Supervisory Technology
As a New Tool for Banking Sector Supervision

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ABSTRACT

After last global financial crisis from a decade ago, financial market have been experiencing significant increase in number of regulations. This was especially visible in the banking sector, in which number of post-crisis new regulations amounted to thousands per year. It was not only challenging for banks, that have been spending increasingly more financial resources on compliance, but also for supervisory entities that have to keep track of compliance for every entity on financial market. Due to the fact that supervisory process relies mostly on manual process, it can be both time consuming and inefficient. This is why, not only banks have been exploring new technologies in compliance with regulations (Reg Tech), but also supervisory authorities have been doing the same with the aim of increasing their efficiency (Sup Tech). The research paper aims to test hypothesis, which is as follows:
– Sup Tech is becoming an innovative tool for banking supervision and is expected to have increasingly larger role in banking supervision

For the purpose of the paper, the following methods have been applied: critical analysis of literature and research papers as well as descriptive method and comparative analysis of presented data.

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Keywords: Supervisory Technology, Supervisory Authority, Sup Tech.

1. INTRODUCTION

During COVID-19 pandemic, companies in every business sector globally have been doing their best efforts to adapt their operations to current business environment. Among most significant changes there are restricted travels, inability to work from office as well as transition to digital from personal. For banking sector, the most important disruption is rapid digital transition. Although it has been undergoing globally for several years, COVID-19 pandemic greatly decreased amount of time during which, banks could have prepared for this transition. Not only do banks have less time to implement technological improvements, but also their financial resources and operating revenues are limited in low interest rates environment and significant spending on compliance. However, the need for digital technologies is present both parties of supervisory process in the banking sector - banks and supervisory entities. Potential synergies from using same technologies could be beneficial for both, hence reducing cost and time of the supervision.

2. RESEARCH METHODOLOGY, PROCESS AND HYPOTHESIS

The research paper aims to test hypothesis, which is as follows:
– Sup Tech is becoming an innovative tool for banking supervision and is expected to have increasingly larger role in banking supervision

The aim of the article is to present Supervisory Technology (Sup Tech) and depict successful implementation of Sup Tech solutions worldwide.

For the purpose of the paper, the following methods have been applied: critical analysis of literature and research papers as well as descriptive method and comparative analysis of presented data. Content analysis was aimed at providing outlook of regulatory trends in global banking sector. Then, Sup Tech definition was provided and key areas of use were presented. Furthermore, Sup Tech cases of implementation with assessment were depicted. Lastly, future outlook on the issue in question and conclusions regarding hypothesis were proposed.

3. REGULATORY OUTLOOK FOR GLOBAL BANKING SECTOR

After global financial crisis in 2007–2009 and several government interventions to rescue largest systemically important banks, numerous new regulations have been implemented in the global financial market, especially in the banking sector (Zaleska M., 2020). Number of new regulations globally for the banking sector is depicted on chart 1. The analysis is dated from 2011 to 2015 due to both rapid increase of the number of regulations and data availability,

Chart 1
New regulatory changes for the banking sector by year 2011–2015 ('000)
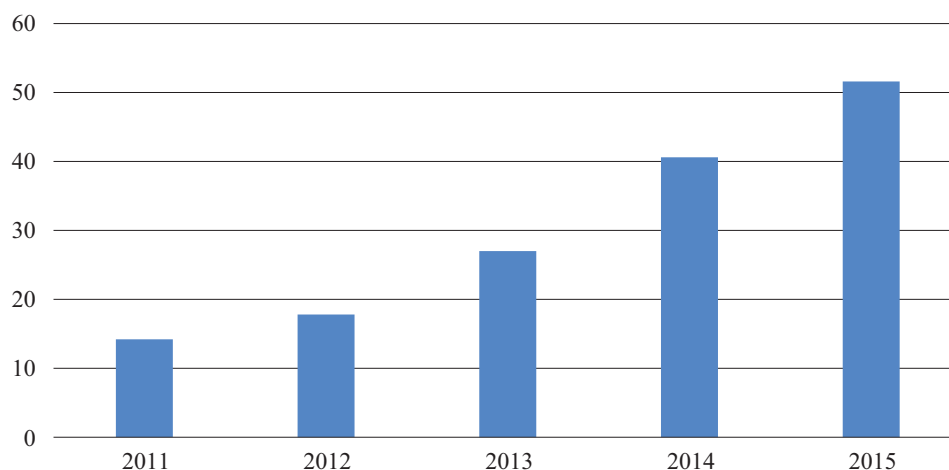
Source: Global Risk 2017: Staying the course in banking, Boston Consulting Group, 2017.

