Supervisory Technology
Anew Tool for banking system Supervisory in Algeria

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Abstract:

This study aimed to clarify the concept of SupTech, and the possibilities of its adoption and application in Algerian financial system in general, and in the banking system in particular by the Bank of Algeria, as a new digital supervisory tool and as part of its efforts to develop its supervisory tools known as the Risk-Based Approach (RBA) and the new rating system via the ICAAP and ILAAP systems.

The study is concluded with a set of results, perhaps the most important of which are the great importance of SupTech adoption not only in Algerian banking system, but also in the world by different supervisory authorities.

The adoption and the implementation of SupTech by the Bank of Algeria requires a set of basic requirements, such as digital infrastructure, financial and qualified human resources, in addition to an appropriate legal and regulatory framework.

Keywords: Supervision; Supervisory Technology; Banking sector; Bank of Algeria
Jel Classification Codes : C88, G18, G21, O32, E50

Résumé :

Cette étude visait à clarifier le concept de SupTech, ainsi que les possibilités de son adoption et de son application au sein du système financier Algérien en général, et au sein du système Bancaire en particulier, par la Banque d'Algérie. Ce nouvel outil de supervision digitale s'inscrit dans le cadre de ses efforts de développement de l'approche fondée sur les risques (RBA) et du nouveau système de notation via les systèmes ICAAP et ILAAP.

L'étude s'est conclue par un ensemble de résultats, dont les plus importants sont l'importance cruciale de l'adoption de SupTech, non seulement dans le système bancaire Algérien, mais aussi à l'échelle mondiale, par les différentes autorités de supervision.

L'adoption et la mise en œuvre de la SupTech par la Banque d'Algérie nécessitent un ensemble d'exigences fondamentales, telles qu'une infrastructure digitale, des ressources financières et humaines qualifiées, ainsi qu'un cadre juridique et réglementaire approprié.

Mots-clés : Supervision ; Technologie de supervision ; Secteur bancaire ; Banque d'Algérie
Jel Classification Codes : C88, G18, G21, O32, E50

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I. Introduction

Supervision technology (SupTech) has become a strong power capability that enhances how supervision authorities supervise banking sector, this is a response to the emergence of financial technology (Fintech). Supervision Technology refers to supervisors' use of innovative technologies to support oversight and supervision.

This technology plays a significant role in enabling regulators to better supervise and manage risks, and some key areas of supervisory technology include risk management, regulatory reporting, data management, financial crime monitoring, and identity management.

With the fast development of the financial sector, the work of banking institutions has become more complex, raising the challenges associated with financial risks and regulatory compliance. In this context, SupTech applications have emerged as an effective tool for enhancing the efficiency of regulatory authorities in monitoring the banking sector and mitigating various risks, so the adoption of supervisory technology applications has become an urgent necessity to ensure the integrity of financial systems and enhancing confidence in them and protecting financial and economic stability.

In the other hand, the regulatory framework of the Algerian banking system witnessed fundamental reforms during the last quarter of 2014. During 2015, the Bank of Algeria continued its efforts to modernize the means and tools of supervision the national banking sector after adopting the new methodology for risk-based control, this will contribute to providing a favorable ecosystem for the adoption of Supervisory Technology in the future.

I.1 Research Problematic:

Accordingly, and based on the above, the problem of this research was formulated in the following main question:

What are the opportunities and requirements for adopting Supervision Technology by the Bank of Algeria in the Algerian banking system?

The main question includes the following sub-questions:

✓ What is meant by Supervisory Technology and what are its most important features?

✓ What are the differences between traditional supervisory and SupTech?

✓ What are the main requirements of Supervisory Technology applications in Algerian banking system?

To answer the main question and the sub-questions, the following basic hypothesis was adopted:

The adoption of supervision technology by the Bank of Algeria requires a set of basic requirements.

I.2 Research objectives

This research paper aims to achieve the following points:

- Defining the main features of Supervisory Technology;
- Examine the advantages which can be gained from Supervisory Technology by Bank of Algeria;
- Clarify the main requirements to adopt SupTech by the Bank of Algeria;
- Defining the main different challenges of Supervisory Technology application in Algerian Banking system.

I.3 Research importance:

Nowadays, everyone in the world knows the big importance of digital innovation industry, and the topic is very significant**,** because Supervisory Technology is different from traditional one, although both types of supervision fulfill the same needs of supervisory authorities but in different ways. In countries with ambitious financial inclusion agendas, robust market conduct supervision is important to ensure that financial inclusion objectives are achieved responsibly and sustainably, the Algerian experience in this field is also interesting.

I.4 Research methodology

To study this topic, a descriptive approach was adopted, by collecting and analyzing data and information about the subject of the study. For this purpose, many relevant references have been relied upon, in addition to the websites especially Bank of Algeria website.

I.5 Research plan

This research is structured as follows: first point covers the theoretical background of Supervisory Technology, its most important elements and also gives some general overview of the key financial services Sub-Sectors for SupTech. Second point discusses the current situation of banking supervisory in Algeria. Third point discusses the main challenges and requirements of SupTech application in Algerian Banking system.

I.6 Literature of previous studies: Among the previous studies we can mention the following:

1.6.1 The study of Jonathan McCarthy (2022), study entitled: ***the regulation of RegTech and SupTech in finance: ensuring consistency in principle and in practice***, this paper's aim is to consider how best to formulate sturdy regulatory frameworks for RegTech and SupTech. The paper appraises how key features of EU and UK regulatory and policy initiatives can contribute to a functional framework for RegTech and SupTech.

The research paper reached several results, the most important is that there are clear differences in how the European Union and the United Kingdom take regulatory approaches to the growth of RegTech and Supervisory Technology.

However, there are several common features between the two approaches. The paper also demonstrated that it is ideal for the regulatory framework to be imbued with comprehensive strategies and policy objectives, as well as practical measures through innovation facilitators, such as sandboxes. However, legislative intervention (from the top down) will be the key element in ensuring legal clarity for RegTech and Supervisory Technology;

1.6.2 The study of the International Bank for Reconstruction and Development (2020), the World Bank Group, study entitled: ***A Roadmap to SupTech Solutions for Low Income (IDA) Countries,*** this paper is a product of the Global Units of Financial Stability and Integrity and Financial Inclusion, Infrastructure & Access in the World Bank Group's Finance, Competitiveness & Innovation Global Practice, this paper's aim to answer the following main question: How will these SupTech solutions work in lower income countries where resources and infrastructure are limited?

The research paper reached several results, the most important are, that SupTech can help supervisory authorities process information faster and in larger quantities, automate and streamline processes, and identify trends and analyze key risks, among other features. The end result is more efficient decision-making, a move towards predictive supervision and risk identification as well as increased ability to achieve regulatory objectives of financial stability and integrity.

financial sector supervision in most International Development Association countries is still weak, preventing supervisors from effectively and efficiently implementing international standards and best practices. Major challenges faced by supervisors in these jurisdictions

include low quality of data, limited resources, lack of technical expertise, and weak IT infrastructure;

1.6.3 Study of The Financial Stability Board (FSB) (2020), ***The Use of Supervisory and Regulatory Technology by Authorities and Regulated Institutions Market developments and financial stability implications***, this paper's aim is to clarify the opportunities offered by SupTech and RegTech have been created by a combination of factors that have come to the fore in recent years. These include the substantial increase in availability and granularity of data, and new infrastructure such as cloud computing and application programming interfaces (APIs) which allow large data sets to be collected, stored and analyzed more efficiently. Authorities and regulated institutions have both turned to these technologies to help them manage the increased regulatory requirements that were put in place after the 2008 financial crisis.

