



THE DEVELOPMENT OF CONTROLS WITHIN THE FRAMEWORK OF OPERATIONAL RISK MANAGEMENT WITHIN THE BANKS

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Summary

Many credit establishments are affected by operational risk, underscoring the need to address the new challenges related to controlling this risk. So, how can controls be developed within the framework of the management operational risks. The system implemented at the bank adheres to the rules governing the three levels of control, the distinction between periodic control and permanent control, as well as the level of requirement in terms of own funds. However, the bank must enhance and optimize its system beyond regulatory requirements. It is necessary to make the system more dynamic to ensure that operational staff are more involved in risk management, automat controls and formalize the risk policy to provide a comprehensive view of how controls should be carried out.

Key words: Risk, Risk management, Control, Operational risk, Bank

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Introduction

Due to their specificities, banks are exposed to different financial and non-financial risks, such as operational risks. The major challenge for banks is to manage their risks in a transparent manner, healthy and prudent manner in order to restore the confidence of their customers, shareholders and regulators and to guarantee their long-term sustainability.

However, these efforts do not prevent the occurrence and media coverage of financial scandals whose scale is commensurate with the financial amounts allocated. Thus, many financial institutions are affected by operational risk. This risk is above all an organizational risk, contingent on the human factor, taking multiple forms as well illustrated in the Basel categories.

There are many examples of cases where operational risks arise. However, operational risk is not only the work of financing and investment banks and is not only an extreme risk in terms of its consequences. It also concerns retail banks. Prudential regulation includes a set of standards aimed at encouraging financial institutions to better control this still emerging and poorly understood category of risk. We have therefore included our study in this vein by seeking to answer the following question: "How can we develop controls for the management of operational risk within Algerian banks?". We supposed that:

- The operational risk control system implemented within the bank complies with regulatory and prudential requirements which allows it to protect itself against probable losses.
- The operational risk controls developed allow the anticipation of their occurrence as well as the minimization of the impact of their realization on the overall result.

In order to carry out our research, the descriptive and analytical methods seemed to us to be the most appropriate. This approach essentially consists of using two types of data:

- Data collection tools: exploratory interviews, observation, use of official documentation and archives of the banking institution.
- Data analysis tools: the internal control survey.

Therefore, our work is divided into two parts, as follows:

- Theoretical foundations as well as the regulatory framework for the control of banking risks, particularly operational risk, in order to shed light on the concepts of controls.
- State of the art of operational risk control within Algerian banks by addressing the case of Popular Credit of Algeria and a comparative analysis between the control systems implemented within ten (10) public and private banks.

1. Theoretical framework and prudential and regulatory framework for controlling operational risks in the banking sector:

1.1. Banking risk control, particularly operational risk: key concepts:

Different key concepts are developed in our study, namely the terms related to control, risk management and in particular operational risks.

Control: It consists of the verification by an authority of the conformity of something. The control ensures that the latter fulfills the required conditions, in particular legal or tax conditions, or that it complies with the standard. It can be an examination, inspection, audit, monitoring or even verification.

It has an increasingly active role in risk management. It is up to it to identify the significant risks linked to the achievement of objectives and to set up a reliable internal control system to avoid certain risks and effectively manage others.

Risk: it is the possibility of an event that could influence the achievement of an organization's strategy or objectives. Risk is the probability of loss or damage. One risk often hides another, from an opportunity can arise threats and vice versa. Risk is the effect of uncertainty on the achievement of objectives affecting various aspects (financial, operational, commercial, strategic, etc.) at different levels of the company (project, product, process, etc.). Risk analysis is a multi-step process aimed at mitigating the impact of risks on the company.

Several definitions can be given to the notion of risk, these are sometimes legal, economic and financial, sociological or even managerial. We will retain the definition of operational risk, the aim of which is to control it. Another way of defining it as the convergence of an external threat to the organization, which induces it

into organizational vulnerability. The banker's reaction is not to avoid risks, but rather to take them into account in its decision-making process, to manage them and to control them. In this context, the main activity of the risk manager is to assess whether all the risks taken are acceptable or whether, quite the opposite, they are too significant in order to be able to decide on the actions to be implemented.

Risk management: it's the process that identifies and assesses risks in order to develop a plan to minimize and control these risks and their potential consequences on the company. It is a cross-functional action. The process involves the systematic application of policies, procedures and practices to activities of communication and consultation, context setting and assessment, processing, monitoring and review, recording and reporting. Anglo-Saxon literature uses the term of business control to designate the system for controlling an activity.

Operational risk: the concept of operational risk is extremely broad, but it must be placed in its entrepreneurial framework. For a company, it concerns all risks that can cause damage, loss, or cost, created or incurred during the performance of the company's day-to-day activity, that's means in its daily operating cycles: production, distribution, supply cycles, document management, management processes, daily operating activities and the achievement of the corporate purpose related to human resources.

Operational risk control: as part of best practices concerning operational risk management. We refer to the reports of the Basel Committee in which it was pointed out that whatever the definition used for this risk by the financial establishment and for effective management and control of operational risk, the stakeholders have a perfect understanding of it. This attests to the interpretative and adaptive nature of the operational risk control standard. This control includes all the functions and actions put in place in order to control the risks that affect the activity of the financial institution, essentially operational risk. Also, operational risk is associated with other financial risks.

1.2. Characteristics of Operational Risk:

The characteristics of Operational Risk can be summarized in the following four (04) sections:

- **Difficult risk to identify:** the difficulty in identifying this type of risk can be explained by the need to formalize and analyze all the bank's activities and processes to highlight all the operational risks linked to the different processes.
- **Risk which is difficult to measure:** despite the quantifiable financial consequences of operational risk, there are other consequences difficult to quantify, such as legal consequences for example or consequences relating to the image and reputation of the bank.
- **Risk difficult to monitor and control:** and this, due to the presence of the human factor in this risk, makes it more difficult to locate and therefore to manage or control compared to other risks, particularly financial ones.
- **Border risk with credit risk and market risk:** the multiple causes of Operational Risk have meant that it has a close relationship and interactions with credit risk and market risk, proven in several research works. operational risks can generate or worsen the impacts of credit risk, here are some examples: anomalies in the credit guarantee (formalism, non-renewal, etc.), loss or destruction of a loan contract, issuance of false documents, lack of advice or anomalies in the processing of files. Concern incidents of operational risks which occur during the processing or monitoring of market operations such as: Error entering an order, incorrect evaluation of a market position due to an error in updating prices, incidents in level of information systems or fraud (concealment of transactions, positions taken outside the limits, etc.).

1.3. Operational Risk Categories:

Internal Operational Risk: this is the Operational Risk originating from the bank itself, i.e. the risk resulting from potential failures of the bank's internal processes (Example: failure or absence of control), employees (e.g. internal fraud or data entry errors) or its information systems.

External Operational Risk: It is due to external events that the bank cannot control. It can be linked to a human factor (example: external fraud), a technical factor (example: problem in the information network) or other causes no less important, for example: natural disasters).

1.4. The different approaches to understanding operational risks:

There are two complementary approaches: a process approach and a more causal approach.

