



Applications of Big data in Vietnamese Banks

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Abstract

Banking as a data intensive subject has been progressing continuously under the promoting influences of the era of big data. In order to provide sound direction for future research and development, a comprehensive and most up-to-date review of the current research status of big data in banking will be extremely beneficial.

Vietnamese banking industry has grown greatly in the last decade from providing services. As banks increasingly expand services, utilities, or apply technology in order to attract more customers, they must build an infrastructure system which collects data to find solutions for improving business efficiency. Some experts predict that the number of data will increase seven times by 2020 (compared to 2016). Big data is a big step for the development of the banking industry.

Depending on each organization's purpose, structure, resources, and capabilities, there will be many different Big Data applications. This paper aims to present the application of big data implementations in Vietnamese banks.

Keywords: *Big data, banking*

1. Introduction

The era of big data came along with both big opportunities and challenges, as almost all science subjects are experiencing overflowing information at unpredictable volume and speeds (Mayer-Schonberger & Cukier, 2013). As a data intensive subject, banking has been a popular implementation field for researchers over the past decades of the information science revolution. Banks have acknowledged that knowledge instead of financial resources is the new biggest asset (Kharote & Kshirsagar, 2014). Moreover, the development and popularization of e-banking and mobile banking adds to the exponential growth of real time banking information. These continuous developments and the rapidly increasing availability of big data make mastering relevant big data analytics tools one of the most crucial tasks for the banking sector.

Today, most Banking, financial services and insurance organizations (BFSI) are making efforts to adopt a new approach towards data mining to develop and innovate their services. Like most other industries, big data analytics will be an important big change in the battle between the same industries.

Although many BFSI organizations are changing the way of exploiting data through collecting a huge amount of data and analysing them, these are just general steps, individual steps at each stage in big data exploitation process. To successfully deploy big data in the banking sector, there must be a comprehensive strategy using professional teams who have deep understanding of both finance and technology, said Kim Anh Nguyen, Deputy Governor of State Bank of Vietnam (Viet Nam News, 2017).

The current data analysis simplifies the process of monitoring and evaluating customers of banks and financial institutions, based on a large volume of data such as personal information and other confidential information. The deputy governor also said that the specificity of banking is creating a huge amount of data from structured data such as transaction histories and customer records to unstructured data such as customer activities on Internet and mobile banking application. "Applying big data to exploit the data will bring significant competitive advantages and efficiency for the banking and finance sectors," he added (Viet Nam News, 2017).

In addition, Tuan Anh Pham, director of Vietcombank's tech modernisation department, said that data in the banking system and those collected from the outside include many types. These include structured data, semi-structured data, and unstructured data." The current banking data is unstructured, which meets all big data standards in volume, movement and diversity," Pham emphasized (Viet Nam News, 2017).



Figure 1 clearly explains that the presence on so many channels will generate so much more data of so many types such as transaction details, preferences, tweets, uploaded images, comments, emails, page views, recommendations apart from the usual sales and purchase data. Now this huge amount of data from a number of sources has storage and analysis requirements of an altogether different nature. For large organizations this data may go into zillions of bytes (Pulakkazhy & Balan, 2013). It is estimated that Walmart collects more than 2.5 petabytes of data every hour from its customer transactions. A petabyte is one quadrillion bytes, or the equivalent of about 20 million filing cabinets" worth of text (McAfee, Brynjolfsson, Davenport, Patil & Barton, 2012).

The concept of "big" in financial industry context is different from what it is in scientific or detail contexts. In retail businesses, for example, the analysis of profiling of customers mainly involves analysis of unstructured data from social media sources. However, financial markets primarily deal with structured data collected from a limited set of sources, such as exchanges and data vendors. Although unstructured data sets have been used with firms for sentiment analysis and trading, these have not traditionally been the data sets of primary importance to the business. In financial markets, big data problems are not considered as being represented by any of the three V's alone. Regarding the volume, technologies that are good at handling the high volume of tick data, which has always been the biggest data set, have already been deployed in a structured manner for years. Although not perfect, these technologies have been able to scale up to meet increased electronic flows of data resulting from increased market activities.

