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# A statistical study of the industrial risk insurance sector in Algeria during the period (2010-2023)

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> **Abstract**---This study aims to examine major industrial risks within the Algerian economic and environmental context, highlighting their dual impacts. Unlike natural risks, which tend to be most severe at their onset, industrial risks often have delayed yet significant consequences. In some cases, both types of risks may occur simultaneously, intensifying the crisis and leading to severe damage to workers, surrounding communities, and workplace safety. The study explores how industrial risk management remains one of the biggest challenges facing businesses. While survival, continuity, and profitability are primary goals for any economic entity, effective risk management, mitigation strategies, and environmental adaptation are essential for achieving these objectives. Insurance is one of the most effective tools for managing industrial risks. This research employs a statistical approach, drawing on reports and data from insurance regulatory bodies, including the Ministry of Finance and the National Insurance Council. The findings underscore the critical role of industrial risk insurance in Algeria, as evidenced by statistical trends during the study period. The sector's growth is primarily driven by the

mandatory nature of this type of insurance, alongside the expansion and increased output of the industrial sector over the years.

**Keywords**---Risk management, Industrial risks, Insurance, Premiums, Compensation.

#### Introduction

The insurance sector is one of the fundamental pillars of the modern economy, providing financial protection to businesses and individuals against potential risks. Within this framework, industrial risk insurance holds a central position due to its role in ensuring the stability of industrial activities and minimizing losses resulting from accidents and damages affecting factories and industrial facilities.

In Algeria, the industrial risk insurance sector has witnessed significant growth over the past decade, in line with industrial expansion and major investments across various sectors. However, this development has been accompanied by several challenges, including levels of insurance awareness, regulatory changes, and the extent to which companies adopt this type of insurance.

Insurance plays a crucial role in protecting assets and wealth from potential risks while ensuring the continuity of industrial and economic establishments, preserving their capital. Industrial risk insurance is one of the primary tools for safeguarding industrial enterprises against losses caused by various incidents, thereby contributing to production continuity and economic stability. Between 2010 and 2023, this sector in Algeria has undergone major transformations, whether in terms of insurance penetration, compensation values, or awareness of its importance. Nevertheless, it still faces challenges related to its adoption, insurance policies, and the responsiveness of industrial companies to this form of protection.

#### Research Problem

Based on the above, the study seeks to address the following research question: What is the statistical evolution of industrial risk insurance in Algeria during the period 2010-2023?

# **Research Hypotheses**

- 1. The industrial risk insurance sector in Algeria has experienced uneven growth between 2010 and 2023, influenced by economic and legislative transformations.
- 2. Regulatory and legislative factors play a key role in determining the revenue volume of the industrial risk insurance sector.
- 3. The increase in industrial investments over the past decade has contributed to a rising demand for industrial risk insurance.

# **Research Objectives**

This statistical study aims to analyze the state of industrial risk insurance in Algeria from 2010 to 2023 by examining the evolution of insurance premiums, compensation rates, and the extent of its adoption among industrial enterprises. It will also highlight the factors influencing the growth of this sector, the challenges it faces, and provide recommendations to strengthen its role in protecting industrial investments and achieving economic sustainability.

# Research Methodology

To address the research problem and validate the hypotheses, this study employs:

- **The descriptive approach** to present definitions and literature related to the topic.
- **The analytical approach** to examine historical data on industrial risk insurance in Algeria.
- **The statistical approach** to study the evolution of insurance premiums, compensation amounts, and adoption rates using numerical data from official statistics and annual reports from the Ministry of Finance and the National Insurance Council.

## **Study Structure**

To address the research problem, this study is divided into three main sections:

- 1. Industrial Risks in Algeria
- 2. The Concept and Importance of Industrial Risk Insurance
- 3. Statistical Analysis of the Industrial Risk Insurance Sector (2010-2023)

# 1. Industrial Risks in Algeria

All human societies are exposed to various risks due to the **complex interactions between society and the environment**. The occurrence of disasters highlights the complexity of these interactions and the scale of potential consequences.

#### 1.1. Industrial Risk

Industry is a key driver of economic growth and plays a crucial role in the development and expansion of cities. However, as industrial activities have expanded over time, their negative impacts on people and the environment have become more evident. What was once a catalyst for development and wealth creation has also become a source of concern, posing significant threats to urban sustainability. These threats are commonly referred to as industrial risks.