The first allows us to take into account the specificities of the company and its multiple businesses. We therefore seek to link operational risks to the main processes, sources of added value, and allowing us to deliver to the customer the service and/or product corresponding to their initial request.

We distinguish three categories of processes: operational processes at the heart of the activity, management or steering processes, the purpose of which is to set directions, assess the situation and decide on corrective actions if necessary and finally, supports, for example legal, fiscal, IT, logistics, etc.

This definition must be completed by transversal and multi-activity processes. Indeed, certain risks attack, for example: buildings, regardless of the activities housed there, while the consequences are precisely linked to the activities sheltered.

The second approach consists of risk analysis by framing it, on the one hand, from the primary cause that gave rise to it and, on the other hand, from the consequences and effects that it generates. This approach is very oriented towards risk management because it makes it easier to identify the causes on which action must be taken to limit the harmful consequences.

1.5. Frameworks used in the context of operational risk control:

The most widely adopted benchmarks for operational risk control are as follows:

➤ **Bale Accords:**

Operational risk was integrated in 2004 with the migration to Bale II. Control of operational risk through compliance with the regulatory capital requirement relating to the latter. In this context, banks can use four different approaches proposed by the committee to assess their Operational Risk:

- **Basic indicator approach:** it is the most widely used and the simplest to implement, capital requirements are determined by applying a specific factor to the average of the last three positive gross banking income. We emphasize that, with regard to Algerian regulations, the calculation of equity relating to operational risk takes into account the average of the last three positive net banking products and not gross banking products, then weights them at 12.5%.
- **Standardized approach:** this approach, for its part, consists of dividing the bank's activities into eight (08) categories called business lines and assigning its own weighting factor to each category. To apply the standardized approach, banks must have precise documentation allowing them to assign each of their activities to one of the eight activities cited by the regulations. If the gross product relating to a business line is negative, it can be offset with the surplus from another line of activity.
- **Advanced Approach and standardized measurement approach:** It is based on a measurement system specific to each bank in terms of operational risk, it requires the use of reliable statistics to develop its own models, the adoption of this approach must be approved by the supervisory authorities. In addition to the requirements for the use of the standardized approach, two other conditions are added to be able to adopt the advanced measurement approach:
 - The establishment of a control and risk management system approved by the internal audit department.
 - The establishment of an effective system allowing the identification, recording and classification of operational incidents.

Bale III is based on the standard approach to measure operational risk, which does not truly reflect its level. This pushes banks to comply with the regulations set without seeking to improve their operational risk management. In 2017, particular attention was paid to operational risk through the importance given to this risk by Bale IV. By focusing on operational risk, the extensions of Bale III concern the transition to the standardized measurement approach, which is a new measure that is more relevant and less complex than previous measures. It is based on financial statements and historical loss data which constitute one of the main improvements.

The banks are required to use stress test scenarios in advance any increase of risk factors. In addition, under the terms of this agreement, the banks are also required to establish Business Continuity Plan. To mitigate the potential consequences of such operational risks, a proactive response would be to implement a Business Continuity Plan. It is a structured process for assessing the potential impact and consequences of incidents on

the bank's operations. It identifies business recovery priorities and provides information for developing business continuity plans, disaster recovery plans and incident management plans.

➤ **Committee Of Sponsoring Organizations of treadway commission:**

In terms of control activities within the framework of risk management including operational risks, recent Committee directives recommend the following principles:

- The bank selects and develops control activities that contribute to reducing the risks associated with the achievement of objectives to acceptable levels.
- The bank selects and develops general control activities in terms of information systems to facilitate the achievement of objectives.
- The bank sets up control activities through directives that specify the objectives pursued and procedures that implement these directives.

It includes a set of behaviors, means, procedures and actions adapted to the specific characteristics of each company that contribute to the control of its activities, the effectiveness of its operations and the efficient use of its resources and must allow it to take into account in an appropriate manner the significant risks whether they are operational, financial or compliance. It should be noted that two systems are complementary where each structure relies on the work of the other. The risk management system, to the extent of securing its proper functioning, must integrate controls relating to internal control. this system, for its part, relies on the work of the risk management system to know the main risks to be identified.

➤ **model of lines control:**

there are three lines:

The 1st one: these are the control activities defined and implemented by operational staff. The first line of control of activities is made up of operational managers, responsible for assessing and reducing risks, in particular by implementing an adequate control system, covering the processes for which they are responsible. This first line allows the control of day-to-day activities by implementing the most effective risk management practices at the level of each process and by ensuring communication of appropriate information to the second line of defense.

The 2nd one: a structured and coordinated system. It's made up of functional departments responsible for areas of expertise and functions dedicated to managing the overall risk control system (risk management, internal control, assurance, compliance, second-level permanent control functions, etc.). These departments have unique expertise and knowledge for analyzing organizations and essential skills in control activities. Its objective is to structure and maintain the system for controlling the bank's activities.

The 3rd one: As the third line of control of activities, an independent periodic control function attached to the highest level of the bank provides, through a risk-based approach, overall assurance to the supervisory bodies and the bank's general management. This overall assurance covers the effectiveness of the first two lines of control and the bank's governance. It is therefore useful to specify the important role of internal audit in the context of risk management, including operational risk.

Furthermore, the Inspection is considered to be the on-site document control that can deepen the investigations beyond the object of the mission of control of operations and this, in the event of detection and/or suspicion of malicious acts. The inspection has the mission of taking a critical look at people, in order to ensure that they respect the rules imposed on them.

➤ **Other Standards have addressed risk control such as:** ISO Standards and COBIT: Control Objectives and ITIL4 for IT.

2. Controls and management of operational risks in Algerian banks:

Internal control has undergone, in recent years, a notable evolution characterized, in particular, by the promulgation dated November 28th, 2011 of the Bank of Algeria Regulation N°11-08 relating to the internal control of banks and financial institutions which encourages Algerian banks to take a set of measures aimed at the reorganization of the control function, separating the tasks of periodic control from those inherent in permanent control and emphasizing the requirements in terms of risk control including operational risk.

The monetary and control authorities have taken numerous initiatives to update, develop and strengthen internal control in credit institutions as highlighted in Law N°23-09 of June 21st, 2023, relating to the monetary

and banking law, published in the Official Journal N°43, of June 27th, 2023, of which the new implementing texts of the Bank of Algeria relating to internal control and the guidelines for risk management are currently being developed.

According to the texts of the Bank of Algeria, we distinguish two types of control:

- **Permanent monitoring** of the compliance of operations, the security of operations, the validation of operations carried out and compliance with other due diligence related to risk monitoring. It must be ensured with a set of adequate means and by agents dedicated exclusively to this function at the level of central services and agencies or by other agents carrying out operational activities.
- **A periodic check** of the regularity and security of internal operations and procedures, of the level of risk actually incurred and of the evaluation of the effectiveness of permanent control. It is represented by internal audit and inspection. These two functions must be ensured by means of investigations by agents other than those carrying out permanent control.

