Developing the performance of commercial banks using big data: Applied Study on (CIB) in Egypt

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Abstract: The aim of the study: is to analyze the mechanisms of the success of CIB and its impact on adding and maximizing value to all customers, shareholders and the Egyptian society through investment in managing data analysis and upgrading of human talents and trying to benefit from this model experience and simulation. **Study Problem:** Investing in Big Data is the trend within the global banking sectors. It is also a tool to understand the variables that affect the financial industry, which contribute to identifying opportunities, trends, analyzing patterns and converting them into information, products and ideas that can be widely used to improve the performance of the bank. Although the data should be managed as quickly and effectively as other bank assets, the challenge is to have the executive management and organizational structure to effectively manage their data assets and to lead the migration program in which the banking data will be stimulated and where large data analysis tools will use revolutionary progress in the economic and social fields and environmental issues. CIB is the first bank in the Middle East to have an advanced analysis and data management team that utilizes the power of large data for the benefit of its clients in its quest to transform from descriptive analysis to predictive analysis. **The importance of research:** The banks that accompanied the spread of technologies in the ranks of their customers, to raise the number of customers by nearly 14% within two years, while the same percentage was 3% in institutions that failed in the follow-up. On the other hand, the shift towards advanced digital technologies to the Bionic phase requires 5 to 10 years, which is not a long time in terms of change in financial and banking institutions. That American banks have more than XB of data stored for customers in their systems and have not been used properly after. An indicator of the importance of research as one of the studies on the future of the banking sector and economic development. Said that banks' prospects are towards broad automation. Banks that introduced digitization into their businesses have decreased by one-third compared with their competitors, who have refrained from adopting digitization and technology. This study deals with the analysis of one of the pilot experiments in the utilization of large data and it analyzes through an analysis of the CIB experiment. The Bank has succeeded in transforming from a private sector bank into an integrated financial institution based on the best standards in the fields of corporate governance and risk management, which in turn contributes to the development of modern banking culture, as well as the development of its management which has been reflected in the bank, shareholders and the community. Analyze the results of the experiment. **Study Hypothesis:** The CIB was able to activate the cycle by using it for analysis of big data.

Introduction:

The world is witnessing waves of change stemming from increased reliance on information and telecommunication technology[1] and what resulted from it in huge accumulation of big data. The financial and banking sector is the most affected sector by the widespread of big data revolution as good prospect banking performance is in the ability to keep up with modern technological advances and providing digital; services while maintaining human relations.

Big data are big in its amount and effect. This effect will never be positive merely with availability of data. Instead, challenges should be overcome and mechanisms and strategies should be provided to maintain efficient treatment of this huge sum of data, especially unstructured data, to reach positive outcomes. This what we try to explore through analyzing the experience of CIP Egypt in using Big Data Analyses to improve its performance.

Research Problem:

Investment in big data is a prevalent trend in international banking sectors. It is also a tool to recognize the variables reflecting on financial industries[2] that help identifying opportunities and attitudes and analyzing patterns and turning them into information, products and ideas that can be widely used[3] to improve and enhance the bank performance.

The challenge is present in the availability of executive administration and organizational structure for managing data assets efficiently and effectively just as other assets of the bank in addition to leading the transformational program that will enhance banking data[4] and use tools of big data analysis. CIP

Egypt is the first bank in the Middle East to have an advanced team in data analyses and management and to use the strength of big data in pursuit of shifting from deceptive analyses model to predictive analyses model. Therefore, we will analyze the challenges of this experience and mechanisms of using big data in improving its role and performance in the community and explore these positive aspects.

Research significance:

US banks own more than one Exabyte of data about its clients stored in its systems without being used correctly yet. This is an indicator of the significance of this research as a study related to the future of banking sector and economic development, in addition to prospects of banks directed towards widespread automation. Banks that introduced digitization into the core of its work managed to decrease its costs by third compared to its competitors who refrained from adopting digitization and its techniques.

