Digital Transformation in Bangladesh's Capital Markets

Key Highlights

- *While technology continues to transform capital markets globally, Bangladesh has so far largely been left behind.*
- *The COVID crisis may act as a catalyst for change. The DSE and CSE were the only equity markets in the world to remain closed from Mid-March to June 2020 during the COVID crisis as a result of the absence of an effective online trading platform.*
- *We also believe the new BSEC Chairman and Commissioners are committed to supporting and encouraging this technology revolution in capital markets.*
- *With the engagement of all stakeholders in tech transformation, Bangladesh can realistically target 5 million new online investors within the next 5 years.*
- *In this report, we discuss the strategic roadmap for technology adoption in the capital markets ,including a proposed trading system for Bangladesh.*
- *We focus on the remarkable growth of China's online trading ecosystem, the largest in the world with 160 million investors and draw lessons for BD.*
- *We also summarize some of the recent research on how new technologies such as AI and Big Data are disrupting capital markets globally.*
- *Finally, we discuss how Stock exchanges themselves are using technology to improve regulatory supervision, governance and market credibility. Also, to bring new high-quality companies to the market and how new technologies such as blockchain can create new innovative financing platforms.*

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Digital Transformation Bangladesh's Capital Market

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Chapter 1: The Digital Transformation Opportunity for Bangladesh's Capital Market

Introduction

Bangladesh has a largely untapped opportunity to leverage technology to transform its capital markets. The adoption of online trading platforms can rapidly expand the investor base in the capital markets. By offering faster, more efficient trade execution, along with higher quality company research and analytics, brokers can offer better customer service and engagement to increase profitability. Bangladesh can realistically target 5 million new online investors within the next 5 years, if all the capital markets stakeholders engage. This report aim to lay out an digital transformation roadmap for the Bangladesh's capital markets, including factors to stimulate the demand side, most critically the move to adopt online trading, the supply side – more high quality companies coming to market, and finally Reg Tech – or the potential for technology to improve the regulatory framework and governance, critical to restoring and sustaining investor confidence.

We also believe technology can help make investing in stocks become a more mainstream activity for a broader range of people from all sorts of income groups. Once, micro investing is integrated with digital payments and wallet systems such as bKash, Nagad etc., one can envisage,in the not so distant future, that rickshaw drivers could be investing a few thousand taka per month into stock mutual funds or stocks directly, as well as being connected to savings products, and even medical insurance, through their digital wallets.

We also focus on the remarkable growth of China's online trading ecosystem, the largest in the world with 160 million investors. As the DSE's strategic partner, effective close collaboration and technology transfer with Shenzhen and Shanghai Exchanges is critical to rapidly develop and implement the transformation roadmap. We also summarize some of the recent research on how new technologies such as AI and Big Data are disrupting capital markets globally. Finally, we discuss how Stock exchanges themselves are using technology to improve regulatory supervision, governance and market credibility. Also, to bring new high-quality companies to the market and how new technologies such as blockchain can create new innovative financing platforms.

COVID May Act As A Catalyst For Technology Revolution

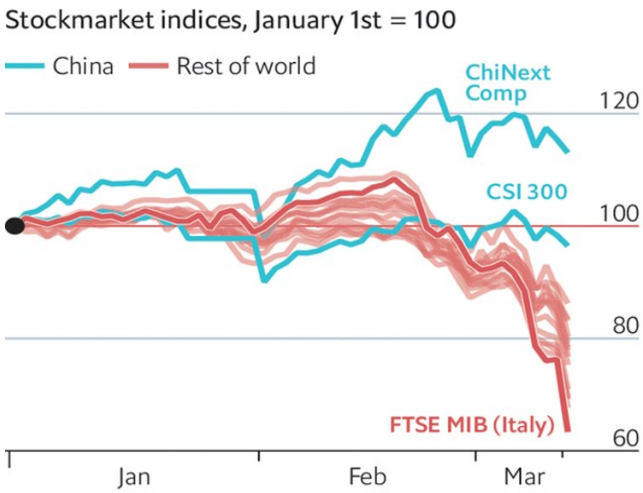
The COVID crisis may act as a catalyst for change. The DSE and CSE were the only equity markets in the world to remain closed from Mid-March to June 2020 during the COVID crisis, as a result of the absence of an effective online trading platform. The negative impact of on confidence in the market among both foreign and local investors cannot be overstated. Simply put, if a bank closed its doors and prevented depositors from withdrawing their money for 2.5 months, it would risk not only a run on that bank, but also undermine confidence in the whole banking system. The capital markets are no different. Moreover, the absence of any revenues for brokers over the period of the shutdown was a painful reminder of the costs of the delay to adopting new technologies. At the time of writing, even though the market has re-opened, DSE turnover is at a 13 year low. The contrast with China is again startling. As the chart below illustrates, in December and January when Coronavirus cases were growing exponentially and 60 million people were in lockdown in Hunan, trading volumes on the Shanghai composite index continued to surge. By July Chinese stocks were hitting new cyclical highs amid surging trading volumes.

Figure 01: Shanghai Composite Index sees weekly turnover surge even as Covid paralyzes China

Source: Reuters

And it meant that China's stock market proved more resilient than other countries in Feb/ March, even though China's earlier entry and exit from COVID were also factors.

Figure 02: China stock market remained immune even at Covid peak Jan/Feb



Source: The Economist

With the Coronavirus pandemic still undermining the economy, there is clearly tremendous uncertainty and nervousness about the outlook for Bangladesh's capital markets. However, we believe that the crisis may actually be the shock or catalyst for much needed digital transformation. Social distancing will be a reality for everyone until a COVID vaccine is found so the traditional practice of crowds of investors packed into broker offices is not feasible. At the same time, the need to leverage technology to bring new investors and companies into the market, while reducing operational costs, is all the more pressing.

Since interest rates are low (FDR rates capped at 6%), there should be greater interest for investors to consider stock-market investments. But retail investors need greater re-assurance both by the quality of information available about companies, investment advice, transparency and improved governance in the capital markets.

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But somehow, despite many successes since Digital Bangladesh launched in 2009, the Bangladesh stock market has been left out of the technology revolution. The DSE mobile app and its desktop version only has around 53,300 users out of 2 million+ registered brokerage accounts. To put this into context, If Bangladesh had the same number of online trading accounts as China, adjusted for population, we should have around 20 million online investors! In part it may reflect the poor user experience of using the app itself (see a June 16,2020 article "In a digital world, Bangladesh's stock trading remains defiantly analogue"). However, we clearly need to see more effective online trading platforms offered by the brokers themselves rather than by the exchange.

We need a broader digital capital markets eco system will include-

- Fast, efficient online trading systems with improved customer experience
- Technology upgradation at the exchanges so trades are executed quickly.
- Adoption of the latest RegTech by BSEC and DSE for improved market surveillance,
- Integration in a digital payments banking system for fund management.
- Technology innovation in financing such as V-Next and LDX Blockchain platforms.

Online Trading is the Key to Engage the Next Generation of Retail Investors

Convenient

- New Generation of Professionals are Digital Natives – have grown up with Facebook, Instagram and WhatsApp
- Don't have time to visit brokerage/phone broker to relay trade order
- Can invest in mutual funds/fixed income funds through app with one click

Allows trading anytime, anywhere, no matter what location or traffic conditions

- Large pool of potential retail investors reside outside large cities – brokerage houses cannot reach them
- Traffic conditions make it impossible for people to travel to brokerages to fill up forms/trade

Background stock information (Fundamental and Technical) available in an instant

- New generation of potential investors focused on research

Digital Fund Transfer allows instant transfers between bank and BO Account

- As wallets, payments and financial services become digitized, brokerage accounts are a logical next step in the digital ecosystem

The key reform is for the DSE to open its API so each broker can develop and launch their own trading system and connect to the exchange. One of the reasons why there may have been reluctance by the exchange to open-up the API is three major concerns from smaller brokers:

1) They will not be able to afford the capex costs in having to adopt their own system.

2) Why should they pay for an online trading system that they can access free from the DSE and CSE?

3) They may not be able to compete with the top brokers who have the resources to invest in large complex trading systems.

Any digital transformation needs to be inclusive all both large and small brokers. We are optimistic that Bangladesh's capital markets to embrace digital transformation for 3 reasons:

1) The appointment at the beginning of June of a new more technocratic Bangladesh Securities Exchange Commission (BSEC) led by Dhaka Finance Professor Shibli Rubayat as Chairman. He has already committed to pressing for accelerated technology adoption and has even announced that an international consultant will be appointed to provide technical support.

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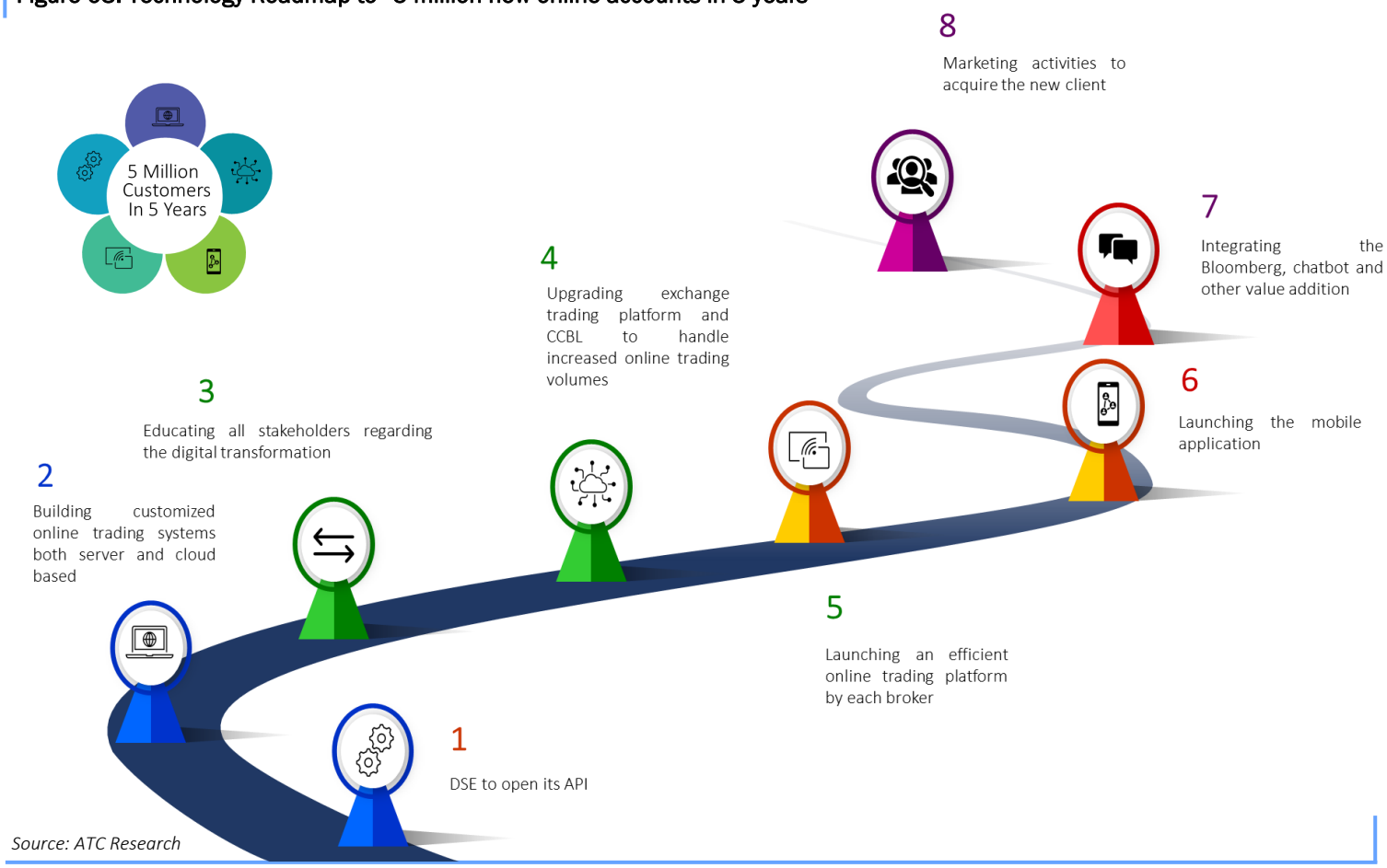
2) The DSE Board has announced a new working committee to prepare a plan for online trading and technology with a preliminary assessment by the end of June. (see "DSE moves to digitalise market fully after flak over the long closure"). The Strategic Investor in the DSE, the China consortium of Shenzhen (SZSE) and Shanghai (SSX) Exchange, are among the most technologically sophisticated in the world. SZSE has more than 1000 employees in their technology department and there is significant potential to learn from China's successful adaptation of technology and take their support to find the best customized solution for Bangladesh.