3. Status of operational risk control within Algerian banks and comparative analysis between the control systems implemented within public and private banks:

3.1. Operational risk control system implemented at the “Popular Credit of Algeria” bank:

In 2014, Popular Credit of Algeria set up a Division responsible for Risks and Permanent Control (DRPC) to which is attached in particular a Directorate responsible for Operational Risks (DOR). This entity is responsible for monitoring and supervising operational risk in accordance with the risk management policy adopted by the Bank and the Risk Committee, in this case.

The DOR is structured as follows: “Permanent Operations Supervisor” Department and “Evaluation and Monitoring of Operational Risk” Department and “Reporting” Service.

- The permanent monitoring function of operations is mainly achieved through the implementation of permanent control guides and plans as well as monitoring their proper application. Also, this function consists of assisting all of the bank's structures in identifying risks related to their activities and setting up an adequate organization of their own controls. Finally, it is responsible for raising awareness and leading the permanent control sector by improving controls and staff training.
- The operational risk assessment and monitoring function, as its name suggests, is responsible for the documented identification of operational risks, particularly on the basis of operational risk mapping. This function is also demonstrated through the animation and awareness-raising of all the bank's structures as well as the training of managers of the structures in the culture of operational risks. It is also responsible for the permanent adaptation of the tools and reporting used in the declaration of operational risk incidents, then for the supervision of the implementation of corrective actions when collecting operational incidents or updating the risk mapping.

The DOR is primarily responsible for the following missions:

- The identification and assessment of operational risks to which the bank is exposed.
- Promoting the “Operational Risk” culture among all bank staff.
- Contribution in relation to the business structures concerned, to the implementation of corrective measures and action plans in order to reduce operational risks and avoid the repetition of anomalies or malfunctions, noted during permanent controls and monitoring their follow-up.
- The development and implementation of control systems in order to reduce the risks incurred and ensuring their correct application.
- The development of technical skills in the “Risk” sector and encouraging best practices in terms of control.

As part of the development of the Incident Database, the bank has implemented:

- A model incident reporting form;
- A reporting model for recorded incidents;
- A procedure for collecting operational losses tracing the reporting circuit for operational incidents as well as the methods for processing them. The 2021 financial year was characterized by the effective implementation and ramp-up of this system.

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- Strengthening the staff responsible for permanent Agency and Operating Group control with the allocation of permanent controllers to each agency according to its classification;
- The allocation for each Regional Operating Group of permanent controllers in addition to the Head of the General Control Unit.
- Dissemination to the entire operating network of reminder notes on regulatory principles relating to ongoing control and risk monitoring activities.
- Holding several meetings of the Risk Committee dedicated to processing the status of handling of the deficiencies noted in the consolidated reports of permanent control (RPC). The meetings of this committee thus made it possible to alert on the Risks incurred by the bank.

The incident database held by the DOR is shared with the structures responsible for periodic control in accordance with regulatory requirements. Also, the Audit Department attached to the Periodic Control Division is responsible for evaluating the permanent control system for operational risk. Thus, the structures responsible for periodic control are informed in real time of the occurrence of operational risk incidents in order to carry out the necessary controls.

In terms of exposure to Bank operational risks:

For this bank as well as the banks that are the subject of our analysis, the Net Banking Product (NBP) is currently considered as the control variable of operational risk in accordance with the regulatory texts of the Bank of Algeria in force.

Table 1. Weighted exposure to operational risk of CPA bank during the period 2018-2022

In thousands of dinars

Categories	Codes	2018	2019	2020	2021	2022
Positive net banking income of the last year (n)	3001	76 995 809	81 059 058	83 648 071	81 542 763	70 148 000
Positive net banking income for the last year (n-1)	3002	68 840 487	76 995 809	81 059 058	83 648 071	81 542 763
Positive net banking income for the last year (n-2)	3003	65 228 138	68 840 487	76 995 809	81 059 058	83 648 071
Average positive net banking income	3004	70 354 811	75 631 785	80 567 646	82 083 297	79 733 836
Equity requirement	3005	10 553 222	11 344 768	12 085 147	12 312 495	11 960 075
WEIGHTED EXPOSURE TO OPERATIONAL RISK(**)	3006	131 915 271	141 809 596	151 064 336	153 906 182	149 500 943

Source: established by the student of the financial statements of Popular Credit of Algeria (CPA) for the period 2016-2022

(**) It should be noted that the weighted exposure to operational risk is calculated from the financial statements of Popular Credit of Algeria (CPA) for the period 2016-2022, published on the Bank's official website.

We note an increase in the weighted exposure to operational risk over the period 2018-2021. A slight decrease of 2.86% was noted for the financial year 2022 and this is due to the decrease in the average positive NBI recorded for this financial year.

We calculated the average concentration of operational incidents based on the declarations made by the bank during the period 2018-2022 and this according to the Basel typology adopted by the CPA.

Table 2. Average concentration of CPA operational incidents occurring during the period 2018-2022 according to the Basel typology

Risk code	Category of risk occurred (Basel typology)	Average concentration of incidents 2018-2022	Brief description of the main events
R01	Customers, Products and Business Practices	0,00%	Customer complaint
R02	Damage to physical assets	8,10%	Fire and water damage - Destruction of bank assets (ATMs, furniture, etc.).
R03	Business interruption and system malfunction	56,28%	Failure or malfunction of: • Information system, • Remote monitoring system, • Equipment failure • Network failure Leading to a temporary interruption of activity.
R04	Execution, delivery and process management	24,29%	Errors in process execution. Cash register incidents.
R05	External fraud	6,48%	Counterfeiting of documents - Thefts - Counterfeit notes
R06	Internal fraud	3,64%	Misappropriation. - Unauthorized activity - Mixed fraud

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R07	Workplace employment and safety practices	1,21%	Altercation between employees - Crowd demonstration - Disputes with employees
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Source: established by the student based on the Operational Risk Incident declarations made by the CPA bank during the period 2018-2022

According to the results, we find that the most significant incidents are related to the category "business interruption and system malfunction" with an average concentration of 56.28% followed by the category "execution, delivery and process management" with an average concentration of 24.29%. External fraud represents 6.48% on average of the incidents occurred followed by internal fraud (3.64%). Incidents related to employment and safety practices in the workplace remain low (1.21%).

Given the importance of incidents linked to system malfunctions, which exceeded 56% over the entire analysis period, existing control must be strengthened, in particular by scheduling periodic control missions of the various processes linked to the systems concerned. The seriousness can be explained by: the complexity of this area, the weak control within the Bank of this type of risk, non-exhaustiveness of existing controls, very weak control for certain technical processes, absence of control or even inadequacies in terms of the profile of the controllers whose dedicated personnel must combine both mastery of the control and of the system subject to the control, a controller with a technical mastery profile. The recommended control mission should focus as a priority on the following points:

- Compliance of the system with legal obligations and alignment with the bank's vision,
- Optimization of the processing of the bank's business processes by the system,
- Optimization of the interoperability and accessibility of the system,
- Optimization of information system security,
- Efficiency and sustainability of the system

3.2. Control of Operational risk and solvency of the Popular Credit of Algeria bank:

In this point, we proceeded to the execution of stress test operations linked to the solvency coefficients in order to study the impact of the aggravation of exposures to operational risk on the solvency of the Bank "Popular Credit of Algeria", compared to the impact of the aggravations of equity and exposures to credit risks.

