

The Role of Internal Audit in Assessing Risks Using the Risk Matrix Approach with Case Study of Procurement Cycle.

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مخبر اقتصاديات الطاقة المتجددة ودورها في تحقيق التنمية المستدامة

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Abstract:

The study aims to clarify the internal audit role in assessing risks using “Risk Matrix” approach to enhance its ability to provide an objective assurance about risks control, a case study was conducted at the Algerian Company for Electricity Production, by exploiting internal audit outputs of procurement cycle during 2011-2015, then applying the Risk Matrix, including other data about risks occurrence probability and its impact;

the study concluded that this approach has a major role for internal audit in evaluating, ranking and prioritizing risks, we also give the necessary recommendations to enhance the internal audit intervention in strengthening risk management systems.

Keywords: Internal Audit, Risks, Risk Mapping, Risk Matrix, Enterprise Risk Management.

JEL Classification: M42, G32

1. Introduction:

One of the main characteristics of the modern era of the life of company, is the continuous changes and the birth of crises, so the trending interest in Risk Management has increased, and become a mandatory field in the processes of the company, and it were appeared in the functional flowchart, and was entrusted with the tasks of setting the necessary measures to control risks, which represents the second line of defense (IIA, 2013, p. 2), the first which represent the operations of the company, and remains the third line of defense, which is the internal audit, supposed to bring an objective assurance of good compliance with these procedures.

A best practice to the assessment of these risks requires controlling the tools and techniques required in evaluating risks, that the Risk Matrix is one of the most useful tool, which is the problematic of our study, represented in the following question: *How can internal audit use the Risk Matrix Approach in assessing and controlling risks?*

Through this problematic, the following sub-questions appear that will help us answer them:

- 1) What is the Risk Matrix and how does it contribute to enhancing risk assessment?
- 2) What is the role of internal audit in risk management systems?
- 3) What is the added value that internal audit can provide by using the risk matrix to assess deficiencies and the risks?

Appropriate Assumptions: To answer the main problem and sub-questions, we adopt the hypotheses that we consider necessary to rely on:

- 1) The Risk Matrix is used as an effective tool in controlling the level of risk.
- 2) Internal Audit plays an important role in risk assessment;
- 3) Internal Audit uses the Risk Matrix to assess risks.

Research' Objectives: The study derives its importance from the importance of internal auditing in controlling risks through the detection of weaknesses and the recommendations it provides to control them, as well as from the importance of modern methods used by the audit team to assess these risks, the most important are the Risk Matrices.

Study' Methodology: In order to achieve our study objectives, we used descriptive-analytical approach by dividing the study into two parts, the first concerns the theoretical aspect of the study problem, in which we relied on what was also stated in books, scientific journals, specialized studies and what has been published by international and professional organizations, the second aspect represents a case study through the use of the internal audit outcomes in preparing a risk map and resulting for its importance in controlling the level of risk in order to answer the problematic of the study.

Study' Methods: In our study, we relied on the personal interview with the concerned employees, as well as personal observations, in order to inquire and ask questions to reach accurate results. The personal interview is an oral interrogation with the auditor and the procurement office employees, the observations is an examination of the company's internal audits documents and recording of their information.

Previous Studies: Among the studies that we were able to obtain that are concerned with one of the study variables are the two studies mentioned below, noting the weaknesses of

references and studies on the ASJP platform, whether in terms of containing the study title or keywords on the word risk map, risk matrix (in English, French and Arabic) :

— A study by Hicham ZERROUKI and Abdel Hamid HESSIANI (2020, زروقي و حسياني) entitled : *The role of modern practices of internal audit in the activating risk management in the light of international auditing standards - a case study of the Industrial Achievements and Installation Corporation BATIMETAL-*, published in Arabic in 2020, the subject of this study was related to an industrial company through an exploratory study, that concluded there is an importance of internal audit in reducing and detecting risks and providing objective assurance of a correct control of this risks.

A study by Imene AKSAS (2019, أكساس) entitled : *The cartography of risks as a method to manage errors associated with employment in the "Essalem Electronics" firm*, published in Arabic in 2019, and it concerned the study of risks related to human resources, and it concluded that the Risk Map requires an accurate methodology that enables the company under study to discover the risks related to employment and how to manage them.

2. Concepts about Risk Assessment and Risk Matrix Approach:

2.1. The risk Culture:

According to Rejeski in 1993 (Cornélis & Billen, 2001, p. 208), the science of risk has developed around 3 approaches :

Table 01. Risk Science Approaches

Community	Risk Approach	Problematics
Scientists	Risk Assessment	Where are the risks? And what are they?
Decision-Makers	Risk Management	What can be done to really reduce these risks?
Public	Risk Communication	Do we have to worry about it?