Global regulatory changes between 2011 and 2015 more than tripled, increasing from ~14200 to ~51600 per year. With this large number of new regulations for the banking sector and little time to ensure full compliance with them, banks were imposed with heavy penalties regarding noncompliance. Despite decreasing, they have been significant for banks financial statements (Boston Consulting Group, 2017). Total noncompliance penalties paid by banks globally are depicted on chart 2.

Chart 2
Noncompliance penalties paid by banks globally 2009–2019 ($B)
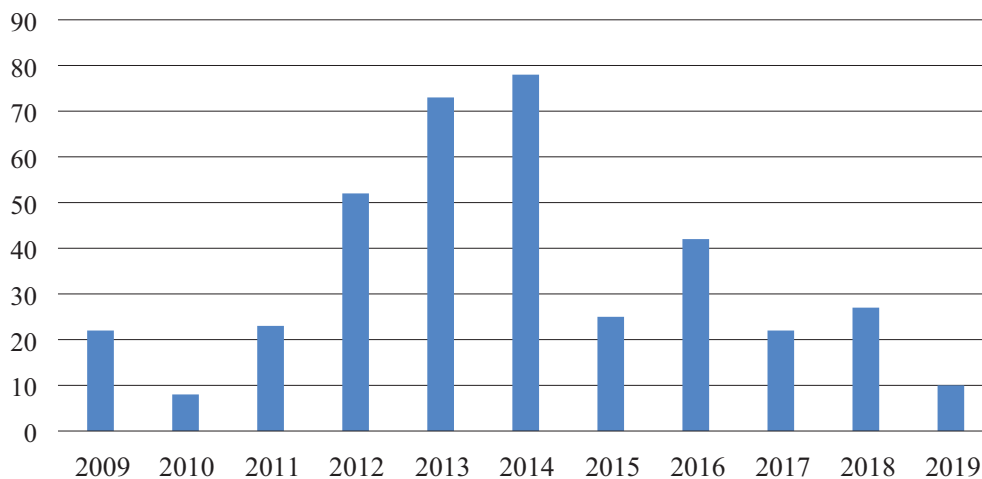
Source: Global Risk 2020: It's Time for Banks to Self-Disrupt, Boston Consulting Group, 2020.

Compliance continued to be a significant cost for banks. Banks are being forced to spend heavy financial resources for keeping up with latest regulations:
– the majority of banks (~75%) are spending ~20% of the overall budget for regulatory compliance (Compliance.ai, 2020),
– 60% of companies (with particular regard to banking) expect compliance budget increase (Reuters, 2020),
– total compliance cost is equal to ~40% of overall bank revenue,
– personnel constitutes for ~80% of total compliance cost (McKinsey, 2018),

Because of the fact that the majority of compliance cost is being spent on human component, Reg Tech market is expected to increase its' global value from $6.3B to $16.3B, while growing very rapidly at ~20% CAGR between 2020-2025 (Markets and Markets, 2019).

What is more, due to ongoing digital transformation in the industry, banks need to anticipate and manage any emerging challenges regarding for instance: cyber security, privacy protection, cloud transition or even impact from climate change (EY, 2019). Implementation of advanced digital banking services, like robo-advisory, has been increasing as well (Dziawgo T., 2018; Financial Stability Board, 2020).

