for working capital corporation dominates over the other, so that the results of the analysis of the product, leaders can develop the provision of credit can be prioritized on credit products for working capital corporations, but also should be a concern related to the value of non-performing loans (NPL) to be pressed under 5%. For Surabaya region, the largest credit is in the credit account of the newspaper, also in Bali and in Yogyakarta. From the above graphic support information support, leaders can take decisions for the development of superior products in each region in accordance with their respective advantages

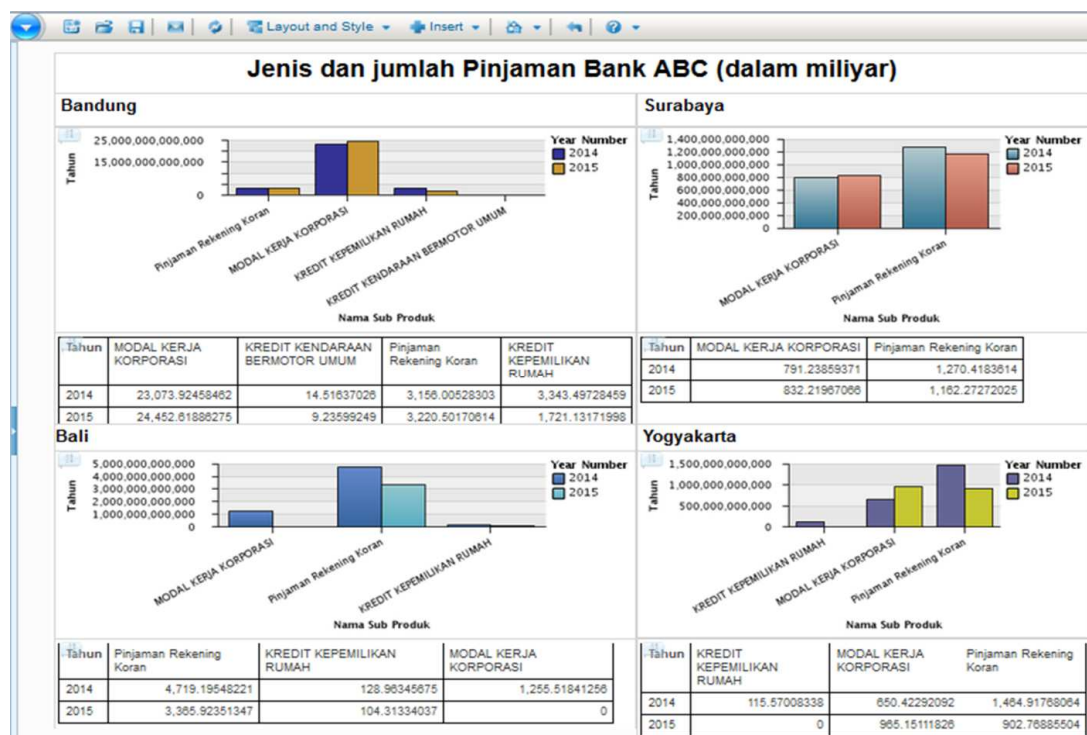


Figure 3.7. Graph of distribution of credit types in 4 branches of ABC bank

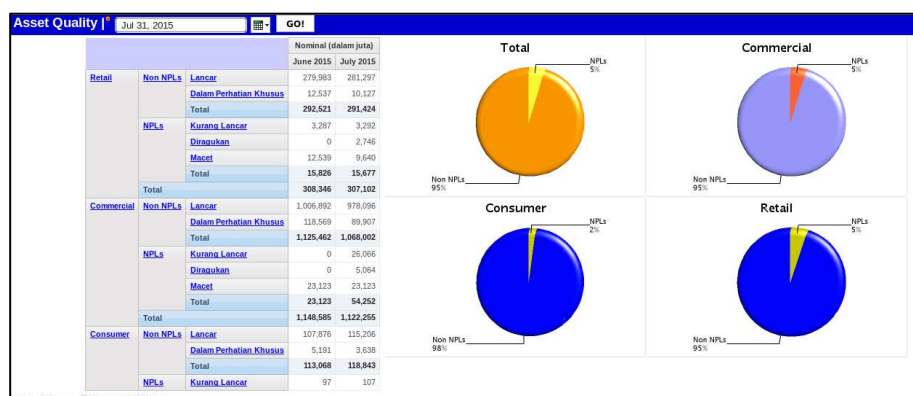


Figure 3.8.. NPL value for each type of credit

Explanation Graph 3.8. of NPL value for each type of credit.