Hypothesis: CIB managed to activate its role and improve its performance through using Big Data Analysis.

Aim: To analyze successful mechanisms of CIB and its effects on maximizing the value - for all clients, share-holders and the Egyptian society – so as to make use of this optimum experience and model it.

Approach: the researcher used the exploratory approach to analyze the experience through official reports of CIB.

Research Plan: This research will be divided as follows:

Part One: Challenged that faced the experience of CIB.

Part Two: Mechanisms used to face challenges and strategies for application.

Part Three: Positive results of CIB experience – manifestations of performance improvement.

Part Four: Results and Conclusions.

Part One: elements of success for CIB experience (total economy – banking reform)
Introduction:

CIB was established in 1975. It is now the biggest private-sector bank in Egypt. It includes 6551 staff members in 2015. CIB possessed the Retail Banking Portfolio of City Bank with 140 million US Dollars in assets and 190 million US Dollars in deposits.

The experience of CIB in using and analyzing big data started in 2015 with a strategy based on the notion that investment in big data will create opportunities, faces challenges and imposes new rules never seen in banking sector before. This strategy was based on several basic axes including:
- ❖ Youth
- ❖ Start-ups and entrepreneurs

- ❖ Advanced monetary technology that provides clients with contemporary requirements.

CIB was kin on investing all its capabilities in technology and continuous technical development to be the first bank in Egypt and the Middle East to use big data. The main goals were:

1. Maximizing the efficiency and effectiveness of economic decisions of the bank.

2. Supporting predictability required by banking sector.

3. Creating a competitive advantage for the bank through designing a number of improved products and services that keep up with the current digital revolution that changed the patterns of consuming financial services.

4. Establishing deeper and wider understanding of clients in addition to risk management, internal and externally, depending on risk prediction and targeting its causes.

CIB is part of the Egyptian banking system. Therefore, its goals match the goals of the state and economic development. The role of the bank is clear in supporting these goals. We will explore, in short, plans for banking economic reform and its structure. Then, we will explore the mechanisms of using big data and results and challenges that faced CIB.

First: Total economy (banking reform and banking environment):

Egyptian banking sector witnessed substantial growth and stability. Studies[5] indicated its good and continuous functionality since 2011 and achieving high growth rates in most field in spite of political and economic conditions of Egypt and the region. Egyptian banking sector includes (39) banks and came fourth among Arab banking sectors, considering the volume of assets, and first among Non-oil exporting Arab countries[6].

During the last decade, several foreign banks withdrew from the Egyptian banking sector due to several reasons[7]. Considering the ranking of Egyptian banks[8], Egyptian National Bank came first, followed by Banque Misr and then CIB.

Egyptian banks are still functioning well in spite of economic pressure. They still achieve high growth rate in most field[9]. Three economic sectors possess the largest portion of credit provided by Egyptian banks. This includes industry (29.7%), families (23.6%) and services (22.8%).

As a reflection of the significance of small and medium projects, reform led the Central Bank of Egypt, in December 2015, to establish four new unified definitions of small and medium project[10]. Undoubtedly, this definition will increase loaning opportunities for this sector, especially with the ability to avoid risks through using big data as we will see in CIB experience.

In conclusion, the role of banks witnessed a dramatic shift from small financial associations to big banking entities capable of surviving any difficulties and barriers in the light of banking reform, the most important of which is the increase of minimum paid capital for banks. This led some banks to evolve and increase its paid capital while others merged due to inability to enforce this decision. In either way, this created stronger banking entities.

Second: Main challenges that faced CIB in using big data:

Using big data depends on the bank's ability to face the challenges and provide mechanisms to overcome it. The success of any experience depends on collaboration among several factors and principles that stimulate achieving the desired goals efficiently and overcoming challenges. Managing large sums of data and information in high rates of quality is a major challenge that requires:

1. Understanding the nature of big data and recognizing all details of the required infrastructure that make it more realistic and usable[11].