Big data challenges in financial context are usually referred to projects that involve multiple factors, such as high volumes of complex data that must be cross-referenced in a specific timeframe. Although not necessarily required to be performed in real time, current tasks are tend to be consolidating different data sets from various sources, structured and unstructured, from heterogeneous asset class and risk information, deploying complex data aggregations for ad hoc regulatory reports, credit analysis, trading signal generation or risk management for instances, while reducing the latencies of data aggregation and increasing the effectiveness of data management.

Today, real-time streaming data is widely available. The proliferation of data is significantly changing business models in financial firms, whether in market making or long-term portfolio management. Even long-only portfolio managers nowadays add screens of data-driven signals to their portfolio selection models in order to abstract volatility and noise, and realize pure returns for their investors. On the other hand, portfolio managers ignoring or under-studying the multitude of available data are adding a considerable risk to their investment portfolios.

4.3 Applications of Big Data in Vietnamese Banks

Banking operations create a huge amount of data: structured data such as transaction history, customer records and unstructured data such as customer operations on websites, mobile banking applications or on social networks. Big Data application if exploited effectively will bring great advantages and efficiency in the banking sector.

4.3.1 Customer spending habits analyzing

Banks have the ability to directly access rich information and historical data related to their customers' habits and behaviors. Banks also have information about how much a customer is paid, for example, a specific salary in a month, how much money is deposited into a savings account, how much money has been paid to utilities provider (power companies, internet service providers, etc.), time of customers using banking services, etc. This provides the basis and opportunities for banks to access and deeply analyse data. Applying filter functions such as when filtering out the time of holidays or macroeconomic conditions (e.g. inflation, unemployment rate, etc.), Bank staff can understand the cause of the increase or decrease in customer salaries and how customers' spending changes. This is one of the fundamental factors for the process of risk evaluation, screening, appraising loans, assessing mortgage and providing other cross-selling financial products to customers.

Banks benefit greatly from knowing that customers want to withdraw cash - all the money earned on the payday - or they want to keep the money on their credit card / debit card. Taking advantage of that,



banks can approach their customers, expand services with proposals, attract customers to invest in short-term loans with high payment rates and appropriate interest rates, etc.

Many banks have also adopted technology to assess customer behaviors, forecast revenue and market demand, and alert risk. Several banks have initially shifted their operations, sales and services towards digitalization, such as TPBank with Livebank, VPBank with Timo, VietcomBank with DigitalBank, VietinBank with new generation CoreBank and Enterprise Data Warehouse (EDW), MB with ChatBot, a virtual assistant application on social networks (Pham, 2018).

4.3.2 Customer segmentation and review loan portfolios

Once finishing the initial analysis of the client's spending habits and identifying the types of services and preferred channels of the customer (for example, whether customers want to save or invest in loans), the bank will have the database to segment, classify customers appropriately. Banks will know which customers spend easily and comfortably, which investors are cautious, which customers pay the debts quickly, which customers are starting to pay back when the debts are about to mature, customer's using bank services time to measure their loyalty ... Knowing the personal profile of all customers helps the bank evaluate their customers' expected spending and income, and make detailed plans to ensure profit for the organization itself and benefits for their customers (The State Bank of Viet Nam, 2017).

Big Data will provide banks with in-depth knowledge of customer spending patterns and habits, simplifying defining customers' needs and desires task. By tracking each customer transaction, banks will be able to classify customers based on different parameters, including services normally used by customers, time of service usage, and their spending habits when using a credit card or even the net worth (net worth - income plus the value of customer assets minus their debts).

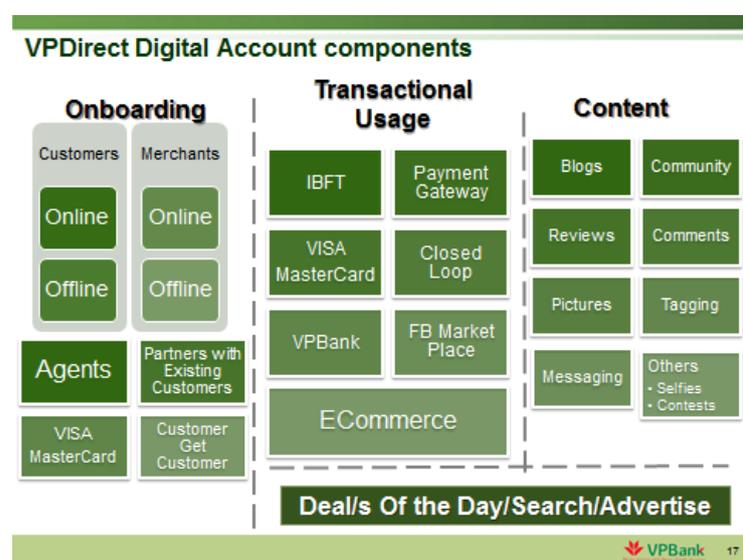


Figure 2 VPDirect digital account components (Source: VPbank)

