Data Warehouse: A Study on Data Warehouse Technologies and its Applications in Modern Finance

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Abstract:

This study examines the use of data warehouses in the contemporary financial sector, which can assist banks with their products, departments, and institutions of profit and cost analysis. By strengthening cost management to increase efficiency, this study will significantly alter bank management departments at all levels of management, control, and means of cooperation and improve overall bank management. In addition, by establishing a data warehouse and continuously enhancing its capabilities, banks can successfully assist in the gradual standardisation of management procedures, the optimization of business processes, the improvement of asset utilisation, and the gradual realisation of the transformation of the modern commercial bank management pattern.

Keywords:

Data Warehouse; Modern Finance; Banking information.

Introduction:

The banking industry has progressively learned that the vast majority of its core business is now processed by computers. As a result, it has amassed a sizable amount of operational and customer data, which is now a significant asset for the bank. Today, one of the most crucial aspects of China's banking reform is how to use this data to uncover useful information that will help a variety of businesses. To effectively manage all information stored on bank and customer information, as well as the need for management decision-making in various banking sectors, it is essential to establish a banking enterprise-class data warehouse. Multi-level data processing, in many ways, presents truly valuable information, management decisions, and meets the needs of bank customer analysis. In other words, the banking data

warehouse technology had to be solved in order to create an efficient data integration management mechanism for the bank's scientific management decisions and the development of new business services.

From this vantage point, the data warehouse will assist the bank in a variety of ways, including in the short term by broadening the scope of its operations, enhancing customer satisfaction, strengthening internal management, and advancing the healthy development banks and international banking giant showdown of power and protection. To strengthen internal management and decision support, foreign better understand customer needs, develop new products or services, use significant means of existing channels to cross-sell to customers, increase profitability, and offer differentiating services in particular business areas, major banks have started to establish centralised data warehouses that contain detailed transaction data.

The Corresponding Technology and Theory Analysis:

In order to support management decision-making, a data warehouse is a subject-oriented, integrated, stable, time-varying data set. Data warehouse data is collected from the data source (such as database operations, external market data, work data, file data, etc.), standardised, filtered, and purified, covering the timestamp, and then through a variety of tools (OLAP tools, reporting tools, DSS tools, data mining tools, etc.) for the data in the data warehouse knowledge discovery, and applied in practise, for clients to provide.

For the purposes of data warehousing, OLAP, and data mining, the data warehouse system is a component of the overall decision support system and can be implemented for specific industries and businesses. A block diagram of the typical data warehouse system is shown in Figure 1.
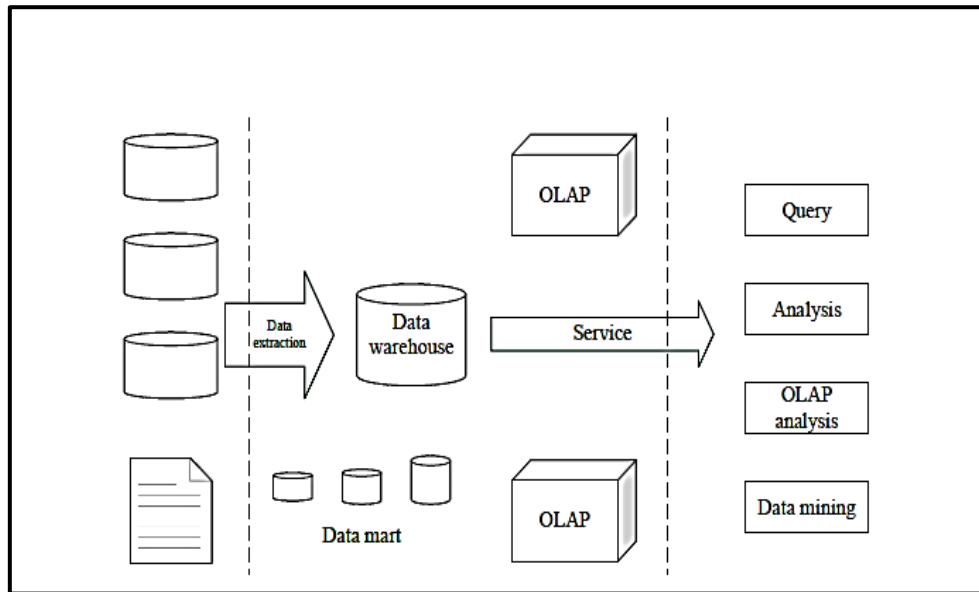
1. System structure of the data warehouse

Virtual storage, storage-based storage techniques, and multidimensional database relational tables are the three components of data organisation data warehouse. Multidimensional database storage is directly facing the organisation in the form of data mining and data analysis necessary for the operation. Data warehouse is DW from the angle of the enormous amounts of data from a client interested in hierarchical processing, abstraction, and setting the proper dimensional indexing and metadata management.

