

BIG DATA'S IMPLIMENTATION SAMPLE IN BANKING SECTORFatih ŞAHİN¹¹Institute of Physical Sciences, Computer Engineering Department, Istanbul Aydın University
fsahin1976@yahoo.com**Abstract**

In this study as information given over Big Data, banking sector's relation with big data is mentioned, big data implementation areas in the sector is referred. Banking sector is a high volumed and involving diversified data, open to big data implementation sector. Making use of high speed social media datas for marketing, analyzing of call center conversation records for customer content and call center efficiency, detection of fraud, efficient data warehouse structure for marketing predictions and operational efficiency, data storage solutions and audition, security by video analytic and customer recognition are the fields and subjects that can make use of big data technologies. In this study these subjects are exemplified by explaining and achievements that can be gained are mentioned.

Keywords: Banking, Big Data, Social Media, Unstructural Data, Data Warehouse, Fraud, Audition.

BANKACILIK SEKTÖRÜNDE BÜYÜK VERİNİN UYGULAMA ÖRNEĞİ**Özet**

Bu çalışmada büyük veri üzerine bilgi verilerek, bankacılık sektörünün büyük veri ile ilişkisine değinilip, sektördeki büyük veri uygulama alanlarından bahsedilmektedir. Bankacılık sektörü yüksek hacimli ve çeşitli veri içeren, büyük veri uygulamasına açık bir sektördür. Pazarlama için yüksek hızdaki sosyal medya verilerinden faydalanılması, müşteri memnuniyeti ve çağrı merkezi verimliliği için çağrı merkezi görüşme kayıtlarının analizi, dolandırıcılık tespiti, pazarlama öngörülleri ve operasyonel verimlilik için etkin veri ambarı yapısı, veri saklama çözümleri ve denetim, video analitiği ile güvenlik ve müşteri tanıma bankacılıkta büyük veri teknolojilerinden yararlanabilecek alanlar ve konulardır, bu çalışmada bu konular açıklanarak örneklendirilmekte ve elde edilebilecek kazanımlara değinilmektedir.

Anahtar Kelimeler: Bankacılık, Büyük Veri, Sosyal Medya, Yapısal Olmayan Veri, Veri Ambarı, Dolandırıcılık, Denetim

1. INTRODUCTION

As a necessity of nowadays thriving technology smart phones, tablets and laptop computers stepped into our life as indispensable. Particularly these devices are portable and accessible, the dispersing and sorting out the information and even whenever wanted and whichever platform is within reach generates a complication of data. Besides all when the developments in sensor technology is considered the size of the information has a significance. As in year 2000 all over the world 800,000 petabyte data is

stored in year 2020 35 zetabyte data is estimated to be stored¹. Here at this point Big Data (Big Data, Giant Data) helps to save us. What this Big Data is? It is the concept that provides the opportunity to make use of log records of datas, photographs, videos, web pages that exist in all social media accounts, the blogs and microblogs etc. that the datas which are in all platforms in the way that are significant, accessible and sorted out. The Big Data is the concept that has put the digital platform in an order and so to say turned into a treasury when at first these information were in cycle randomly. Besides has become the biggest savior not only in social area but also in science and in economy areas too.