The research paper reached several results, the most important, that SupTech and RegTech tools could have important benefits for financial stability.

For authorities, the use of SupTech could improve oversight, surveillance and analytical capabilities, and generate real time indicators of risk to support forward looking, judgement based, supervision and policymaking.

1.6.4 Research gap: Accordingly, the research gap is represented in an attempt to clarify and identify the requirements for adopting supervisory technology as a modern tool for monitoring of the global Algerian financial sector by the Bank of Algeria and to attempt to propose a model for its feasibility.

II. Definition of Supervisory Technology and its types

The definition and types SupTech will be presented as follows:

II.1 Definition of Supervisory Technology: The SupTech market is still an emerging market, as the term was only coined in 2017, and many definitions have been given, the following can be mentioned:

II.1.1 SupTech is "an acronym for Supervisory Technology, a term that combines the words "supervision" and "technology", meaning the use of modern technologies such as artificial intelligence and big data analytics to help regulatory and supervisory authorities in the financial and banking sector, improve the efficiency and effectiveness of supervisory and regulatory processes." (Jermy Prenio & others, 2024, p. 1) ;

II.1.2 SupTech is "the use of innovative technology by supervisory authorities to support supervision, as it helps digitize reporting and regulatory processes, leading to more efficient and proactive monitoring of risks and compliance in financial institutions". (Ssebalamu, 2024)

II.1.3 In 2018, the Financial Stability Board defined supervisory technology as "the use of innovative technology by supervisory bodies to support oversight, this system helps supervisors digitize reporting and regulatory processes, leading to more efficient and proactive monitoring of risk and compliance in financial institutions". (Financial Stability Institute, 2018, p. 1)

II.1.4 SupTech is the "use of technology by supervisors to deliver innovative and efficient supervisory solutions that will support a more effective, flexible and responsive supervisory system". (EIOPA, 2020, p. 1)

II.1.5 Basel Committee on Banking Supervision defines SupTech as the "use of technology to facilitate and enhance supervisory processes from the perspective of supervisory authorities".

Furthermore, SupTech evolves as technology evolves, so the definition should not be limited to specific technological tools, such as artificial intelligence, machine learning, and natural language processing. As technological tools become increasingly available, supervisors can leverage them to perform their responsibilities. (Jermy Prenio & others, 2024, p. 1) ;

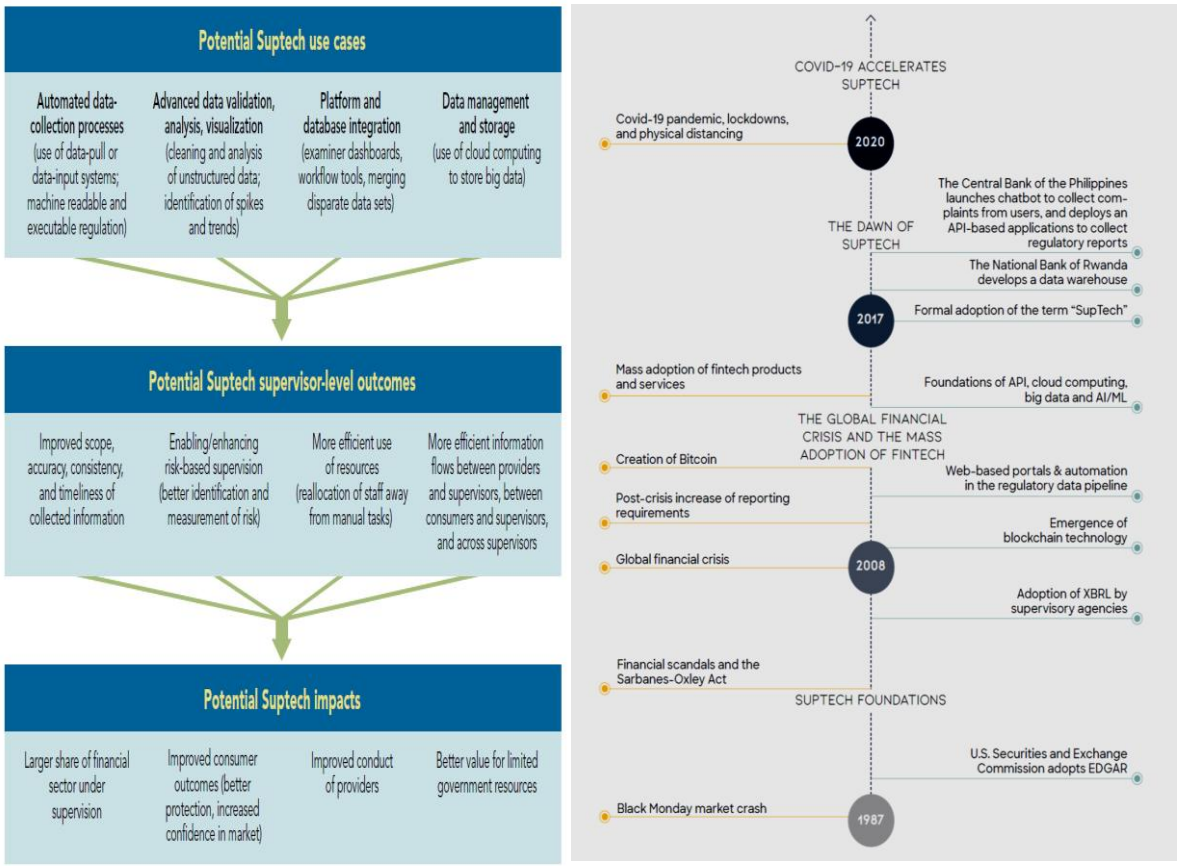
Although there is no universally agreed definition of SupTech, based on the definitions provided, it can be defined as the "use of technology to carry out

supervisory responsibilities".

Based on this definition, it can be concluded that SupTech are sub-set of FinTech whose distinction, relies on the user and the goal of a specific innovative technology. If the innovative technology aims to assist a financial firm to comply with its compliance duties, that specific technology should be considered as RegTech. On the other side, if a specific innovative technology aims to support the Supervisory tasks performed by a supervisory entity, it should be considered as SupTech. (de Azevedo, 2021, p. 12)

The following figure illustrates the results framework for market behavior and supervisory technology solutions.

Fig (01): SupTech Conceptual Framework and its chronological evolution



Source: International Bank for Reconstruction and Development, ***From Spreadsheets to Suptech Technology Solutions for Market Conduct Supervision***, discussion note, The World Bank, June 2018, p: 6

II.2 SupTech types:

There are two main areas of application of SupTech, namely investigative supervisory technology and preventive supervisory technology. (Mothibi & Rahulani, 2023, p. 7)

II.2.1 Investigative SupTech: involves the detection of regulatory non-compliance after its appearance. This regulatory breach is within a spectrum that

can range from mild to severe flaws. Investigative SupTech activities entails; misconduct analysis, data management, and reporting;

II.2.2 Preventative SupTech: implies allowing the supervisor to act in advance of a breach of regulation by any of the supervised entities, thereby monitoring the risk factors that could trigger a breach. Activities under preventative SupTech include risk monitoring, financial crime surveillance, and identity management.