3) Finally, there is an increasingly clear consensus among the broker community and indeed all major stakeholders that change is needed urgently for Bangladesh capital markets to achieve its long-term growth potential.

If the Bangladesh stock-market is to maximize the potential impact of technology, it is also important that that the stock exchanges themselves, the DSE and the CSE, as well as the newly establish Central Clearing Counterparty Bangladesh (CCBL), also engage in technology upgrades to embrace global best practice. As online trading volumes increase, the exchanges need to be able to ensure technology upgradation that delivers fast execution speed with low latency and sustained system stability. Clearly, Bangladesh has to make a number of radical changes, but we remain optimistic, if all stakeholders come together, that we can achieve "digital leapfrogging" seen in other areas such as Digital payments with bKash, Nagad etc. or internet bank transfer. This can catalyse the growth, profitability and long-term health of the stock market and move Bangladesh from being a laggard to adopting regional best practice on capital markets technology.

Figure 03: Technology Roadmap to "5 million new online accounts in 5 years"



Source: ATC Research

Chapter 2: An Online Trading/Technology Roadmap for the Bangladesh Capital Market

Establishing Broker Based Online Trading Systems

As we discussed in the previous chapter, the current online trading system used in the Bangladesh market, the DSE Mobile app, clearly is not effective. A June 16,article "In a digital world, Bangladesh's stock trading remains defiantly analogue", highlighted some limitations from the existing app. Existing investors highlighted the lack of price modification option, and no facility to offer stop-loss orders. They also highlighted the lack of notifications, insufficient market information and lack of smooth execution, app stability. There are a number of reasons for this but as a starting point, Bangladesh is the only capital market in the world where the exchange itself offers the online trading app or platform. In every other country, the brokers themselves offer their own online trading platform with the exchange providing the order matching engine and trade clearance/settlement functions. Indeed, the exchange has to pay the solution provider for existing system per trade and hence is actually losing money when investors trade online. Why is this the case? In part it might be argued that it's a legacy of the collective decision by the DSE brokers after the de-mutualization act of 2013 to require the DSE to offer a cost-free solution so that brokers themselves would not be encumbered by additional costs. But this is not "free" for the brokers since they are shareholders in the DSE and hence losing money in operating the existing online system. But more importantly than the costs are the poor user experience has limited the growth of online trading and the investor base which is a major lost opportunity. And "free" older legacy technology is sub-optimal when developing their own trading platforms would offer significant opportunities to increase revenues and also reduce costs.

It is clear that, any proposed online trading system needs to address those concerns and be an "inclusive" technology platform that expands revenue and business opportunities for all members of the exchange.

One of the points we would again re-iterate looking at the experience of China and indeed other smaller Asian countries such as the Philippines that have embraced online trading platforms is the extent to which the rapid growth of the overall market and onboarding of new clients can benefit all brokers. As we highlighted in the overview section, we believe that the implementation of an efficient online trading platform by all the brokers can see the number of investors expand to 5 million on a 5-year time horizon from less than 2 million currently. This will increase revenue opportunities for all brokers. Technology platforms also offers greater prospects for cross selling by brokers of other products and services such as wealth management and insurance products.

We will discuss in the next section, a multi-segment/product offering that meets the needs of all the brokers and stakeholders in the DSE is the most important objective.

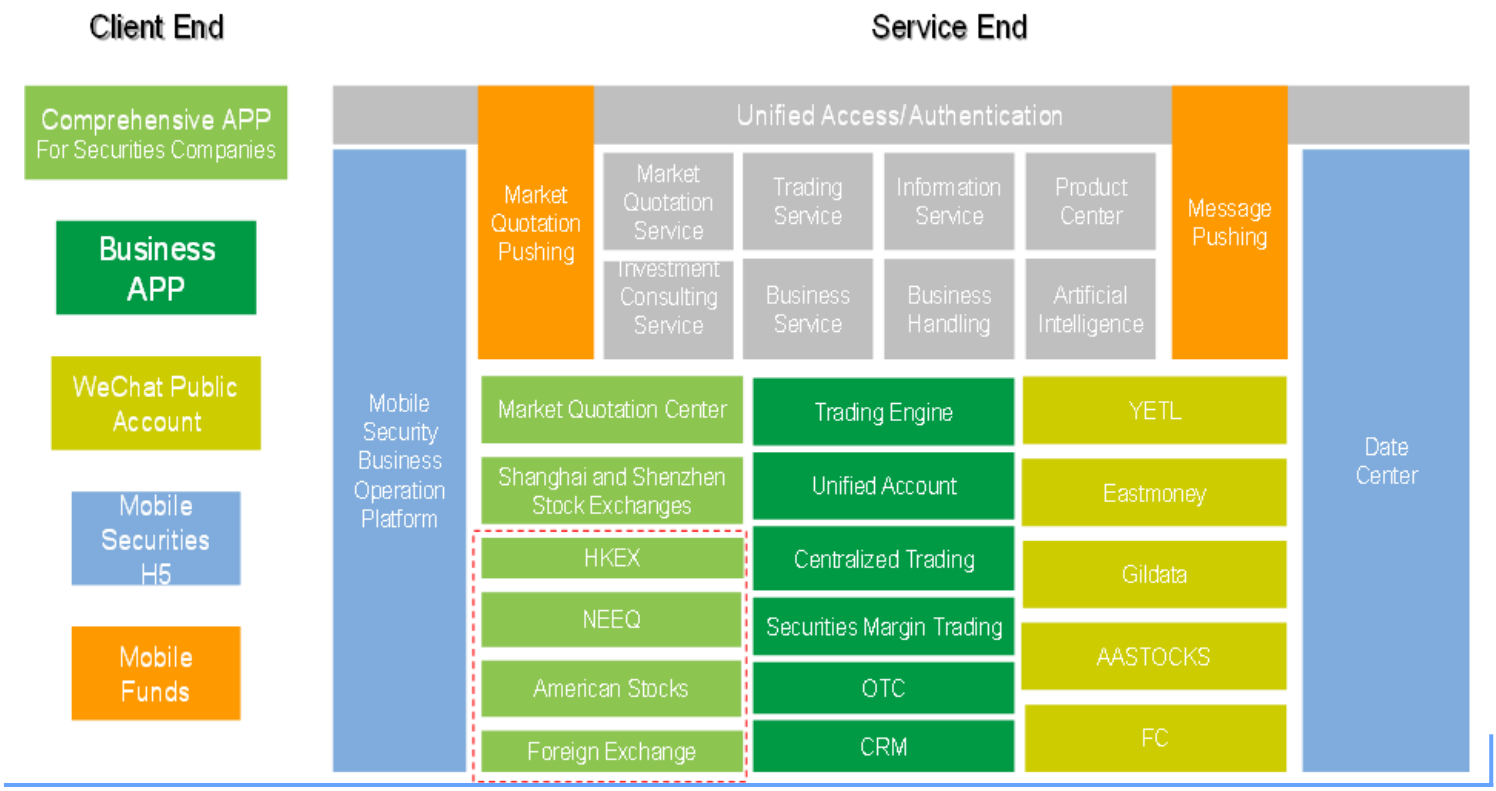
Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Kingdom Technology Online Trading System Proposal for The Bangladesh Market

What is the optimal trading system for the Bangladesh market? Well one of the challenges is that there is wide range in terms of broker size. There are 250 brokers in the DSE for around 2 million BO accounts and only 200,000 to 300,000 active trading accounts. This compares to 140 brokers in China for 160 million active retail investors. In addition, in Bangladesh the top 20 brokers account for around 80% of turnover. Some brokers are actively involved with foreign clients need integration with Bloomberg and Reuters and others who focus on local institutional investors and may want to invest in large trading systems which offer a wide range of services and products. But smaller brokers have much lower volumes or trade primarily for their own account. The later cannot justify large scale capex either in software systems or hardware/servers. Probably a hybrid system would be optimal with the larger brokers having comprehensive server-based systems such as China and smaller and medium sized brokers having simpler and more cost-effective cloud-based systems. But there are regulatory restrictions for the cost-effective cloud-based system and they will need to relax/amend the rules for the API approval to different brokers.

Below we can see the summary framework of the Kingdom system for large Chinese brokers

Figure 04: Illustration of the Kingdom system for mainland Chinese brokers



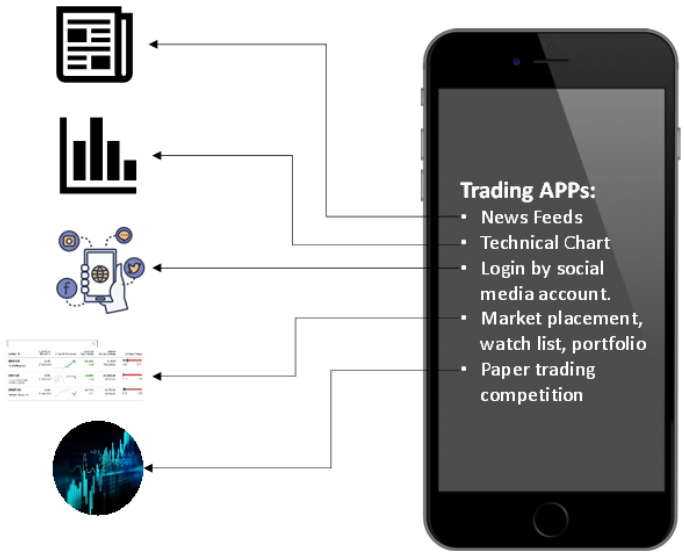
Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Kingdom is developing a customized online trading system for Bangladesh that will leverage technology platforms developed for China, the largest online trading market in the world. Hence, Kingdom has designed the broker Order Management Software (OMS) with Online Mobile Application (iOS & Android; the highlighted features are as below:

Figure 05: Features of the Kingdom system

Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Figure 06: Highlights of Mobile Features



Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Kingdom has planned to launch two versions of the OMS & Mobile App for Bangladesh Capital Market with two deployment model:

- Kingdom Premium
  - ◊ Specially designed/customized for Individual / Large Broker
- Kingdom Essential
  - ◊ Specially designed for deployment in DSE
  - ◊ Small and Medium Sized brokers will take services from DSE

Kingdom's deployment model can be:

- On-premise Deployment (for Individual/Large Broker):
  - ◊ Broker uses his own server room and hardware.
  - ◊ Broker purchases a full set of software from Kingdom Technology.
  - ◊ Add-on functions can be developed on the products in the future.
- DSE Cloud Deployment (for Smaller Brokers):
  - ◊ DSE builds server room and purchases hardware and software from Kingdom Technology.
  - ◊ Kingdom Technology provides daily technology maintenance for brokers.
  - ◊ Brokers use software products and submit demands on functions to Kingdom Technology.
  - ◊ DSE will take part in function developments or system maintenance.