An industrial risk can be defined as a sudden event occurring within an industrial site, leading to severe consequences for workers, nearby residential communities, properties, and the surrounding environment (1). A risk is an inherent characteristic of a material, factor, energy source, or situation that may cause harm to individuals, property, or the environment (2). Industrial risk is classified among the 14 major risks identified by the United Nations and is one of the 10 critical risks recognized in Algeria. This classification underscores the severity of industrial risks. According to Article 10 of Law No. 04-20, these risks are

considered major hazards and are subject to specific preventive measures outlined in Article 5 of the same law. The major risks include (3):

- Industrial and energy-related risks
- Radiological and nuclear hazards
- Climatic hazards
- Risks related to human health
- Risks affecting animal and plant health
- Disasters arising from large human gatherings
- Air, land, marine, and water pollution
- Earthquakes and geological hazards
- Floods
- Forest fires

According to Article 2, Chapter 1 of the same law, a major risk is defined as "any potential threat to humans and their environment, which may arise from exceptional natural hazards and/or human activities."

This classification reflects the critical importance of addressing industrial risks through preventive measures and insurance solutions, ensuring the protection of lives, property, and environmental sustainability (4).

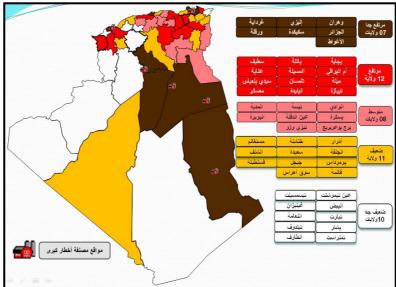
# 2. Types of Industrial Risks

Industrial risks primarily arise from **human activities** and generally manifest in the following forms (5):

- **Fire hazards** in industrial or urban areas, caused by the ignition of materials due to contact with other substances, open flames, or sparks.
- **Explosion hazards**, resulting from the mixing of certain substances, violent gas releases, or explosive materials.
- Toxic hazards, occurring through the emission of hazardous and toxic gases into the air, water, or soil. Poisoning can happen via inhalation, ingestion, or skin contact.
- Hazards related to wastewater leakage, as well as intentional or accidental discharge of harmful substances into water bodies.
- Radiological hazards caused by exposure to ionizing radiation or nuclear incidents.
- Marine and aviation disasters involving accidents at sea or in the air.

Assessing **risk levels** remains challenging due to the **lack of qualitative and quantitative data** on industrial hazards. The following figure presents a **map of industrial risks** across Algeria's provinces.

Figure 1: Industrial Risk Map of Algeria



Source: Colonel Ben ChaabanSebti, Commander of the Multi-Purpose Combat Engineering Unit, "Major Risks in Algeria," Algeria, May 2013, p. 10.

# 3. Concept of Risk Management

The concept of risk management has been primarily discussed by insurance scholars, who often consider it as an introduction to insurance rather than a standalone field. Below are some key definitions of risk management from their perspectives:

- Risk management is the process of controlling risk by reducing its frequency and minimizing potential losses at the lowest possible cost.
- According to Heinz, a global expert in risk and insurance, the primary function of risk management is to identify, assess, and insure against risks (6).

This definition highlights the scientific approach to risk management, which helps derive generalized strategies for analyzing risks, implementing effective control measures, and mitigating their impact at the lowest possible economic cost. Some researchers in risk science define risk management as (7):

• A set of functions that deal with insurable risks, employing the best available methods for handling them.

#### 4. The Importance of Industrial Risk Management

The concept of risk management is not entirely new; however, it has gained renewed significance in the industrial sector. The increasing risks faced by industrial enterprises—resulting from the continuous rise in the financial value of these projects and the growing liabilities associated with industrial activities—have not been matched by equivalent advancements in insurance. Finding complete insurance coverage for these risks is often challenging, and even when available, it has become an expensive solution due to the large scale of industrial projects. As time progresses, insurance costs continue to rise, making it necessary to rethink risk management strategies to provide complementary or alternative coverage solutions.