III. Supervisory Technology solutions and its generations

The solutions and generations of SupTech can be classified into four distinct categories and stages, as shown below:

III.1 Supervisory Technology solutions

Supervisory Technology solutions are classified according to supervisory activity into four main categories for monitoring market conduct, which are: (Chien & Wallace, 2021, p. 6)

III.1.1 Regulatory reporting: includes supervision information systems, automated data submission via API and web portal data upload with central database;

III.1.2 Collection and processing of complaints data: include complaints management system and analysis of unstructured complaints data;

III.1.3 Non-traditional market monitoring: include: web scarping, social media monitoring, consumer sentiment analysis, reputational analysis and dark web monitoring;

III.1.4 Document and business analysis: document analysis for regulatory compliance, document analysis for examination of FSPs, document analysis for peer group comparison, validation of terms and conditions, automated review of new provider registrations, predictive modeling of financial statements, business intelligence and geospatial analysis and managed data platform.

III.2 Supervisory Technology generations

To clearly define the future of supervisory Technology for supervisory authorities, it has been divided into four generations: (Beerman, 2021, pp. 3-4)

III.2.1 Generation 1: The first generation encompasses data management workflows, which rely heavily on manual processes and mostly descriptive analytics. Data is manually entered into spreadsheets, randomly checked for errors, stored in different databases or folders, and painstakingly transformed to generate consistent management reports;

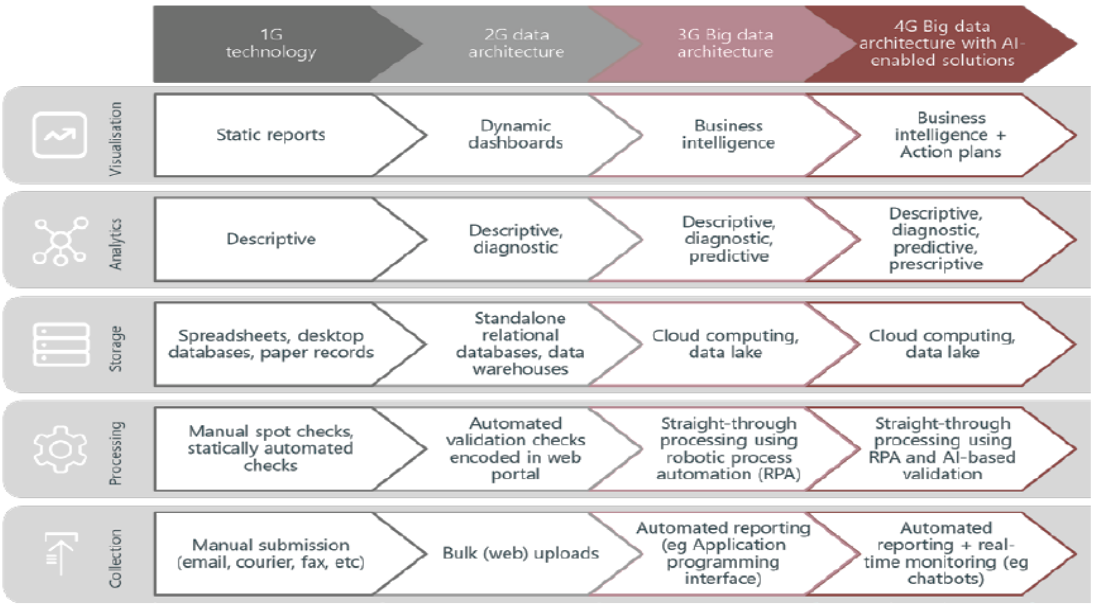
III.2.2 Generation 2: The second generation covers the digitization and automation of some paper-based and manual processes for data transmission, processing, and storage. Enhanced analytics enable more comprehensive diagnoses of changes in the supervisory landscape, as well as richer descriptive insights than were available in the first generation.

III.2.3 Generation 3: The third generation covers big data structures. These structures are built using technology packages that support data with higher accuracy, diversity, and frequency than previously available. Computing power, coupled with big data, enables more advanced statistical modeling, including predictive analytics.

III.2.4 Generation 4: The fourth generation includes the addition of artificial intelligence (AI) as a defining feature. Generally, AI-enabled solutions or tools assume a basic big data architecture, as most AI models require massive amounts of data and significant computing power to produce accurate, meaningful, and actionable results.

All of the above can be explained through the following figure:

Fig (02): SupTech generations

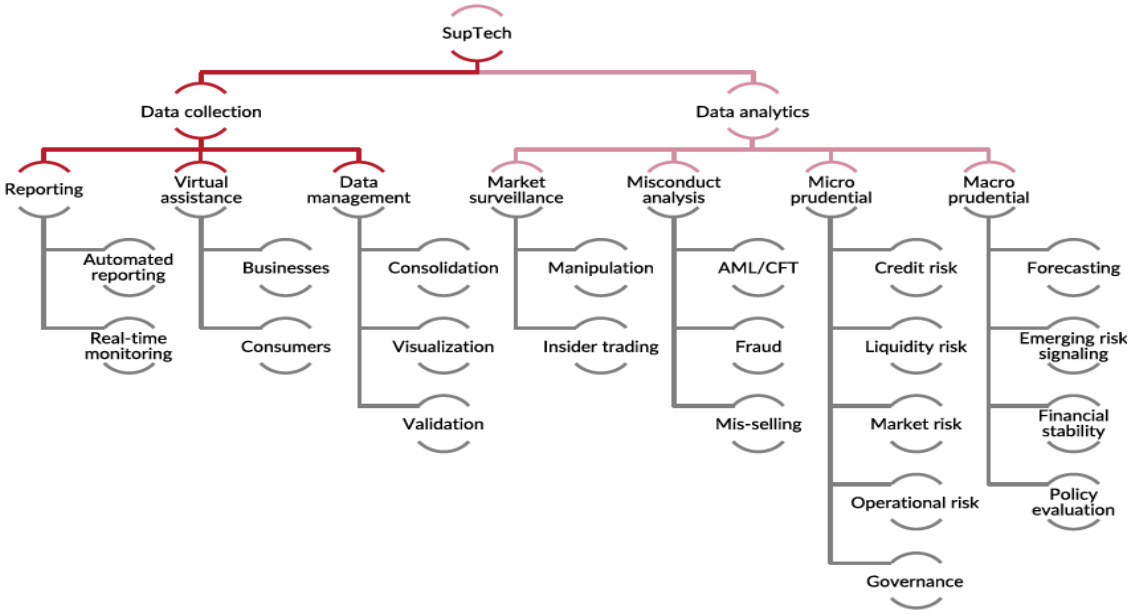


Source: Simon di Castri and others, the SupTech generations, Financial Stability Institute, October 2019, p: 6.

IV. SupTech use cases

SupTech can be used in two main areas, the first is related to data collection and the second is related to data analytics, each of which has major sub sectors, as shown in the following figure:

Fig (03): Areas of financial supervision in which SupTech applications are used



Source: Simon di Castri and others, the SupTech generations, Financial Stability Institute, October 2019, p: 10.