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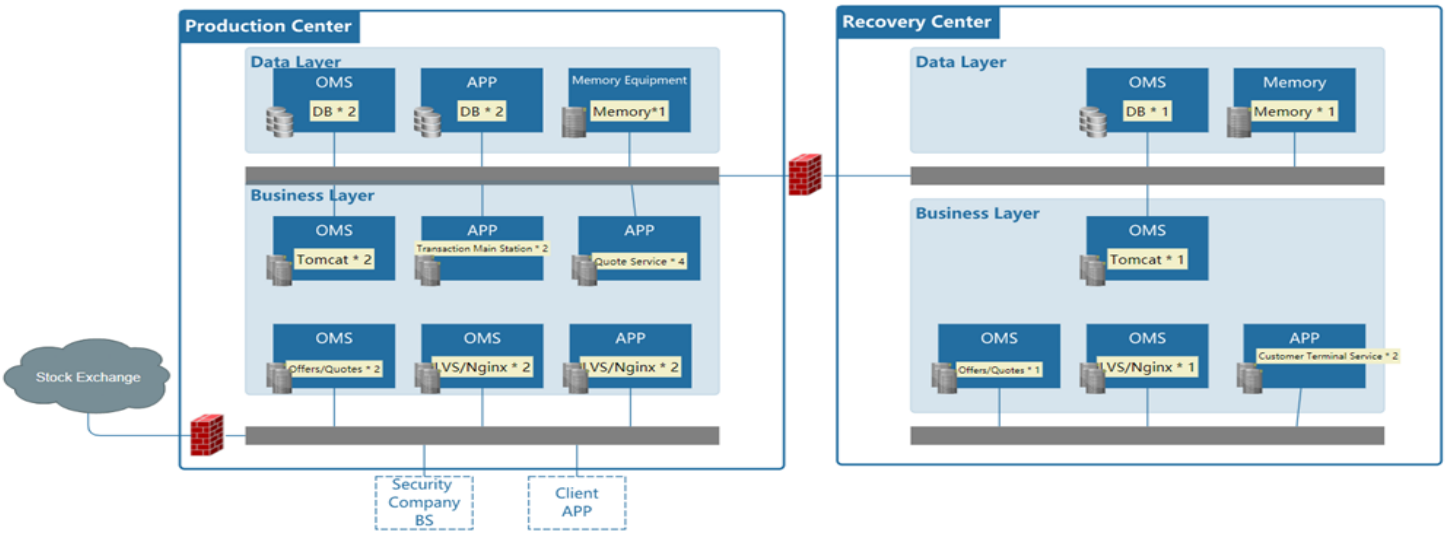
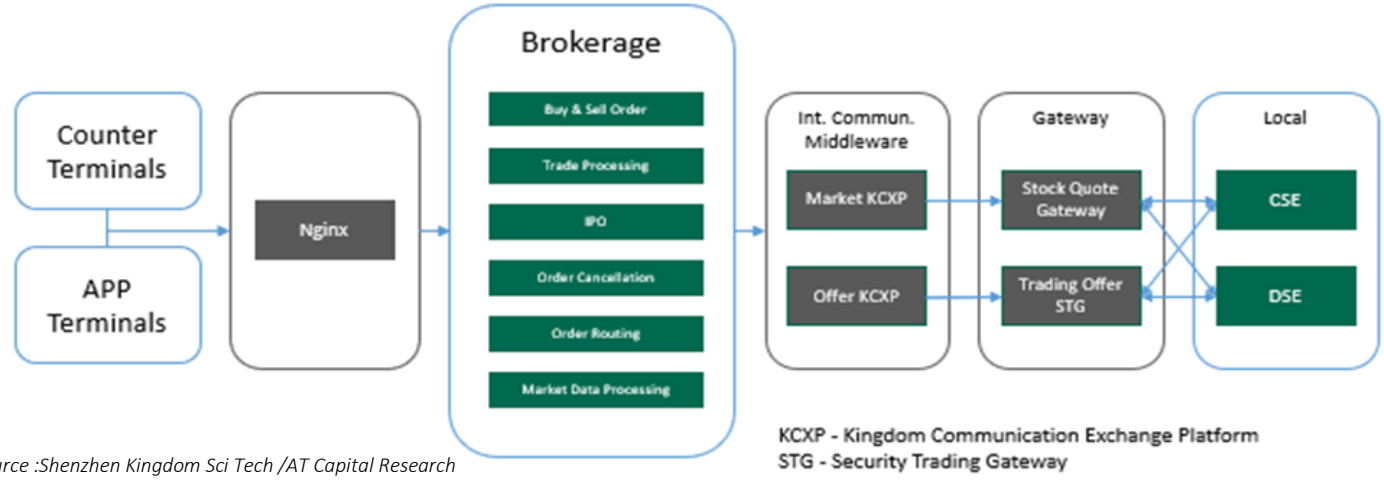
Figure 07: Kingdom System Deployment Diagram



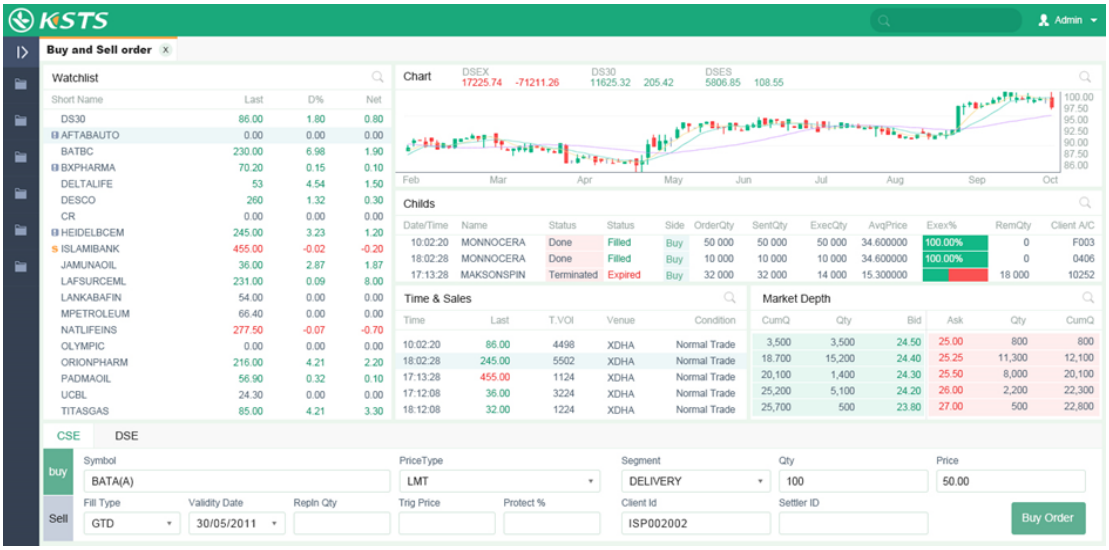
Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Figure 08: Kingdom Broker System Architecture



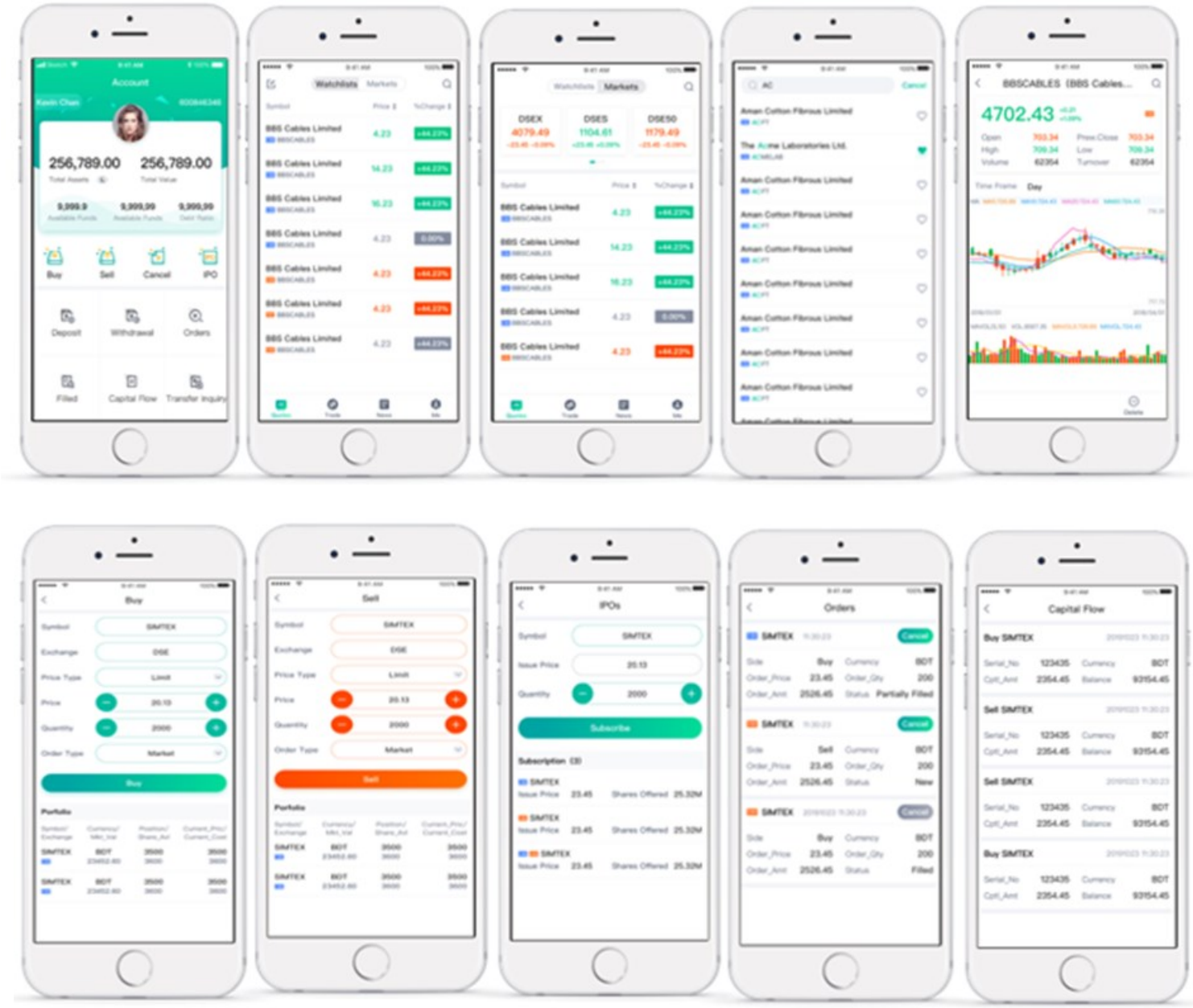
Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Figure 9: Draft Proposal of web-based Trading Terminal



Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Figure 10: Key Features of Proposed Trading App



Source :Shenzhen Kingdom Sci Tech /AT Capital Research

We see considerable opportunities to expand the Kingdom online trading system in the future. Sia Partners, a consulting firm, have highlighted 3 areas where brokers can leverage technology and mobile phone/online - based trading platforms:

1) Big Data
2) Social Media
3) Personalization

Big data— One of the major advantages brokerage firms have, is the amount of data they have access to. With a huge client base and enormous amounts of data records, the traditional brokers can offer clients services that are not deliverable by new, smaller entrants. Big data can be on the basis of advanced analysis tools; self-directed investors require such tools in order to build their portfolios and maintain a clear overview of historical performance and current risks. Moreover, based on (historical) data of the client, other investors and the market, the system can provide the client with suggestions and help the investor to build a portfolio that meets the clients' objectives.

Social Media—The power of social media lies in the speed and ease of sharing, and the enormous amount of people that can be reached. Online brokers should therefore not only integrate social media in their communication strategy, but also in their online customer experience; creating trusted client communities in which market developments, opinions and investment opportunities could be discussed. Fully integrated in the brokerage platform, clients will be able to access the community via the web or mobile devices. Building such self-maintaining social communities will increase customer relationships and sustain customer engagement.

Personalization—Technological developments, the use of big data and increased use of mobile applications create opportunities for brokerage firms to offer highly customized services. This has become a necessity since new entrants offer more focused, lean platforms that service certain customer segments. In order to compete with these innovative players and sustain customer engagement, online brokerage firms should leave the idea that a highly standardized, transaction-oriented platform suits the preferences of every retail investor, whether he is self-directed or advisor-led.

In order to do so, brokerages should develop modular-based platforms which are highly customizable. Contrary to legacy systems that are transaction based, modular systems make it possible to serve different kinds of customers. For example, a modular system can support both self-directed clients and advisor-led clients, creating a hybrid service that attracts a wider group of consumers. Additionally, data gathering and analysis may help the firm to better address the preferences and interests of individual investors, which may be on the basis of customized service and product offerings. Analysis of clients' investment behavior, for instance, may help the online broker to offer educational tools or analysis tools on topics which fit the client's interests. (See "Customer Engagement in the Dutch Online Brokerage Market", Sia Partners, Oct 2015)

Online Trading and Chat Bots

Chatbots are now common in many online trading platforms and can also be embedded into the trading platform that is being developed for Bangladesh. A chatbot is defined at its simplest as a software application used to conduct an on-line chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent. Designed to convincingly simulate the way a human would behave as a conversational partner, chatbot systems typically require continuous tuning and testing. The term "ChatterBot" was originally coined by Michael Mauldin 1994 to describe these conversational programs. Chatbots are typically used in dialogue systems for various purposes including customer service, request routing, or for information gathering. While some chatbot applications use extensive word-classification processes, natural language processes, and sophisticated AI, others simply scan for general keywords and generate responses using common phrases obtained from an associated library or database.

Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Financial companies are known to be mostly conservative, and currently their chatbots tend to offer semi-automated support services and basic information related to the account of the user, such as statements. Brokerage firms move slowly and typically limit their offerings to stock prices or general information about the markets. brokers' chatbots typically offer real-time quotes, generic FAQ, account statements, information about trader's positions and notifications about sharp price moves or margin calls. Most companies stop here. While useful, this is far from being a game changer.

Chatbots have much more potential. Conversational UIs, powered by even the most basic machine learning algorithms, perform much better than emails, blog posts and FAQ pages. The key point is data about your prospects and personalization: in contrast to one-way communication channels, chatbots can learn more about their users, by analyzing all conversations held, and adapt.

Functions of Chatbots

Support: More and more banks and brokers are deploying chatbots to reduce the costs of customer support and sales. Many questions are typical and frequently asked and can responses with a touch of natural language processing (NLP) tools can significantly reduce the number of incidents, which require actual human interaction.

For example, chatbot can handle a typical "Where is my withdrawal?" inquiry by checking the status in a CRM and providing a response like "Your request #123 to withdraw 275 GBP is being processed. We expect the money to be sent today; however, in certain cases we may need to review your request further which may result in a delay of up to 3 days". Even though the processing involved has been fairly superficial, it gives the satisfaction and arguably maintains almost the same quality level as if such a request was handled by a human customer support representative.

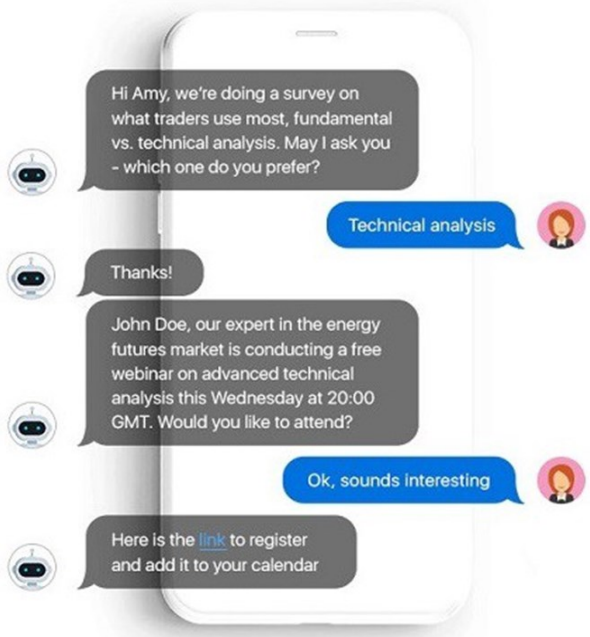
Quick access to simple operations via a messenger with a chatbot on the backend helps to relieve the support staff from tedious activities and let them concentrate on more complicated issues. Also it could be a real delighter for traders to do things on the go without the need to open a trading platform: close all positions, check the unrealized P&L etc.

Convert: Most people prefer to engage with programs that are human-like, and this gives chatbot-style techniques a potentially useful role in interactive systems that need to elicit information from users, as long as that information is relatively straightforward and falls into predictable categories. Bot can qualify leads: collect information from visitors, auto-assign conversations, and create leads in Salesforce. After following up any queries a trader may have, they analyze aggregated queries and send out relevant appeals, news or opportunities.

For example, if a trader requests the price of Litecoin, a logical step could be a personalized offer to open an account: "George, you recently asked me about Litecoin. Would you like to trade Litecoin, Bitcoin, Ether and 100+ more cryptocurrencies on our new multi-asset trading platform? Click here to find out more".

Another example is to throw a question, or a series of questions followed by an offer, e.g.: "Hi Amy, we're doing a survey on what traders use most, fundamental vs. technical analysis. Hope you don't mind if I ask you just one question — which one do you prefer?" then, after words of gratitude: "John Doe, our expert in the energy futures market is conducting a free webinar on advanced technical analysis this Wednesday. Would you like to attend? It starts at 20:00 GMT"

Figure 11: Example of chatbot (a)

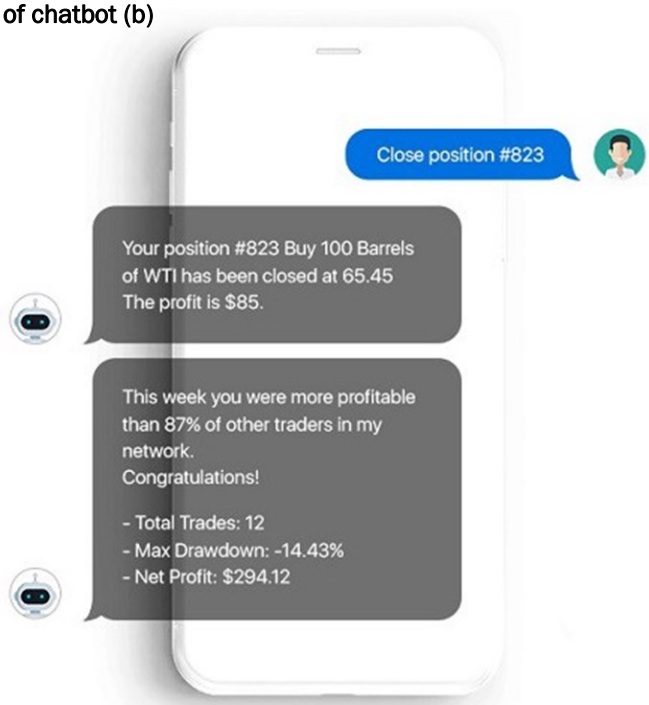


Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Chatbots certainly should be integrated with a brokerage's CRM, trading platform and back office systems to bring the trader closer and motivate them. Personalization ultimately produces higher conversion and activation rates.

Engage: Chatbots give the ability to start small talk or engage in casual conversations between customers and businesses without human interaction. The sky's the limit for engagement techniques: fine-tuned news feed, unique educational or entertainment content, games, contests, personalized memes, polls, etc. Bot can send performance insight to inform the trader if he made it into the top-10 list of progressive traders according to this chatbot statistics, or if he was more profitable than X% of other broker's traders.

Figure 12: Example of chatbot (b)



Source :Shenzhen Kingdom Sci Tech /AT Capital Research

Sell: Chatbots have the ability to initiate and close sales, where a sale equals the placement of an order or a deposit. Let's investigate such scenarios. The user sets an alert, for example, "Notify me when a Bitcoin is less than $7000". If this event occurs, the chatbot notifies the user adding a call to action "Would you like to trade the Bitcoin now?" In other words, any interest of the user to a financial instrument is followed by a call to action which facilitates a transaction. A second scenario illustrates how chatbots help discover new opportunities. For example, a trader may ask, "What are the top performing US stocks in the past 3 months?", the chatbot would then find such stocks and show them with an executive summary helping the user to make a trading decision. In a third use case, being connected to a trading platform, the chatbot can analyze the trader's exposure to the market and warn of potential threats, for example, "The U.S. Nonfarm Payrolls are out today at 13:30 GMT, which may cause significant volatility. Would you like to manage your positions now?" .Chatbot can be smart. If it knows the user's deposit history, open positions and margin requirements, it can make calls-to-action more targeted: "Your equity is $1040.34. Should EUR/USD drop more than 100 pips, your position "#123 Buy 1 lot EUR/USD @ 1.12345" will be liquidated. Would you like to top up your account to avoid this? The suggested amount is $450". In addition, it can broadcast general messages to a wider audience: "Federal Reserve Governor speaks at 3:15pm EST, don't forget to top up your account!" Sophisticated chatbots break new ground in conversion and activation of prospects into sales. Being a diligent conversational partner, this AI remembers the history of the dialog and is continuously self-learning. Thus, a chatbot can connect with a user on a more intimate level, it has the ability to get under a traders' skin by adding value that improves their day-to-day lives. However, only a chatbot with a well-designed architecture and advanced functionality can enrich a company's communications. Chatbots still remain an underrated channel these days among brokerages, it is a good time to explore whether your business may need one. This is a video of a chatbot being used

Chapter 3: The Growing Importance of Technology in Global Capital Markets

The impact of technology on the global financial markets in the past two decades has been nothing short of extraordinary. High Frequency trading systems that use using complex algorithms to analyze markets and buy or sell shares within seconds have become the dominant driver of liquidity. Electronic trading platforms allowing institutional investors to execute equity, fixed income and FX trades automatically without human intervention have increasingly made traditional salesforces redundant. On the retail brokerage side, online trading has grown exponentially, especially in the US and to an even greater extent China which now has more than 160 million investors. Indeed, during the peak of the China online trading boom in 2015, 3 million new accounts were being added every week!

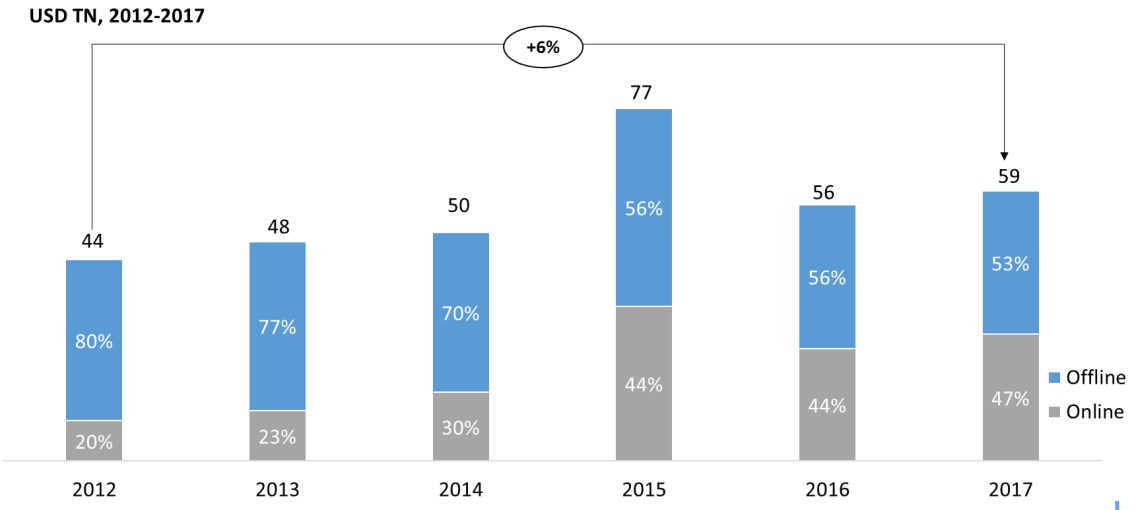
Figure 13: New brokerage account openings in China averaged over 3 million a week at the peak

Source: Bloomberg

A June 27 Bloomberg article ("Amateur Traders Pile into Asian Stocks, Making the Pros Nervous"), highlights both the growing importance of retail investors and online trading in the aftermath of the COVID crisis. It notes that: In the Philippines, AAA Southeast Equities Inc. saw two to three times more new online brokerage accounts opened each month from March when the lockdown was imposed, said President William Matthew Cabango. Meanwhile, India has seen 1.8 million new accounts opened since March. Japanese individuals opened more than 820,000 online brokerage accounts between February and April, more than double the number in the same period in 2019."

According to one estimate, in 2017, 47% of all global securities trading was online and 54% offline. Almost certainly the online share of trading in 2020 is above 50% and in China more than 80% of all online investor accounts are retail. Online trading platforms, also known as digital brokers, aim to provide an alternative to traditional brokerages by facilitating access to stock market information and trade execution via smartphones or PC. Robinhood is one of the most successful online trading platforms in the United States enjoying exceptional growth in clients based on zero commissions model. Chinese players include Futu Securities. China's online retail securities market has grown tremendously in recent years, from USD 1.8 trillion in 2012 to USD 12.7 trillion in 2017, representing compound annual growth of 47.8 percent."