It should be recalled that banking stress tests are a risk management and banking supervision tool that now plays a key role. They are an instrument for measuring, analyzing, controlling and anticipating to ensure financial stability in the most unfavorable future situations possible. They allow a financial institution to assess its performance and the potential impact in unfavorable, unusual but plausible conditions.

In order to carry out these operations, we first proceeded to create a basic scenario. This is the projection of solvency coefficients over eight (08) quarters (from the 1st quarter of 2024 to the 4th quarter of 2025).

The projection was based on historical data concerning the elements of the calculation of the Solvency coefficients mentioned in the Regulatory Declarations of the Popular Credit of Algeria bank and this, since the implementation of the Instruction of the Bank of Algeria No. 04-2014 of December 30th, 2014 relating to the solvency coefficients applicable to banks and financial institutions (from the 4th quarter of 2014 to the 4th quarter of 2023), a total of 37 quarterly declarations.

Then, the simulation of three crisis scenarios: moderate, severe and extreme, which are based on well-defined hypotheses.

In order to optimize the projection of forecast data, we used the methods developed in this area, namely: Box & Jenkins method; Double Exponential Smoothing; Holt Winters (No seasonal & seasonal).

The Box & Jenkins method is a univariate approach intended to model time series, this approach goes through five (05) necessary steps, presented below: Step 1. Preliminary analysis, Step 2. Identification of the parameters of the process, Step 3. Estimation, Step 4. Validation and Step 5. Forecast.

It should be mentioned that in the case where the implementation of the Box and Jenkins approach is not possible and this, for various reasons, such as the non-identification of significant peaks for both the moving average part and the autoregressive part and/or the non-validation of the models retained in the estimation stage, we proceeded to carry out the forecasts of the element in question by one of the four (04) methods below:

- Double Exponential Smoothing Method;
- Holt Winters Method – No Seasonal;

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- Holt Winters Method – Seasonal (Additive or Multiplicative).

If seasonality is present in the Holt Winters method, it is necessary to determine the type of model, whether additive or multiplicative.

Solvency Ratio stress test results:

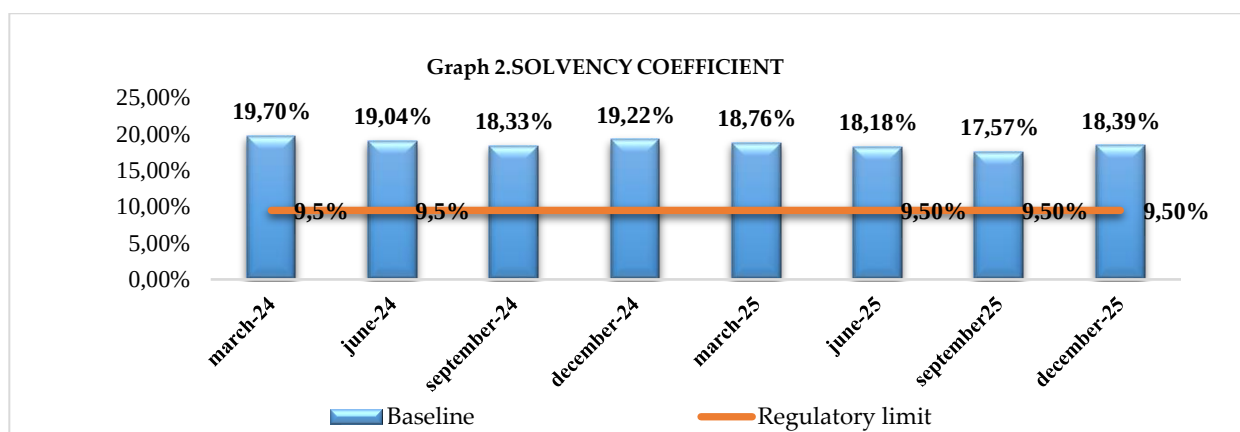
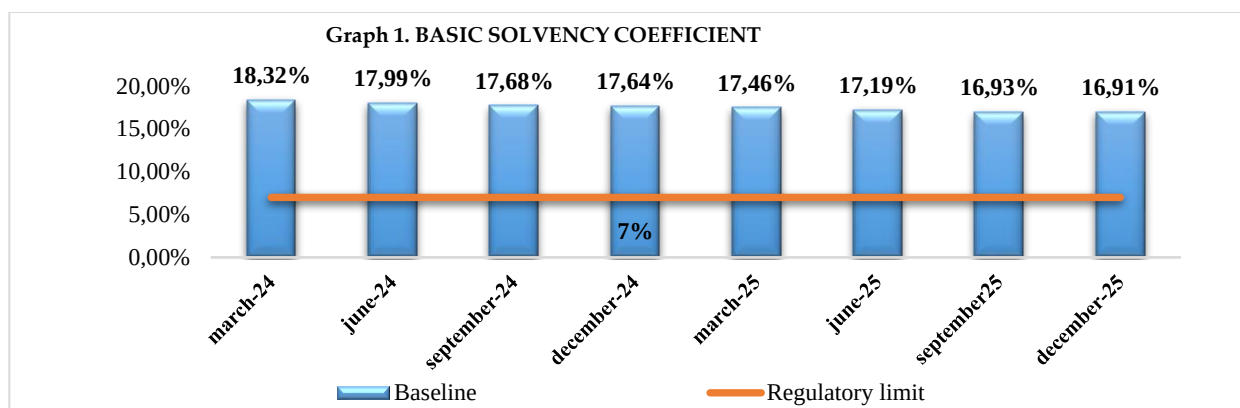
Table 3. The results of the BASELINE:

		<i>In millions of dinars</i>							
		2024				2025			
		1st trimester	2nd trimester	3rd trimester	4th trimester	1st trimester	2nd trimester	3rd trimester	4th trimester
Codes	Categories	amount	amount	amount	amount	amount	amount	amount	amount
2035	Total net risk-weighted current receivables	396 286	369 991	343 697	317 402	291 107	264 813	238 518	212 224
2042	Total net risk-weighted assets of classified receivables	396 447	468 251	540 056	611 860	683 665	755 470	827 274	899 079
2058	Total net risk-weighted assets of other assets	69 875	74 889	72 669	72 424	73 666	78 680	76 459	76 215
2084	Total net risk-weighted off-balance sheet commitments	130 240	132 851	141 971	120 323	115 332	117 943	127 063	105 415
2090	TOTAL WEIGHTED EXPOSURES TO CREDIT RISK	992 848	1 045 982	1 098 393	1 122 009	1 163 770	1 216 906	1 269 314	1 292 933