Source : By Authors based on (Cornélis & Billen, 2001, p. 208)

In his diagram of risk cultures (Figure 01), Rejeski places risk modeling and mapping at the intersection of the three cultures:

Figure 01. Risk Cultures

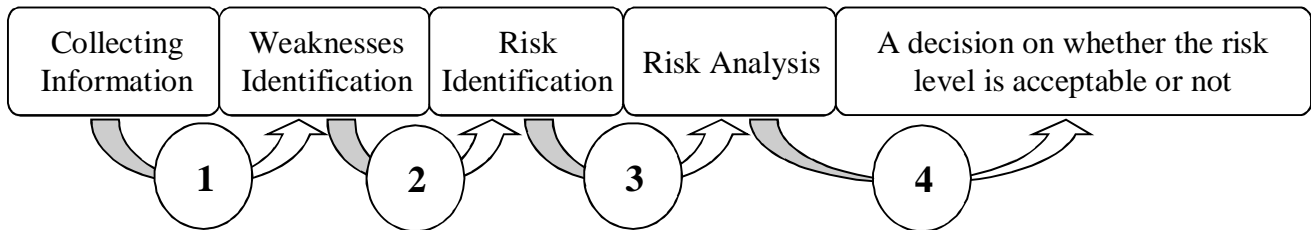


Source : (Cornélis & Billen, 2001, p. 209)

2.2. Risk assessment methodology:

In the modern literature, the method published in risk assessment guidelines and manuals by the European Agency for Safety and Health at Work (Nenad Kovačević et al., 2019, p. 59) is usually used as the baseline risk assessment methodology, in Figure 02, a schematic presentation of the steps of the risk assessment methodology.

Figure 02. The steps of the risk assessment methodology



Source: By authors based on (Nenad Kovačević et al., 2019, p. 59).

2.3. Risk Matrix “RM” Definition:

The RM is the positioning of major risks according to different axes, such as the potential impact, the probability of occurrence or the current level risk control (IFACI, 2003, p. 24).

2.4. Risk Matrix Steps:

It is established following three steps:

Step 01. Defining the probability of occurrence: There is many methods that can be applied in risk assessment; they can be divided into 03 major groups (Nenad Kovačević et al., 2019, p. 05):

Table 02 : Risk Assessment Methods

Methods	Examples
<i>Qualitative:</i>	Polling, SWOT analysis, Causal Diagram, Expert-Marks, Delphi Method, Probability results Methods ...
<i>Semi-Quantitative:</i>	
<i>Quantitative:</i>	Probability Theory, Mat Stat, Operational Research, Sensivity Analysis, Error Log, Even Tree, Monte Carlo ...

Source : By the Authors based on (Nenad Kovačević et al., 2019, p. 05)

The most frequent is the quantitative and qualitative approach, in qualitative approach we use numerical value as a probability based on the use of one through multiple processes (Qazi et al., 2021, p. 4), for example the Monte-Carlo Simulation is most used in the context of Project Management, with the qualitative approach, we need to form ranks of ordinates with the appropriate probability of occurrence to be a descriptive statement of the qualitative risk size (Nenad Kovačević et al., 2019, p. 60). Then we apply a digressive notation in each statement, the following table is commonly used.

Statement	<i>Very likely</i>	<i>Likely</i>	<i>Possible</i>	<i>Unlikely</i>	<i>Very unlikely</i>
Notation	05	04	03	02	01

Step 02: Defining the Impact: The magnitude of an event may be considered to be the inherent level of the event and the impact can be considered to be the risk-managed level (Hopkin, 2017, p. 22). Because usually the impact and the associated consequences is more important than its magnitude or severity.