The importance of risk management is demonstrated through the following benefits (8):

- Risk Differentiation: It helps distinguish between risks that can be sustained without disrupting or bankrupting the project and those that could lead to the project's collapse or inability to continue. By preparing for such risks, risk management ensures business continuity.
- Profit Maximization: Effective risk management can directly contribute to increased profitability by reducing costs, which in turn increases revenue.
- Additional Profit-Generating Aspects:
  - Encouraging Expansion and Investment: When a company effectively manages its inherent risks, it gains greater opportunities to engage in speculative risks such as investments and expansion. For instance, once workplace accident risks are covered, worker productivity improves, and employers find it easier to invest and expand.
  - Better Decision-Making: By providing decision-makers with a clear understanding of the potential risks facing the business, risk management enables more informed and strategic decisionmaking.
  - o Business Continuity After an Incident: By ensuring the project resumes operations quickly following an accident, risk management helps retain customers and suppliers, preventing them from turning to competitors.
  - Stronger Stakeholder Confidence: Creditors, customers, and suppliers prefer working with a business that has strong protection against risks. Similarly, employees favor companies that ensure workplace safety and risk management.
  - Social Responsibility: Risk management also benefits employees and other affected parties by ensuring that the company meets its social responsibilities.

Despite its significance, risk management alone cannot fully address industrial risks. The magnitude of these risks often exceeds the capabilities of preventive measures and self-insurance. Therefore, industrial risk insurance remains a crucial and necessary component of comprehensive risk management.

# II. The Concept and Importance of Industrial Risk Insurance

Industrial risk insurance serves as an effective method for industrial entities to manage risk by transferring its financial burden to an insurance provider. The following section explores the concept, importance, and coverage aspects of this type of insurance.

# 1. The Concept of Industrial Risk Insurance

Through our research on industrial risks, we have observed that legislation does not explicitly define or provide detailed regulations regarding industrial risks. In Algeria, for example, the legal framework does not differentiate between industrial risks and simple risks. However, classification systems exist to distinguish between these categories:

- Based on Insured Amounts: If the insurance coverage amount is substantial and exceeds the threshold for simple risks, the risk is classified as an industrial risk.
- Based on Risk Complexity: Industrial risks are also categorized based on their nature. For example, fire risks in residential buildings and small commercial establishments fall under simple risks. However, fire risks in workshops, factories, and large industrial installations are classified as industrial risks due to their complexity and potential for large-scale losses.

# 2. The Importance of Industrial Risk Insurance

#### 2.1. For Industrial Production Units

- Strengthens the economic capacity of the production unit, allowing it to expand its industrial activities (e.g., by securing loans using insured assets as collateral).
- Ensures the protection of property and assets within the production unit, which boosts morale and positively impacts productivity.
- A project that incorporates insurance as part of its risk management strategy is considered progressive, with its management team demonstrating specialized expertise in risk management and insurance.
- A business insured against risks gains increased trust and respect from market stakeholders.

All these benefits provide a safety net for production units, ensuring their sustainability, growth, and expansion within the economic and industrial landscape.

#### 2.2. For the National Economy

The stability of the national economy is directly linked to the stability of its economic units. Ensuring security for any economic entity contributes to overall economic stability.

- Insurance that guarantees economic projects and absorbs the impact of realized risks provides these businesses with financial stability, which positively affects the overall economy.
- Implementing insurance-based risk management strategies in national economic projects ensures these entities are equipped with the best protection mechanisms against potential threats.
- National projects that insure their production assets against potential risks can enhance their international economic relations, thereby strengthening their overall economic position.
- Insuring economic resources against loss and depletion serves as a fundamental pillar of economic and social security.

# 3. Growth of the Industrial Risk Insurance Sector (2010-2023)

The industrial risk insurance sector has experienced significant growth in turnover during the study period, increasing from 26.428 billion DZD in 2010 to 64.887 billion DZD in 2023. The table below illustrates the revenue development over this period:

Billion BED								
Year	2010	2011	2012	2013	2014	2015	2016	
Revenue	26.428	28.690	32.022	34.065	41.355	41.910	43.067	
Year	2017	2018	2019	2020	2021	2022	2023	
Revenue	45.866	46.660	51.698	53.033	59.950	63.257	64.887	

Table 1: Growth of Industrial Risk Insurance Production (2010-2023) Unit:

Source: Compiled by researchers based on reports from the Directorate of Insurance and the National Insurance Council (2010-2023).

From the table, we observe the growth in the turnover of the Industrial Risk Insurance sector during the study period, increasing from 26.428 billion DZD in 2010 to 64.887 billion DZD in 2023.

Public insurance companies played a significant role in this increase, accounting for 63% of total production, compared to 25% for private companies, 10% for mutual insurance companies, and 3% for mixed companies. The market structure also underwent notable changes, as the number of insurance companies operating in the market rose from 16 in 2010 to 23 in 2012. Since 2011, a distinction has been made between life insurance companies and non-life insurance companies. Finally, the following figure illustrates the growth of industrial risk insurance production in Algeria from 2010 to 2023.