2. The widespread of data and increased technological complications still lead to shifts in the way industries work, especially in financial industry and its competitiveness. During the past two years (2015-2017), 90% of data was created as a result of of creating 5.2 Quintillion Bytes of data daily[12]. This is expected to reach 35 Zeta Bytes in 2020[13]. The size of unstructured data reached 88% - this means unorganized data that can not be categorized easily as it is not consistent with data bases. This large sum of unused data is increasing and is the source of considering big data and required techniques to use them. by 2020, nearly 33% of all data will include valuable information if analyzed[14].

3. Rarity and diversity of required officious cadres who should enjoy various skills including:

a) Analysis and programming skills that require strong backgrounds in mathematics, statistical analysis and wide knowledge in statistical programming languages and specialized modeling techniques.

b) New technical skills that can not be found ready in many data centers of companies. These skills include information engineering to design very big data bases in addition to specialized software for analyzing and securing this large sum of data.

c) Personal accessibility to inclusive data about the nature of work and deep understanding of the business process path. This facilitates identifying what is to be achieved of analyzing data correctly through concluding various trends and variables.

4. Cyber security: This is the biggest challenge for banking sector as it is one of the most sectors targeted by spying and piracy. Estimated cost of cyber crimes on the international economy reached 600 billion US Dollars, nearly 1% of total local production of the world in 2017, vs 450 billion US Dollars in 2016.

This clearly indicates the importance of adopting a strategy for containing the risks of electronic threats and increasing the capability to face these risks through improving the technological infrastructure and reinforcing expenditure levels on data security. It is expected[15] that Middle East and North Africa expenditure on information technology, as a lamp sum, may reach 155 billion US Dollars in 2018, with an increase of 3.4% from 2017.

Part Two: Mechanisms and Strategies used by CIB

First: Information Technology Investment

Banking and securities sector is the main sector that supports growth of expenditure on information technology that will increase by 3.6% in 2018[16]. CIB invests strongly in information technology and human capital to improve extraordinary infrastructure that can be used to support big data platforms. These investments include data storage and computer platforms to increase organized data storage and improve reporting performance. Good organizational requirements and infrastructure investment are the main platform that supports private advanced gig data analysis[17]. CIB owns a world-ranked center for data management, advanced analyses and report enhancement, in addition to investments in autonomous business intelligence, and real-time data delivery systems.

Second: Establishing New Departments including Digital Banking and Data Management:

The largest challenge is in starting to use opportunities and establish these departments and this reflects the bank attitude towards digital shift. This is to invent new banking products and services that keep up with the behaviors and requirements of clients and respond to them through providing suitable products and services in addition to its direct effects on supporting financial inclusion. Therefore, CIB established digital banking services department that includes banking innovation. By the end of 2016, data management became a central power that supports the leadership of the bank and its superiority over competitors. Through this, CIB managed to become the first and essential motor of "data Management" along the banking sector as it helped identifying market opportunities and trends and to analyze patterns and turn them into information, products and ideas to be widely used in improving banking services and clients' offer.

Third: Innovative strategies in data analysis and sciences

CIB uses different strategies in data analysis and data sciences different from other European and American banks. Department of risk analysis and

fraud detection comes first in strategies concerning data in the west – as it is more concerned with factors affecting and maximizing profit – while CIB concentrates on maximizing performance first. Therefore, the bank established a department for process research as top priority. This affected work mechanisms in branches greatly, as we will see.

Fourth: Establishing the first national team specialized in Data Sciences

Data shift in financial services sector led to creating new specialized jobs. This is one of the biggest challenges facing the use of big data and requires more advanced digital skills in data sciences, designing user interfaces, designing clients" experiences, improving applications and digital payments, cyber security and digital governance.

