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EMERGING TRENDS IN KNOWLEDGE MANAGEMENT IN BANKING SECTOR

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ABSTRACT

Banking Sector all over the world is witnessing a paradigm shift. The computerization of financial operations, connectivity through World Wide Web and the support of automated softwares has completely changed the basic concept of banking. The irony of the situation is that in spite of collection of huge amount of data from the various transactions and other sources, the banks are not able to fully capitalize the benefits which can be reaped from these huge data bases. The survival mantra in the present day environment of globalization and cut throat competition is to find out the power of invisible force which runs the whole show i.e. the knowledge. The banks have realized that their biggest asset is the knowledge and not the financial resources and are using the techniques of knowledge management and data mining for customer segmentation and profitability, marketing, risk management and customer relationship management. This paper highlights the perspective applications of data mining for knowledge management to enhance the performance of some of the core business processes in the banking sector.

KEYWORDS

Knowledge Creation and Retention, Information Communication Technology, Customer Relationship Management, Data Mining.

INTRODUCTION

In the most basic sense the knowledge is defined as a derivative of information, which in turn is derived from the data. Knowledge is the information or data which has been organized in a meaningful way. Data is mostly unstructured, factual, and often times numeric, and reside in database management systems. Information is factual, but structured and crisp, Knowledge is inferential, abstract, and is needed to support decision making or hypothesis generation. Knowledge and knowledge management are being used interchangeably. Knowledge management is being used in our society since time immemorial. Its origin can be related to the time when languages were discovered. Human beings learnt how to communicate with each other and this was probably the first medium through which transfer of information took place [8]. The transfer of knowledge took place from parents to children, teacher to the taught and from educated to the uneducated through the verbal or non-verbal mediums of communication [8]. This knowledge transfer was informal and was transferred to generations through customs and folklore. Till the time, the society was not widespread; these means of knowledge dissemination were successful even in the small organizations also. The major problem in this process was faced when the organizations started growing in size and magnitude, the work pressures on employees and ever changing demands of the industry posed by cut throat competitions started increasing. The solution to this problem lies in implementation of techniques of knowledge management and dissemination. The organizations are collecting huge amount of data through various transactions executed every second, but they fail to fully capitalize the benefits from these huge data bases only because they do not have some strong mechanism for knowledge collection, organization, dissemination and hence are not able to use this knowledge for the survival and growth of the organization. Knowledge is: "... a fluid mix of framed experiences, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information"

Karl Sveiby defined KM as, the art of creating value from an organizations intangible assets.[14]

Davenport and Prusak defined KM as - KM is concerned with the exploitation and development of the knowledge assets of an organization with a view to furthering the knowledge objectives.[14]

Despres, Charles and Chauvel, Daniele defined KM as, the purpose of knowledge management is to enhance organizational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of different types of knowledge that are critical for decision-making.

According to the World Bank, KM is the management of knowledge through systematic sharing that can enable one to build on earlier experience and obviate the need for costly reworking of learning by making the same repetitive mistakes.[14]

In the simplest sense, knowledge can be divided into two categories:[11]

- Explicit knowledge
- Tacit knowledge

Explicit knowledge is formal knowledge that can be packaged as information and can be found in the documents of an organization: reports, articles, manuals, patents, pictures, images etc. It can be expressed in form of specific language and can be shared in the form of data or scientific formula. It can be processed, transmitted and stored relatively easily.

Tacit knowledge is personal knowledge acquired by the individual experience and is shared and exchanged through direct conversations. It is highly personal and hard to formalize. It is deeply rooted in action, procedures, routines, commitment, ideas, values and emotions.

NEED OF KNOWLEDGE MANAGEMENT IN BANKS

Since 1980's the whole concept of banking has been shifted to centralized databases, online transactions and ATM's all over the world, which has made banking system technically strong and more customer oriented. The introduction of these reforms brought with it a healthy competition around the globe and the rule of "survival of the fittest" is prevailing in the banking sector. Then arises the question, who is the fittest, the organizations which has right information available at the right time will be called the fittest. The right information will be converted in to knowledge and this acquired knowledge will help the bank to survive, grow and capture the new markets and they can provide better customer oriented services and hence can retain their existing customers also. This need of the hour forced banks to upgrade their customer service to a much higher plane in order to survive in this competitive environment [13]. They found technology as an ideal tool to achieve this objective. Public sector banks were guided by the recommendations of the Committee for up gradation of Banking Technology