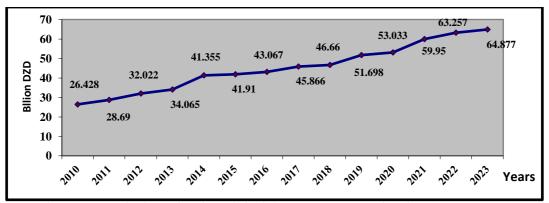


Figure 2: Evolution of Industrial Risk Insurance Production (2010-2023) Source: Compiled by researchers based on data from the previous table.

# III. Analysis of Compensation for Industrial Risks

# 1. Risks Covered by This Insurance

# 1.1. Fire Insurance and Related Risks (Assurance Incendie et Risques Annexes)

Fire insurance holds a prominent position among all insurance branches, being the oldest and most widespread. It covers all fire-related damages unless otherwise specified in the insurance contract. However, it does not cover damages caused solely by heat, direct contact with fire, or flammable materials unless such contact leads to an actual fire outbreak (10). The insurer is responsible for material damages directly caused by fire, explosion, lightning, or electrical malfunctions (11).

Fire insurance is considered a multi-risk contract (contratmultirisques) as it also covers other damages unrelated to fire, such as:

- Collisions or falls of aircraft, their parts, or objects dropped from them.
- Vibrations caused by an aircraft breaking the sound barrier.
- Electrical hazards affecting electrical machinery, transformers, or electronic devices of any kind.

# 1.2 Machinery Breakdown Insurance (Assurances Bris de Machines)

Machinery has always been, and continues to be, a crucial tool for production and development, serving as a valuable asset for businesses. However, as machinery evolves, the risk of damage increases, especially given the fragility and complexity of modern equipment, leading to potential capital losses (12).

Under this insurance contract, the insurer covers all material damages or breakdowns that occur during the installation or operation of machinery. This coverage extends to all equipment used in heavy industries, such as transformers, furnaces, and other industrial machinery, as well as power-generating equipment like generators and turbines, and lifting and transportation machinery (13).

## 1.3 Business Interruption Insurance (Assurances Perted'Exploitation)

This type of insurance aims to restore a company to its financial position as if no insured incident had occurred. The first key condition for this insurance is that the incident must be covered under a material damage insurance contract. The second key condition is that the insurer will only provide business interruption coverage if the company already has material damage insurance.

This insurance compensates the policyholder for the following losses (14):

- Loss of gross profit due to operational downtime.
- Additional operating expenses incurred during the compensation period or due to a disruption or reduction in business activity caused by an insured disaster.

# 4.1. Water Damage Insurance (Assurance Dégâts des Eaux)

Although often associated with residential properties, this type of insurance is equally important for industrial establishments, particularly due to potential damage to inventory and goods.

This insurance covers:

- Property damage, including losses to company assets, goods, equipment, foreign currency, bonds, shares, banknotes, transfer orders, certificates of deposit, and tax or postage stamps (15).
- Indirect damages, such as expert fees and the costs of investigating the cause of water leakage.
- Third-party liability for water damage originating from the insured premises, provided the leak was sudden and unexpected (16).

# 1.5 Glass Breakage Insurance (Assurance Bris de Glaces)

Modern architecture heavily relies on glass for aesthetic appeal. Many businesses construct buildings with extensive glass features, which, while visually appealing, are expensive and fragile. As a result, it has become essential to have an

insurance policy that covers unexpected glass breakage during the contract period.

Under this insurance, the insurer covers all losses resulting from broken glass, mirrors, marble, and similar materials. Additionally, the policy includes:

- Transportation, installation, and cleaning costs related to glass breakage.
- Compensation for expenses incurred in restoring the affected area or relocating necessary materials.

It is important to note that glass breakage caused by fire or external forces (such as falling objects or thrown stones) is typically covered under fire insurance policies.

# 1.6 Workshop or Construction Equipment Insurance (Assurance Tous Risques Engins de Chantier)

This insurance policy covers all damages to machinery resulting from the following incidents (17):

- Sudden accidents occurring during operation, loading, unloading, assembly, or disassembly within the company's premises.
- Installation errors.
- Accidents caused by improper use or lack of maintenance (negligence).
- Fire, lightning, and explosions.
- Theft or attempted theft.