Analysis of the Needs for Modern Finance:

Technologies connected to bank-based customer relationship management data warehouses segment customers to better satisfy their needs, connect customers and banks, and maximise customer income while boosting customer happiness and loyalty [6]. The overall goal of building a data warehouse system is to create a banking enterprise data base system and integrate customer information resources to achieve comprehensive customer information management functions. These functions include: a single customer information management, customer comprehensive analysis, target customers and business search query and statistical functions, providing decision support management information to the bank to improve their competitiveness.

The goal of establishing the bank's CRM data warehouse system is to take timely, accurate decisions based on customer demand in order to develop the market, maintain and grow its customer base, and increase revenue opportunities while maximising the bank's internal

resources and operational efficiency. Commercial banks' targeted marketing, sales, and service delivery for customers are based on the establishment of the bank's data warehouse system for CRM, which provides thorough and accurate data in order to achieve support decision-making and help decision-makers reach accurate and quick decisions. These customers are classified according to specific criteria, which identify the fundamental characteristics of each type of consumer customer.

In order to accomplish efficient customer relationship management business, data mining is the application of CRM data mining theory and technology to construct a model to characterise and forecast customer behaviour. Banks use data mining tools that include statistical and machine learning skills to find future consumers, anticipate customer behaviour, identify key clients for investment behaviour, and get ideas and cautions from clients to assist banks alter their marketing plan and lower risk. Figure 2 depicts the general banking CRM data mining procedure.
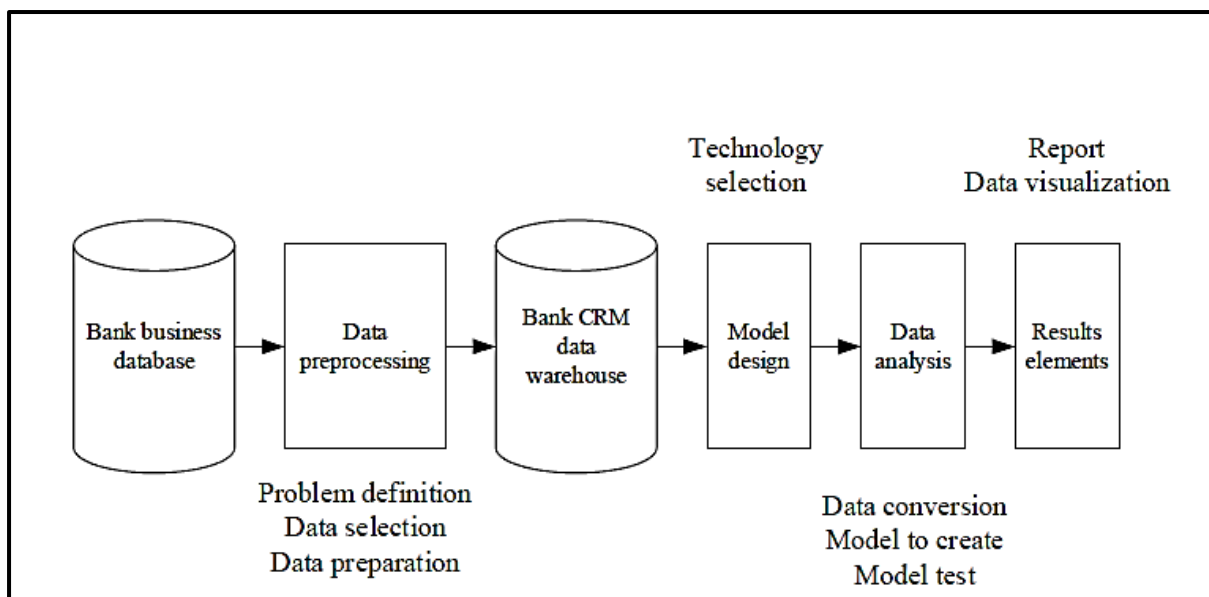
2. Data Mining Process of Bank CRM System

Pre-processing of data. We must ask the right questions at this point. The primary task in this activity, which can be the subject of data mining, is what is clear. Data for banking-related business can be pulled from the database after pertinent questions have been asked, and the data can also be used for data extraction, cleaning, and summarization. Export verification, selection, and preparation of the data were asked to debate the issue based on their expertise in business-related topics. Because the data must be extracted from the system and then go through matching, filtering, and classification, pre-processing data takes a long time.

Phase of model design. In-depth data analysis and the extraction of the most pertinent areas are requirements for this step. For instance, by using a range of in-depth analyses of consumer data to comprehend, model, and forecast customer behaviour in the future. Reduce the amount of data that needs to be reduced into a set and/or a few test sets. Data aggregation technology may also be used to divide subsets of data into groups based on shared traits, which were then examined for each subdivision.

Phase of data analysis. This stage is for data mining activities after the first two stages' preparation. In order to complete this work, we must first create a solid model, apply the appropriate data mining methods to the data, and then validate the model using at least one last independent set of test data. Also, it is possible to comprehend and evaluate this model's correctness and validity properly.