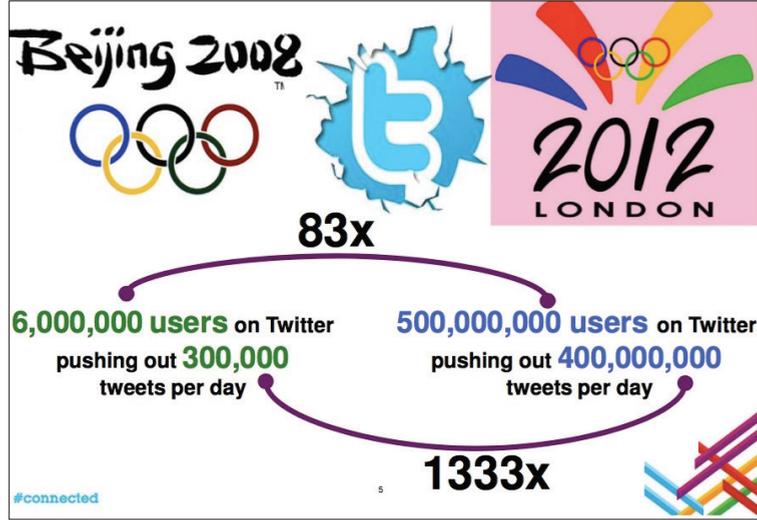
Şekil 1. Data Size Terms

There are high volumed, structural/non-structural diversified and high speed coming datas exist in banking sector; by legal obligation all the operations that are made in banking channels have to be recorded on the purpose of analysis or such like. In a system of banking the operation's hardware detail informations such as by which user, for which client, from which channel, the time when it is done, the server that is used and all the software layers and objects that passed through, state of success, failures taken if there are should be recorded. These datas are later be subjected to various analysis and used for such as enhancing the banking software system and auditing matters. Besides banking clients and their operations' datas conversations that are made with customers by banks' call centers are recorded for such as security, analysis, legal obligations reasons. Likewise branches, ATMs, organisation's domestic working areas also are tracked by the surveillance cameras, recorded for security pupose and branch interior camera images such as facial recognition can be used for the sake of raising the quality of service provided to customer as well. Like XTM [4] the footages that are recorded in providing video operating alternative distribution channels can also be talked about in factors which are increasing the non-structural data quantities. The logs that keeps the enterance and exit hours of employees to the organisation, file

1 http://www.academia.edu/23738755/B%C3%9C%C3%9CCK_VER%C4%B0_VE_AKILLI_%C5%9EEH%C4%B0RLER_B%C4%B0G_DATA_AND_SMART_C%C4%B0T%C4%B0ES (04.04.2017 22:00)

system access informations, internet access informations, sent e-mail informations and also logs of hardware and system are can be given as the other examples for datas that are exist to be there for banks.² This study tries to depict the implementations of Big Data in banking sector and Big Data Technology in these implementations.

2. BIG DATA



The concept of Big Data is not a new concept but it is a target that changes depending on technological developments. Since there is no universally accepted definition or implementation in the literature intended to Big Data fact, varied approaches are observed to be used in Big Data analysis. LCIA (2011) define Big Data as “the majority of which is unstructured and unendingly continuing to pile up, far from structurality to be solved with the help of conventional correlation based database technics and extremely very large, very raw and exponentially growing data sets”. The Big Data according to another approach as for “is a term that difficult or impossible to solve with the help of standart database management or analytic instruments and very large, defining the data sets that are very complicated or required to be analyzed high speedly” (Partners 2012). Sometimes this state is tried to be define as size, variability and velocity. While some emphasizing the volumetric size of Big Data, some choosed to emphasise the velocity. Yet another researcher and practitioner group choosed to define Big Data’s irregular and complicated structure as focal spot.³

3. BIG DATA IMPLEMENTATION AREAS IN BANKING AND SAMPLES

When it is said Big Data informatics firms come to mind at first. Google, IBM, Oracle, Microsoft, SAS Institute etc. can be cited as primary informatics firms that can transform Big Data into benefit. One of the

2 Şekil Bankacılıkta Büyük Veri Uygulamaları: Bir İnceleme, Merve Can Kuş-Khalilov, Mücahit Gündebahar, Akademik Bilişim 2014- 16. Akademik Bilişim Konferansı Bildirileri, 05-07 Şubat 2014, Mersin Üniversitesi

3 Altunışık, Remzi, “Büyük Veri: Fırsatlar Kaynağı mı yoksa Yeni Sorunlar Yumağı mı?” Yıldız Social Science Review Cilt-1, Sayı-1, 2015, sf:45-76

areas that Big Data is used most efficiently is finance sector. Chase Bank is regarded as of the vanguards in this field. Nowadays along with the market datas all the banking services that people perform from credit card expenses to bank credit usage are analyzed as recorded data.⁴ At this stage estimating the risk in the market has importance for the banks and finance corporations. Here at this point they benefit from Big Data offerings. Furthermore in academical writing there are studies that making estimation with the datas obtained from sources such as Twitter, Facebook sharings, Google searches etc. and trying to associate this with the other variables in market. In this section samples of Big Data implementation areas in banking discussed without priority order.