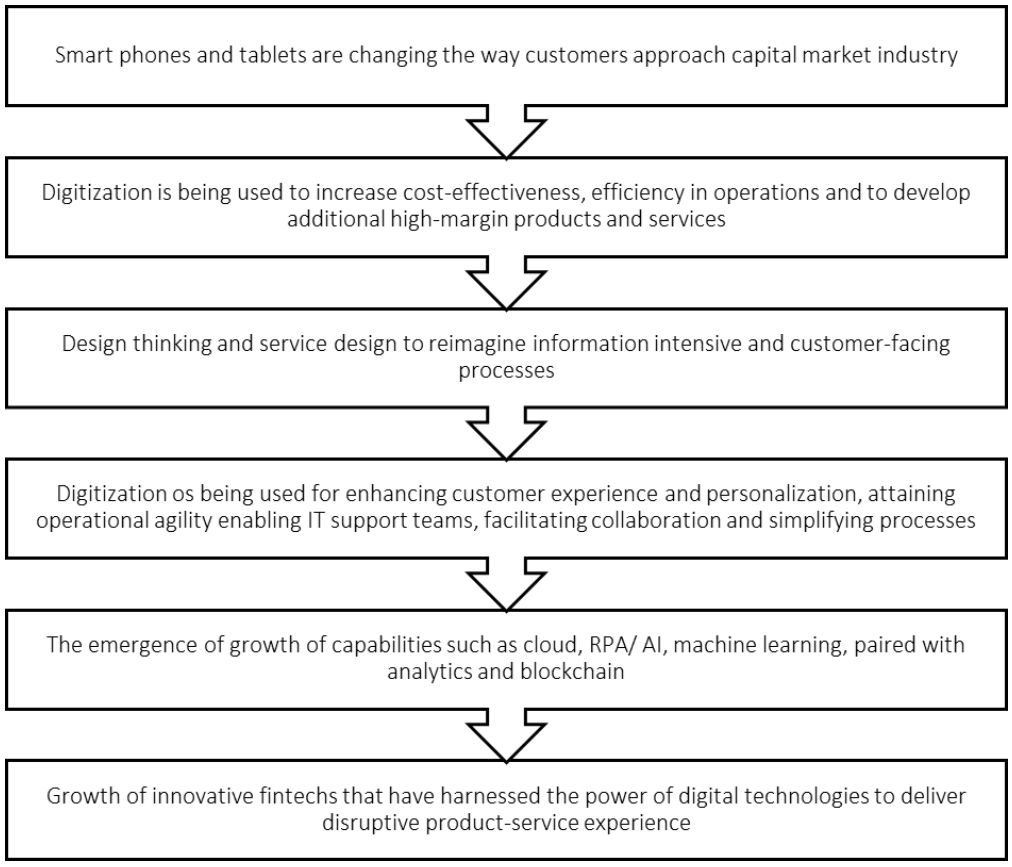
Figure 14: Global retail securities market transaction volume



Source: Bloomberg, World Bank, Oliver Wyman estimation

The diagram below summarizes a number of areas where digitization is transforming capital markets – from improving the customer experience, lower commissions, reducing operational costs to integrating frontier technologies like AI and partnering with innovative fintech.

Figure 15: Trend overview

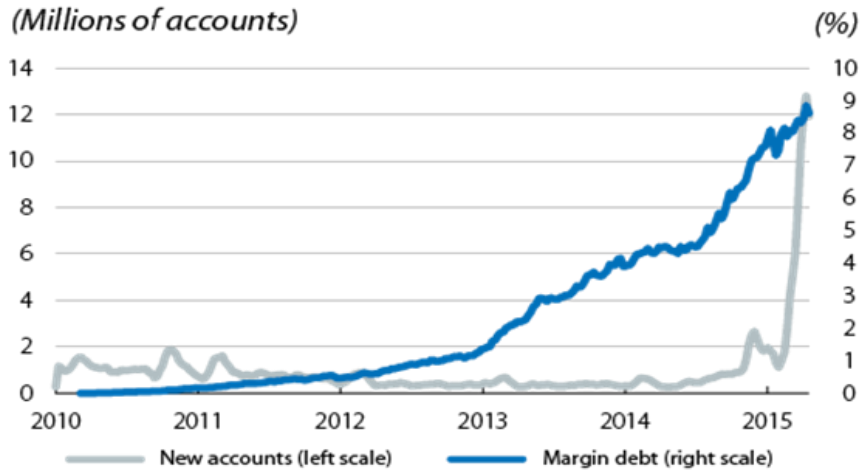


Source: Wipro

The Capital Markets Technology Revolution in China

In this section, we review the evolution of China digital capital markets revolution and then considers some lessons for Bangladesh. China's rise as the leading country for Fintech has been driven by rapid mobile phone penetration and the integrated digital ecosystem centred around the two technology giants Alibaba and Tencent. Parallel to this has been extraordinary growth in the number of online trading accounts which currently stands in excess of 160 million. Most of this growth occurred in the boom years of 2013-2015. As we highlighted in the overview, at the peak of the bull market in 2015, 3 million online accounts were being added every week. And as the chart below illustrates, margin loans to finance trading also increased sharply.

Figure 16: China: stock-trading accounts opened and margin debt

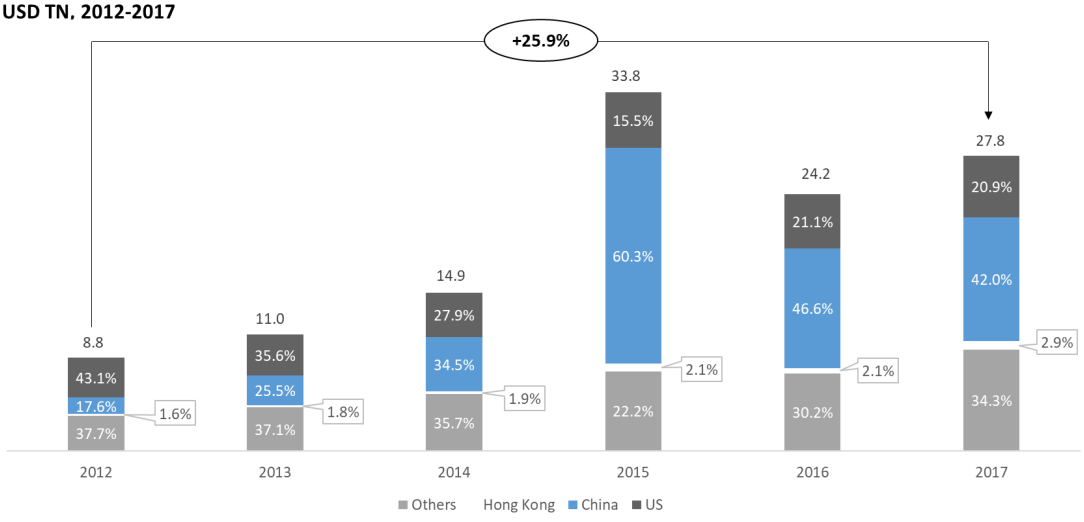


Notes: ** Number of new trading accounts for the Shanghai and Shenzhen stock markets, cumulative over four weeks. ** Outstanding balance of debt for buying shares as percentage of the free float market capitalisation for Shanghai and Shenzhen stock markets as a whole.*
Source: *"la Caixa" Research, based on Bloomberg data.*

Source: Bloomberg

Figure 17: Global online retail securities trading volume

USD TN, 2012-2017



Source: Bloomberg, Oliver Wyman estimation

And as the chart above shows, according to estimates by Oliver Wyman, 2017 online trading volumes in China were twice as large as the US.

In developing the BD Capital Markets Digital Transformation Roadmap, as we highlighted in the previous overview section, there are valuable lessons from China, the largest and most successful online stock trading eco system in the World. We discuss China's capital markets revolution in more detail later in this report, but in this section we will present some immediate learnings from their experience and a proposed product roadmap for the Bangladesh market.

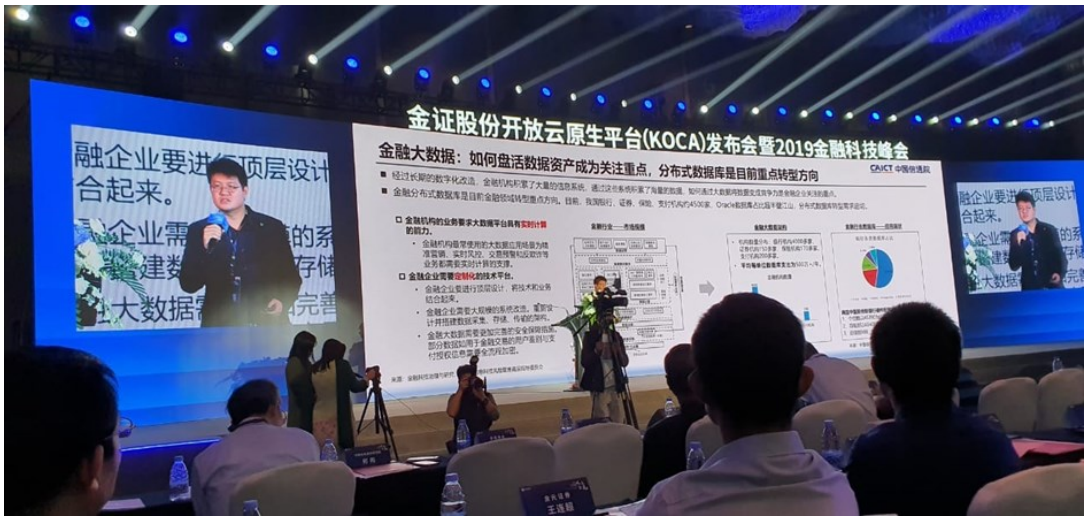
In November 2019, Kingdom Technology (KT)/AT Capital (ATC) along with Shenzhen Stock Exchange (SZSE), hosted a 90 person delegation of DSE board members, Dhaka Brokers Association (DBA) Executive Committee Members, leading DSE brokers, journalists and 15 BD tech companies in Shenzhen, China. They attended 4 different conferences over two days as well as visiting and meeting a number of the leading Chinese brokers.

Firstly, "The 3rd China-Bangladesh Capital Markets Co-operation Seminar" held at SZSE attended by more than 200 attendees where there were a number of keynotes presentations as well as two panel discussions, one for brokers and a second for asset managers, from both China and Bangladesh .

Figure 18: The 3rd China-Bangladesh Capital Markets Co-operation Seminar

Secondly, the Bangladesh Delegation attended the annual Kingdom China Capital markets Conference attended by over 1,200 delegates from leading banks, brokers, technology companies and regulators. Indeed, the then Chairman of the DSE, Professor Hashim, gave a presentation on Bangladesh to the Chinese audience.

Figure 19: Annual Kingdom China Capital markets Conference



Scan or click here to watch Essence Securities China Online Trading Platform

Kingdom and ATC also hosted a workshop on the China Fintech Revolution. But perhaps the most interesting session was the visit of the delegation to **Essence Securities**, China's Number 17 ranked broker. The **Essence Securities** CEO stated that they considered themselves increasingly a technology company rather than a broker. Their annual technology budget was RMB 140mn (USD 20mn) in 2019 and they planned to increase that further in 2020. They already had generated more than RMB 1 bn of revenue from more than 5 million retail accounts and effective implementation of new technology initiatives the key to expanding their revenues and client base further. In particular, they were focusing on greater integration with the ubiquitous WeChat social media and messaging app to provide both seamless integration of their trading platform, market news and also AI systems to understand their clients investment needs more effectively. We can mention another leading Chinese broker "**China Merchant Securities**" who had invested over RMB 100mn from 2017 for their main Data Centre (DC) in Shenzhen which follows National A-Level & Internationally Uptime Level -4 standards. The China Merchant Securities has 5 million registered customers, 3 million monthly active users (MAU), 2.2 million con-current users with 99.9% online customers and their backend supports 17,000 TPS (Trade Per Second). Their system also consists of AI-based stock selection & robot assistant through which they provide information of the stocks to clients but no suggestions due to regulatory issues; AI consulting service handling 30,000 Q/A per month.

Scan or click here to watch Essence Securities China Fintech Online Trading System

The leading brokers in China have as many as 10 million clients and RMB 10 bn of revenues again with technology as being a primary focus to improve market share as well as the frequency of trading and hence turnover from their existing clients.

Figure 20: Bangladesh delegates in Essence Securities

In their report (See "New Kids on the Block: China as A New Force in the Wealth Tech Market") Oliver Wyman concludes with three key attributes that defines the most successful Chinese online brokers that gives important lessons for Bangladesh brokerage firms who want to successfully leverage technology and online trading platforms to grow their business.