CIB recruited efficient cadres and formed the first specialized Egyptian team including more than 70 data sciences scientists and experts in addition to other newly-invented jobs in banking sector. This team is fully aware of the Egyptian consumer's culture as they all have an international experience[18] and have the accessibility to inclusive information about the nature of work in addition to deep understanding of work processes. This enables them to analyze data correctly.

Fifth: Skills refinement for employees through training

Human factor is the base for bank success. CIB continues improving capabilities and qualifications of employees in addition to refining their various expertise and skill acquisition[19]. Budget allocated for training is among the biggest compared to other associations[20]. Bank staff includes 6551 employees. They are considered among the most efficient experts in banking who work on achieving the bank's strategic goals, especially maximizing value for all relevant parties through providing the best financial solutions and innovative banking products for Egyptian economy.

Sixth: Investment in Innovation

Clients expect more quick, easy-to-apply services with limited cost and transparency. CIB invests in digital technology for improving banking services of all sectors of the bank through using techniques supported by business models and major attitudes of clients. This is reflected in the short term on enhancing its trade mark. On the medium range, it helped establishing a base for new capabilities required for the new trend of clients' demands.

Significance of budget allocated to innovation is not measured by expenditure but by efficient use and positive outcomes. This is what CIB did as the bank concentrated in its strategy on improving alternative digital channels and this basically helped decreasing the cost in all banking services and exchanges that exceeded a billion Egyptian ponds annually.

Investment in digital technology not only provides clients with a distinct and innovative banking experience and supports financial inclusion but also is a basic factor for banks to save costs and reach for wider sectors of the society. The bank's efforts in innovation affected growth rates greatly and contributed in managing coasts more effectively on the long-run. This effect extended on the medium and long term to include net income growth.

Seventh: Partnership with Fin Tech and shifting relations from competition to collaboration

CIB collaborates with prominent international technology companies in addition to Fin Tech companies that represent a vital and basic sector for generating more ideas and information that help designing products and services suitable for clients and providing them through their favorite banking channels. This increases speed, easiness and efficiency of banking processes and contributes in introducing the cutting-edge banking technological services for different sectors of clients[21].

Eights: Cyber Security

Financial associations that introduced cyber security effectively can face potential risks that may harm its processes and reputations. CDO (Chief Data Officer) in CIB is completely different from CDOs in most international banks that defensive strategies in big data management and analysis. These strategies target quality assurance, protection and privacy of data as a main target while CIB uses an offensive strategy that targets maximizing economic value of stored data to help decision makers take correct decision that generate optimum revenue. This is done through targeting decisions with high economic and process value without breaching the security and secrecy of information as protected by law.

Part Three: Achieved Results

CIB managed to maximize and add value to all clients, shareholders and the Egyptian society through investment in data management and analysis and improving human talents. Big Data techniques enabled the bank to:

1- Discover important applicable visions.

2- Identify most relevant data for each target group and direct future decisions.

3- Understand clients' needs better and improve efficiency through improving risk management and process management. Big Data tools developed by CIB in statistics and computer sciences provided several applications through linking data with demographic factors, advertisement, social media activities, expenditure and credit date. This initiated parallel improvement in banking activities reflected on several positive results. In spite of the interwoven nature of results, it can be divided into three

categories. These include effects on clients, shareholders and the Egyptian society.

First: Clients

1- Big Data contribution in marketing campaigns for the bank and its products

The use of big data supported the bank vision and realization for clients. The bank became more aware of clients' needs and requirements in time in addition to paying more attention to interactive channels suitable for clients[22] that is a major factor affecting clients' responses.

Five indicators were designed to detect clients' performance. The main goal was to provide a banking services team for individuals with main performance indicators of clients during a specific period. Therefore, we can detect the development of their behaviors with new marketing options or pricing decisions (to help establishing the target marketing campaigns and then generate profitability and foster clients' loyalty).