V. The tools and benefits of SupTech

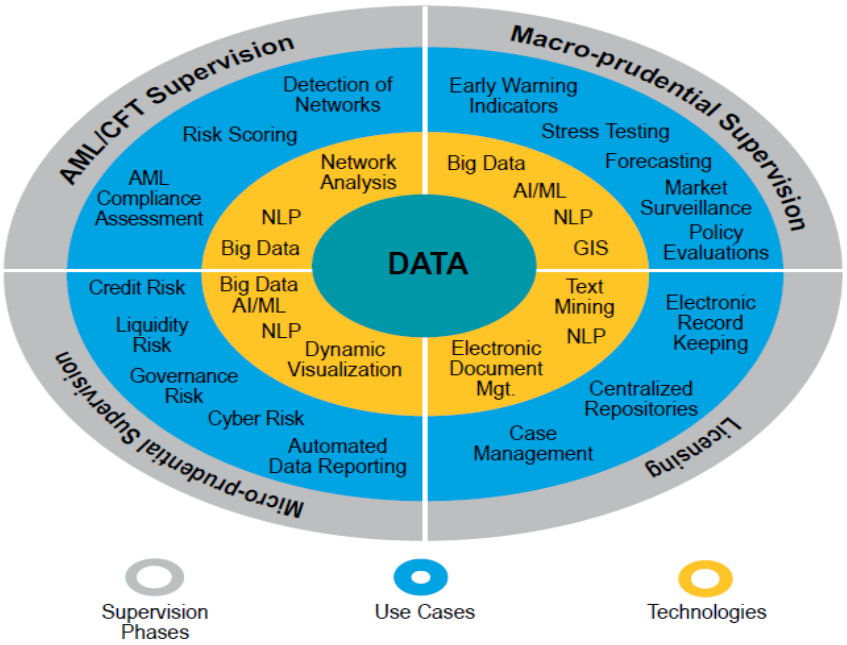
The Financial Stability Board has highlighted how the balance of supply and demand ignited the development and use of SupTech tools. From the demand side and among other aspects, enhanced supervisory and regulatory requirements and improved risk management capabilities, where the automation of data retrieval and summarization can drastically improve supervisory processes. From the supply side, the increasing availability of data and new analytical methods are among the top supporters of the regulatory necessities. (Guerra & others, 2022, p. 5)

V.1 SupTech tools

The following figure illustrates the different technologies that supervision technology relies on, and the possible uses cases for each one, it must be noted that use cases and technologies may overlap. Among the most important tools of supervision technology are: big data, artificial intelligence, natural language processing …etc.

The following figure illustrate the different technologies of SupTech and their uses at different supervision phases.

Fig (04): different technologies of SupTech and their uses



Source: International Bank for Reconstruction and Development / The World Bank, ***The Next Wave of Suptech Innovation, Suptech Solutions for Market Conduct Supervision***, 2021, p:7.

V.2 Benefits of SupTech: There are many benefits to supervisory technology which include: (Central Bank of Egypt, 2024, p. 3)

V.2.1 Enhanced analytical capabilities;

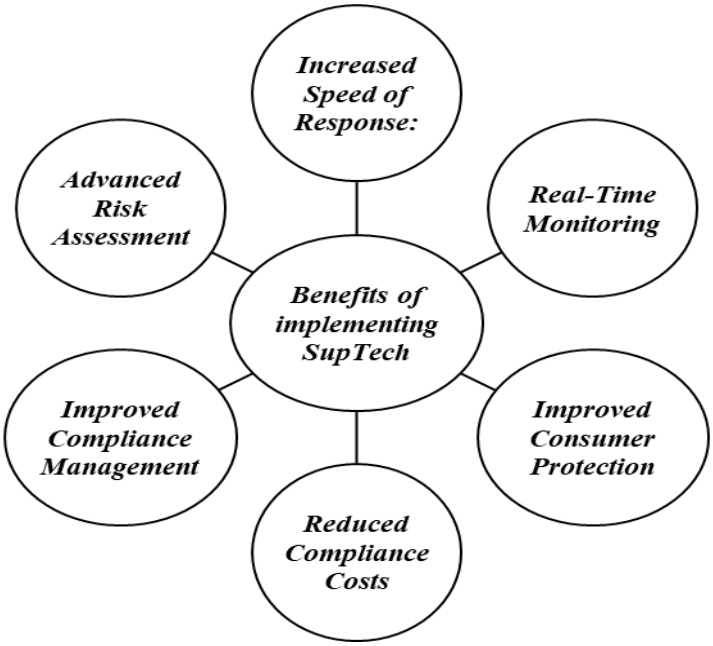
V.2.2 Enriched visuals, stemming from state-of-the-art data collection to sophisticated dashboards;

V.2.3 Reduced costs, as a consequence of automation.

V.2.4 Ensuring a delicate and full compliance with the regulatory requirements, the reporting and compliance routines of banks and financial institutions are becoming digital and technological.

The following figure summarizes the most important benefits of implementing SupTech in banking sector:

Fig (05): Benefits of implementing SupTech in Banking sector



Source: By authors depending on: Central Bank of Egypt, SupTech, May 2024, p: 3

VI. Banking supervision in Algeria

Banking supervision is exercised on the basis of continuous monitoring known as document-based monitoring, and on-site monitoring of banks and financial institutions subject to the supervision of the Banking Commission.

VI.1 Supervision objectives: supervisory actions focus on the following aspects collecting, reviewing and analyzing the accounting and prudential statements of banks and financial institutions to verify their reliability and consistency, so supervision mission aims to ensure: (Bank of Algeria, 2015, p. 120)

VI.1.1 ensuring compliance with prudential standards;

VI.1.2 ensuring the adequacy of the internal control and risk monitoring systems implemented by banks and financial institutions;

VI.1.3 conducting close and prospective monitoring of subject banks and financial institutions (specific risk profiles);

VI.1.4 assessing the quality of the systems implemented by banks and financial institutions in the fight against money laundering and terrorist financing

VI.1.5 using the reports of the Statutory Auditors and obtaining the opinion of the external auditor;

VI.1.6 Reporting to the Banking Commission any proven evidence likely to expose the situation of a bank or financial institution;

VI.1.7 Assessing the conditions for authorization of banks and/or financial institutions to begin operations or for changes to their shareholder structure;

VI.1.8 Assessing applications for approval of senior executives and authorization to implement new products;

VI.1.9 Review customer requests.

VI.2 The evolution of banking supervisory in Algeria

On the regulatory level, the Monetary and Banking Council and the Bank of Algeria continue their efforts to consolidate and strengthen the conditions for conducting banking activities, preparing banking reports, and protecting customers of banks and financial institutions. The Bank of Algeria and the banking commission also continued to work in order to strengthen banking supervision, particularly to ensure it is compatible with international standards and principles in this area.

VI.2.1 Bank of Algeria has refined its monitoring, vigilance, and warning mechanisms, particularly its monitoring of banks' situations through stress testing and banking system resilience indicators.

VI.2.2 In 2013 the adoption of a banking rating system called "CAMELS", the Bank of Algeria uses the CAMELS system, which is based on six elements, Capital adequacy, Asset quality, Management quality, earning management, Liquidity position, Sensitivity of market risk, that are weighted by assigning a point to each of these elements, so the evaluation process concludes with allow a point to the institution called the composite evaluation, which reflects the degree of the institution's exposure to risks. The Bank of Algeria seeks to develop supervisory system to ensure the effectiveness of banking supervision, or what is known as the Supervisory Bank Patting System. (Bank of Algeria, 2015, p. 121).

- Project to redesign the CAMELS 2020-2022 rating system: (Bank of Algeria, 2022, p. 15)
- In the permanent control department, with the aim of ensuring continuously updated ratings;
- Expansion of rating components (from 6 to 10) through the examination of ten risk areas;
- Reduction in the number of ratings, removal of the intermediate rating 3 when rating each risk to enable a pronounced rating;
- Redesign of rating guides;
- Next steps: Implementation of the ICAAP (Internal Capital Adequacy Assessment Process) and ILAAP (Internal Liquidity Adequacy Assessment Process);
- Improving the granularity and quality of information and its processing;
- Project to redesign the bank chart of accounts and implement a single accounting report (currently being validated);
- Dematerialization of interactions with third parties (started in 2022).