Bangladesh Capital Market Technology suggestions with Chinese Case studies:

Closed-loop, proprietary technology facilities: To stay ahead of the market, leading securities firms need robust systems to support all the processes along the securities transaction value chain, from the mobile app in the front office to trading, clearing, and risk management in the back.

- **Proprietary systems**: Leading players should develop their own systems for the whole securities transaction process, from mobile app and customer relationship management to trading, clearing, and risk management. This will mean they have independent platforms that do not rely on systems provided by third parties or other securities firms.
- **Scalability:** The systems need to be designed so that they can be scaled up to cope with any sudden increase in trading volume due to high market volatility. If a trade cannot be executed on a timely basis due to technical issues, investors may switch to another platform.
- **Security:** Safety is always investors' top concern. Leading securities firms should make system security a priority, as any security incidents would significantly affect investors' confidence in them. Excellent user experience A favourable experience is crucial for attracting and retaining investors. There are four key components:
- **Efficient services:** Transactions must be executed efficiently and on a timely basis. The investor experience can further be enhanced by letting investors monitor the performance of their investments round the clock.
- **Accurate, real-time information**: Securities trading requires analysis of the most up-to-date information. Leading platforms should therefore provide accurate, real-time information that investors can reference before they make an investment decision. Such services rely heavily on relationships with information providers.

- **Easy to use**: Both the PC and mobile versions of the securities platform need simple, user-friendly designs.
- **Low transaction costs:** Competition means that low transaction costs are a weapon for increasing market share. Leading platforms do not necessarily charge zero transaction fees, but in general they have low-cost, easy-to-understand transaction schemes. New investors need to be obtained and signed up efficiently in order to cover the operating and marketing costs. In general, there are two methods:
    - ◊ **Conversion from internal ecosystem:** Leading platforms normally develop their own investor ecosystems, which provide securities information, trading facilities, and performance tracking. A user may download an app and read the information on it before investing in securities. Accurate, real-time securities information is a way to attract these users and make them part of the ecosystem. Once these users have developed an understanding of the ecosystem, platforms can then turn them into investors.
    - ◊ **External acquisition:** Securities players can promote their services and attract new investors by cooperating with third parties, such as social media platforms. Financial services comparison players publish information on different securities firms, including their commission rates, minimum commission fees, margin rates, and custody fees. Some of the firms offer these comparison websites referral fees as a means to attract new investors.

Huatai Securities – A Leading Onshore Online Securities Trading Platform

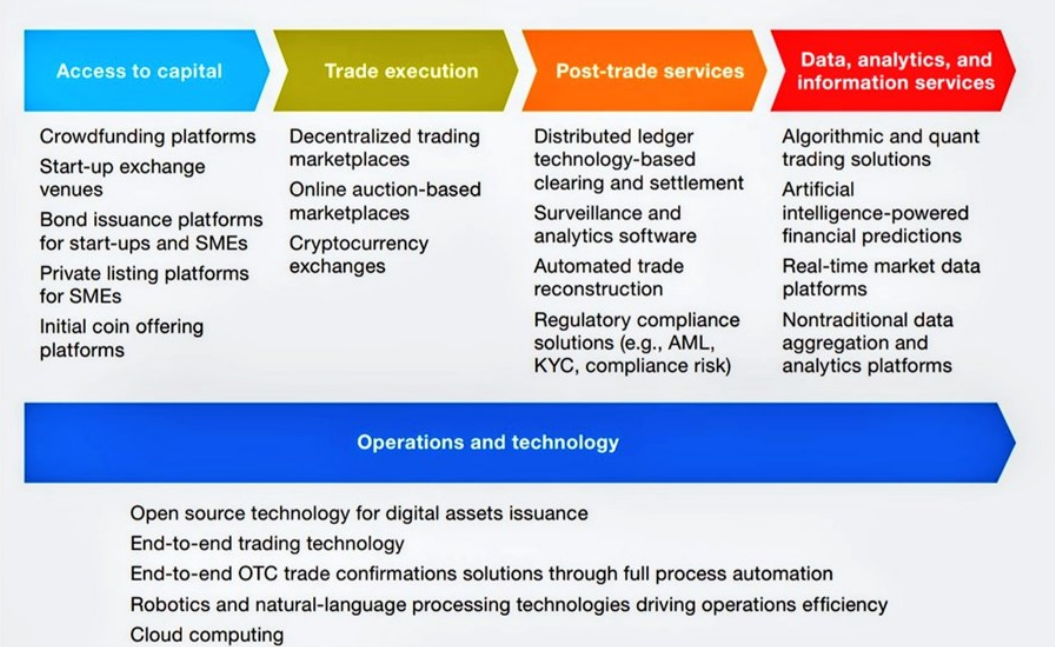
Traditional Chinese securities firms started to adopt Internet strategies in 2009. Huatai Securities was one of the earliest and developed a low-brokerage-commission strategy to attract investors, taking advantage of low operating costs resulting from technology advances. It launched a mobile trading app in 2014, and its share of transaction volume increased from less than 5 percent in 2013 to around 8 percent in 2017. Key features include the ability to open an account in three minutes, real-time securities market information, and more than 100 online investment professionals to provide advisory services. In late 2017, Huatai announced an upgrade for the app, which now uses artificial intelligence to monitor securities performance in real time. Huatai's mobile app has around 7 million active investors as of August 2018, significantly more than PingAn Securities, which is ranked second with around 4 million. China's online retail securities market has also attracted tech giants such as Baidu, Alibaba, and Tencent, which have been actively investing. Tencent invested in Futu Securities, and Alibaba-backed YF Financial acquired Reorient Group and expanded into the online wealth management and brokerage businesses. However, the investment and strategic resources needed are entry barriers to new joiners and small players."

Futu Securities, which is backed by Tencent, launched an IPO in the US in 2019 raising $90mn and listing on the Nasdaq. Since it was launched in 2012, Futu has grown its user base to 5.3 million and boasts more than 457,000 registered clients, defined as users who have opened trading accounts, and more than 124,000 paying clients, defined as clients with assets in their trading accounts. In June 2018, Futu's total trading volume had exceeded HK$1.5 trillion (USD 192 billion), a fifteen-fold increase compared to that of June 2015. The company allows mainland China investors to trade stocks in Hong Kong and the U.S. In article in Market watch , they noted that "Futu says its average client is 34 years old and is typically a high earner, with 45% working in the IT, internet and financial services fields. Since the beginning of 2017, it has retained about 97% of its paying client base."

The Impact of Technology on Capital Markets Is Wide Ranging

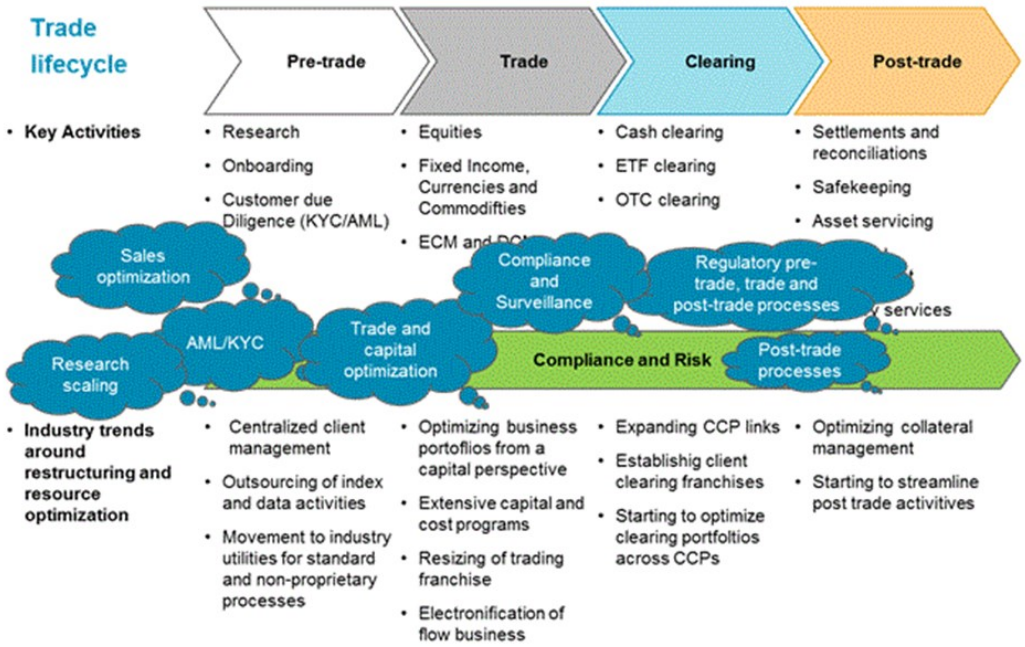
A majority of investment banks globally see technology having a greater impact on their business in the future. The diagram below summarizes the range of areas where technology is disrupting capital markets. From innovations in fund raising platform, faster and cheaper trade execution, more effective regulation, market surveillance, compliance, to better customer experience and trade analytics.

Figure 21: Innovation is occurring across the entire CMI value chain



Source: McKinsey Panorama Fintech database

Figure 22: Trade Lifecyle Restructuring Enabled by Artificial Intelligence



Source: Wipro

How Do Chinese Brokerage Firms Leverage 4IR Technologies to Deliver A Better Customer Service?

One of the major areas in which the major online brokers compete is leveraging new 4IR technologies such as AI, Big Data, Robotic Process Automation (RPA) and also integrating into social networks.

Artificial Intelligence

AI is being used to develop intelligence for portfolio management, investor matching engines and potentially for risk management. We are also seeing greater use of facial recognition technology as pioneered by Alipay to make the login process much easier. The main goal is to improve the customer experience and greater customization.

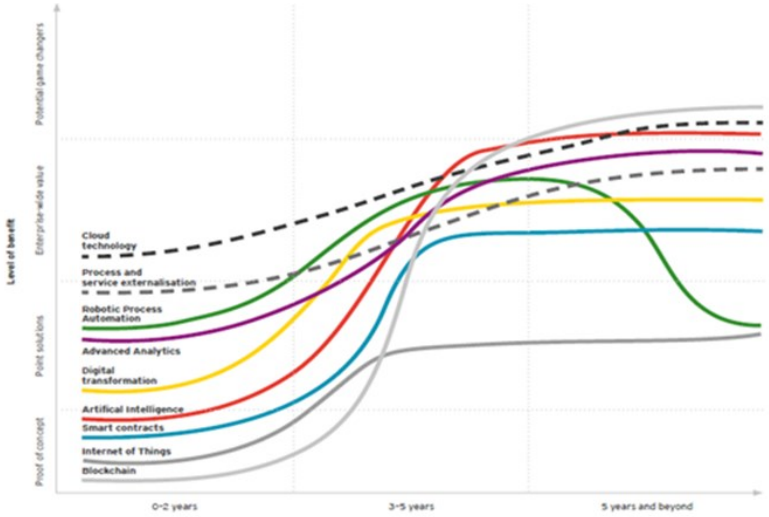
Big Data

The huge growth in online trading accounts also creates massive data sets were big data analytics can help to understand client behaviour better and thereby customize offerings for clients and even target cross selling between different products and services the broker and affiliated partner companies can offer.

When combining AI and Big Data analytics, Ernst and Young have noted in a recent paper (Capital Markets Innovation and the Fintech Landscape) a number of opportunities including

- Behavioural analytics — examining how and why humans make decisions (for example, judgments on client due diligence).
- Predictive analytics — using a data-driven simulation approach to determine future outcomes with greater certainty and confidence (for example, the modelling of future commodity prices).
- Sentiment analysis — discerning sentiment from structured and unstructured data (for example, sentiment toward specific stocks or market sectors).
- Data visualization — presenting insights in pictorial form to improve the quality and speed of people's decision-making (for example, the visualization of trading patterns to identify instances of market abuse).