2- Using Big Data in innovating new services and products for clients

Big data contributed to break up the "one-size-fits" rule through creating products convenient for clients[23]. Digitization allows enhancing clients' experiences with various banking services. The main idea is that banks are described as "bionic"[24] with the ability to respond differently to clients' needs individually too. According to data analysis of clients, personal offers for individuals can be designed according to their needs. This means using data to attract those who prefer to interact with personal offers that meet their needs. These offers are introduced according to analyzing details of the client, his/her own expenditure habits and his/her data available on social media[25] that enable banks to know his/her interests and direct accordingly. Through big data analysis, CIB managed to achieve several positive results including:

a) Deepening the bank understanding and realization for clients' nature and their needs.

b) Identifying optimum areas and products that should be expanded to include new sectors of clients through recategorizing clients and providing various services according to various clients.

c) Developing mathematical models for clients' expectations before latency through detecting their activity level and targeting them with reactivation and recruiting more approaching clients.

d) Developing a risk-prediction system and identifying best places for opening new branches and deployment of ATMs in addition to identifying the best communication channels for different sectors of clients.

This enabled CIB to increase clients' number to 2 million in 3 years.

3- The bank continues improving services and products in addition to launching digital services like bank internet, CIB Mobile Banking App and Smart Wallet [26]. These types of services foster the widespread of banking services convenient to daily life style of clients[27] and enable them to access banking services easily in addition to controlling their banking exchanges.

4- Decreasing waiting time inside branches: Big data is a means used by banks to analyze and understand clients' behaviors, either current or potential clients. Therefore, CIB studied current models of service providing quantitatively to gain detailed information about clients and their preferences, attitudes and interests, in the past and future, through designing a mathematical model that enters data about clients' behaviors, cahiers and customer service methods and others. The model then will provide suggestions and acts including how to invest in cashiers number, compared with customer services employees.

The model is characterized by not giving suggestions for tangible investment. Instead, it provides each branch with different suggestions depending on location, type of activity inside the branch, nature of money exchange, duration of work and number and models of ATMs.

In 2017, action research was used in a project aiming to enhance communication centers and performance enhancement to evaluate current work and identify enhancement opportunity. Statistical prediction techniques are used to help predicting overcrowded time intervals. This, in turn, helps improving resources allocation. Basic data models provided an inclusive understanding for the ideal journey of the client with the bank. This decreased waiting time inside branches with 35%.

5- Customer services and Solving clients' problems

Big data depends on accurate analysis of data and link them in a way that shortcuts the relation to gain information. The current method depends on direct interaction between the bank and each client in private and ask several questions to make sure that the problem is accurately identified. With correct use of big data, the bank can see a real problem in real-time and communication with client once a single mistake is observed and this means the problem will be solved in short time. In addition, big data enabled the bank to deeply and widely analyze the needs of each client in separate and this improved the quality of client experience.

Data sources can be from complain centers or interactive channels with client including branches, phone or social media. The bank detects complains to use all available data, including complains as they are

good source for developing service model. Accordingly, the bank evaluates the staff and increase their awareness in addition to turning the voice of clients into digital indicators related to service level and client satisfaction. This is how the bank can predict and avoid misleads before it turns into bigger problems. This will also decrease complains' rate.

6- Facing fraud

Banks face problems concerning fraud of clients' credit cards when used in stores contracting with the bank. This necessitates modern measures to limit such operations and face them. the Acquiring Commission generated important recommendations to overcome this problem.

Knowing expenditure habits of each client enable the bank to identify any unusual operation. The current measure taken by banks is to freeze the credit card when used in a new local or for unexpected buying. With big data analysis, it is now possible for CIB to prevent fraud in a more sophisticated way through comparing expenditure habits with those of other clients with the same income and same expenditure habits to better understand behavior. CIB has a fraud risk identification model with more than 90% of accuracy while the standard in similar banks all over the world is 70-75%[28].