Architecture of Banking Data Warehouse System:

Systems for managing banking information based on data warehouses must integrate elements such as: first addressing customer relationship management; business systems will organise the data into customer-centric data warehouses; and analysis and management of market activities. Whereas the customer will receive fast market information and outcomes of the study via an email system that is closely integrated. Second, the companies' revenue, costs, budgets, and other factors were examined. Using statistical analysis methods, a number of perspectives are taken in order to give pertinent key performance indicators and income statements. City authorities can obtain a business development report while using a complete study of the scenario to determine income development, project status, budget, and other issues. A structured data warehouse-based bank information systems environment is created by taking into account the requirements of all aspects of the aforementioned system and basing information systems on data warehouse management from basic banking information networks, warehouse management, data warehousing, and data presentation of five parts.

CRM system by the application layer, data integration layer, and external data layer, according to the logic of the overall design. ETL tools should not be used with IBM's System database DB2. Application services and the data stage prevent use Infor8, ACRM A picture of the total architecture is shown in Figure 3.
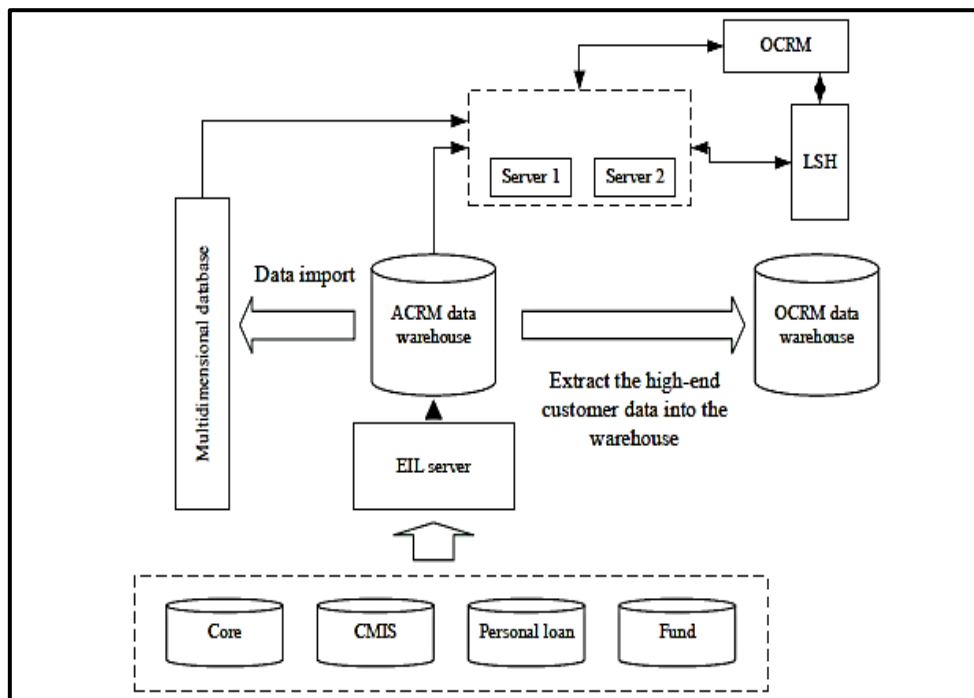
3. Application of Data Warehouse in Banks

1. The term "external data layer" typically refers to the external data layer (ODS) and business systems as a data source. On the one hand, ODS in the customer information system by smoking-related post-integration into the data warehouse, ETL full customer segmentation, customer loyalty and contribution analysis, and other applications. On the other hand, it provides full database query records for OLTP (online transaction processing), reporting, monitoring, etc., in order to give account managers access to up-to-date information. Banks require the same information, such as the customer's name, contact information, address, and other data, through any channel, regardless of the level at which they have created their business systems and have a unique picture of their clients.

2. Data loading frequency, recording system description, data transformation guidelines, data warehousing, data dictionary, business rules, and other metadata are organised and stored in the data integration layer of the data warehouse. However, the physical storage layout of the data warehouse is ultimately determined by the bank's core ACRM systems, which also organise and extract, transform, and load data into topics.

3. The application layer displays the system's front end and includes traffic control authorities, services, and reporting tools. Access database installation and front-end operation, along with accompanying reporting, query, analysis, and data generation; JAVA

services; and the equivalent provision of HTTP services to users. Concurrently, create relevant reports based on business requirements and offer OCRM report query.

Conclusion:

In order to uncover the correlation between various data and rules and to produce efficient decision support solutions, data mining is a method that excludes banks from each system set found in the database. In this paper, a solution to the bank customer relationship management system is proposed based on data mining techniques, the data warehouse to obtain initial data from the different sources of information systems, through the data processed, stored in the banking system's database by system access tools to provide a unified and integrated data information to the user, the enterprise global depth and comprehensive analysis of the decision-making process. The fundamental understanding of the demand for bank account management and other associated work requirement solutions is based on the actual needs of the banking industry.

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