Commonly used the qualitative approach with the following table:

Statement	Severe	Significant	Moderate	Minor	Negligible
Notation	05	04	03	02	01

Step 03. Combining ranking levels results: In this step, we will define the criticality of the risk that It is proposed that represents the significance of individual risks relative to exceeding the risk appetite across a specific risk exposure zone (Qazi et al., 2021, p. 4), which is calculated by: $C = Probability \times Impact$. After defining the criticality or the risk score, we need to form ranks of ordinates with the appropriate score, we use also a qualitative approach based on the following scale, which determine the level of risk:

Criticality Range	Reduced	Medium	Hight	unacceptable
	01-04	05-09	10-15	16-25

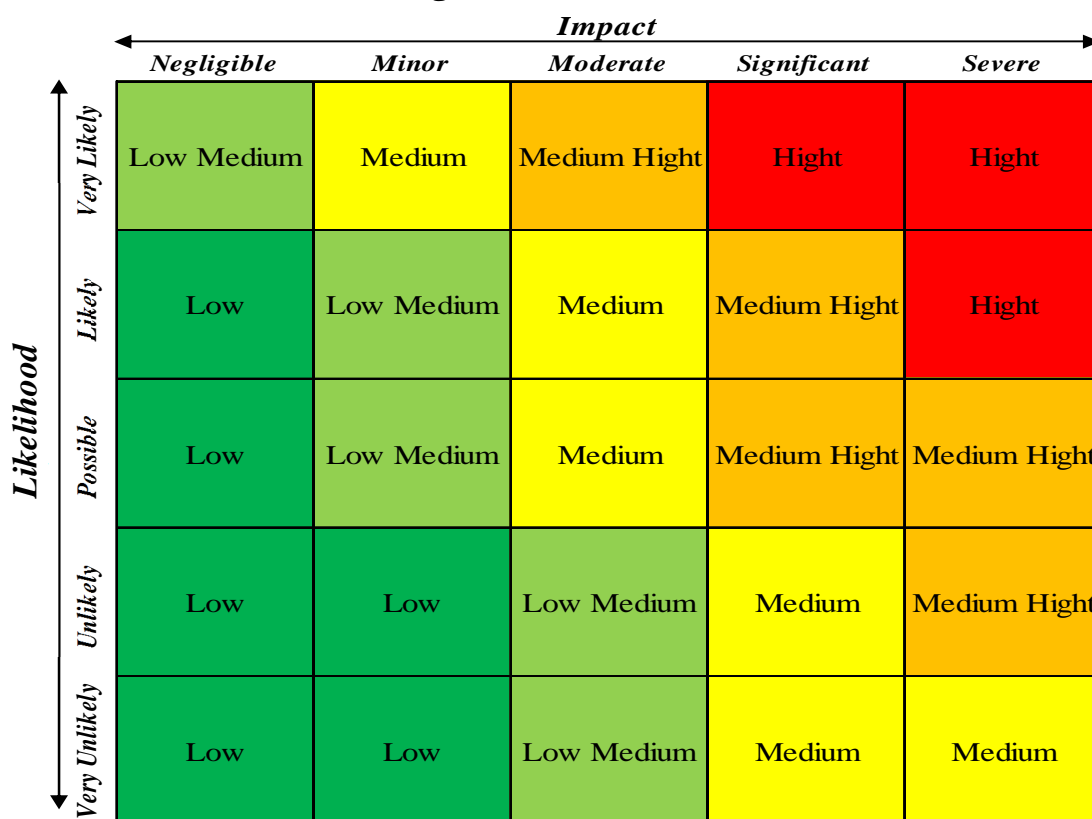
2.5. Types of Risk Matrix:

In practice there are three types of Risk Matrix rating used most frequently (Nenad Kovačević et al., 2019, p. 07) :

- The 3x3 Risk Matrix (OHSAS), in some contemporary literature it is called “Singaporean Method/Model”.
- The 4x4 Risk Matrix (AS/NZS 4360 2004), it is formed according to Australian/New Zealand standards, who belongs to the standards ISO 31000.
- The 5x5 Risk Matrix (MIL-STD-882B), used by the American military standards (MIL-STD), it comprises five levels of probability and five levels of consequence or impact, so we have 25 positions grid. We try to use the 5x5 RM model in our case study.

As follow, an example of the 5x5 RM:

Figure 03. 5x5 RM Model.