VI.2.3 During 2015, work continued on developing the application for stress testing to adapt it to the national environment. The first tests of the model were conducted, and document-based control work was consolidated through the establishment of IT application for the automated analysis and exploitation of

prudential reports. In this regard, with technical support from the world bank, the bank of Algeria began developing an integrated and dynamic model for stress testing.

This application allows to assess the sensitivity of banks and financial institutions to any changes in the risk factors arising from their banking activities (probability of default, interest rates, excessive deposit withdrawals…etc), taking into account the occurrence of each factor individually or the simultaneous occurrence of more than one factor.

These tests enable assessing the strength of the banking system through a systemic measure, as stress tests take into account the interactions between financial institutions (contagion risk) and the impact of macroeconomic variables on the banking system.

Furthermore, in 2015 an application called the Financial Projection Model (FPM), Calculate the total cost of rescuing banks and institutions (during a systemic crisis); (Bank of Algeria, 2022, p. 15)

VI.2.4 The Bank of Algeria has updated its supervisory tools and methods allowing for greater supervisory efficiency, as it directly targets the risks specific to each bank and financial institution. This is a newly developed supervisory system known as the Risk Based Approach or Risk Based Monitoring and definition of supervisory actions based on the risk profile, based on the rating assigned to it.

Rating assigned by the on-site inspection based on quantitative analysis of data and a qualitative assessment, assignment of a composite rating on a scale of 1 to 5 based on rating guides/matrices, a document-based inspection guide outlining the risk assessment methodology.

VI.2.5 With the aim of modernizing the supervisory function, during 2020 year, the Bank of Algeria launched a project related to the transition from a banking rating system based on on-site supervision to a Supervisory Review and Evaluation Process (SREP) system, which is part of permanent supervision. (Bank of Algeria, 2020, pp. 126-127).

The transition from CAMELS to SREP is expected to take place over the medium term (5 years). For the purpose of performing the Supervisory Review and Evaluation Process (SREP), the Bank of Algeria must develop a common methodology for the ongoing assessment of credit institutions' risks, their governance arrangements and their capital and liquidity situation.

VI.2.6 The SREP requires that the supervisors review the arrangements, strategies, processes and mechanisms implemented by the credit institutions and evaluate the following: (European Central Bank, 2014);

- Risks to which the institutions are or might be exposed;
- Risks that an institution poses to the financial system in general;

- Risks revealed by stress testing, taking into account the nature, scale and complexity of an institution's activities.

VI.2.7 The SREP encompasses three main elements: (European Central Bank, 2017)

- A risk assessment system (RAS), which evaluates credit institutions' risk levels and controls;
- A comprehensive review of the institution's (ICAAP) and (ILAAP) Process;
- A capital and liquidity quantification methodology, which evaluates credit institutions' capital and liquidity needs giving the results of the risk assessment.

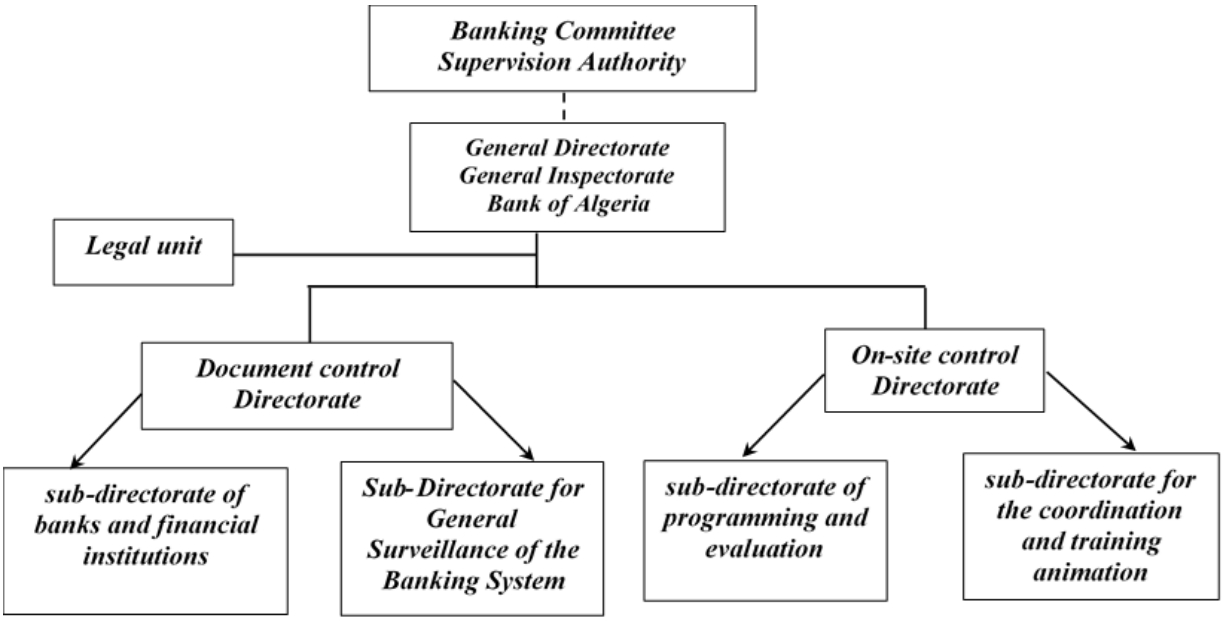
VI.2.8 Islamic Finance:

- Establishment of a supervisory framework for Islamic finance activities;
- Development of prudential regulations and implementing texts adapted to Islamic finance activities;
- Training of inspectors for the supervision of Islamic banks.

The Bank of Algeria will continue to prioritize supervisory activities based on the CAMELS rating matrix. This new system consists of four main, interconnected axes, providing the necessary data for ratings, both quantitative and qualitative. In addition to the first two axes, based on governance and business model assessments, this system is expected to be complemented at a later stage with tools allowing banks and financial institutions to participate in a new rating system via the ICAAP and ILAAP systems.

The following figure, illustrate the main missions and organization of banking supervision in Algeria (Banking Committee):

Fig (06): organization of banking supervision in Algeria (Banking Committee)



Source : Bank of Algeria, ***la supervision basée sur les risques***, 60 -ème Anniversaire de la Banque d'Algérie 2022 : p : 15.

VI.3 Risk-Based Supervision in Algerian Banking system

The Risk-Based Approach (RBA) is a supervisory tool used by both competent regulatory and supervisory authorities and regulated institutions, so it represents a proactive control process (risk profiling of regulated institutions) and a precise assessment of individual financial strength and the quality of their governance.

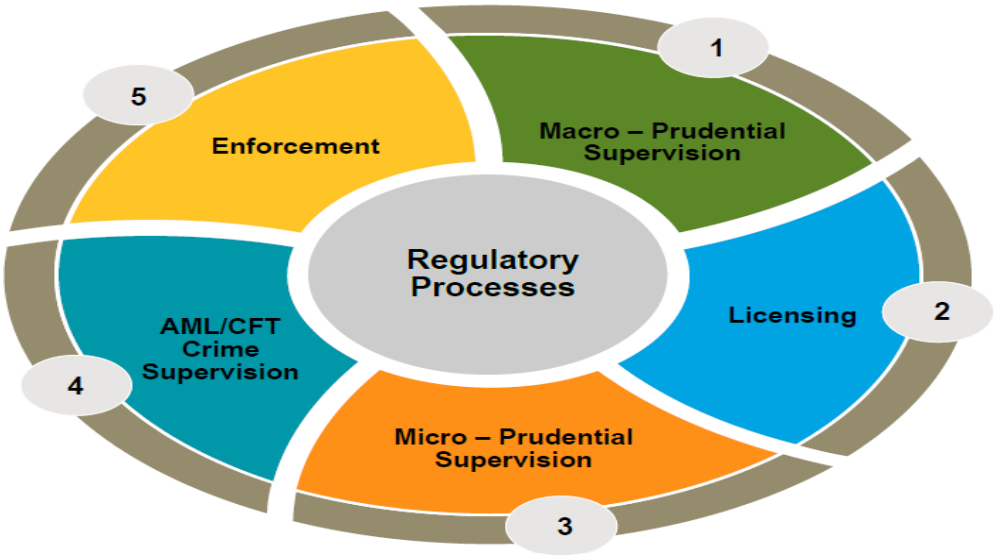
VI.3.1 It takes in to consideration both the degree of damage which the failure of an institution could cause to financial stability and the possibility of such a failure occurring.