3.1 The Customer Content Over Social Media/Network and Marketing

Social media has become a power that; unavoidably progressing, has indefinite boundaries, determining the agenda, influencing a country's administration and decisions. As it is seen new technologies change the communication models. Technical infrastructure and interaction feature that internet offers made simultaneous and mutual communication possible. Therefore a communication model that is from a single centre to the masses yielding to a actualising in the way from masses to the masses communication model.⁵ 6 Millions users tweeted related with 2008 Beijing Olympic Games over Twitter, this number in 2012 London Olympic Games escalating 83 folds reached 500 millions, and the tweet number in a day went up from 300 thousands to 400 millions increasing 1333 folds.⁶

By year 2016 in Twitter approximate tweet number in a year exceeded 200 Billions, total user number in Facebook 1,6 Billions, Youtube's user number 1,5 Billions, and Whatsup's user number 1 Billion.⁷ These numbers, give an idea on non-structural data size that can be produced from these sources. To filter and separate the parts from datas produced this much pertaining to themselves swiftly and for processing and storing the banks utilize the Big Data technologies.

Nowadays the banks are marketing of products and services over social media like other organizations. New products that are advertized, credit and deposit interest rates, investment tools, stock prices, credit cards, customer specific services etc. taking part in social media. In this way, while the users are kept informed about advertising campaigns; and also are sharing their opinions with the other users at the same time. While %90 of the users act upon other users' recommendations, only %14 of the users recognize the products and services by the means of advertisements they watched and tend to purchase. %53 Of the Twitter users recommends the product and services they purchased to their followers.⁸

Social media platforms; emerge as most efficiently used and one of the preferred methods to make contact with the customers and for protecting communication that is exist. At the same time these platforms are also regarded as a transparent, reliable criticism stage by the customers.⁹

4 Doç. Dr. İbrahim Halil SEYREK, Şemsettin ÇİĞDEM, Gaziantep Üniversitesi İktisadi ve İdari Bilimler Fakültesi İşletme Bölümü, "İşletmelerde Büyük Veri Uygulamaları: Bir Literatür Taraması"

5 http://journals.manas.edu.kg/mjsr/archives/Y2016_V05_I03b427042acfe16257b192209efeddc2c2.pdf

6 ftp://ftp.software.ibm.com/software/pdf/tr/connected2013/01_Buyuk_Veri_ile_Analitik_Uygulamalar.pdf

7 <http://blog.euromsg.com/sosyal-medya-hakkinda-63-istatistik/> (05.04.2017 12:35)

8 https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/financial-services/Sosyal_Medya_Kitle_Bankaciligi.pdf

9 https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/financial-services/Sosyal_Medya_Kitle_Bankaciligi.pdf

Some of the banks are rather than selling product to customers, they are providing their trust to make contact, utilizing the masses' common grounds, offering suggestions and services intended to these common grounds. For example; Amerikan Bank of Wells Fargo, creating its own blog and giving opportunity to the students, friends, art buffs and groups that have plenty of common grounds to take part with their opinions, questions and suggestions in the blog and determine new idea and strategies by seriously evaluating these suggestions.¹⁰

3.2 The Customer Content by Call Centre Talk Analysis

Banks are one of the sectors where customer complaints are most intensive. Call centers are one of the banks' indispensable channels and are used for giving information, banking services to customers that they want and for receiving positive/negative feedbacks of customers. Despite many of the average response period, average call period, average active/awaiting calling numbers are metrics that are used for call center productivity and obtained from structural datas in fact nonstructural call center conversation records analysis forms the call center's largest data.¹¹

Call centers, for a long time, are along with being the unit that is conducting customer relations, marketing, problem solving activities and to whom the customer complaints are passed on, from now on by using social media as well, customer complaints and suggestions are taken into consideration also in Facebook and Twitter webpages.