Figure 2 shows the VPDirect Digital Account components according to the criteria. The benefit that the customer segment offers is that it allows VPbank to target customers better with relevant marketing campaigns designed to accurately meet customers' needs.

Analyzing Big Data increases the ability for BFSI organizations to understand customer insights, therefore creating a customer segment. However, the collection and evaluation of customer information requires investment in the infrastructure of the organization as well as investment in the interconnection network between all departments of the organization with advanced technology and software.



4.3.3 Product cross-selling

In recent years, retail has become the core strategy of most joint-stock commercial banks in Vietnam. However, most individual customers use only from 1 to 2 products and services of the bank.

According to an analysts of Wells Fargo's experts, the cost of selling to existing customers is five times less than selling to new customers and a 5% increase in sales can bring 25-100% increase in profit. More importantly, it helps increase the satisfaction and promotes customer engagement. A survey of Bancography (a consulting company in US) is also worth considered: if a customer uses only 1 product - he/she stays in the bank in 18 months; uses 2 products - the average sticking time will increase to 4 years; and uses 3 products – the customer will stay for nearly 7 years.

Commonly, customers have only one loan at a bank and have payment deposits and other transactions remaining at the others. In that case, the bank loses its revenue and suffers higher risk at the same time. Therefore, for borrowers, it is necessary to sell more accounts, payment services, Internet and sms banking, POS, card, insurance, savings ... In fact, when being introduced to new services, customers are willing to use. Consequently, instead of selling a single product, bank staff should try to offer a package (4-5 products or more).

Accurately analyzing customers, banks can sell more efficient services and attract more customers. For example, the bank may introduces attractive investments to customers with idle money or investors who always cautiously considering investments. Or banks propose short-term loans to customers who have a "comfortable" spending habit for their daily consumption needs or those who are having difficulty paying old debts.

One of the very successful cross-selling products in Vietnamese banks recently is insurance. Customers, insurance enterprises and banks are all beneficiaries of this bank and insurance cooperation (also called bancassurance). Banks either work with experienced insurance companies or set up their own insurance companies. For example, HDBank cooperates with Dai-ichi Life, Saigon Commercial Bank (SCB) and Techcombank with Manulife, National Bank (NCB) with Bao Viet Insurance Corporation, Dong A Commercial Joint Stock Bank (DongABank) with the AIA Insurance. The banks that set up subsidiaries or joint-venture insurance companies are: MBB currently has 2 subsidiaries: MB Ageas Life Insurance Company, Military Insurance Corporation (MIC); Bank for Investment and Development of Vietnam (BIDV) has BIDV Insurance Corporation, Lao Viet Insurance Joint Venture Company or BIDV Metlife Life Insurance Company Limited.

4.3.4 Personalized marketing

The benefits of personalized marketing are increasing investment efficiency; enhancing the ability to attract potential customers; and increasing customer satisfaction.

After acquiring the customer segments, banks need to leverage personal marketing to target customers based on their personal spending habits. In addition to collect the transaction history of customers, financial services companies or banks can also combine unstructured data - a form of Big Data - obtained from social network or social media to get a more complete picture of customer needs based on psychological analysis, customers' expectation analysis. On the other hand, besides usual appraisal, customer data in social media or other smart social applications will help the bank analyze potential risks and consider whether to provide loans or not.

After analyzing and understanding the specific needs of each customer, banks should continue to further segment and provide appropriate marketing solutions from which to gain more feedback from customer. For example, VPbank use e-mail marketing tools to send customers the latest information on short-term lending services with moderate interest rates, or savings with attractive interest rates,... Creating products and services for each customer segment, or even specific customers will help banks build brand image and a good relationship with customers.