Second: Shareholders

1. Increase of Free Money Flow to CIB after applying the new decision-making mechanism: The main aim to concentrate on big data is to discover repetitive patterns of business through smart tool for exploring information and analyses in addition to maximizing opportunities to generate more profit. CIB designed and "Analytical Root Map" that starts with analyzing the consumer's behavior and identify methods to maximize profits and revenues. After that, risks are studied and frauds are minimized. Through this map, monetary flow increased significantly as it depends on big data analysis that works on keeping decision-making biases at its minimum level in addition to increasing predictability correctly.

2. CIB gained the highest income of foreign currencies among Egyptian banks from 2007 to 2017. CIB became the first bank that acknowledges risk-taking behavior and established a framework for that. The bank established an inclusive understanding for the existing base, according to sectors, including clients abroad. This, in turn, established visions about all aspects of consuming CIB products, behaviors of consumers and their preferred products in addition to its profitability. This was extended to include evaluating clients' levels of activity and identifying current opportunities and threats. Therefore, CIB succeeded in attracting 7% of all new deposits.

3. Income increased quicker than expenditure. Identifying market gaps created a competitive

advantage that allowed using increased opportunities. Income costs reached 21.4% while consumption banking services net income reached 46% on annual basis of 2 billion US Dollars while collecting 25.1 billion Egyptian ponds and 505 million US Dollars as deposits as a result of using big data and launching new products designed for household sector for value add. Net banking income before tax deduction increased by 18% in 2016, compared to last year with 5.3 billion Egyptian ponds[29], mainly from increasing net income of interest, foreign currency exchange, commercial services and growth of monitored expenditure.

4. Improving Bank Reputation

a) CIB was nominated as the best bank in the Middle East by Euromoney.

b) CIB came first at sustainability indicator EGX launched by the Egyptian Exchange and Standard & Poor's for the fourth year in row since 2014. Egyptian Exchange launched EGX in cooperation with Standard & Poor's and Egyptian Institute for Administrators in March 2010. This put CIB as the only Egyptian bank in FTSE for the second consecutive year under FT indicator.

Third: the Egyptian Society (helping banks to simulate the experience – financing small projects – supporting monetary inclusion).

1- Helping banks to simulate the experience

CIB is eager to cooperate with all banks working in the banking sector who intend to establish departments for big data management and analysis based on the notion that change in banking industry will never happen individually. In addition, working in a strong competitive market helps everyone to improve activities and profits. Cooperation maximizes economic value and adds weight to Egyptian banking industry.

2- Financing small projects

Central Bank of Egypt launched an initiative for small projects sector and identified its concept with

four concepts. The bank obliged all banks to allocate 20% of its credit portfolio to small projects by 2020. Total funding of small and medium companies by CIB reached 21 billion Egyptian ponds (nearly 18.6% of CIB credit portfolio according to June 2017 budget). CIB applies different policies to small projects clients. These include:

a) CIB used big data to design and deliver banking products suitable for their demands and support their business (considering the nature of credit and duration of payment).

b) CIB dedicated a customer service team with experience in fulfilling clients' banking needs like funding, banking internet services, trade business and other services.

c) CIB signed understanding and partnership memoranda with specialized companies[30] to support young entrepreneurs and startups to develop financial technological solutions that help increasing the widespread of monetary and banking services among all sectors of the society.

d) CIB financed Non-companies indirectly through financing associations eligible to finance Nano-companies. This fund servs nearly 120.000 entity. It is expected that the bank will reach for this sector, especially entities not dealing with banks, and provide them with Smart Credit services that support Nano-companies in the light of monetary inclusion and continuous technological developments that provide low-cost banking services. This means the increase of banking, especially with avoiding the challenges facing funding small projects sector as follows:

i. Risk management is a challenge in investment[31] that is expected to be developed using big data analysis[32]. For example, the problem of delay in paying loans can be solved by monitoring major events of loaners as this may indicate the probability of being late in payment like dates of payments, loaner's behaviors and other data capable of predicting the potential behavior of a loaner.

ii. CIB uses various channels for supporting monetary technology projects[33]. CIB held a partnership with AUC[34] in 2016 to establish a business incubator under the title of "AUC Venture Lab" to improve and support startups in this venue in Egypt as its business covers digital and mobile payment and peer loaning[35].