		2024				2025			
		1st trimester	2nd trimester	3rd trimester	4th trimester	1st trimester	2nd trimester	3rd trimester	4th trimester
Codes	Labels	Amount	Amount	amount	amount	amount	amount	amount	amount
1018	BASIC EQUITY	251 419	255 252	259 086	262 919	266 753	270 587	274 421	278 254
1030	TOTAL REGULATORY EQUITY	270 456	270 189	268 605	286 462	286 578	286 311	284 726	302 584
2090	TOTAL WEIGHTED EXPOSURES TO CREDIT RISK SECURITIES	992 848	1 045 982	1 098 393	1 122 009	1 163 770	1 216 906	1 269 314	1 292 933
3006	WEIGHTED EXPOSURES TO OPERATIONAL RISK SECURITIES	139 965	133 226	126 767	128 883	124 183	117 768	111 619	113 007
4032	WEIGHTED EXPOSURES TO MARKET RISK SECURITIES ¹	239 850	239 850	239 850	239 850	239 850	239 850	239 850	239 849
5001	TOTAL WEIGHTED CREDIT, OPERATIONAL AND MARKET RISKS	1 372 663	1 419 058	1 465 010	1 490 742	1 527 803	1 574 524	1 620 783	1 645 789
5002	BASIC SOLVENCY COEFFICIENT	18,32%	17,99%	17,68%	17,64%	17,46%	17,19%	16,93%	16,91%
5003	SOLVENCY COEFFICIENT	19,70%	19,04%	18,33%	19,22%	18,76%	18,18%	17,57%	18,39%

¹ The market risk exposure considered in our analysis is the average of the exposures recorded since the 2021. It should be noted that CPA Bank's market risk exposure is zero before the 2021 financial year.

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Source: established by the student according the declarations of the Popular Credit of Algeria bank during the period: 2014 to 2023

We have taken some assumptions for three (03) different scenarios mentioned in the following tables:

Table 4.Scenario 1: Worsening of Regulatory Capital

Crisis:	Moderate	Severe	Extreme
Unfavorable evolution of Regulatory Capital	Maximum rate of aggravation recorded in history + 15%	Maximum rate of aggravation recorded in history + 35	Maximum rate of aggravation recorded in history + 55

Result of Scenario 1:

	Scenario 1: Worsening of Regulatory Capital							
	Basic Solvency Coefficient				Solvency Coefficient			
	Baseline	Moderate crisis	Severe crisis	Extreme crisis	Baseline	Moderate crisis	Severe crisis	Extreme crisis
march-24	18,32%	15,57%	11,91%	8,242%	19,70%	16,75%	12,81%	8,87%
june-24	17,99%	15,29%	11,69%	8,09%	19,04%	16,18%	12,38%	8,57%
september-24	17,68%	15,03%	11,50%	7,96%	18,33%	15,58%	11,92%	8,25%
december-24	17,64%	14,99%	11,46%	7,94%	19,22%	16,33%	12,49%	8,65%
march-25	17,46%	14,84%	11,35%	7,86%	18,76%	15,94%	12,19%	8,44%
june-25	17,19%	14,61%	11,17%	7,73%	18,18%	15,46%	11,82%	8,18%
september-25	16,93%	14,39%	11,01%	7,62%	17,57%	14,93%	11,42%	7,91%
december-25	16,91%	14,37%	10,99%	7,608%	18,39%	15,63%	11,95%	8,27%

Following a moderate crisis, the Solvency coefficient recorded a remarkable downward variation, but the coefficient in question remains above the minimum required by the Bank of Algeria.

A severe crisis has a significant impact on the solvency coefficient or it always records a sharp decline.

Furthermore, the solvency coefficient is reaching alarming levels, which are below the minimum required by the Bank of Algeria in the event of an extreme crisis (8.27% in December 2025).

Table 5.Scenario 2: worsening of weighted exposures under credit risk

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Crisis:	Moderate	Severe	Extreme
Increase in Total Net Risk Weighted Current Receivables	Maximum increase rate recorded in history + 15%	Maximum increase rate recorded in history + 35%	Maximum increase rate recorded in history +55%
Increase in Total net risk-weighted assets of other assets	Maximum increase rate recorded in history + 15%	Maximum increase rate recorded in history + 35%	Maximum increase rate recorded in history +55%
Increase in Total net risk-weighted assets of other assets	Maximum increase rate recorded in history + 15%	Maximum increase rate recorded in history + 35%	Maximum increase rate recorded in history +55%
Increase in Total net risk-weighted off-balance sheet commitments	Maximum increase rate recorded in history + 15%	Maximum increase rate recorded in history + 35%	Maximum increase rate recorded in history +55%

Result of scenario 2: worsening of weighted exposures under credit risk

	Scenario 2: worsening of weighted exposures to credit risk securities							
	Basic Solvency Coefficient				Solvency Coefficient			
	Baseline	Moderate crisis	Severe crisis	Extreme crisis	Baseline	Moderate crisis	Severe crisis	Extreme crisis
march-24	18,32%	16,52%	14,62%	13,10%	19,70%	17,77%	15,72%	14,10%
june-24	17,99%	16,20%	14,30%	12,80%	19,04%	17,14%	15,14%	13,55%
september-24	17,68%	15,90%	14,01%	12,52%	18,33%	16,48%	14,52%	12,98%
december-24	17,64%	15,85%	13,96%	12,47%	19,22%	17,27%	15,21%	13,59%
march-25	17,46%	15,67%	13,78%	12,30%	18,76%	16,83%	14,81%	13,22%
june-25	17,19%	15,40%	13,53%	12,06%	18,18%	16,29%	14,31%	12,76%
september-25	16,93%	15,15%	13,29%	11,83%	17,57%	15,72%	13,79%	12,28%
december-25	16,91%	15,12%	13,26%	11,81%	18,39%	16,45%	14,42%	12,84%

The simulation of a moderate and severe crisis shows that the Solvency coefficient records a downward variation, but it always remains above the regulatory limit, and this for the entire projection period.

The solvency ratio drops significantly in the event of an extreme crisis. But it will remain above the minimum required by the Bank of Algeria.

Table 6.Scenario 3: worsening of weighted exposures under operational risk

Crisis:	Moderate	Severe	Extreme
Worsening of weighted exposures under operational risk following an increase in Net Banking Income (NBI)	Maximum increase rate recorded in history + 15%	Maximum increase rate recorded in history + 35%	Maximum increase rate recorded in history +55%

Results of scenario 3: worsening of weighted exposures under operational risk

	Scenario 3: worsening of weighted exposures under operational risk							
	Basic Solvency Coefficient				Solvency Coefficient			
	Baseline	Moderate crisis	Severe crisis	Extreme crisis	Baseline	Moderate crisis	Severe crisis	Extreme crisis
march-24	18,32%	18,04%	17,68%	17,34%	19,70%	19,41%	19,02%	18,66%
june-24	17,99%	17,74%	17,42%	17,10%	19,04%	18,78%	18,43%	18,11%
september-24	17,68%	17,46%	17,17%	16,88%	18,33%	18,10%	17,80%	17,50%
december-24	17,64%	17,41%	17,12%	16,84%	19,22%	18,97%	18,65%	18,34%
march-25	17,46%	17,25%	16,98%	16,71%	18,76%	18,53%	18,24%	17,95%
june-25	17,19%	16,99%	16,75%	16,51%	18,18%	17,98%	17,72%	17,47%
september-25	16,93%	16,76%	16,53%	16,31%	17,57%	17,39%	17,15%	16,93%
december-25	16,91%	16,73%	16,51%	16,29%	18,39%	18,20%	17,95%	17,72%

Looking at the results, we find that an increase in operational risk has a low impact on the bank's solvency compared to an increase in equity and credit risk.