4.3.5 Detecting and preventing frauds

Risk management faces new demands and challenges. In response to the crisis, regulators are requiring more detailed data and increasingly sophisticated reports (Veldhoen & De Prins, 2014). One of the biggest problems of banking industry is is fraud and credit crimes. Nowadays, e-payment and mobile



banking services are developed strongly, opportunities for fraud are endless. Therefore, the need for instant detection of fraudulent transactions (very small compared to millions of legitimate transactions) as well as prevention of fake bank warnings is huge. For example, a customer living in Hanoi, traveling to Da Nang by plane, checks-in on Facebook at visiting places in Da Nang, but the credit card of this customer is swiped to buy goods in Ho Chi Minh City. If the bank has full customer information as well as collecting data from Facebook social network, from the airline, the bank can immediately discover that the credit card of that customer is stolen and be bought in Ho Chi Minh City. Therefore, the bank immediately notifies the customer and prevents subsequent fraudulent transactions. At the same time, based on the collected data, the bank identifies the customer who is actually in Da Nang so as not to give fake warnings, refusing customers to make valid legal transactions in Da Nang.

Banks are experts in manipulating the rows and columns of numbers captured from past transactions and stored in vast data warehouses. On a daily or even intra-day basis, banks package these facts in the form of reports for credit or finance officers to review for trends and outliers (The Economist Intelligence Unit, 2014). Therefore, the bank will be able to alert if something unusual happens during the operation. For example, if an investor or customer often pays for their daily living expenses or leaves the money in the savings account to get interest, but in a day try to withdraw all the money from his account ATMs. This means the card may have been stolen and used by the thieves themselves. Bank staff will call the account holder or notify the customer in any way to verify that transaction more clearly: legal transactions of customers or illegal transactions by criminals? Thus, the analysis of historical transaction data is a basis for checking the legality and security of current transactions, minimize possible violations of law.

Banks and financial institutions exploit big data to distinguish the transactions are offenses with the legitimate transactions by applying data analytics algorithms and machines learning. Analysis systems will automatically detect, extract illegal transactions in real time and suggest immediate actions, such as blocking unusual transactions, preventing fraudulent behavior.

4.3.6 Participate in controlling and improving employee performance

Too focused on increasing profits, many banks often forget a potential application of big data that can have a huge impact on the business development process. That is to improve employee productivity. Big data systems support collecting, analyzing, evaluating, and transmitting data about employee performance. The analytical results will help leaders get a glimpse into the current working situation of their employees, such as those who are performing best, who do not meet their targets, and especially considering the level of employee satisfaction with the working environment, welfare, ... Big Data's tools exploit all data in real time, so when the solution is launched, it will be highly feasible, and make rapid changes.

In addition, banks can measure many things not only for individual performance, but also for teamwork, interactions between departments and the overall culture of the company. Employees will reduce the time spent on manual work including complex processes by relying on the Big Data system with pre-programmed software to handle those tasks quickly and exactly. Since then employees spend a lot of time for jobs, more difficult and urgent tasks from higher levels.

4.3.7 Implication

Research showed that banks that apply analytics to customer data have a four-percentage point lead in market share over banks that do not. The future growth of big data as a strategy in the industry relies on the continued education of internal staffs about its uses and advantages. Most of the banks using big data tend to hire experts in order to grow their internal knowledge base. However, this will open up to key person risk if the big data knowledge and skills are not disseminated wider among internal staffs.

Plus same as other technologies, after initiative, big data needs constant refinement and evolvement to adapt the dynamic market conditions. Banks also need to invest continually in training their analytics staff on new techniques and their business personnel to enhance decision-making. The continued in-house education will be a key to future successful deployments and maintenance of big data strategies and technologies over time.



5. Conclusion

Doing the things in the old way is too risky nowadays. Companies must evolve and grasp new technologies if they want to succeed. Adopting the Big Data analytics and imbuing it into the existing banking sector workflows is one of key to surviving and prevailing in the rapidly evolving business environment of the digital millennium. Big data will expand the banking industry's work in a way that will allow them to both increase profits and reduce costs.

By updating, applying not only big data but also emerging global trends such as AI (artificial intelligence) or Machine Learning, BFSI organizations will understand customer needs and the internal operational objectives of the organization better to provide improved services in a timely manner with optimal operating costs to customers, or offer solutions to improve employee productivity.

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