VI.3.2 Focusing control resources on identifying activities generating significant risks and institutions with high-risk profiles, and this objective is achieved through the Determination of risk profile of regulated institutions, the anticipation of individual and systemic difficulties, and finally rational allocation of control resources to areas and/or institutions presenting or expected to present the highest actual or potential risks.

VI.3.3 Risk Based Supervision (RBS) is gradually becoming the dominant approach to regulatory supervision of financial institutions around the world. It is a structured system that assesses risks posed by a regulated financial institution and prioritizes allocation of supervisory resources in proportion to these risks. The supervision of the licensed institutions is performed at two levels, micro-prudential supervision focusing on firms, data validation analysis and risk identification, the macro-prudential supervision addressing the wider system and financial markets as a whole especially financial stability. Most supervisors employ the RBS approach to organize and execute their key activities, namely licensing, micro-prudential supervision, AML/CFT or financial crime supervision, conduct supervision, and macro-prudential supervision (World Bank Group, 2020, p. 5).

The figure below illustrates the essential features of an effective RBS framework. Starting from the foundational level, the effectiveness of the RBS framework relies on timely, adequate and accurate data management, covering various facets of financial institutions' data as well as relevant macro data about the markets and the economy. This requires an efficient data collection system and a comprehensive data management function covering systems for data validation, storage, consolidation, analytics visualization and dissemination.

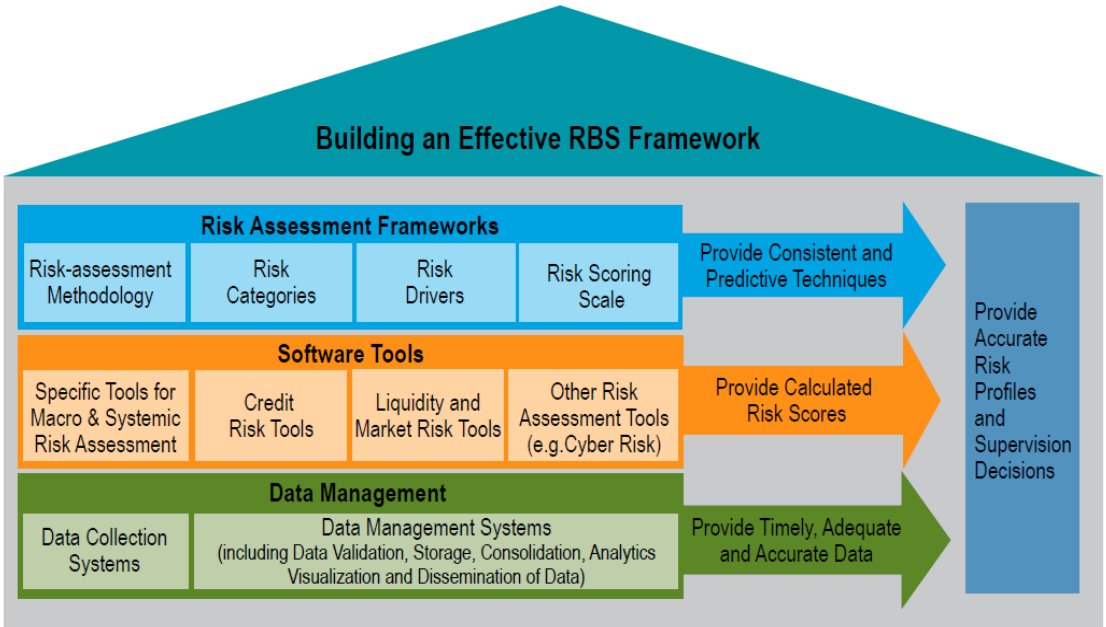
Fig (07) Key Supervisory Processes



Source: World Bank Group, ***a Roadmap to SupTech Solutions for Low Income (IDA) Countries***, Washington, 2020, p: 5.

VI.3.4 For the Bank of Algeria to adopt Risk-Based Supervision, a set of tools must be available to support this system, such as data management and software tools, which represent a big challenge for supervisory authorities. The figure below illustrates the most important tools to Support an effective RBS framework:

Fig (08) Tools to Support an Effective RBS Framework



Source: World Bank Group, ***a Roadmap to SupTech Solutions for Low Income (IDA) Countries***, Washington, 2020, p: 5

VII. Reasons for adopting SupTech by the Bank of Algeria

Algerian Banking system reforms began with the integration of stricter prudential recommendations accepted internationally since 1991, which strengthened financial resilience indicators. Furthermore, in the last quarter of 2014, the Bank of Algeria strengthened its macroprudential policy through the implementation of new regulatory texts, primarily concerning the solvency ratio and risk management. Attending to the challenges and issues related to financial stability has become a primary goal for Algerian monetary authorities, especially given the unstable global financial environment caused by geopolitical crises, climate crises, and other factors. This necessitated the issuance of a new monetary and banking law, the establishment of a Financial Stability Committee, and the strengthening of the banking supervision system.

VII.1 Risk Assessment Unit -Money Laundering and the Financing of Terrorism- ML/FT

Based on the National Risk Assessment adopted in June 2024, which highlighted the growing threats in the field of virtual assets and virtual asset service providers, Algeria conducted an in-depth assessment in this area.

Bank of Algeria has been set up a unit to identify the risks of money laundering and terrorist financing in the context of electronic transactions or the use of new technologies. (Cellule d'identifiCation des risques de blanChiment, 2025, p. 5).

The most popular virtual assets in Algeria are cryptocurrencies. In terms of user numbers, Tether (USDT) leads the way, followed by Bitcoin (BTC), Ethereum (ETH), and Litecoin (LTC). USDT, a stablecoin pegged to the US dollar, is particularly valued for its stability[*].

However, in terms of transaction volume, Bitcoin dominates by a wide margin, followed by USDT and ETH. As for the other types of virtual assets adopted, they mainly concern tokens and non-fungible tokens (NFTs).

