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Big Data in Financial Industry: Benefits and Challenges

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Summary

Big Data is a promising field especially for financial institutions. With no physical products to manufacture, data –the source of information- is one of arguably their most important assets. Financial industry is characterized by a huge number of transactions, conducting hundreds of millions daily, each adding another row to the industry's immense and growing ocean of data. So the most urgent question for many financial firms is how collect and use this precious tool –data- to gain a competitive advantage.

Key words: Big Data, finance, capital market, financial institutions

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I. Introduction

The vast spread of data and increasing technological complexities continue to transform the way industries operate and compete. The rapid growth and storage of Big Data –that is the 2.5 quintillion bytes of data created on a daily basis over the past few years- creates opportunities for collection, processing, and analysis of structured and unstructured data. Organizations use data and analytics to gain valuable insights to inform better business decisions. Industries that have adopted the use of big data include financial services, technology marketing, and health care…etc. The adoption of Big Data continues to redefine the competitive landscape of industries. An estimated of 84 percent of enterprises believe those without an analytics strategy run the risk of losing a competitive edge in the market.

Financial services, in particular, have widely adopted Big Data analytics to inform better investment decisions with consistent returns. Related with Big Data, algorithmic trading use vast historical data with complex mathematical models to maximize portfolio returns. The continued adoption of Big Data will inevitably transform the shape of financial industry. However, along with its apparent benefits, significant challenges remain in regards to big data's ability to capture the mounting volume of data.

II.Big Data in finance: what is it?

Big Data in finance refers to 'the petabytes of structured and unstructured data that can be used to anticipate customer behaviors and create strategies for banks and financial institutions' (Pearlman 2019). Big Data is no longer confined to the realm of technology. Today it is a business imperative and is providing solutions to long-standing business challenges for banking and financial markets companies around the world. Financial services firms are leveraging Big Data to transform their processes, their organizations and soon, the entire industry (Turner et al). Subrahmanyam (2019) categorises Big Data in three parts : first, there is human generated data via social media, and on various online forums, which can be analysed using starndard tools for text analysis. Second, there is process generated data, via the act of purchases and sales, such as credit card receipts, supermarket scanners and so on. Finally, there is machine generated data, such as tracking GPS movements of delivery trucks, and satellite-based images of parking lots (Subrahmanyam, 2019). Big Data can also be categorized into three major categories : unstructured, structured and semi structured data. Unstructured data is information that is unorganized and does not fall into a

predetermined model. This includes data ghathered from social media sources, which help institutions ghather information on customer needs. Structured data consists of information already managed by the organization in relational databases and spreadsheets (investopedia, 2019). Semi structured data is a form of data that does not conform to the formal structure of data models associated with relational database or other forms of data tables in the financial service system, we find different examples of structured data sources such as :

-Trading systems (transaction data) ;
- Account systems (data on account holdings and movements) ;
- Market data from external providers ;
- Securities reference data ;
- Price information ;
- Technical indicators ;

Financial industry is moving towards unstructured data rather than focusing only on high velocity market data. Diffrent examples can be cited :

- Daily stock feeds ;
- Company announcements and news ;
- Online news media ;
- Articles/ blogs ;
- Customer's feedback / experience ;

The amount of unstructured information in enterprises is around 80-85% . the financial industry has vast repositories of structured data in comparaison to other industries , with a large amount of this information having its origin inside the organization (Hussain and Prieto, 2016).

III. How Big Data has helped financial industry?

Financial institutions are not native to the digital ladscape and have had to undergo a long process of conversion that has required behavioral and technological change. In the past few years, Big Data in finance has led to significant technological innovations that have enabled convenient, personalized, and secured solutions for the industry. As a result, Big Data analytics has managed to transform not only individual business processes but also the entire financial services sector. This digital revolution has been achieved through different aspects, among them we cite:

▪ **Real time stock market insights:** machine learning is changing trade and investments. Instead of simply analyzing stock prices, Big Data caan now take into account political and social trends that

may affect the stock market. Machine learning monitors trends in real-time, allowing analysts to compile and evaluate the appropriate data and make smart decisions.

- **Fraud detection and prevention:** machine learning, fueled by Big Data, is greatly responsible for fraud detection and prevention. The security risks once posed by credit cards have been mitigated with analytics that interpret byuing patterns. Now, when secure and valuable creditcard information is stolen, banks can instantly freeze the card and transaction, and notify the customer of security threats.
- **Accurate risk analysis:** big financial decision like investment and loans now rely on unbiased machine learning. Calculated decsions based on predictive analytics take into account everything from the economy, customer segmentation, and business capital to identify potential risks like bad investment or payers. (Pearlman, 2019)

IV. Application of Big Data analytics in financial services

Financial industry in particular, generates large volumes of data- be it through trading, transactions or operations. However, computing efficiencies and cost constraints limited the management of such data in the past. Today, advanced computing powers coupled with new technologies have made it possible to have integrated views of data. Regulatory changes, advanced trading strategies, tighter risk management and compliance, complex processing and stricter timeline for reporting are fast paving the way for the adoption of Big Data.