What is more, over-regulation may lead to several negative macroeconomic effects. FRAME (online repository of studies on financial regulations effects) provides information on approximate impact of given regulation on several micro and macroeconomic variables. The analysis considers regulatory ratio, i.e. bank balance sheet ratio subjected to regulation. Based on data from 2019, it can be concluded, that increasing regulatory ratio by 1 p.p. can lead to moderate GDP decrease of 0.1 p.p. and significant investments decrease by 2.5 p.p. It does not have much impact on banking metrics, since: bank funding cost (decrease of 0.1 p.p.), bank lending rate (increase of 0.1 p.p) and bank liquidity growth rate (decrease of 0.1p.p.) have similar levels (Band for International Settlements, 2019).

COVID-19 also had significant impact on the financial situation of the banking sector, when total combined market capitalization for top 25 banks worldwide dropped from USD ~3.5 trillion to USD 2.71 trillion (GlobalData, 2019). Banks however need to take into account both global and national regulations, while performing business operations (Koleśnik J., 2018). If banks are to fail with compliance to such regulations, banks could take significant reputational damage (Niedziółka P., 2018; PwC, 2019; KPMG, 2019).

However not only banks are looking for optimizing and managing regulatory processes internally through new technologies (Reg Tech). Supervisory authorities have been doing the same. Two of the key trends for regulations in financial market regard supervisory entities, which are: shifting from implementing new regulations to ongoing supervision by the authorities and shifting from supervising activities rather than entities (for example supervising payments than payment institutions) (Deloitte, 2019; European Securities and Markets Authority, 2018; Randall D., Lopes L., 2018).

Supervisory entities are also looking for new ways to use technological innovations in order to better respond to ongoing regulatory trends and increase efficiency of supervising both entities and activities (Sancak I., Zeranski S.,2020). Although concept of new technologies in supervision is not a new concept, numerous supervisory entities rely on non-automatic manual process (World Bank, 2018). Therefore, supervisors pursue similar technology as financial institutions to strengthen mutual cooperation and increase speed of sharing important data.

4. CLASSIFICATION OF SUP TECH AND ITS KEY AREAS OF USE

According to Bank for International Settlements, supervisory technology (Sup Tech) is: "Use of innovative technology by supervisory agency to support supervision" (Broeders D., Prenio J., 2018). Similar definition is presented by European Insurance and Occupational Pensions Authority, which states that: "Supervisory technology, that is defined as use of technology by supervisor to deliver innovative and efficient tech solutions, that will support (…) supervisory system" (European Insurance and Occupational Pensions Authority, 2020). It is important to differentiate Reg Tech, Sup Tech and Fin Tech. While Reg Tech is focused on assisting in compliance with law and regulations from companies perspective, Sup Tech is focused on helping, enhancing and facilitating supervisory process from supervisor perspective (World Bank, 2018). Fin Tech on the other hand is focused on financial services in general (Ślązak E., 2018).

Although Sup Tech is a relatively new term, it is expected to significantly develop in the next 10 years (KPMG, 2018). Key drivers for increased volume of Sup Tech solutions are as follows:

1) Unstructured data from financial entities – data received from financial companies is often qualitative and come from various sources, therefore aggregating information, identifying risks, giving recommendations and concluding insights is often time-consuming manual process.
2) Large complexity of received data – since final recommendations for financial company require professional judgment, increasing number regulations on the market, makes it more difficult for professionals to stay up to date with each guideline and provide appropriate recommendation.
3) New potential risks on financial market – dynamic migration of financial companies to virtual as well as numerous Fin Tech companies entry on the market, make supervisory process even more complex and technology more important to detect any new potential risks.
4) Limited manual resources in developing countries – several countries where financial regulations are not yet fully developed, could face issues concerning lack of qualified staff to undertake supervisory actions or heavy reliance on qualitative case to case supervision (World Bank, 2020).

Sup Tech core use is automating and digitizing supervisory procedures, while increasing their efficiency, availability of data to analyze and reducing costs (Toronto Centre Notes, 2018).