constituted by Reserve Bank of India, though the pace of the computerization has been moderate.[7,2,3] Till 1980s, the banks were accessible only through their branches. With the growth of technology other delivery channels and technology-aided products like ATMs, anywhere Banking, Smart Cards, Internet Banking, WAP Banking, etc.,[2,3] have provided the customers with a flexibility and ease of performing banking operations. Over the years, technology has brought a drastic change in the functioning of the banks. The earlier manual system of handling transactions, have been automated, thereby saving a lot of time and effort. In the present day environment, the huge amount of electronic data is being maintained by banks around the globe [10]. The knowledge required for various operations and decisions to be taken need not to be gathered by intrusive customer surveys or expensive market research programs, but the already collected data in the organization's store houses is to be mined for the relevant knowledge. The terabytes of data is being collected, generated, printed, stored, filed and discarded by banks; these data items serve only the short lived purpose of audit trail and paper trail. But this huge collection of data can be used for further analysis and for finding the future directions. The Total Branch Computerization (TBC) software packages being used at various branch levels are transaction oriented, as these were designed keeping day to day transactions in mind. Designing the new MIS or restructuring the existing ones would not be possible by just replacing the existing Total Branch Computerization packages. The solution seems to be in incorporating the concept of data warehousing and data mining. Data warehousing and mining will become important for banks to take business decisions [2, 3].

THE KNOWLEDGE DISCOVERY AND MANAGEMENT PROCESS

Knowledge discovery and learning is an iterative process that extends the collection of data mining techniques into a knowledge management framework. Figure 1 shows the complete knowledge management process [15]. The steps in the KDD process contain [6]:

- 1. Data Cleaning:** In this phase noise data and irrelevant data are removed from the collection.
- 2. Data Integration:** In this stage, multiple data sources, often heterogeneous, are combined in a common source.
- 3. Data Selection:** The data relevant to the analysis is decided and retrieved from the collected data. As data mining technique can be applied to the complete database or a representative sample of the data can be chosen. The process of feature selection is done by the use of data visualization to bring number of variables to a manageable range.
- 4. Data Transformation:** It is also known as data consolidation; in this phase the selected data is transformed into forms appropriate for the mining procedure.
- 5. Data Mining:** It is the crucial step in which out of the various data mining techniques available, such as neural networks, tree-based methods, logistic model, rule induction methods, or other statistical models, the technique most suitable to the present context is chosen and is applied to extract potentially useful patterns.
- 6. Pattern Evaluation:** In this step, interesting patterns representing knowledge are identified based on given measures.
- 7. Knowledge Representation:** It is the final phase in which the discovered knowledge is visually presented to the user as per their requirements and hence the organization can take decisions accordingly. If the knowledge presented does not fulfill the requirements of the individual or the organization, then the process is repeated through learning and refinement of the derived solution is done [13].

DATA MINING AS A TOOL FOR KNOWLEDGE MANAGEMENT IN BANKING SECTOR

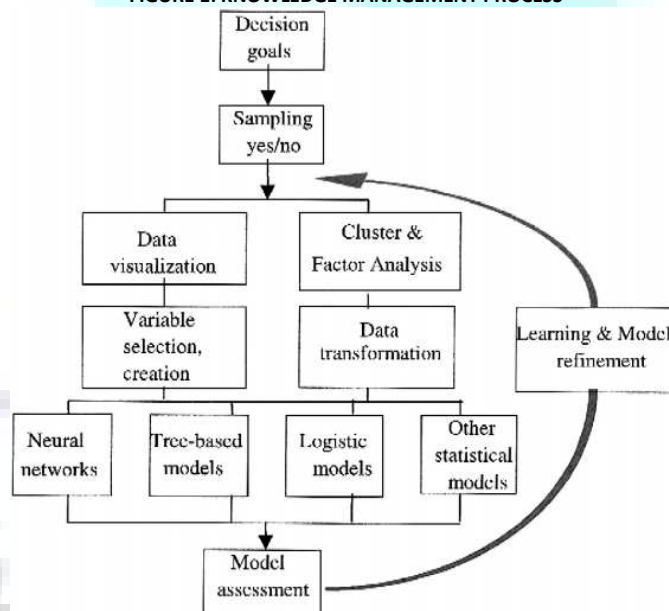
Data mining is also called knowledge discovery from databases. Data mining is often used during the knowledge discovery process and is one of the most important subfields in knowledge management.