Most early Big Data efforts of financial services organizations are targeted at sourcing and analyzing internal data, which suggests a pragmatic approach (David Turner). Data strategies can be applied to a whole of functions, ranging from front-office trading to back-office processing, surveillance, reference data and support. Many firms today are focused on data-driven initiatives, and are looking to discover unique ways in which data can address prevailing problems or give them a competitive advantage.

Big Data in financial services tend to be implemented in different areas with an important focus on revenue optimization and cost reduction. The key areas are :

- Client relationship management;
- Market data;
- Risk management;
- Post-trade processing;

- Trading;
- Surveillance;
- Research; (TCS Bancs resarch Journal)

These application find use in three critical areas : those focused on revenue generation, those aimed at meeting compliance or risk requirements, and those concentrated on cost reduction and operational efficiency.

Among the potential benefits of the use of Big Data and related technologies on financial services we find :

- **Major cost savings across the entire value chain:** advances in technology, including Big Data, allow for tremendous cost savings. New, innovative services such as online payment services or money transfer services enable consumers to carry out certain transactions or access certain services at a fraction of the cost compared to traditional banks.
- **Enhanced security and transparency:** technologies such as Block chain may revolutionize completely the way the entire financial industry operates. Instead of secrecy and sophisticated, opaque systems, financial transactions could become 'public' and open using Block chain technology.
- **Speed:** many traditional financial processes take time, be it money transfer, lending decisions or insurance policy approvals. With the use of Big Data and algorithms, all of these processes can be sped up tremendously, allowing instant access to products consumers may urgently need.
- **Faster innovation cycles:** using Big Data analytics, financial service providers will be able to respond to changes in the market, bringing new products that consumers may 'need' much faster
- **Financial advice, guidance and budgetary management:** real time analysis of consumer data carries much potential for financial advice in terms of financial investment and money management, guidance in terms of product comparison or finding / recommending products which best suit consumer needs, and also in terms of empowering consumers to manage their budgets more responsibly, notifying them of budget imbalances and potential financial problems down the road.
- **Preventing over-indebtedness:** the other side of the 'budgetary management' coin, is that financial service providers may be able to identify problematic spending patterns or other problems in a consumer's budget, helping them to catch such issues early and prevent them from spiraling into over- indebtedness.
- **Tailored services:** financial products may move away from 'bulk' offers, available to all consumers with the same conditions and features to personalized products tailored to consumers' needs based on their data.

▪ **Fraud prevention:** by gaining a deeper insight into consumer's behavior, fraud can be prevented by early or even instant identification of suspicious behavior.

▪ **Increased competition:** national markets with a low level of competition might benefit from innovation via digitalization of financial services and be forced to propose better products to match the competition from newer financial products.

Unfortunately, most of these potential benefits can also work against the interest of the consumer. For instance, cost reduction for banks can benefit shareholders and not be reflected in lower consumer prices, detailed insight into consumer's financial situation may be used to maximize profit as opposed to serving a consumer's best interest. Hence, policymakers should assess whether the effective realization of the benefits for consumers requires an adjustment of the existing regulatory framework or whether the current framework is adequate(Finacncial services user group, 2016).

V.Big Data main challenges in financial industry

As Big Data is rapidly generated by an increasing number of unstructured and structured sources, legacy data systems become less and less capable of tackling the volume, velocity, and variety that the data depends on. Management becomes reliant on establishing appropriate processes, enabling powerful technologies, and being able to extract insights from the information. The technology is already available to solve these challenges; however, companies need to understand how to manage Big Data, align their organization with new technology initiatives, and overcome general organizational resistance. The specific challenges of Big Data in finance are more complex than other industries for many reasons:

▪ **Regulatory requirements:** the finance industry is faced with stringent regulatory requirements. Innovative Big Data technology makes it possible for financial institutions to scale up risk management cost-effectively, while improved metrics and reporting help to transform data for analytic processing to deliver required insights.

▪ **Data security:** with the rise of hackers and advance persistent threats, data governance measures are crucial to mitigate risks associated with the financial services industry. Big Data management tools ensure that data is secure and protected, and that suspicious activity is detected immediately.

▪ **Data quality:**finance companies want to do more than just store their data, they want to use it. Because data is sourced from so many different systems, it does not always agree and poses an

obstacle to data governance. Data management solutions ensure information isaccurate, usable, and secure.

- **Data silos:** financial data comes from many sources like employee documents, emails, enterprise applications, and more. Combining and reconciling Big Data requires data integration tools that simplify the process in terms of storage and access. Big Data solutions and clouds work together to tackle and resolve these pressing challenges in the industry. As more financial institutions adopt cloud solutions, they will become a stronger indication to the financial market that big data solution are not just beneficial in IT use cases, but also business applications (Pearlman, 2019).

VI. Conclusion

Data is becoming a second currency for finance organizations, and they need the right tools to monetize it. As large firms continue to move towards full adoption of Big Data solutions, new technology offerings will provide cost-effective solutions that give both small and large companies access to innovation as well as a sharp competitive edge.

Big Data is a promising field especially for financial institutions. With no physical products to manufacture, data –the source of information- is one of arguably their most important assets. Financial industry is characterized by a huge number of transactions, conducting hundreds of millions daily, each adding another row to the industry's immense and growing ocean of data. So the most urgent question for many financial firms is how collect and use this precious tool –data- to gain a competitive advantage.

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