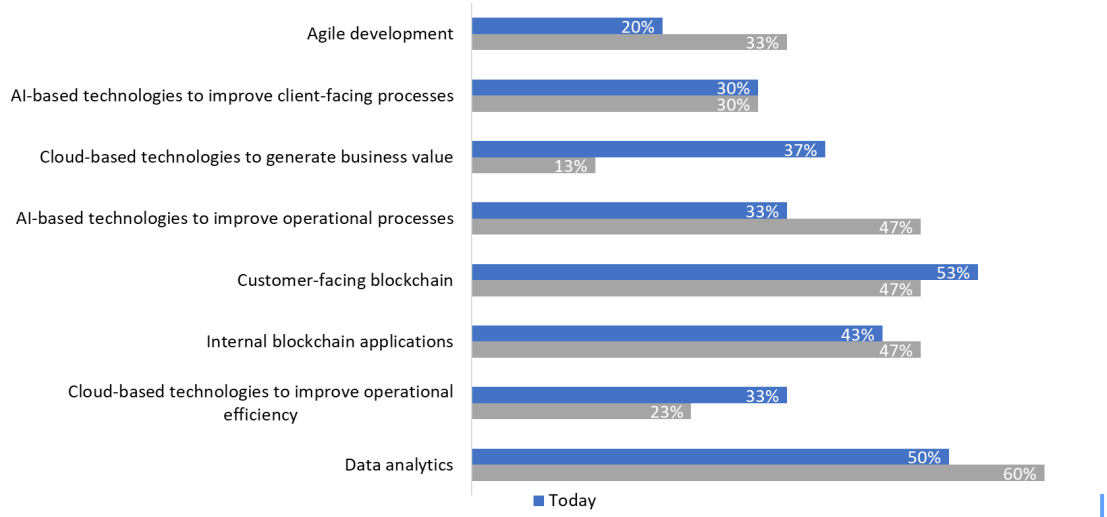
Figure 23: Trade Lifecyle Restructuring Enabled by Artificial Intelligence



Source: : EY Analysis

- **Social Networks** - Another interesting trend in China is the rapid growth of investor social networks where investors can share and receive investment ideas and experience, learn new ways of analyzing markets and build a greater sense of community. Of course, this also presents regulatory challenges to avoid deliberate misinformation and fraudulent market manipulation. But overall social networks have been a valuable tool to build investment and trading awareness and literacy.

Figure 24: Operational AI has everyone's attention



Source: : Accenture

- **RPA** - RPA can be defined as the use of software "robots" or processes to undertake operational tasks. In a recent paper Ernst and Young estimated that RPA can reduce operational costs by 50 to 70 %. RPA is being used by a number of organizations in specific areas such as operations and finance where value can be gained from the automation of repetitive tasks. Accenture also asked what is the biggest challenges in adopting new technologies and the results are summarized in the table below:

Figure 25: Change-management tops the list of obstacles

Source: : Accenture

Chapter 4: Stock Exchange Technology Innovations, Reg Tech and Sup Tech

If the Bangladesh stock market is to maximize the potential impact of technology, it is also important that that the stock exchanges themselves, the DSE and the CSE, as well as the newly established Central Clearing Counterparty Bangladesh (CCBL) also engage in technology upgrades to embrace global best practices. As online trading volumes increase, the exchanges need to be able to ensure technology upgradation that delivers fast execution speed with low latency and sustained system stability. They also need to ensure improved market surveillance in collaboration with the regulator BSEC.

Even the most sophisticated stock exchanges regularly upgrade their technology infrastructure given the demands of, and greater competition for, institutional and retail customers. Shenzhen Stock Exchange (SZSE), the DSE's strategic partner, which is the number 1 globally in market turnover, has itself made a significant investment in upgrading its technology infrastructure. In 2016, SZSE moved to a new data center with 5000 server cabinets for co-location that allows brokers to put their servers alongside those of the exchange. The new order-matching engine has a response time of 1.1 milliseconds, which is one-hundredth of the previous system, with order processing capacity tripled to 300,000 trades a second. There has also been an interesting research paper by the Borsa Istanbul "Technology Upgrades in Emerging Equity Markets : Effects on Liquidity, Trading Activity and Volatility" . "Technology Upgrades in Emerging Equity Markets : Effects on Liquidity, Trading Activity and Volatility" . The report examines the effects of technological changes on selected stock market qualities such as liquidity, turnover and volatility. The data set includes daily data of 361 stocks from 10 emerging market exchanges, namely Colombia, Indonesia, Johannesburg, Korea, Malaysia, Mexico, Russia, Shanghai, Shenzhen and Thailand. The analysis is based mainly on the comparison between the pre- and post-launch of a new trading platform for equity markets. The report notes defines "technological change or technological upgrade…(as) an upgrade in trading systems and/or the launching of a new trading platform which significantly decrease latency." And they conclude that "A panel data regression analysis shows that technological upgrade decreases the bid-ask spread and increases trading activity. In other words, launching a more sophisticated trading platform contributes to the overall efficiency of the market. Moreover, we find that, in some exchanges, an important upgrade in the technological infrastructure of the exchange decreases its level of volatility. "

In November 2019, SZSE signed a technology partnership agreement with Pakistan Stock exchange to upgrade their technology and market surveillance systems.

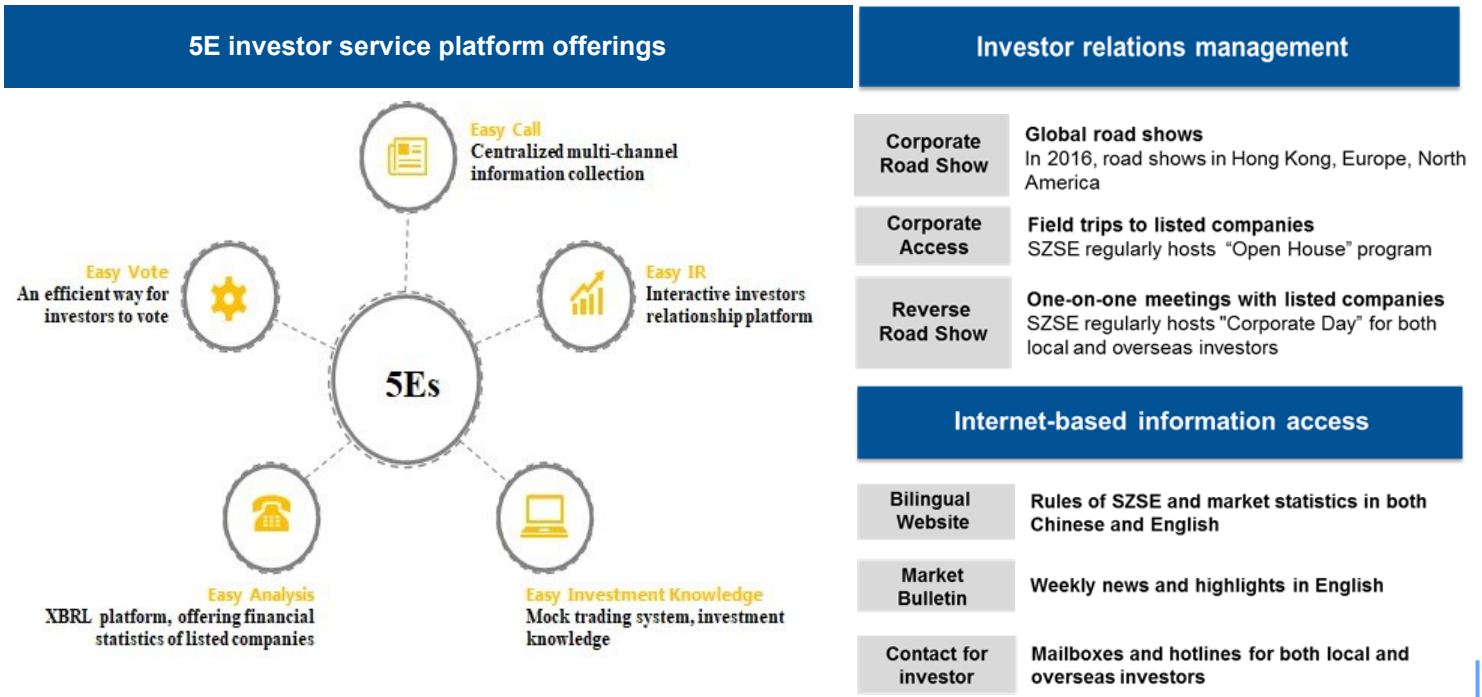
Figure 26: Signing Ceremony of PSX Trading and Surveillance Systems with SZSE

In their joint press release SZSE and PSX noted that: "Technology systems are the lifelines of stock exchanges. SZSE's technology team has nearly 1,000 people. After nearly three decades' independent R&D, the technology team has accumulated profound professional knowledge in such core fields as trading, surveillance, information disclosure and financial cloud, as well as world-leading core technical indicators, and maintains the world record of safe operation for 17 years straight. SZSE has the capability to provide more secure, more reliable, more economical and more effective technology systems to international markets including Pakistan.... According to the agreement, SZSE will upgrade PSX's existing trading system and build a market surveillance system based on the newest generation of trading and surveillance systems independently developed by SZSE and the development realities of the Pakistani capital market. The new systems will significantly improve the safe operation capability, market operation efficiency and risk control level of PSX and further enhance PSX's competitiveness and influence in the region, laying a solid foundation for the development and expansion of the Pakistani capital market."

SZSE Technology Initiatives on RegTech / SupTech

SZSE has also developed a number of innovative technology platforms to improve governance and information transparency that are key factors in supporting greater investor confidence in the stock market and a more effective regulatory framework that reduces market manipulation and abuse. These could be adapted and customized for the Bangladesh stock market. The SZSE "5E" investor service platform summarized in the diagram is perhaps one of the best examples. The "5E" refer to "Easy Call; Easy Vote; Easy IR; Easy Analysis; and Easy Investment Knowledge". Without going into details, the core of the system is making it easier for all investors to get information from/about and contact listed companies. The SZSE also ensures that Chinese listed companies respond to investor enquiries. SZSE launched it's Easy-IR (Investor Relationship) platform in 2010, a micro-blogging platform (like Facebook) to facilitate communication between investors and listed companies. SZSE developed the Easy-IK (Investment Knowledge) in 2013, which incorporated investment knowledge into online games. Through games, tests and simulated investment, investors know better of their own risk preference, and thus employ rational investment strategies.

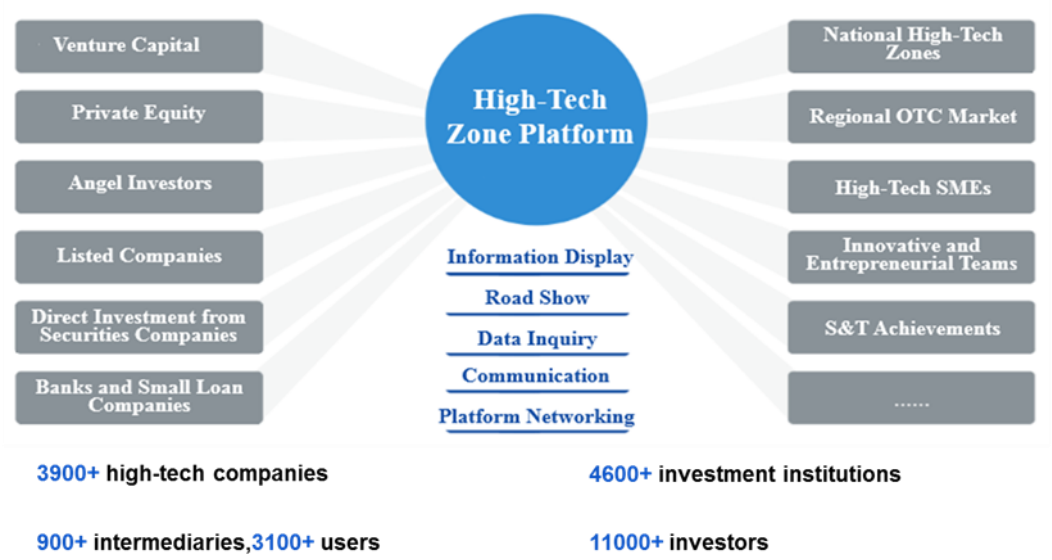
Figure 27: SZSE "5E" investor service platform offering



Source: SZSE

Technology can also be leveraged to promote the supply side. SZSE has also launched V Next, an online platform for connecting non-listed companies with investors with extensive information exchange opportunities on the platform as well as virtual roadshows.