In this context, German Bank of Deutsche Bank; solve out the customer complaints over Twitter and Facebook. Because the social platforms regarded as unsafe in respect of sharing customer name, number and other informations, customers are got contact with secured PIN code sent by the bank and the e-mails are erased right after problems are solved.¹²

3.3 The Detection of Fraud

In a critical financial sector like banking one of the utmost important issues is security. There is a fraud threat for every bank at any time. According to figures that USA Ministry of Justice Consumer Protection Network has given that total credit card fraud in the world is 5.5 billion \$ and soaring every passing day. For this reason banks are making large expenses for developing systems and enhancing these constantly in order to identify the fraud and prevent it.¹³

European Fraud Conference that was organized 11th in the year 2016 took place on 9th of June 2016 in the capital of Serbia in Belgrad. In the event in which many stakeholders that are experts on their subject participated, fraud avoiding in payment sector and progresses in new technologies transferred to participants. In the Conference; a multiple approach requirement for fighting against financial frauds is underlined and since the "Fraud" cases in year 2015 have increased 80 percent. It is pointed out that it

10 https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/financial-services/Sosyal_Medya_Kitle_Bankaciligi.pdf

11 http://ab.org.tr/ab14/kitap/khalilov_gundebahar_ab14.pdf

12 https://www2.deloitte.com/content/dam/Deloitte/tr/Documents/financial-services/Sosyal_Medya_Kitle_Bankaciligi.pdf

13 http://ab.org.tr/ab14/kitap/khalilov_gundebahar_ab14.pdf

can be provided an effective protection by raising the proportion of fake operation detection with corporations, customer and member office based profiles upon functions such as operation signing in login and payment stages by risk based authentication, real time intervention before autorisation, device and user identification verification, rapid intervention with automatic triggered actions. Malware/boots and back of proxy actual IP detection. It is pointed out that approximately 5 percent of finance organisations' incomes all across the world have been lost in fraud incidents and it matters taking on corporate fighting against fraud policies which are adaptable to future projections of corporations, integrated into all their products and processes in fighting against forgery which is day by day becoming more sophisticated with developing technology.¹⁴

3.4 Efficient Data Storehouse/Marketing Predictions by Work Analytic

All datas that are produced since the years computer technologies are started to be used, are stored up in structural form in databases. But because these datas are piled up and necessity to keep in view all of the various datas that are gathered from various sources, direct ourselves to data storehouse. All data structurals and data types used up to now are in data types that are accepted in all the world database standards. In data storehouse projects it can not be accessed to instant information. Besides this also, confronts us as a major issue in keeping pace with the speed of business world.

As for the banks in conventional data storehouse models there are vast datas, daily high volume data transfers, enquiries that continue for hours. For this reason banks are seeking for ways of significant profits in enquiry performances. Furthermore banks in conventional data storehouse approaches by making some deductions for questions that they look for answer in current situation have tendencies to store datas that they require for those deductions, to delete the rest of datas on subjects that they are not looking for answer at the moment[26]. Storage cost of datas, protection and management difficulties and deterioration in enquiry performance by enlarging data size can be cited as reasons to this tendency. However in the future together with changeable work and market conditions can new questions come out for banks that are looking for answers and making deductions from these deleted datas can be required. With opportunities that Big Data technologies have provided minimum data deleting, vast amount of data storage and access to intended information from all these datas can be possible.

To keep holding of the existing customers and to attract the new customers are one of the highest priority targets of the banks. Competing advantage and new income channels can be acquired by offering of new product, service and functions with extensive predictive analysis of bank customer datas. Banks though have knowledge about their customers by account activities and segmentation with big data technologies can difference be made on subjects like optimization of offer and cross sales by deeper and predictive analyzing of behaviours and necessities of customers, can real time individualised products and services be offered[27].

Reserch and development departments' reaching to customer datas is restricted on the subject of developing a new product or services in conventional banking conception. They have to abide the legal

¹⁴ <http://www.computerworld.com.tr/haberler/dolandiricilik-olaylari-yuzde-80-artti/>

arrangement on the subject of personal information privacy made by the government and search the new product market share with restricted personal informations. On the other hand, the informations about customers' habits and experiments on multiple channels, lie on many structured and unstructured data sources. More importantly, information almost adhere to functional and implementation clusters. This makes difficult for banks to acquire an integrated comprehension for customers, getting early warning signals and give them loyalty propositions. Reaching the individuals whether they are customer of the banks or not, making appropriate propositions have become necessity and must. By analyzing and evaluating the informations out of too many informations shared over social media, to respond immediately to the criticizing and appreciating remarks concerning his/her own bank come out as a customer acquisition way.

It can be given as another example to informations which can be required in this kind of a data storehouse that during the analysis of customers' activities who have quited working with the bank is identified that the customers who have quited actualising the paying bill process usually have quited working with bank in about 6 months. Thus on prediction of a customer who is not doing bill paying process anymore can quit working with bank so the person who will convince bank customer to stay can be joined in exclusive activities.