Data mining aims to analyze a set of given data or information in order to identify novel and potentially useful patterns [4].

Data Mining is defined as "the nontrivial extraction of implicit, previously unknown, and potentially useful information from data" [1].

It is basically "the science of extracting useful information from large databases".

FIGURE 1: KNOWLEDGE MANAGEMENT PROCESS



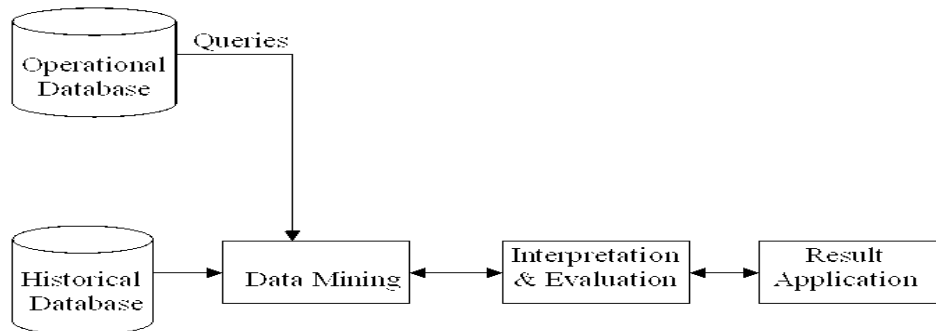
Data mining is a process that uses a variety of data analysis tools to discover knowledge, patterns and relationships in data that may be used to make valid predictions. [1].

DATA MINING CONSISTS OF FIVE MAJOR ELEMENTS:

- Extract, transform, and load transaction data onto the data warehouse system.
- Store and manage the data in a multidimensional database system.
- Provide data access to business analysts and information technology professionals.
- Analyze the data with the help of application softwares.
- Present the data in a useful format, such as a graph or table.

Data mining involves the use of sophisticated data analysis tools to discover previously unknown, valid patterns and relationships in large data sets. These tools can include statistical models, mathematical algorithms, and machine learning methods. Thus, data mining is not only collecting and managing data; it also includes analysis and prediction. Data mining can be performed on data represented in quantitative, textual, or multimedia forms. The Figure 2 shows the Process of Data Mining.

FIGURE 2: THE PROCESS OF DATA MINING



There are three major areas of application of data mining for execution of financial operations [15]:

1. **Customer Profiling** - For better Customer Relationships through Customized Services.
2. **Deviation Analysis** - For Risk management and Fraud detection.
3. **Trend Analysis** - For future forecasting.

1. CUSTOMER PROFILING

Customer is considered as the king and it's the customer who is running the whole show and a huge amount of data is collected by the organizations knowingly and unknowingly, and this data can be explored to discover the hidden patterns and hence the organization can design strategies accordingly. While learning customer profiles, an organization is interested in general information like, age, sex, demographics and specific information like:

- a) **Frequency of Transactions:** How many transactions are done by a customer and how frequently these are done?
- b) **Size of Transactions:** How much does the customer spend on a typical transaction?
- c) **Recency of Transactions:** How long it has been since this customer last performed a transaction? The recent emphasis on customer relationship management has put the focus back on the customer. The four key steps of customer relationship management are as under:
 - Identifying the right customers,
 - Differentiating among them,
 - Interacting with and learning from existing customers, and
 - Customizing the services.