Sup Tech could be also used to following actions:
– real time access to company data and monitoring ongoing transactions,
– exchanging real time information across supervisory authorities,

– undertaking preventive ex ante supervisory actions via predictive monitoring tools,
– using Artificial Intelligence (AI) to analyze Big Data in the company to detect any regulatory breaches, insider trading or market manipulation (KPMG, 2018).
Detailed use of Sup Tech application areas are depicted in Figure 1.

Figure 1
Sup Tech application areas of use
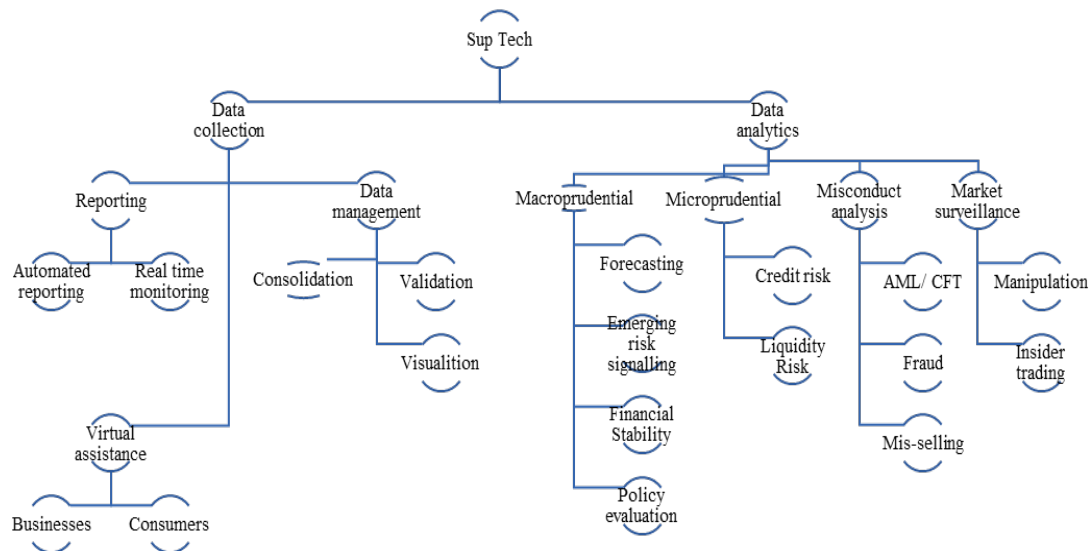
Source: Broeders D., Prenio J., Innovative technology in financial supervision (suptech) – the experience of early users, Bank for International Settlements, 2018.

Main areas of use for Sup Tech are data collection and data analytics. Data collection is further divided on: reporting, virtual assistance and data management, while data analytics in broken down on: macroprudential, microprudential, misconduct analysis and market surveillance.

Key technologies for reporting are: data push (development of special platform, on which banks can send data received directly by central bank), data pull (extracting necessary data directly from bank IT system by supervisor) and real-time monitoring (giving real-time alerts to supervisory entity in case of any abnormal situations). On the other hand, for data management key solutions are: automated data validation (checking whether data is complete and correct as well as improving data quality via machine learning), data consolidation (combining several data sources), data visualization (using visualization tools to present insights) and cloud computing (allowing for increased storage and capacity). For virtual assistance most important solutions are: chatbot usage (allowing online assistance to supervised bank) and machine- readable regulations (transforming regulation document into machine-readable format using natural language processing technology).

For market surveillance key technologies are applications analyzing vast amount of transactions, allowing for detecting insider trading and market manipulation. For misconduct analysis, Sup Tech solutions are focused on developing Neuro-Lingustic Programming (NLP) and Machine Learning (ML) algorithms to identify non-compliance with Anti-Money Laundering (AML) or Combating of Financing Terrorism (CFT) as well as detecting fraud and mis-selling. For microprudential supervision, main Sup Tech solutions are Machine Learning algorithms for credit-risk assessment and neural network to identify liquidity risk. Finally, key technologies for macroprudential supervision are NLP to measure client sentiment (ex. in social media) and applications designed to detect emerging risks (Broeders D., Prenio J., 2018).