Furthermore, the VASPs - Virtual Asset Service Providers-identified in Algeria, primarily active via social media, include both illegal local actors and foreign actors. They are divided into the following categories:

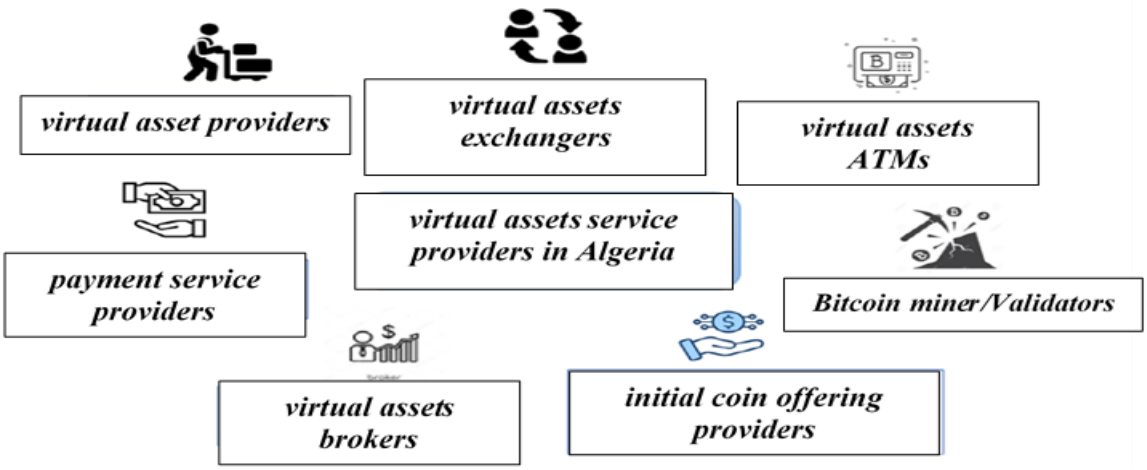
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[*] It should be noted that the current legislative framework regarding virtual assets is primarily based on a ban on virtual currencies, as established by Article 117 of Law No. 11-17 of December 27, 2017, relating to the 2018 Finance Act.

Furthermore, the concept of "virtual assets" is defined for the first time in Law No. 05-01 on the prevention and fight against money laundering and the financing of terrorism, as amended and supplemented by Law No. 23/01 of February 7, 2023.

The Article 48 of Bank of Algeria Regulation No. 24-03 of July 24, 2024, requires subject institutions to implement a mechanism to block any transaction involving virtual assets or service providers related to these assets and to immediately report them to the Algerian Financial Intelligence Processing Unit.

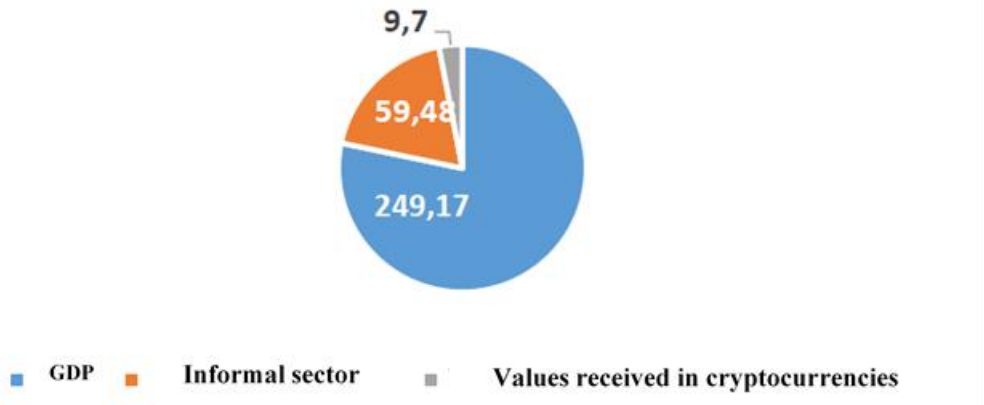
Fig (09): Virtual Asset Service Providers operating in Algeria



Source : Cellule d'identification des risques de blanchiment d'argent et de financement du terrorisme dans le cadre des transactions électroniques ou de l'utilisation de nouvelles technologies, ***synthèse du rapport d'évaluation des risques de blanchiment d'argent et de financement du terrorisme lies aux actifs virtuels***, 2025, p : 9.

Growing adoption of cryptocurrencies, with over 1.74 million users nationwide and 1309.5 billion dinars in assets received. These assets represent over 16% of the informal sector and over 4% of GDP (see graph below).

Fig (10): Share of values received in relation to the informal sector and GDP



Source : Cellule d'identification des risques de blanchiment d'argent et de financement du terrorisme dans le cadre des transactions électroniques ou de l'utilisation de nouvelles technologies, ***synthèse du rapport d'évaluation des risques de blanchiment d'argent et de financement du terrorisme lies aux actifs virtuels***, 2025, p : 8.

VII.2 The results obtained from the updated sectoral assessment report on money laundering and terrorist financing risks for the banking sector confirm those from the previous assessment, in terms of individual risk scores and by subsector. The assessment assigns a "medium-high" residual risk to the banking sector, this ranking reflects a balance between some progress in compliance and persistent vulnerabilities. These vulnerabilities are linked to the diversity of customers, the exposure of certain products/services to threats, and the extent of operational networks. Some institutions are particularly exposed due to their systemic weight. Furthermore, gaps remain in governance and internal control systems, although structural measures have been taken to strengthen the fight against ML/TF.

This assessment is part of the supervisory missions carried out by the Banking Commission, in application of Monetary and Banking Law 23-09 and law number 23-01 relating to the prevention and fight against ML/FT, as well as Executive Decree number 23-430 governing the methods of intervention of the regulatory and supervision authorities in this area.

The following table shows the impact of the main threats on the Algerian banking system.

Table (01): Impact of the main threats on the banking system

Threats	**Corruption**	**Tax fraud**	**Drug trafficking**	**Customs office violation**	**Smuggling of goods**	**Migrant smuggling and human trafficking**
Impact on the banking system	**Indirect impact**	**Direct impact**	**Indirect impact**	**Direct impact**	**Indirect impact**	**Indirect impact**

Source : Bank of Algeria**,** ***Synthèse du rapport d'évaluation sectorielle des risques de BA-FT du secteur bancaire et d'Algérie Poste*****,** 2025, p : 15.

VII.3 Approaches for Applying SupTech Solutions by the Bank of Algeria

Effective implementation of SupTech in Algerian banking system is not only about the availability of financial and human resources, it is also dependent on how this technology is implemented by the Bank of Algeria, and the necessity of providing the appropriate ecosystem for its adoption.

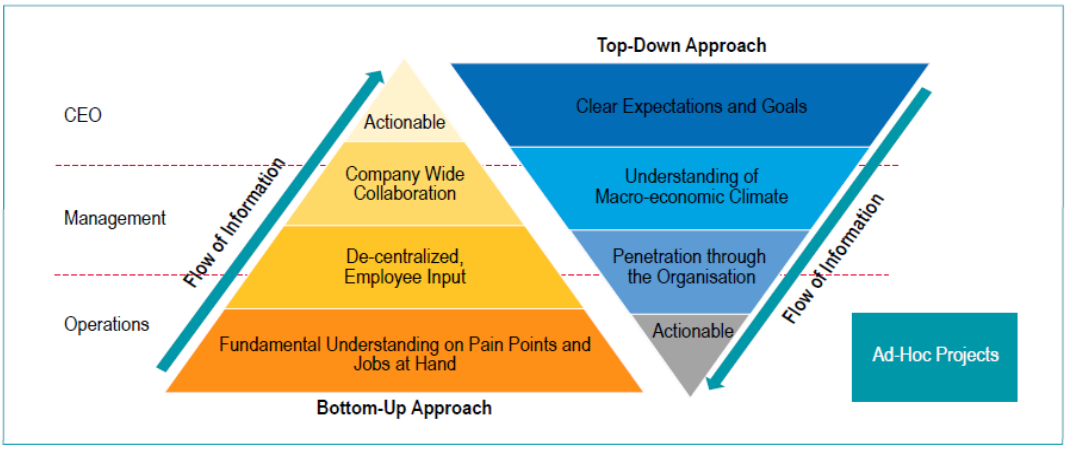
The first step is to design a clear, well defined and objectives of SupTech strategy for an effective implementation of SupTech solutions.