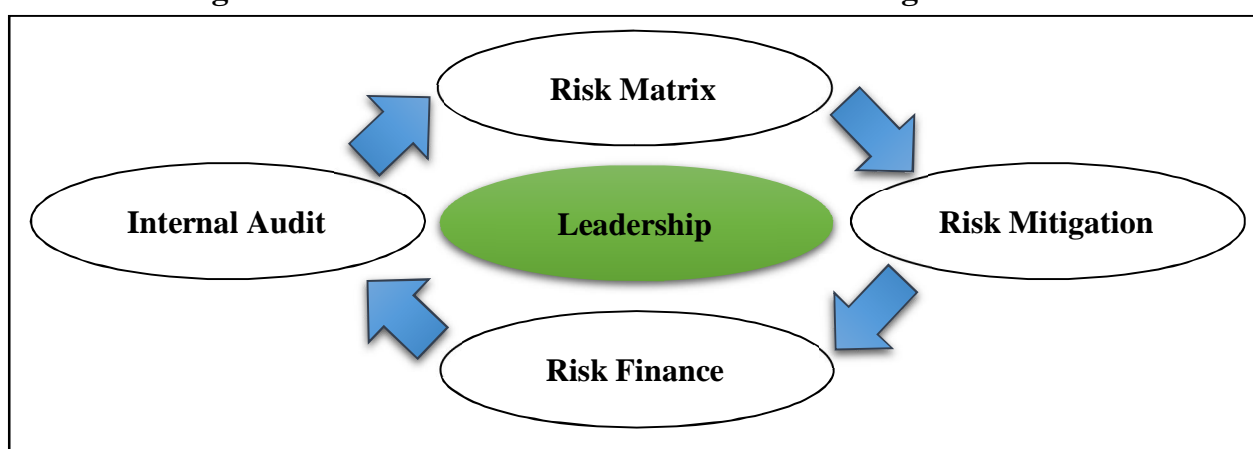
Source : (Nenad Kovačević et al., 2019, p. 62)

3. The Internal Audit within the Risk Management System:

3.1. Internal Audit role in Enterprise Risk Management “ERM”:

Internal audit plays a major role in managing risks in the organization, and it has been concerned with many international considerations of its importance, especially after the financial crises that the world has experienced. Hence, these statements were a new call for risk managers and internal auditors to work together (Louisot, 2016, p. 176), and this is exactly what was addressed by a joint committee of FERMA (Federation of European Risk Management Associations) and ECIIA (European Confederation of Institutes of Internal Auditing), which indicates the importance of internal audit in risk management. The following figure (Véret & Mekouar, 2005, p. 83) represents a simplified model of the position of auditing in the risk management process:

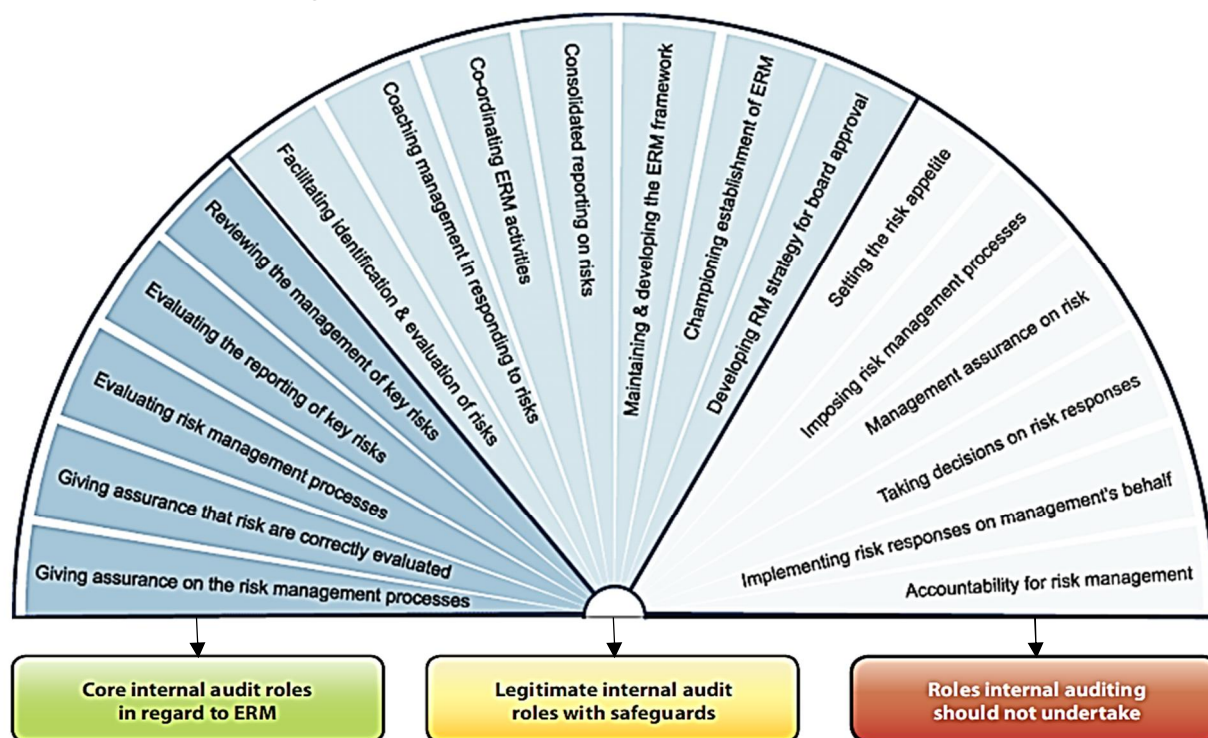
Figure 04 – The Internal Audit in the Risk Management Wheel