Also accelerating of work analytic is a very big advantage that big data has put forward. A Fortune 20 company by taking advantage of big data technologies pulled down risk reporting time from 45 minutes to 45 seconds and provided making faster decision and doing business[29]. Besides operational productivity[30] can be provided by detailed analyzing of all these datas in domestic processes.

3.5 The Advantages of Storage and Supervision

There are many datas kepted pertaining to system in the bank; users' file system access informations, internet access informations, data access informations, e-mails, security records, system logs that are produced by implementations and hardwares, change and accessibility logs can be given as examples¹⁵. Nowadays one of the primary problems that big data confronts with is legislative regulations. Because of legal sanctions and concern for keeping the trading prestige at top level the informations in information repository should be analyzed by evaluating and inferences should be made. Yet in this subject again we need to Big Data. Because the conventional database remains weak with respect to meet this need. Making datas in accessible condition that are available on hand take very long time and error rate also increase. Thereby banks' internal auditors step in. By internal auditors who are required to be Data Mining expert, by making constant audits failing matters should be eliminated. Again by internal auditors taking data size also into account controls should be executed constantly. By means of big data technologies the storing of the informations which are available on hand, processing, acquiring and managing are easier and far more rapid.

15 Bankacılıkta Büyük Veri Uygulamaları: Bir İnceleme, Merve Can Kuş-Khalilov, Mücahit Gündebahar, Akademik Bilişim 2014- 16. Akademik Bilişim Konferansı Bildirileri, 05-07 Şubat 2014, Mersin Üniversitesi

3.6 Security by Video Analytic and Customer Recognition

All these informations' security along with in digital media also physical security measures in their environment should be taken. Every bank branch by a corporate set of precautions actualise this. This security is provided by whether as man power ve or with security cameras which are another dimension of technology. When all these precautions are considered and benefit cost analysis is made security cameras come to forefront. On branch internal security camera records the immediate detection of security threats such as robbery or theft can be carried out by video analytic. Moreover the camera displays of counters in branch that are followed can be kept by matching with the operations which are made in those counters. In this way when there is a matter of fraud about an account by making analysis over all videos that are connected to that account it can be revealed that whose, which faces have executed operations and whether these persons are related with other accounts or not, whether they made operation or not [32].

From the beginning of their entrance of the gate automatically sensing and evaluating every customer that gets into to the bank branch, can making displayed operation like XTM and automatically recognition of the customers also again plus advantages that can made use of by help of the video analytic. Furthermore think of all fraud sentenced and characterized as suspects whose whole datas including facial recognition are in a database and detecting these with smart cameras and with facial recognition featured cameras who enters the bank branch or be around then sending message secretly to security and branch employees. It will improve the perception of employees who received the message to be much more careful and to deliberate on and be cautious about possible fraud operation. By no means storing, compiling, entering, making sense of all these informations and datas and finally to inform the relevants is a task that Big Data will undertake.

4. CONCLUSIONS

With this study a general description of big data has been made, implementations and evaluations in finance sector most particularly in banking sector are examined. When doing this the implementations in the world are put forward as examples. Big Data's benefits on creating gigantic information heaps that by taking this much large sized information out of rubbish repositories and filtering them which are proper for themselves that can be utilized by every sector is mentioned. Because banking sector is a sector that mistake and negligence can not be accepted, in parallel with rapidly developing technology have to take one step ahead of harmful human opinion.

Therefore utilization and utilization areas of big data technologies in banking sector expected to rise.

5. REFERENCES

Setty, K., ve Bakhshi, R., "What Is Big Data and What Does It Have to Do With IT Audit?", *ISACA Journal*, 3:23-25 (2013).

Sagiroglu, S., ve Sinanc, D., "Big data: A review", **2013** International Conference on Collaboration Technologies and Systems (CTS), 42-47 (2013).

Jacobs, A., "The Pathologies of Big Data", *Data – ACM Queue*, 7(6): 1-12 (2009).

Gündebahar, M. ve Kuş Khalilov, M. C., "XTM: An Alternative Delivery Channel in Turkish Banking Sector", *Elsevier Procedia - Social and Behavioral Sciences*, 57:373-380 (2012).