Figure 28: High-Tech Zone Platform



Source: SZSE

Blockchain Based Digital Exchanges and New Forms of Capital Raising

Capital markets digitalization has also seen the emergence of crypto assets and use of Security Tokens. The STO (Security Token Offering) provides financial securities that are, contrarily to the ICO (Initial Coin Offering) Token, is regulated and backed by assets, profits or revenues of the company. In the case of the ICO (Initial coin offerings), they compare to the STO since they basically have the same uses. However, the lack of security and regulation in the area of ICOs increases the investors risks at the time of the acquisition and restrain the rise of it.

By using blockchain technology as well as smart contracts, security tokens are becoming increasingly popular. Even though the technology is new, we see a significant potential for the emergence of Digital Securities and assets as a new opportunity for companies to raise fund more cheaply and the emergence of new exchange platforms as an alternative to traditional equity or debt.

First of all, security token offering is cost-effective. Since they don't require any administrative cost for buying or selling the tokens and eliminates third-parties that might be involved in the acquisition process with the smart contracts, security tokens offering is cheaper than traditional methods such as Initial public offering (IPO).

Furthermore, the fact that they can be traded 24/7 globally makes them more accessible and attractive than traditional models and as Security Token Offering become more popular and liquidity improves, they will become a genuine alternative and competitor to traditional exchanges.

Digital Transformation Bangladesh's Capital Market

LDX to launch in Bangladesh

One of the leading new digital exchanges, "London Derivatives Exchange" (LDX) has launched Digital Exchanges in the UK, and several other countries globally and would like to launch a similar platform in a number of Asian markets including Bangladesh.

Background

The LDX DCRS is a new financial instrument allowing companies to raise capital in a manner that is disruptive to the equity markets and much more cost effective. The other principal aim of DCRS is to resolve a number of issues that arose out of the Initial Coin Offering (ICO) market in the latter half of 2018. The ICO market, while successful in terms of its ability to raise capital for a large number of companies and projects, was fundamentally flawed in its total lack of a Return On Investment. The coin was a "utility" token that only provided value to the investor through either its utility use or the ability to trade it on exchange, hopefully for a higher price than issued or bought. There were no equity or debt rights or any other claim on the company for any kind of return. The DCRS provides the benefit to the issuer of no equity dilution, and to the investor via a return on investment through a share of revenue generated by the company.

Digital Capital Raise Security (DCRS)

DCRS is a financial instrument that provides the following features:
The rights to a proportional share of a pool of revenue provided by the issuer Each project will define revenue to the investor and provide undertakings to support the definition and pay the revenue into a licensed custodian account The ability to trade the Digital Security under the rolling futures model via the LDX platform. Potential equity uplift based on clauses in the Revenue Share Definition classing the proceeds of a sale of the company or any assets as well as an IPO as a revenue share event

Revenue Share Distribution

At a periodic time stipulated and contractually bound by the company, the company will distribute the defined revenue share into a Trust account at the custodian where the funds are converted into a stable coin (USDC) and held on behalf of the DCRS holders. Upon receipt of the revenue share the custodian will issue a Digital Revenue Share Security (DRSS) to the DCRS holders. The DRSS will be backed by USDC (a USD denominated stable coin) , held by the custodian on behalf of the DCRS holders.

	EQUITIES	DEBT	RFS
Issuers	Corporates	Governments, corporates	Mostly corporates
Status	Shared corporate ownership	Creditors, with claim to interest and principal	Creditors, with claim to share of GROSS revenue
Risk	HIGH, systemic and non-systemic	LOW, with agreed interest and principal payments	MEDIUM with defined payments in perpetuity
Returns	HIGH, share in profits via undefined dividend, capital gain	LOW, defined guaranteed interest payments	HIGH, guaranteed share in GROSS revenue
Claim to Assets	Last claim to assets	Holders are prioritised over equity holders	Claim status is flexible
Voting Rights	Shareholders have voting rights in the company	Holders have no say in the running of the company	Holders have no say in the running of the company
Gains from Merger IPO or Buyout	YES, Holders gain from higher company evaluations	NO, Holders benefits are limited to the returns of the debt	YES, Holders gain from the payments deemed revenue.

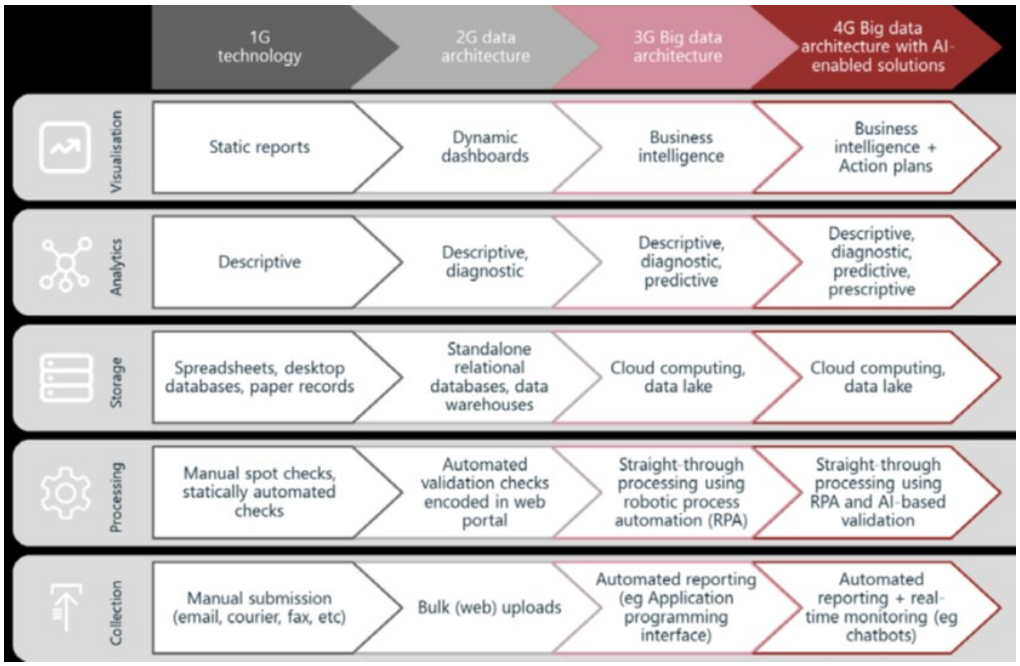
Source: SZSE

The Growth of SupTech and RegTech

In the same way that the growth of fintech has disrupted the financial services industry, "SupTech" refers to new use of technology to improve the effectiveness of regulatory agencies to supervise market surveillance and compliance. A more effective and credible regulatory framework is an important foundation of greater confidence in the capital markets from all the major stakeholders – investors, issuers and market intermediaries. We believe there is significant scope to leverage new technologies to improve the regulatory system in Bangladesh.

According to a recent research conducted by the Bank of International Settlements, about half of the 39 financial authorities it surveyed have explicit SupTech strategies or are developing them. The majority of SupTech initiatives reported however are still in either the experimental or development stages, with less than a third operational.

Figure 29:1G, 2G Data, 3G Big Data, 4G Big data with AI



Source: BIS

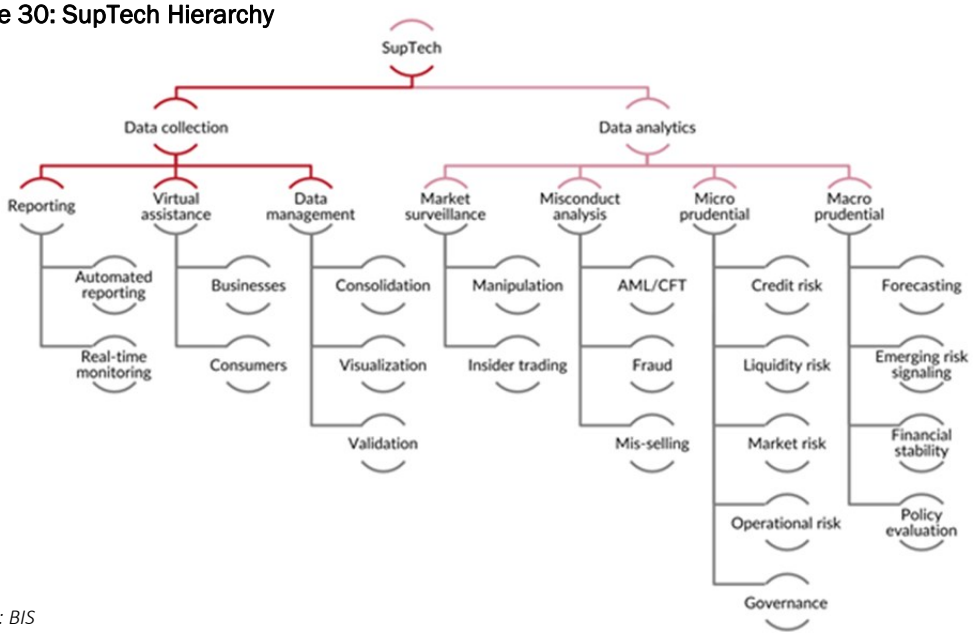
With reference to the diagram above and the evolution of SupTech, the BIS Report noted that "The third generation covers big data architecture."

Such architectures are built with technology stacks that support data of higher granularity, diversity and frequency than could be accommodated previously. On the input end, data ingestion and consolidation are fully automated, for instance, using a combination of APIs and RPA. Data storage and computation are optimised for seamless and continuous data interrogation, which may entail the use of cloud storage and "data lakes". Larger data pools coupled with greater computing power enable more advanced statistical modelling, including predictive analytics (e.g. econometric forecasting).

The fourth generation involves the addition of AI as the defining characteristic.

Generally, AI-enabled solutions or tools presuppose an underlying big data architecture since most AI models require large volumes of data and significant computing power for their results to be valid, meaningful and actionable. Hence, digital transformation and big datafication can be considered enablers of AI. Furthermore, the fourth generation takes automation one step further by having "machines" drive parts of data management and analysis, as well as inform authorities' actions. The former might entail leveraging natural language processing to scrape data from the web or using ML to match and merge disparate data sets. The latter can take the form of recommendation engines that suggest courses of action or even chatbots that execute supervisory tasks previously performed by humans, such as responding to and resolving customer complaints."

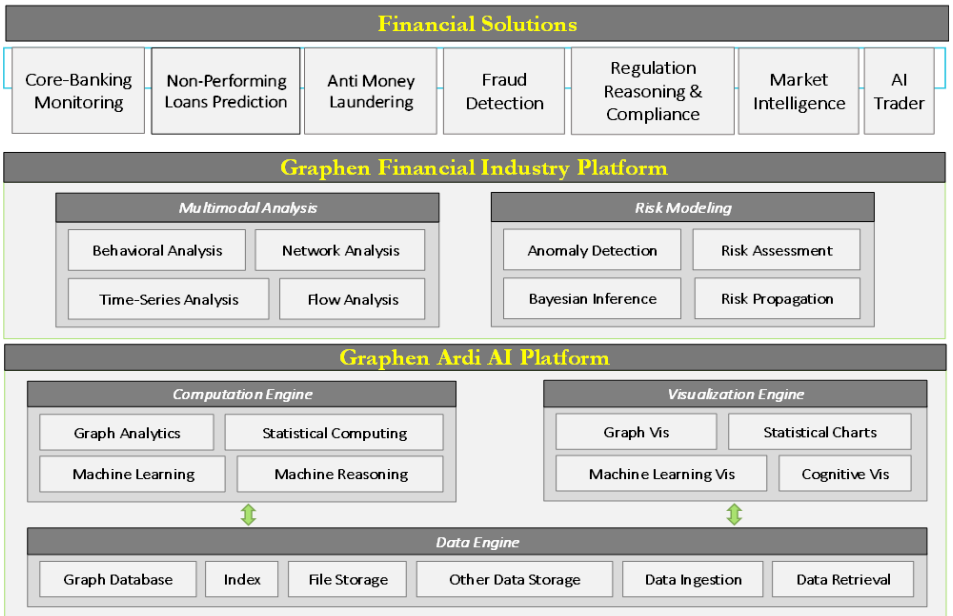
Figure 30: SupTech Hierarchy



Source: BIS

Kingdom Technology's partner company Graphen Technologies has developed AI and machine learning based SupTech and Reg Tech Software as illustrated in the diagram below.

Figure 31: Overview of Graphen Technologies Solutions



Source: Kingdom Shenzen Sci tech

Digital Transformation Bangladesh's Capital Market

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