In a study by London Business School about CIB in 2013, CIB was the first bank to use revenue of capital; modified to risks (RAROC) and to deliver a fixed vision for profitabilityacross business. The bank strategy in providing support to all sectors of the state continued and this made CIB the biggest supporter of tourism in spite of major disorders and severe declain

in this sector. The bank also supports Energy, Basic Structure and Infrastructure sectors.

3- Supporting Financial Inclusion

To support the financial inclusion initiative launched by the Central Bank of Egypt, CIB didn't limit financial inclusion to opening bank accounts only, but also reconsidered organizational frameworks for providing services and loaning processes so as to contain all continuous changes into digital technology and identify clients through big data technology. This will help attracting new clients. A study[36] indicated that CIB sought to lead financial services sector in Egypt towards the future. Innovation is the core of serving those who don't deals with banks through big data analysis and the ability of CIB to analyze expenditure patterns in unincluded markets. This will support financial inclusion and there is no doubt that activating digital services will support financial inclusion and introduces a different experience and distinct banking concept[37.]

Results and Conclusions:

1. Digital banking led to a new framework represented in CIB that developed and launched new models. This improved its rank and support for sustainable development goals.

2. CIB strategy is offensive targeting maximizing economic value of stored data.

3. Applying big data enabled CIB to design economic models that maximize performance and to design a future development base based on technology as the main motor for advance. CIB managed to own cutting edge technology in banking services and this pioneer experience led us to study it.

4. CIB aims to digital simplicity through developing digital capabilities and data to simplify work and reflect positively on the bank performance and banking sector as well.

5. The strategy is based on designing and delivering client-centered banking products and services, especially for youth who represent a major base of those who don't deal with banks in Egypt.

6. CIB kept up with modern international banks and changed radically from a traditional bank to a non-traditional financial association according to it knowledge with effects and opportunities provided by big data in addition to opportunities for distribution channels to provide storing tools, controlled services and research.

Recommendations:

The study uncovered CIB strategy and calls for more studies to enable other Egyptian and Arab banks to simulate CIB experience.

References:

1. Connected to social media networks and smart phones in addition to developments in statistics and the widespread of cloud computing technology.

2. Banks that kept up with the spread of technologies among its clients managed to increase its clients up to 14% in two years, while the same percentage was only 3% in associations that filed to do so. In return, shifting towards advanced digital technologies to reach the "bionic" stage may require 5 to 10 years. This is not long considering the rates of change in financial and banking associations.

3. Kashi, Khaled & Al-Awadi, Saed (2017): Big Data and its effects on decision making. Revue d'économie et de statistiqueappliquée, 14(2), 150-165.

4. https://www.cibeg.com/English/CIBCommunity/ Corporate%20Sustainability/Documents/Sustaina bility%20Report%202016.pdf

5. Federation of Arab Banks: http://www.uabonline.org/ar/magazine/16051608 15901608159315751604159416041575/1575160 41602159115751593157516041605158915851650 0116/21811/3

6. Ibid

7. Including poor political and security stability, increase of processing risks in addition to the financial status of some of these banks and changes of its strategies according to the economic status of mother countries.

8. Federation of Arab Banks Opp Cite.

9. Assets as a percentage of sum of banking sector assets. See reports of Central Bank of Egypt in several years.

10. These are: medium, small, micro and Nano-projects. It is identified according to three basic criteria: business volume, employment volume and capital. This step came in response to various definitions set by banks.

11. Concerning applications, storage and networks related to data storage and security policies so as to be able to analyze data effectively. Any company consider its data sensitive and should be secured.