To see the NPL value in lending to consumer, retail and commercial. Showing above the NPL value of the consumer is the smallest compared to the others. This graphic

description can support the information for the leadership in analyzing the problem of returns from each type of credit channeled, so that the leadership in developing the types of credits that are the leading products in the future can be more precise and provide greater benefits than others.

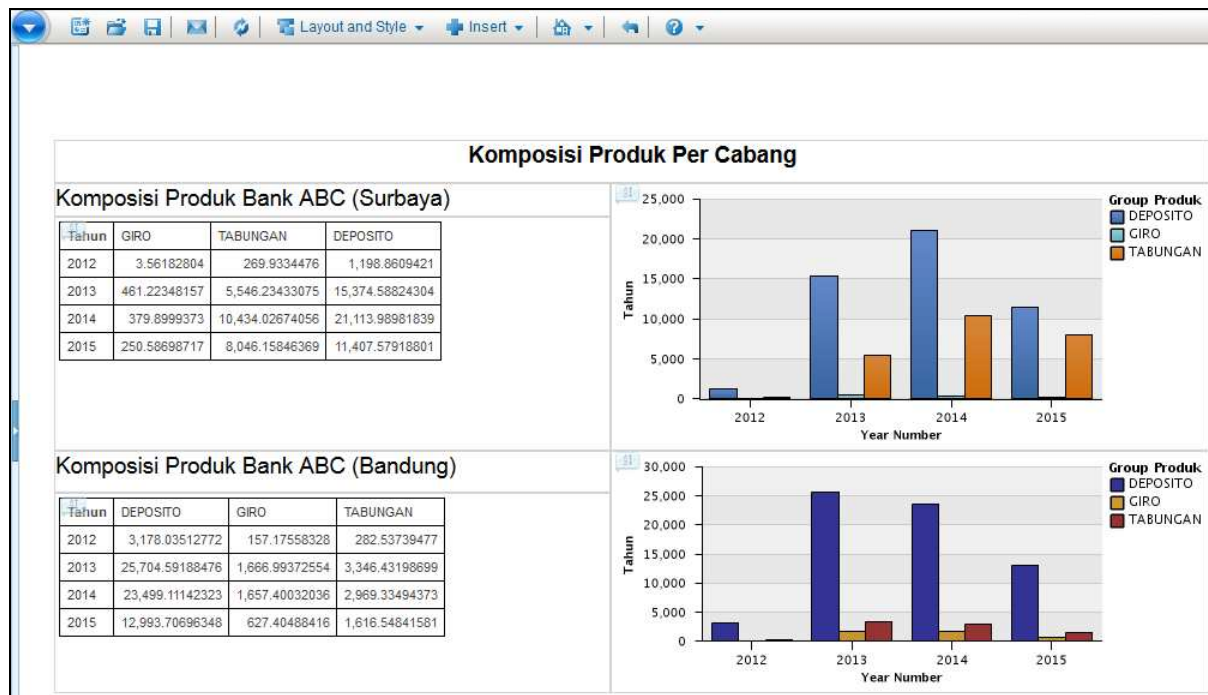


Figure 3.9. The composition of ABC bank products in different regions

Explanation Graph 3.9. of Composition of ABC bank products in different regions

Savings products have 3 types of deposits that become the mainstay of the bank products, namely Giro, Savings and Deposits; can be seen in the graph below. Deposits value in the Surabaya and Bandung area increased the highest value. For 4 years running in Surabaya branch, the highest deposit value is in 2014 and there is a decrease in 2015. For Deposits in Bandung area decrease from 2013, 2014 and decrease drastically in 2015, although the highest deposit value is in Deposit, General decline. From the above graphic description of course the bank's leadership must perform an analysis to find out why the decrease in the value of deposits, then from the findings of the analysis can be used as product development strategy planning that is considered superior and become the priority scale of product development.