Hilbert, M., ve Lopez, P., "The World's Technological Capacity to Store, Communicate, and Compute Information", *Science*, 332(6025):60-65 (2011).

(2013) What is big data?. [Online]. <http://www-01.ibm.com/software/in/data/bigdata/>

(2013). New Tweets per second record, and how!. [Online]. <https://blog.twitter.com/2013/new-tweets-per-second-record-and-how>

(2013), The Top 20 Valuable Facebook Statistics. [Online]. <http://zephoria.com/social-media/top-15-valuable-facebook-statistics/>

(2013), Website reportedly shows Internet activity; 1.67 million emails per second. [Online]. <http://articles.latimes.com/2013/aug/12/business/la-fi-tn-internet-activity-every-second-20130812>

Asadoorian, M. O., ve Kantarelis, D., "Essentials of Inferential Statistics", University Press of America, 2 (2005).

Nelles, O., "Nonlinear System Identification", Springer, 2011.

Dean, J., ve Ghemawat, S., "MapReduce: Simplified Data Processing on Large Clusters", Google, Inc., (2004).

White, T., "Hadoop: The Definitive Guide", 3rd Edition, O'Reilly Media / Yahoo Press, (2012).

Guterman, J., "Release 2.0 Issue:11 Big Data", O'Reilly Media, Inc., 27 (2009).

Yöntem, H. E., "Büyük Veri ile Analitik Uygulamalar", **IBM Connected 2013**, (2013).

(2013), Facebook Statistics. [Online]. <http://www.statisticbrain.com/facebook-statistics/>

(2013), LinkedIn. [Online]. <http://en.wikipedia.org/wiki/LinkedIn>

(2013), Predicting & Preventing Banking Customer Churn by Unlocking Big Data. [Online]. <http://www.ngdata.com/predicting-preventing-banking-customer-churn-by-unlocking-big-data/>

(2013), Consumers want banks to use big data, just don't access their social profile: Report. [Online]. http://www.cmo.com.au/article/465904/consumers_want_banks_use_big_data_just_don_t_access_their_social_profile_report/ **Demirel, Y.**, "Müşteri İlişkileri Yönetimi ve Bilgi Paylaşımı", *IQ Kültür Sanat Yayıncılık*, 157 (2006).

(2013), Should Your Call Center Collect Big Data?. [Online]. <http://www.servion.com/americas/news/should-your-call-center-collect-big-data-aug1-2013.pdf>

(2013), How Zions Bank Is Conquering Big Data for Marketing Campaigns. [Online]. http://www.americanbanker.com/issues/178_135/how-zions-bank-is-conquering-big-data-for-marketing-campaigns-1060603-1.html

(2013), Leveraging Big Data to Revolutionize Fraud Detection. [Online]. <http://www.banktech.com/risk-management/leveraging-big-data-to-revolutionize-fra/240158275>

Vacca, J. R., "Biometric Technologies and Verification Systems", Butterworth-Heinemann, 181 (2007).

Traore, I., ve Ahmed, A. A. E., "Continuous Authentication Using Biometrics: Data, Models, and Metrics", Igi Global, (2011).

(2013), Using Big Data to Prevent Fraud. [Online]. <http://www.bankinfosecurity.com/big-datas-tie-to-fraud-prevention-a-6251/op-1>

"Smarter digital banking with big data", IBM Software White Paper, (2013).

(2013), How Zions Bank Is Conquering Big Data for Marketing Campaigns. [Online]. http://www.americanbanker.com/issues/178_135/how-zions-bank-is-conquering-big-data-for-marketing-campaigns-1060603-1.html

(2013), The Newest Banking Game-Changer: Your Data. [Online]. <http://www.banktech.com/business-intelligence/the-newest-banking-game-changer-your-dat/240164638>

Wallace, T. F., "Customer-Driven Strategy: Winning Through Operational Excellence", **John Wiley & Sons**, (1992)

(2013), Putting Big Data Principles to Work in Audit & Compliance. [Online]. <http://www.complianceweek.com/putting-big-data-principles-to-work-in-audit-compliance/article/285964/>

(2013), 3 of Banking's Most Unusual Analytics Deployments. [Online]. <http://www.banktech.com/business-intelligence/3-of-bankings-most-unusual-analytics-dep/228300278>