Additionally, this policy covers all accidents not explicitly excluded in the contract. The coverage applies whether the machinery is in use or idle, as it follows an "all-risk except" (Tousrisquessauf) principle, meaning everything is covered except explicitly excluded risks.

# 1.7 Theft Insurance (Assurance Vol)

This type of insurance covers losses and damages to the insured company's property due to theft. However, compensation is granted only if the stolen assets were located in the designated areas specified in the insurance contract (18).

# 1.8 Electronic Equipment and IT Risks Insurance (Assurance Tous Risques Électroniques)

This insurance policy covers all losses or damages affecting IT equipment and electronic devices (e.g., scanners, cameras), as well as the data stored in these devices. It also covers rental costs of replacement equipment needed to maintain operations and overtime costs for rebuilding lost databases.

The covered damages include:

- Improper manual handling, negligence, or human error by an employee or any other person within the company.
- Fire, lightning, explosions, and damages caused during firefighting and rescue operations.
- Installation and disassembly-related risks.
- Electrical surges and induction damages.
- Cyberattacks targeting the company's information systems.
- Loss of electronic records due to theft or burglary.
- Unauthorized copying, recording, or transmission of sensitive business information.

Additionally, the insurer **covers the costs** of replacing damaged digital storage media and reconstructing lost data, within the financial limits defined in the contract.

# 1.9 Civil Liability Insurance for Operational Activities

Civil liability represents one of the greatest risks a company may face. While the maximum potential loss of a company's property is limited to its value, civil liability claims have no fixed limit. A legal judgment against a company for bodily injury or property damage caused to a third party during its operations could result in financial liabilities far exceeding the value of its own assets. Examples of covered liabilities include:

- Noise, pollution, odors, vibrations, and glare-related damages.
- Glass breakage caused by an explosion in a neighboring industrial facility.
- Major industrial accidents, such as the 2004 Skikda LNG plant explosion (GNL1K).

The insurer covers financial consequences arising from the insured company's civil liability for damages to third parties. It also covers legal expenses associated with any lawsuit where the insured party is held responsible for an insured incident (19).

## 2. Analysis of Compensation for Industrial Risks

This section examines industrial risk compensations from 2010 onward, analyzing and comparing the compensated amounts each year.

Table 2: Industrial	Risk Compensations	(2010-2023)	Unit: Billion DZD
Table 2. Illuusiilai	INSK COMBULISATIONS	12010-20201	CIIII. DIIIIOII DZD

Year	2010	2011	2012	2013	2014	2015	2016
Total Compensations	35.678	43.176	50.706	54.059	61.832	71.088	69.562
Industrial Risks	4.353	7.464	9.880	9.243	10.483	16.638	17.141
Share (%)	12	17	19	17	17	16	25
Year	2017	2018	2019	2020	2021	2022	2023
Year Total Compensations	<b>2017</b> 70.640	<b>2018</b> 69.497	<b>2019</b> 74.544	<b>2020</b> 62.361	<b>2021</b> 72.588	<b>2022</b> 70.302	<b>2023</b> 76.845
Total							

**Source:** Compiled by researchers based on reports from the Insurance Directorate and the National Insurance Council (2010-2023).

From the table, it is evident that compensations for industrial risk coverage are substantial. In 2010, the total compensated amount reached 4.353 billion DZD, representing 12% of all paid compensations. The amount of compensation reached in 2011 was estimated at 43.1 billion DA, an increase of 21% compared to 2010 when payments were 35.6 billion DA. All companies contributed or participated in this progress, as the values recorded vary from one company to another, between 22 million and 2.3 billion DA. Industrial risk insurances that caused damage to property in terms of losses, recorded during 2012, an increase

of 32%, or 2.4 billion DA compared to 2011, and the analysis shows the significant contribution of La CASH, which achieved an increase of 117% of compensation in 2012, the amount of compensation rose from 2.3 billion DA in 2011 to 5 billion DA in 2012. This increase is due in large part to the settlement of several major disasters in 2011 that were settled in 2012. Compensation paid by insurance companies during 2013, in favor of the insured, witnessed an increase of 3.3 billion DA, from 50.7 billion DA in 2012 to 54 billion DA in 2013, which represents a positive change of 7%.