IV. CONCLUSION

From the results of the application of business intelligence at Bank ABC as described above, it can be concluded as follows: Business Intelligence provides ease of bank leadership to analyze various bank products offered, the report can be quickly presented with various models of interest and interactive. The results of the implementation of Business intelligence can help corporate leaders in making

decisions related to the strategy of developing a potential bank products provide great benefits. With Dashboard reporting displayed can know the performance of the Bank of the various products offered, and facilitate the leadership of the Bank in analyzing the ratio between bank products, so that the leadership can properly decide the priority of product development that is the mainstay of banks in certain areas. In the end the implementation of Business Intelligence can be used to see the performance of all branches of the existing bank in Indonesia and show which products are superior in each respective region, so that the decision on the development of bank products can be implemented quickly and accurately.

V. RECOMMENDATIONS

Recommendations that can be given for further research in the implementation of Business intelligence is to try other methods to see bank performance from the other side, then in data processing to produce information can do research in analyzing data by making BI report in real time (OLTP), because methods to process data in BI there are several ways, also should measure the performance of interbank by doing research using the same method in several different banks, so can know the superiority of one bank from another bank on each product become superior.

REFERENCES

- [1] Al-ma, M. A. (2013). The Role of Business Intelligence Tools in Decision Making Process. *International Journal of Computer Applications*, 73(13).
- [2] Ballard, Paul J. "Measuring Performance Excellence: Key Performance Indicators for Institutions Accepted into the Academic Quality Improvement Program (AQIP)." (2013).
- [3] Carlo, Vercellis,. (2009), "Business Intelligence : Data Mining and Optimization for Decision Making". United Kingdom: John Willey and Sons, Ltd.
- [4] Connolly & Begg (2005), Database Systems: A Practical Approach to Design, Implementation, and Management, Addison-Wesley, 2005
- [5] Dewan, S., Aggarwal, Y., & Tanwar, S. (2014). Review on Data Warehouse, Data Mining and OLAP Technology: As Prerequisite aspect of business decision-making activity.
- [6] Eka, M. (2008). Pengembangan Business Intelligence Bagi Perkembangan Bisnis Perusahaan. *Jurnal CommIT*, 2(02).
- [7] Eckerson, W. W. (2010). Performance dashboards: measuring, monitoring, and managing your business. John Wiley & Sons.
- [8] Gour, V., Sarangdevot, S. S., Tanwar, G. S., & Sharma, A. (2010). Improve performance of extract, transform and load (ETL) in data warehouse. *International Journal on Computer Science and Engineering*, 2(3), 786-789.
- [9] Husni, Z. N., & Mukhlash, I. (2014). Implementasi Business Intelligence Pada Manajemen Report Bank XYZ. *Jurnal Sains dan Seni ITS*, 3(2), A16-A21.
- [10] Inmon, W. H. (2005), Building the Data Warehouse, Fourth Edition. Wiley Publishing, Inc.
- [11] Kahorongo, T. C., Reddy, N., & Karodia, A. M. (2015). The Adoption of Information Technology in the Governance System of the Bank of Namibia. *Business and Management Studies*, 1(2), 77-96.
- [12] Kusrini, & Emha, T. L. (2009). *Algoritma Data Mining*. Yogyakarta: Andi.
- [13] Larose, Daniel T. *Discovering knowledge in data: an introduction to data mining*. John Wiley & Sons, 2014.
- [14] Loshin, David. (2012) *Business Intelligence, The Savvy Manager's Guide*, 2nd Edition, MK Series, Copyright © 2012 Elsevier Inc
- [15] Muhammad, G., Ibrahim, J., Bhatti, Z., & Waqas, A. (2014). Business intelligence as a knowledge management tool in providing financial consultancy services. *American Journal of Information Systems*, 2(2), 26-32.
- [16] Rajesh Kumar, Sahu,. 2012."Business Intelligence for Banking" India: Ifosys Finacle.
- [17] Turban, Efraim (2008), *Business Intelligence: A Managerial Approach*, Pearson Prentice Hall, 2008
- [18] Wieder, B., & Ossimitz, M. L. (2015). The impact of Business Intelligence on the quality of decision making—a mediation model. *Procedia Computer Science*, 64, 1163-1171.