However, it is important to remember that several scientific research studies have clearly illustrated the existing interaction between operational risk and other financial risks, in particular credit risk, such that operational risk increases the probability that counterparties will default.

3.3. Operational incident reporting system and collection of losses generated by the bank "Popular Credit Of Algeria":

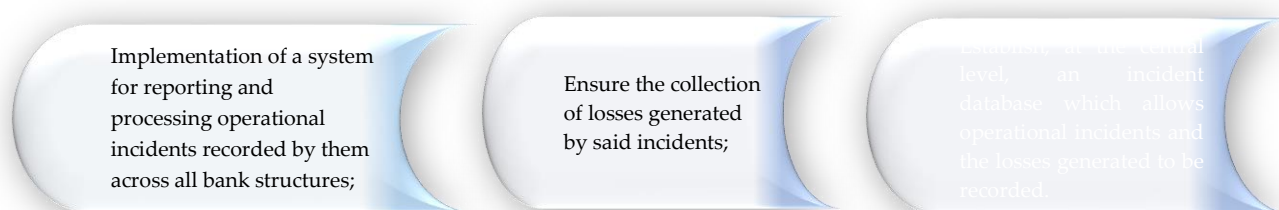
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According to the regulatory provisions of the Bank of Algeria, banks are required to determine thresholds and registration criteria adapted to the nature of their activities and their risks. Significant incidents must, according to appropriate criteria, cover the risks of loss, including when this has not materialized. The incident file(s) are made available to those responsible for permanent and periodic controls. Objectives of the operational incident reporting system:

- Comply with regulatory requirements as part of strengthening control;
- Strengthen the bank's financial security;
- Create a database by recording incidents;
- Participate in updating risk mapping;
- Measure the bank's exposure to operational risks;
- Supply regulatory reports

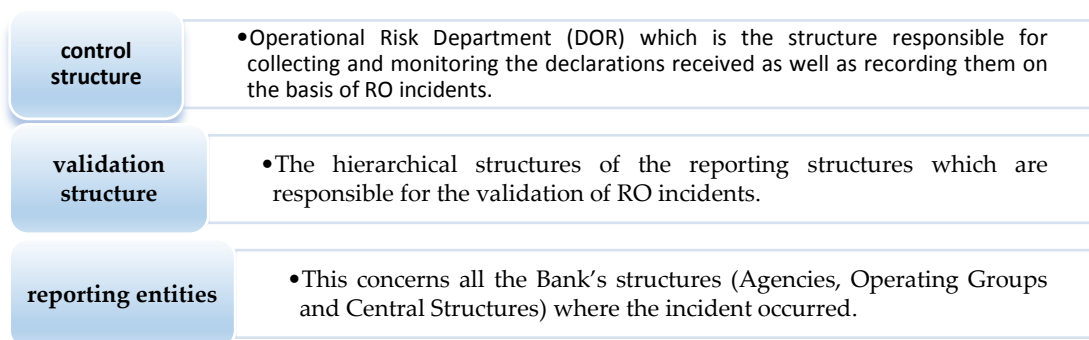
The bank implemented an internal regulatory text in 2019 relating to the incident reporting system. The following figure illustrates the purpose of the text:

Figure 1. Incident Operational Risks reporting system of "Popular Credit Of Algeria" Bank



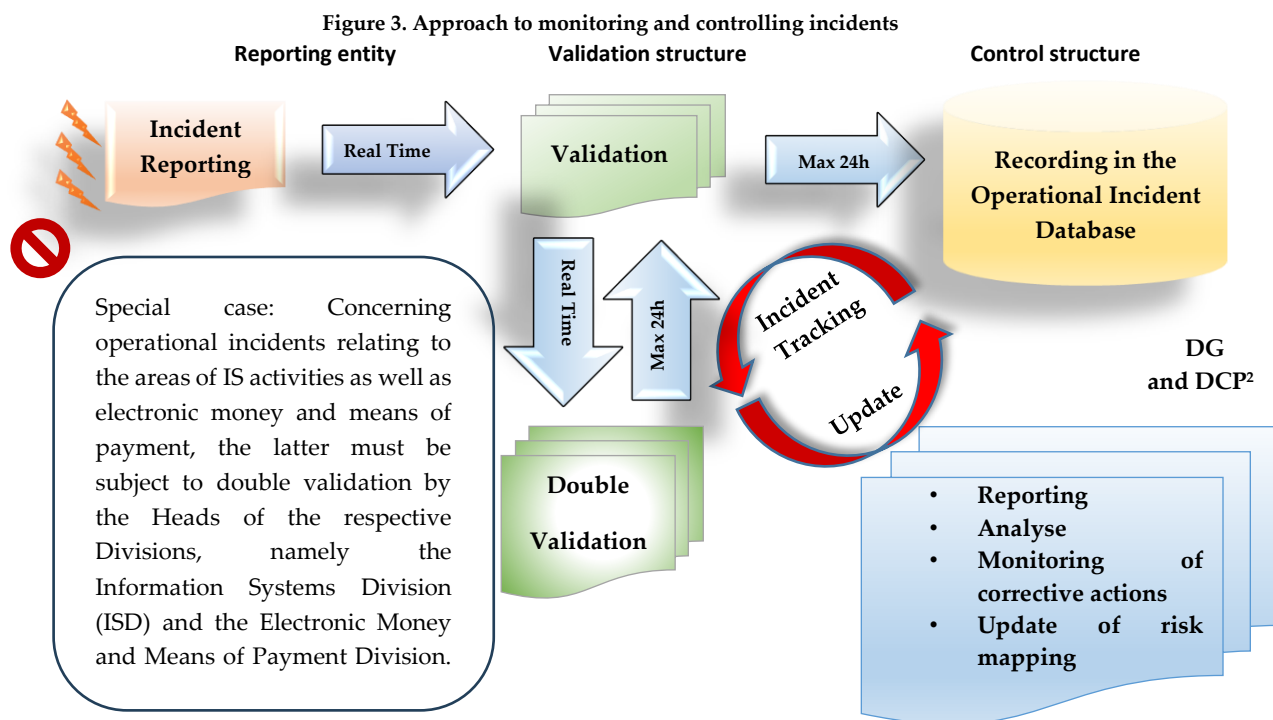
Source: developed by the student on the basis of an internal document from the "popular Credit Of Algeria" Bank

Figure 2. Structures involved in the incident reporting and processing system



Source: developed by the student on the basis of an internal document from the "Popular Credit Of Algeria" Bank

The Figure 3 describes the approach to monitoring and controlling incidents declared by the bank's various structures.



Source: developed by the student on the basis of an internal document from the “popular Credit Of Algeria” Bank

Update of the declared incident: an update of the incident must be established and transmitted for validation, by the declaring structure, as soon as an event related to the previously declared incident occurs.

Closing an incident: An event must be closed when no more potential recovery flows or costs are expected and, consequently, there are no more provisions or additional losses concerning it. An event can, therefore, be entered and closed simultaneously if no appeal is possible.

The Operational Risk Department is the authorized structure, within the Bank, for the closure of an operational incident.