12. https://ar.talkingofmoney.com/how-big-data-has-changed-finance

13. http://blog.naseej.com/مؤسسات-في-الكبيرة-البيانات- العالي-التعليم (big data in higher education institutes).

14. Ahmed, Abu Bakr Sultan: Big Data. Its harsvhteristics, opportunities and strengths, November 28th, 2017. http://www.alfaisal-scientific.com/?p=2093

15. Federation of Arab Banks: Information Security: Risks and Future Challenges. The Union Magazine, no. 454, September 2018.

16. Ibid

17. These analyses require various skills.

18. As some banking behaviors of Egyptian clients can not be understood by European researchers including, for example, credited loans.

19. CIB Annual Report 2017 P: 79.

20. Federation of Egyptian Banks. http://www.febgate.com/12596

21. On the other hand, the bank invests and holds strategic partnerships with various bodies to support innovation. One clear example on that is collaboration with business incubator in the field of financial technology "AUC Venture Lab" (Fin Tech) under business incubator of AUC.

22. If products are presented to clients through an inconvenient interactive channel, like text messages, they will ignore it. But if clients are called by phone to explain the advantages and importance of a product, this will lead to a more favorable marketing effect. In addition, the bank is distinguished by interest in "Personal Seasonality" indicator that helps identifying the most appropriate times to present products to clients.

23. Ben Habib, A.; Ben Ashnaho, S. & Bodia, M. (2013): Exploring Client Satisfaction Model in Services, 9 (1), 215-230.

24. A common tern in Robotics that refers to what is learned by a "mix' of what is traditional-biological and what is robotic and automated. This description fits for banks and its consultative services in addition to network processes and other technology-related fields. It means mixing digital technology with direct dealing with clients and their various behaviors to preserve competitive advantage.

25. Masoud, Sasi Omar Sasi & Sedik Bel Ibrahim (supervisor) (2015): Mediating role of demographic factors in the relation between electronic advertisement and attitudes of bank clients: Towards adopting new service technology. PhD dissertation – Sudan University for Sciences and Technology.

26. Individuals can exchange liquid money to digital currency and vice versa through ATM to initiate money transfer, deposits and e-wallet recharge, in addition to other new services like payment of school and college fees via ATM.

27. Mohamed, Safia Al-Baker Jah Al-Rasoul & Sedik Bel Ibrahim (supervisor) (2014): Motivation for accepting ATM services among bank clients and its effects on behavioral

- 23 -

intention. PhD dissertation. Sudan University for Sciences and Technology.

28. https://www.cibeg.com/English/InvestorRelation s/FinancialInformation/Annual%20Reports/Annu al%20Report%202017.pdfpp74

29. Ibid PP: 38.

30. Like Orange Business Services – Cairo Center for Supporting Innovation.

31. Tubidi, M.; Abd Al-Wahab, M & Adam, M. (2018): Role of risk management in achieving goals of commercial banks: case study of Um Dorman Bank – Sudan.

32. Bazam, S. & Ben Kanan, I.: using financial indicators for predicting financial stumbling: applied study on medium and small foundations in Warfala *doctoral dissertation).

33. Ba Khaled, K. & Mohsen, A.: Role of technological business incubators in rehabilitating medium and small foundations to adopt governance. Case study on two projects in Warfala (Doctoral Dissertation).

34. https://www.wamda.com/2018/02/شركات-التقنيات-والقيمة-العدد-في-نمواً-تشهد-مصر-في-الناشئة-المالية والتخصص

35. CIB sponsored season two of "Here are Youth" competition in which more than 30 companies competed for innovative ideas. The bank is still supporting and providing banking and non-banking solutions to help them increase the volume of their business.

36. London Business School: A study about CIB.

37. Financial inclusion is a current goal as Egyptian economy suffers a lot from unofficial economy that posses a high percentage without any records or official documents. What is more dangerous is that this economy has no data. Therefore, supporting financial inclusion is a top priority in Egypt.

12/8/2018