Sup Tech poses several uncertainties as well. The most important risks and challenges for Sup Tech are:
– cyber-attacks – with the rise of new technologies, hackers could be willing to attack Sup Tech systems or exploit bugs and limitations during early stages of development,
– system crash – increased importance of IT risk and system failure on the global or local scale,
– over-reliance on technology by both regulators and banks – risk of little involvement from employees in supervisory process, could pose a threat of missing several compliance violation or financial crimes (Patel B., 2018).

5. SUP TECH SOLUTIONS IMPLEMENTATION AND ASSESSMENT

Sup Tech solutions are being implemented mostly in reporting (32%) and misconduct analysis (30%). Key areas of Sup Tech implementation are depicted in chart 3.

Chart 3
Share of key areas of Sup Tech implementation (%)
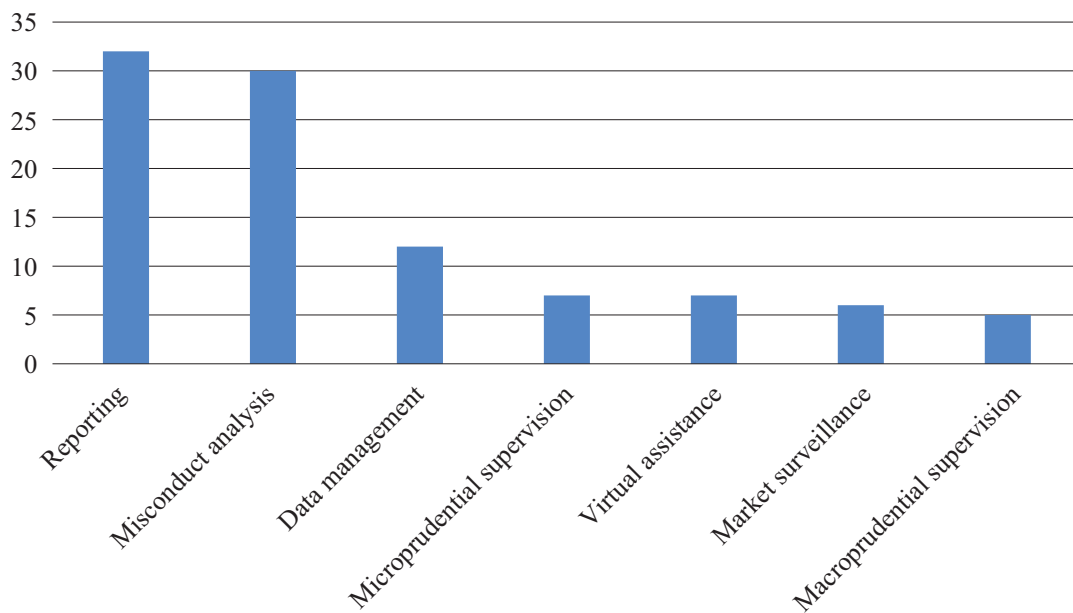
Source: Di Castri S., Hohl S., Kulenkampff A., Prenio J., The suptech generations, Bank for International Settlements, 2019.

In reporting, vast majority of solutions concern automated reporting, while in misconduct analysis refer to AML/ CFT detection. In spite of the fact that Sup Tech market is currently in infancy, its' solutions are being implemented across supervisory entities globally. Sup Tech is believed to have the best results, while supporting experts by freeing their time on repetitive tasks and providing necessary information to help making judgement call (European Central Bank, 2019).

One of the most significant Sup Tech solutions was implemented in Austria. The central bank of Austria (OeNB) was facing issue with the lack of data harmonization submitted by banks, as well as technology gap from different IT systems between both parties. Because of that, AuRep (Austrian Reporting Services GmbH) was established in 2015. This company is owned by seven largest banks in Austria, accounting for ~87% of national market share. Its aim is to decrease time of regulatory process, lower cost of compliance and implement standardization in data collection on the market. AuRep uses data push approach, due to which each entity

prepares data in standardized format that is later on sent to central bank. This system is being used in the vast majority of the market and has been an improvement over previous supervisory process, where data was collected over different frequencies and levels of aggregation (Lux J., Piechocki M., 2015).