Special case of the ISD and the DMMP: for the sections relating respectively to IS as well as “Monetics and Means of Payment”, the monthly report to be transmitted, as a report, to General Management must be the subject of a pre-validation by the Information Systems Division (ISD) and the Monetics Payment and Means of Payment Division (DMMP).

These latter structures must return to the DOR their conclusions on the reported incidents, at the latest the day after their receipt. These latter structures must return to the DOR their conclusions on the reported incidents, at the latest the day after their receipt. The conclusions in question must be examined by the DOR which will, in turn, make the necessary corrections and must keep the intervening structures (declaration and validation structures) informed of the final results of analyses, recommendations and proposals for improving procedures.

² DG : the General Management and DCP : the Periodic Control Division (General inspection, audit and monitoring unit and monitoring of the status of handling of findings noted by the audit and inspection)

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Figure 4. Communication of reports to the bank's departments



Source: developed by the student on the basis of an internal document from the "Popular Credit Of Algeria" Bank

The DOR is required to communicate an exhaustive report on the situation of incidents and operational losses to the Bank's authorities, within a period not exceeding 10 days following the end of each period.

3.4. Comparative analysis of operational risk control implemented in public and private banks:

In order to carry out our comparative study, a questionnaire was developed by us. This questionnaire is intended for the ten (10) banks, including five (05) public and five (05) private in the Algerian banking sector. The objective of this questionnaire is to assess the operational risk control system implemented within these banks, its degree of compliance and effectiveness in relation to regulatory changes and recent developments in this area as presented in the theoretical part of this document.

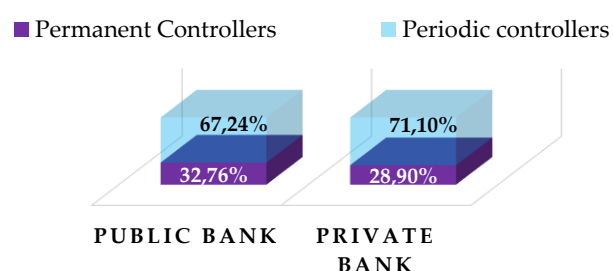
The responses to our questionnaire were provided by the agents dedicated to the control of these banks (risk managers, auditors, inspectors, regional group controllers and agency controllers). In addition, a direct interview was conducted with the managers concerned. The questionnaire was distributed to a sample of 30% of the total bank controllers. Before presenting the results of the study, it is necessary to present the target population, namely the agents dedicated to permanent and periodic control.

Table 7. Distribution of controllers of the ten banks by type of control for the 2022 financial year

		Permanent Controllers		Periodic Controllers	
		Level Central	Regional Level and agencies	Level Central	Regional Level and agencies
Public Bank	P1	70	215	78	58
	P2	68	240	91	60
	P3	74	315	102	55
	P4	58	191	89	61
	P5	76	255	101	66
Private Bank	P6	150	247	80	70
	P7	74	250	144	72
	P8	109	355	77	68
	P9	122	333	99	75
	P10	111	301	78	71

	Number of controllers dedicated to periodic control	Number of controllers dedicated to permanent control	Total Controllers
Public	761	1562	2323
Private	834	2052	2886

GRAPH 3. DISTRIBUTION OF CONTROLLERS ACCORDING TO THE NATURE OF THE CONTROL



Graph 4 : Proportion of controllers according to the type of control by nature of bank



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Source: established by the student according to internal documents of the banks included in the study

We note the following:

- The number of agents dedicated to permanent control is greater than those for periodic control, for each type of bank.
- The number of controllers is greater at the level of private banks and this, for each type of control (periodic or permanent).
- Periodic control at the level of public banks, the subject of our analysis, is represented by internal audit and inspection. However, periodic control at the level of private banks is represented by Internal Control function. Also, by periodic control carried out by controllers of the parent company of the private bank.
- Permanent control at the level of public banks is more important at the regional level, particularly for banks with a large operating network, often set up to meet regulatory requirements.
- Permanent control at the level of private banks is important at the level of central structures compared to that of public banks, taking into account the strategic orientations in terms of strengthening the central structures responsible for risk management and compliance (second level second degree permanent control).

4. Results and Discussion:

The results are presented in the following table:

Table 8: summary table of responses to the “Operational risk control system” questionnaire by type of bank

		Public Bank			Private Bank		
		Yes	No	Neutral	Yes	No	Neutral
Subject of Question 1	the General Management and the deliberative body ensure the establishment of a risk control culture within the entity. All staff understand their role in the control system and are actively involved in it	49%	31%	20%	60%	25%	15%
Subject of Question 2	The entity has a reporting system that allows, through various channels, the reporting of cases of irregularities and fraud. This system ensures the protection of the interests of complainants	33%	21%	46%	71%	24%	5%
Subject of Question 3	operational risk mapping covers all of the bank's processes and is updated periodically	5%	70%	25%	30%	45%	25%
Subject of Question 4	the bank develops control activities which contribute to reducing to acceptable levels the risks associated with the achievement of objectives	20%	55%	25%	31%	41%	28%
Subject of Question 5	Control activities include manual and automated controls as well as preventive and detective controls	35%	40%	25%	37%	35%	28%
Subject of Question 6	control activities are focused on relevant (critical) business processes	45%	29%	26%	51%	20%	29%
Subject of Question 7	the bank defines objectives related to operations, reporting and compliance in a manner sufficiently clear to make possible the identification and assessment of risks likely to affect their achievement	30%	40%	30%	35%	25%	40%
Subject of Question 8	the bank respects the principle of separation of tasks	80%	18%	2%	85%	11%	4%
Subject of Question 9	the list of key risks is established collaboratively by including the various managers of the structures.	5%	70%	25%	41%	35%	24%
Subject of Question 10	the bank takes into account risk tolerance thresholds when defining objectives	0%	95%	5%	20%	67%	13%
Subject of Question 11	the bank assesses the identified risks by determining their probability as well as their potential impact	20%	76%	4%	58%	26%	16%
Subject of Question 12	an action plan is put in place to ensure a response to the identified risks including the different scenarios of accepting the risk, avoiding it, reducing it or transferring it	20%	66%	14%	45%	31%	24%
Subject of Question 13	the bank is proceeding with the modeling of the database of recorded operational incidents	2%	78%	20%	27%	51%	22%