This type of information collected by an organization can be mined and following benefits can be obtained:

- a) **Identifying typical customer groups:** Classifying and grouping the customers with similar set of transactional behavior. The customers of a particular group can be offered services as per their requirements. Knowing the customer and targeting the right deal gets a far better response rate than a general message. Like, the customers from the service class always demand for the policy which ensures more security as they are not intended to take risks, likewise the same set of service class people in rural areas have the preferences for some particular brands which may differ from their counterparts in urban areas. This information will help the organization in cross-selling their products, Instead of mass pitching a certain "hot" product, the bank's customer service representatives can be equipped with customer profiles enriched by data mining that help them to identify which products and services are most relevant to callers[9].
- b) **Prospecting the future:** Customer profiles (highlighting their age, sex, income and demographics) and their transactional behavior give clues to the organization to predict the future, Like a customer who has taken loan from the bank for the construction of a house can be contacted after 6 months, for the purchase of furniture, refrigerator or AC, as these are the obvious requirements after the purchase of a house.
- c) **Success or Failure of Marketing Programs:** Customer databases provide accurate information for marketing programs. The marketer can use the patterns of purchase discovered from the database and the related marketing programs to measure the short-term and long-term effects of the programs.

2. DEVIATION ANALYSIS

Knowledge of deviations from normal is extremely important for any organization. A deviation can be an anomaly or fraud or a change. In the past, such deviations were difficult to detect in time to take corrective action. Data mining tools provide powerful means such as neural networks for detecting and classifying such deviations. For example, a higher than normal credit purchase on a credit card can be a fraud anomaly. Once a deviation has been discovered as a fraud, the organization takes steps to prevent such frauds and initiates corrective action. If the deviation has been discovered as a change, further information collection is necessary. For example, a change can be that a customer got a new job and moved to a new house. In this case, organization has to update the knowledge about the customer.

3. TREND ANALYSIS

Trends are patterns that persist over a period of time. Trends could be short-term trends like the immediate increase and subsequent slow down of sales following a sale campaign. Or, trends could be long-term, like the slow flattening of sales of a product over a few years. Data mining tools, such as visualization, help us detect trends, sometimes very subtle and hidden patterns can be obtained, which would have been missed using traditional analysis tools like scatter plots. The study of these trends can be helpful for the organization to identify trends in sales, costs and profits by products, regions or markets in order to understand the impact of a sales promotion campaign [6]. Data mining also provides statistical tools to precisely measure the performance of the various parameters of interest and the organization can forecast future sales. Data mining allows discovery of subtle relationships like a peak in sales of a product associated with a change in the profile of a particular group of customers.

World Bank is renowned as one of the champions in knowledge management application. It has an extensive knowledge management approach in action. Relevant information was identified that could then be captured and entered into the knowledge base so that it was accessible by all staff members. Relevant parts of the system are accessible to clients, partners, and stakeholders around the world so that they can act according to the information retrieved through these knowledge bases [11].

Bank of Montreal (BMO) is the oldest bank in Canada. It is also Canadian third largest bank with sales of \$US12.23 billion in 2000. BMO is a leader in customer centric knowledge based solution [11].

CHALLENGES IN KNOWLEDGE MANAGEMENT THROUGH DATA MINING

1. The major issue in knowledge management is the organization, distribution and refinement of knowledge. In order to maximize the effectiveness of this knowledge management process, the organization requires proper definition of the knowledge elements and measures so that the full benefit can be reaped.
2. The second most important issue in knowledge management is knowledge integration from disparate sources. Organizations need to explore data from various sources and the collected data is to be integrated to derive at a particular result. The data collected is normally heterogeneous in nature, so the process of data refinement is to be carried out, so that the appropriate data mining technique can be applied.
3. While transferring the data, large amount of noisy data is also added which creates problem. So data is to be preprocessed by filtering the noisy data. This step is usually time consuming.

4. Privacy Issues are the greatest obstacles. There is a war like situation between the data miner and the subjects, as while mining the data, the privacy of the subject is at the stake.
5. The results obtained from the various data mining tools are subject to validation, as these are to be tested before acceptance.
6. While studying the customer behavior usually the purchasing or transactional behavior is considered, but this analysis needs deep study of customers and their circumstances.
7. The difficulty is faced in developing customer models and moreover the validation of these models is again a Problem

CONCLUSION

Knowledge management and retrieval of relevant knowledge as per the requirements of the organization and hence to design the business strategies based on this knowledge is the need of the hour. If you are not able to act before your competitors that means you are dead. The data mining techniques can be of immense help to the banks and financial institutions in this arena for acquiring new customers, fraud detection in real time, providing segment based products for customized services, analysis of the customers' purchase patterns over time for better retention and relationship, detection of emerging trends to take proactive approach in a highly competitive market adding a lot more value to existing products and services and launching of new product and service bundles.

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