Case of Sup Tech solution implementation in misconduct analysis took place in Singapore. Monetary Authority of Singapore (MAS) aimed at improving detection of AML/ CFT violations on the national market. It developed data analytics system based on Natural Language Processing (NLP) to search through thousands reports in order to identify cases with the highest likelihood of AML/ CFT violation. With those automatic identifications, supervisors could focus their efforts not on time-consuming manual process, but on particularly suspicious documents and reports. This approach not only improves efficiency in supervisory process, but also helps to detect data patterns that human would not be able to see (Broeders D., Prenio J., 2018).

Moreover, Bank of Italy implemented Sup Tech solution for data management as well as microeconomic and macroeconomic supervision. Bank of Italy established IT infrastructure with advanced statistical programs (Python, R, Matlab, Spark), which is linked to IT infrastructures of other financial entities. Because of such programs, Bank of Italy can develop macro and microeconomic models more efficiently, and also analyze qualitative data (such as social media sentiment) to assess non-quantitative indicators (Broeders D., Prenio J., 2018).

What is more, Australian Securities and Investments Commission (ASIC) developed Sup Tech platform named Market Analysis and Intelligence (MAI). It operates by collecting real-time data from companies and their transactions. On the basis of the data, it provides risk assessment of the national market and identifies key cases that require further investigation. Due to several technologies that it uses such as advanced analytics in R and Python, it can also predict future outlook of the whole national financial market (Broeders D., Prenio J., 2018).

Sup Tech implementation was successful not only in developed markets, but also in emerging ones. Major case of Sup Tech solution implementation took place in Rwanda in 2017. In Rwanda, policymakers put strong emphasis on financial inclusion, therefore numerous various financial service providers were being established. Although it improved competition on the market, it also challenged supervisors to cover different financial entities with various profiles and capabilities. Because of that, National Bank of Rwanda together with Sunoida Solutions company, developed Electronic Data Warehouse (EDW) aiming at automating and boosting efficiency of supervisory process. Contrary to OeNB, National Bank of Rwanda uses data pull approach, where it can automatically pull necessary data from financial entities. In spite of the fact that financial market in Rwanda is different and has different challenges than financial markets in developed countries, Sup Tech application was successful (Kamali W., Randall D, 2017).

6. FUTURE OUTCOMES AND CONCLUSIONS

The research paper aims to test hypothesis, which is as follows:
– Sup Tech is becoming an innovative tool for banking supervision and is expected to have increasingly larger role in banking supervision

After using the following methods: critical analysis of literature and research papers, descriptive method and comparative analysis of presented data, the hypothesis can be proven positively.

Demand for Sup Tech solutions is on the increase due to several drivers, which are: unstructured data, large complexity of data, limited manual resources in several countries as well as identification of potential new risks in the sector. Sup Tech solutions are applicable in numerous areas such as: reporting, virtual assistance, data management, misconduct analysis etc. Case studies from Austria, Rwanda, Singapore and Italy depict that central banks are able to collaborate either

with banks, technology companies or develop infrastructure by themselves. Banks are especially aiming at reducing effort and cost in compliance, especially considering COVID-19 pandemic and loss in market capitalization. Post financial crisis, number of banking regulations have been of significant increase and penalties for non-compliance were also high. Therefore banks have been spending significant share of overall budget on compliance over business operations. It can be concluded that both banks and supervisory entities aiming at reducing cost and time of the supervision process with the use of new technologies. Successful implementation of Sup Tech solutions could result in increased efficiency of the overall supervision process. The aim of the article was to present Supervisory Technology (Sup Tech) and depict successful implementation of Sup Tech solutions worldwide.

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