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Subject of Question 14	periodic control regularly assesses the permanent control system	50%	31%	19%	61%	26%	13%
Subject of Question 15	the bank integrates the risk of fraud into its assessment of risks likely to compromise the achievement of objectives	31%	54%	15%	40%	50%	10%
Subject of Question 16	The internal control bank respects the principle of the three lines of defense	49%	20%	31%	51%	35%	14%
Subject of Question 17	the structure responsible for internal audit establishes an audit plan based on a risk-based approach	20%	70%	10%	35%	65%	0%
Subject of Question 18	there is coordination between the permanent and periodic control systems	29%	27%	44%	29%	38%	33%
Subject of Question 19	The audit periodically reviews the controls put in place to ensure their relevance and, if necessary, updates them	22%	59%	19%	23%	25%	52%
Subject of Question 20	the bank has implemented relevant controls relating to the IT infrastructure, designed to contribute to the completeness, accuracy and availability of IT processing	70%	21%	9%	66%	57%	-23%
Subject of Question 21	The bank has implemented controls within the IT security management process to provide limited access to users based on their responsibilities and protect the entity's assets from external threats	79%	15%	6%	55%	20%	25%
Subject of Question 22	the bank has implemented relevant controls related to the processes of acquisition, development and maintenance of information systems	35%	25%	40%	40%	30%	30%
Subject of Question 23	management has implemented, via procedures specifying the controls integrated into the business process and daily activities	44%	30%	26%	40%	35%	25%
Subject of Question 24	a monitoring status of the handling of recorded incidents is communicated to the parties responsible for taking corrective measures as well as to the General Management	85%	15%	0%	79%	20%	1%
Subject of Question 25	the bank has a procedures manual covering its fundamental processes	82%	13%	5%	78%	22%	0%
Subject of Question 26	General Management ensures the monitoring of corrective measures in order to remove control deficiencies within the appropriate timeframes	46%	28%	26%	47%	24%	29%
Subject of Question 27	The bank's control and supervisory bodies are informed of the control results (board of directors, audit committee, risk committee)	69%	2%	29%	68%	31%	1%
Subject of Question 28	the bank has a formalized operational risk policy validated by the deliberative body	10%	70%	20%	12%	70%	18%
Subject of Question 29	The bank has a permanent system for evaluating the performance of controllers	5%	70%	25%	10%	67%	23%
Subject of Question 30	agents dedicated to control regularly benefit from the necessary training	25%	73%	2%	25%	69%	6%
Subject of Question 31	The archiving needs in terms of communication intended for and/or originating from third parties as well as those concerning compliance with legislation and regulations are defined, as well as the terms of their access.	11%	51%	38%	13%	50%	37%

The processing and analysis of the results revealed the following main findings and recommendations:

- Overall, the control system implemented in private banks is better developed than that of public banks, particularly in relation to the risk policy required by the parent company and the analysis, control and risk management tools implemented (existence of a risk policy validated by the group, implementation of integrated systems, alert system, involvement of all the bank's structures);
- Public banks are complying well with the rules of the three levels of control, taking into account the management of the recommendations of the consultancy firms hired in 2011 as part of the bank's compliance with the new requirements for operational risk control (creation of structures responsible for operational risk and permanent control, implementation of a system for recording and reporting incidents, sharing the incident database with the departments responsible for periodic control, implementation of risk mapping). However,

they must accentuate and optimize the risk management system; beyond the regulatory aspect, it is necessary to boost the system so as to make operational staff more involved in managing the risks inherent in their activities.

- Unlike private banks, public banks do not have a formalized risk policy validated by the deliberative body.
- The bank must implement a risk policy that defines the principles underlying risk management at the Bank level, determines the responsibilities for risk management and the due diligence to be implemented in order to optimize the control of these risks. It underlines the Bank's desire to deploy best practices in control systems.
- The bank's risk policy should be formalized in order to provide a global vision of the risk and the way in which its monitoring should be carried out and experienced within the bank.
- The risk mapping implemented at the bank level only covers processes related to operations carried out by branches. Processes related to operations carried out by central structures are not yet supported. Also, the risk mapping has not been updated for some banks since 2014.
- The limits and the level of tolerance for operational risks have not yet been set given the inadequacies in incident-related data as well as the history of recorded losses. These inadequacies are often encountered due to non-automated controls and/or business processes not yet supported by the Bank's Information System.
- Establish a less restrictive procedure for updating procedures,
- Strengthen training and awareness initiatives on operational risks among operational staff, those most directly concerned by the control of risks inherent in their activities.
- Change the paradigm so as to make risk management a lever for performance and not a regulatory constraint.
- Strengthen the structures responsible for operational risk with the necessary skills, resources and tools.
- Ensure the completeness of risk mapping and accelerate automation of the monitoring system.

Given the results recorded, we can confirm that the hypotheses adopted in the context of our research are partially confirmed, particularly in terms of banks' compliance with regulatory requirements in terms of directives relating to the control and management of operational risks, compliance with the methods for calculating exposures to operational risks and their requirements in terms of own funds.

However, these controls lack effectiveness, particularly at the level of public banks, given the shortcomings recorded in terms of the means and tools dedicated to controlling this type of risk, the modest and non-exhaustive history of incidents as well as the losses recorded which do not allow the modeling and anticipation of these risks. Also, the conflict of interest noted between the permanent control agents of the first degree at the level of the business structures with their direct hierarchy, particularly at the level of the agencies and operating groups.

The operational risk control system must involve: the identification and assessment of risks and controls of all processes, the reporting of operational incidents and losses, the reporting of any exceeding of set limits, monitoring of the status of application by operational structures of the instructions and/or guidance given by the Bank's bodies authorized in terms of risks, the identification of existing controls for each identified risk, the use of the results of on-site and off-site controls for the reassessment of residual risks and the updating of risk mapping, the implementation of risk mitigation action plans and measures to strengthen the risk control system, the analysis and modeling of incidents as well as losses recorded.

Conclusion:

An effective operational risk control system contributes to the bank development and to the reinforcement of its profitability. Additionally, it provides reasonable assurance that the strategic objectives set have been achieved.

According to the results of our study, the system implemented at the bank generally complies with the rules of the three levels of control, regulatory requirements regarding the separation of controls between permanent and periodic as well as the level of requirement regarding own funds. However, the bank must accentuate and optimize its system beyond the regulatory aspect; it is necessary to energize the system by:

- automating all control processes,
- developing the necessary controls for business processes affecting banking operations carried out by central structures,

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- strengthening control structures with the necessary skills, means and tools,
- ensuring coordination and information sharing between the structures responsible for periodic and permanent control,
- developing risk culture as an essential part of the bank's culture.

Risk management is a necessary objective of each bank, within the framework of the rules set by regulatory texts, the decisions of the executive body and the deliberative body and in accordance with best banking practices.

Thus, the structures responsible for permanent control and risks provide instruments and measures to identify, assess, control and monitor potential risks effectively by equipping themselves with information systems enabling them to carry out their missions. However, it is essential to involve the business managers in the exercise of permanent control at the first level, each within their scope of activity. Also, it was noted that the controls developed in terms of operational risks do not allow for the anticipation of their occurrence as well as the minimization of the impact of their realization on the overall result, due to the shortcomings noted in particular in terms of non-automation of certain controls and/or the manual entry by operational staff of certain activities on the bank's information system.

The deliberative body and the executive body must ensure that they instill a risk culture at all levels of responsibility, in particular through:

- The integration of the notion of risk into the Bank's strategy;
- The promotion of ethical and honest behavior and respect for professional ethics at all levels in order to avoid situations of conflict of interest;
- The establishment of a control culture within the Bank;
- The integration of risk management concepts into the various training programs and seminars provided for the benefit of Bank staff;
- Raising staff awareness of the importance of the role given to them in managing risks, particularly through their active involvement in the control system.

The risk policy and the general risk control framework are evolving. It is necessary to emphasize the importance of the issues of translating the control standard relating to risks, particularly operational risks within financial institutions.

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