Approaches to apply a SupTech solution can vary, there is a top-down approach, here the role of Bank of Algeria is a key component, while in a bottom-up approach, the role of individuals, departments are very important.

Furthermore Project-based (ad-hoc) approach, its benefit is that it addresses particular needs of individual departments in a timely manner.

So, the Bank of Algeria may choose from among these approaches which it considers appropriate.

Fig (11): General Approaches to Apply a SupTech Solution



Source: International Bank for Reconstruction and Development, The World Bank Group, **A Roadmap to SupTech Solutions for Low Income (IDA) Countries,** Fintech Note, No. 7, 2020, p: 19.

VII.3 Challenges of SupTech application by the Bank of Algeria

The implementation and development of SupTech solutions currently in Algeria faces many challenges. These challenges are different and can be identified both in terms of infrastructure or technology, as well as regulatory or operational, including in the context of financial and human resources. One of the significant problems faced by developers of SupTech solutions is the lack of interoperability, which in this case should be understood as the inability to quickly implement solutions at the level of institutions, as well as limitations related to the possibility of banking outsourcing in risk management of banking activities.

This limits the possibility of introducing solutions to improve and automate some processes in the bank and other financial institutions Banks have often different and outdated systems especially in public banks that makes implementation of even relatively simple solutions technologically and operationally difficult.

Other challenges, like the lack of knowledge and expertise in using modern analytical tools, underdeveloped IT infrastructure, high price of modern business analytical tools and data Collection

The Bank of Algeria faces greater challenges in banking supervision, such as poor data quality, a lack of financial resources, weak analytical capacity, and scarce human and information technology resources, exacerbated by weak institutional structures and weak legal and regulatory frameworks.

The following table shows the most important obstacles and possible solutions to the implementation of supervision technology by the Bank of Algeria. Note that the table was taken from a study prepared by the Global Units of Financial Stability and Integrity and Financial Inclusion, Infrastructure & Access in the World Bank Group's Finance, Competitiveness & Innovation Global Practice, with some modifications that are consistent with the Algerian situation.

Table (02): Obstacles to the Adoption of SupTech Faced by Bank of Algeria Countries and Potential Remedies

Obstacles	Potential remedies
Lack of Management buyin; resistence to change	- Begin with a feasibility and cost-effectiveness study - Encourage dialogue with industry's leaders - Understand international benchmarks and efficiency gains - Develop a clear view of outcomes and potential cost-savings
Lack of financial Resources	- choose the appropriate approach to apply a SupTech Solution which is consistent with the Algerian situation; - investments and then scale up while keeping focused on the key outcomes - In the longer term, investments in SupTech solutions should bring substantial
Insufficient number of staff with the required Skills (IT, analytical skills)	- Human resources policies that are oriented toward hiring and retaining staff with necessary skills (IT, analytical skills, Fintech's tools) - Capacity building for staff including with the help of international organizations and other third parties - Use of external vendors to design and implement SupTech solutions, with a subsequent training of staff to use them
Costs and burden for regulated entities	- Constant and detailed dialogue with regulated entities to understand risks, associated costs and other constraints - Holistic strategy at the level of reporting entities and supervisors intended to bring eventual cost savings to both sides
Need to ensure cohesion with existing legacy Systems.	- Conduct a feasibility and dependency assessment before implementation - Ensure that all the relevant departments are well cited on the new tool(s) and Concerns taken into consideration
Underdeveloped IT Infrastructure	- Where possible, IT infrastructure should be upgraded before starting to implement SupTech solutions, which requires significant investment (often at a country level)
lack of a legal framework governing the exercise of the activities of Virtual	- Establish a regulatory framework - Implement specific legislation for virtual assets, including a comprehensive definition of virtual

Asset Service Providers	currencies and virtual asset service providers (VASPs), as well as a clear sanctions and confiscation regime. - the provision of all necessary resources and tools to enable the investigation and traceability of virtual assets;
Fight against money laundering and the financing of terrorism (AML/CFT).	- the establishment of specialized services for handling cybercrime investigations; - the organization of training sessions for operational agents involved in the fight against cybercrime and economic crimes, as well as participation in seminars and conferences, in Algeria and abroad, on cybercrime, cryptocurrencies, and other forms of crime using these technologies. -Develop continuous technology monitoring -Encourage the implementation of technology monitoring systems and strengthen the skills of teams responsible for regulation, financial supervision, and cybersecurity, in order to anticipate rapidly evolving practices and threats in the field of digital assets.
Banking sector supervision	-mobile app used to verify customers' identity -artificial intelligence used to monitor transactions -KYC utilities used to gather customer due diligence documentation RegTech solutions to enhance the effectiveness and efficiency of SupTech's tools -Established at the level of the Bank of Algeria Supervision information systems for regulatory Reporting and Complaints management systems (CMS) Collection and Processing of Complaints Data The creation of a web-based platform like Athena and Heimdall used by the european central bank
Informations security	-The foundation of Data protection commission to cooperate with the Algerian Financial Intelligence Processing Unit and banking commission

Source: International Bank for Reconstruction and Development, The World Bank Group, **A Roadmap to SupTech Solutions for Low Income (IDA) Countries,** Fintech Note, No. 7, 2020, p: 21,

Bank of Algeria**, *Synthèse du rapport d'évaluation sectorielle des risques de BA-FT du secteur bancaire et d'Algérie Poste*,** 2025, p : 15.

V.III. Conclusion

This research paper presented general concepts of SupTech, in terms of definition, tools, and importance, in addition to reviewing the requirements for its application in the Algerian banking system, as well as the challenges facing supervisory authorities, especially the Bank of Algeria, in this field.

So, SupTech, is a new term of art in the meaning of using technological tools and solutions like cloud computing, machine learning, predictive analytics and Natural Language Processing to carry out supervisory responsibilities

Technology and innovation are transforming the financial landscape, presenting opportunities and challenges for regulated institutions and supervisory authorities, one important area of innovation is the application of financial technology throw its different technologies by supervision authorities, so there is an Interaction of technology solution with supervisory system.

The creation and adoption of SupTech tools can be traced to the need to support supervisory processes while ensuring compliance with the increased regulatory requirements that were implemented after the 2008 global financial crisis.

Many supervisory authorities are therefore seeking technology enabled solutions to increase the efficiency and effectiveness of their supervisory activities, the Bank of Algeria should adopt a SupTech initiative and attempt to develop its tools, either internally or through collaboration with other supervisory authorities around the world and thus creating appropriate SupTech ecosystem.

The Bank of Algeria seeks to develop its supervisory tools for the entire financial sector by adopting new supervisory digital tools, since 1990, the Bank of Algeria has been trying to Keeping up with global prudential standards.

To address the structural vulnerabilities of its economy, notably the predominance of the informal sector and the widespread use of cash, Algeria has implemented a multifaceted action plan aimed at strengthening financial inclusion and regulating financial flows. This has resulted in the recognition of the right to a bank account, the promotion of electronic payments, the banning of cash payments in certain sectors, and the formalization of informal activities through schemes such as self-entrepreneurship and micro-importation. Strict regulatory measures also govern cross-border capital flows.

At the same time, Algeria has strengthened its legal and operational arsenal to combat the financing of terrorism with the creation of a national sanctions committee, the obligation to freeze assets, the systematic consultation of sanctions lists, and the implementation of an automated alert system, thus ensuring proactive monitoring.

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