This share increased to 25% in 2016, amounting to 17.141 billion DZD, highlighting the crucial role of insurance in mitigating losses and restoring conditions before the risk occurred. However, compensations for industrial risks fluctuate, which reflects the probabilistic nature of insurance contracts—where payouts cannot be entirely controlled. For instance, compensations dropped to 14.064 billion DZD in 2017 and 14.860 billion DZD in 2018, before rising again to 18.330 billion DZD in 2019. The highest compensation share was recorded in 2022 at 26%, while the largest total payout was 20.629 billion DZD in 2023. These figures underscore the significant role of insurance in risk coverage, confirming that industrial risk compensations involve substantial financial commitments.

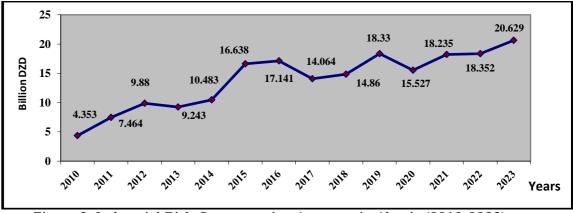


Figure 3: Industrial Risk Compensation Amounts in Algeria (2010-2023) Source: Prepared by researchers based on data from the previous table.

The analysis highlights the significant contribution of CASH Insurance, which achieved a 117% increase in compensation for industrial risk insurance covering property damage losses in 2023. This increase is largely attributed to the settlement of numerous industrial risk incidents, particularly fires and marine risks.

# Conclusion

Through this study, we aimed to identify and assess the nature of industrial risks, which have become an unavoidable reality in Algeria rather than a mere possibility. Addressing these risks is crucial, as they can lead to severe economic crises, as seen in the Skikda disaster (January 2004) and the Tiguentourine gas plant attack in Ain Amenas, Illizi (January 2013). Crises and disasters serve as a

true test of state management, highlighting the importance of proper governance during such events.

Industrial risk insurance is one of the fundamental pillars for protecting industrial enterprises from accident- and disaster-related losses, ensuring the continuity of production and the stability of the economy. Between 2010 and 2023, Algeria's industrial risk insurance sector underwent significant transformations due to economic, regulatory, and corporate insurance awareness changes.

The study revealed fluctuating growth in the industrial risk insurance sector. Some periods saw an increase in demand, driven by major industrial investments, while others experienced a decline due to economic instability and a lack of awareness about the importance of insurance among some businesses. Our analytical study of industrial risk insurance compensation amounts revealed substantial payouts, with total compensations in 2023 amounting to 20.629 billion DZD. This figure underscores the crucial role of insurance in covering such risks.

# **Key Findings:**

- Gradual growth in insurance premiums, although still below expectations relative to Algeria's industrial activity levels.
- Low insurance awareness among some industrial firms, affecting insurance penetration rates.
- Regulatory and legislative challenges that hinder sector expansion, such as complex procedures and long compensation processing times.
- High compensation values in certain periods, especially in high-risk industries like oil, gas, and petrochemicals.

This study also provided insights into the realities of industrial risk insurance, emphasizing its critical role in the industrial sector and its positive impact on economic development. However, despite its significant importance, industrial risk insurance in Algeria faces several challenges:

- Lack of a specific Algerian tariff system for pricing major industrial risks (e.g., oil refineries, power plants, desalination plants). This is due to insufficient statistical data, which is essential for risk pricing (law of large numbers). As a result, Algerian insurers rely on international reinsurance companies (e.g., Munich Re, Swiss Re, SCOR), which have extensive databases to establish appropriate pricing models.
- Limited expertise in risk assessment:
  - The first step in underwriting is risk evaluation, which requires specialists to provide detailed reports containing key risk data and recommendations.
  - o These reports help determine insurance pricing and maximum probable loss (MPL).
  - o However, Algeria has very few qualified risk assessors.
- Lack of specialized training programs in Algerian universities:

- There is no structured academic framework for training insurance professionals, except for a few private institutions and recently established training centers.
- o Unfortunately, many instructors lack sufficient expertise.
- These schools are mainly concentrated in Algiers, while the insurance sector requires a larger workforce to develop further.
- Shortage of specialists in claims settlement:
  - There is a severe lack of qualified technicians capable of processing and repairing industrial damages.
  - As a result, medium- and large-scale claims often rely on foreign expertise.
- Unfair competition in the Algerian insurance sector:
  - O Unethical competition has led to underpriced industrial risk insurance policies.
  - o In many cases, premiums are set at symbolic rates, which do not match the actual risk levels.
  - For instance, in 1989, when the government liberalized the sector, public treasury losses amounted to 13 billion DZD due to poor pricing strategies.

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