Source : (Véret & Mekouar, 2005, p. 82)

The IIA Position Paper titled The Role of Internal Auditing in Enterprise-wide Risk Management (Sobel, 2011, p. 12) provides an illustration (See figure 05) that presents a range of risk management activities and indicates which roles an effective professional internal audit activity should and, equally importantly, should not undertake:

Figure 05. Roles of internal audit in ERM.



Source : (Sobel, 2011, p. 12)

3.2. The importance of Risk Matrix Approach in internal auditing:

Internal audit can apply its own Risk Matrix Approach (IFACI, 2013, p. 10) as a tool to:

- Enables to meet the requirements of the professional standards of internal auditing related to planning activities.
- To be adapted to the characteristics of his mission and thus support its independence.

So the importance of using this approach (IFACI, 2013, p. 20) is as follows:

A tool to meet the requirements of the professional standards of internal auditing: The Internal Audit Professional Practices Reference Framework (CRIPP) provides guidance on the use of risk in planning, the Standard on Planning 2010/IFACI/IIA states that the chief auditor should develop an audit plan using risk approach to identify priorities consistent with the organization's objectives, and as defined in Standard (2010A1), "the internal audit plan must be based on a risk assessment that is documented and carried out at least once a year." By establishing Risk Matrix across an audit perimeter, internal audit has a solid and formal basis for developing its audit plan. The chief of internal audit should communicate with senior management and the board in order to present the considered risks.

In response to other needs: Although the Risks Matrix already identified by other functions already exists, the ones carried out by the internal audit provide an added value:

- This approach allows to acquire and formalize a comprehensive knowledge of the activities and operation of the company;
- Risk analysis and assessment can be carried out independently by the auditor;
- The accuracy of the Risk Matrix specified by the company may not correspond to the requirements of the audit assignment;
- Frequently, the area covered by these RM is often partial, while the internal audit approach provides a comprehensive view of the company and the scope of the audit.

4. Case study: The use of Risk Matrix Approach in Procurement Cycle Internal Audit.

4.1. Case Study Presentation:

4.1.1. The Company Study Subject:

The case study was carried out at F'kirina power plant, attached to the Algerian Electricity Production Company, by using the outcomes of the internal audit of the procurement cycle during the period 2011-2015, and then apply the Risk Matrix Approach according to the 5x5 model and trying to figure out the benefits of using this approach.

4.1.2. The Audit Function in the company:

The Finance inspectorate makes some periodic interventions with regard to the processing of invoices, the compliance with contracting procedures, stocks and accounting, and others; about the internal audit functions, it was initially assigned to the Audit Executive Directorate of the parent company Sonelgaz, but after the strategic restructuring of the group, it was assigned to the subsidiary company CASEG.

4.1.3. The Audit Perimeter:

Through the audit report that we obtained, we found that the audit task was limited in time from 05 to 16/06/2011, limited to analyse and evaluate the following points:

- Procedures for identifying needs;
- Procedures for qualifying and selecting suppliers;
- Procedures for awarding contracts;
- Procedures for agreements and small orders;
- Procedures for closing agreements, and evaluating suppliers.

Then, we used the information's about measures undertaken by company to follow-up the recommendations until 2015, and we tried to establish a corrected RM. In the following table 03, a presentation of the sample selected randomly by the audit team in its mission:

Table 03: Internal Audit sample

Designation	Sample
Call to tenders	38
Unsuccessfull call to tenders	26
Limited consultations	05
Consultations for direct agreement	03
Concluded contracts (Investment or Major Maintenance)	02
Small Orders	10
Very Small Orders.	16

Source: By authors basing on IA reports.

4.2. The Elaboration of the RM:

4.2.1. Defining Risks and Weaknesses:

To create a RM we need first to have a look on the weaknesses detected by the audit team, and the possible risks, so we exploit the audit report, and as follow a list of deficiencies and weaknesses, and the resulting risks that the audit team was able to investigate, this risks have all the same priority for the audit team:

Table 04 – Weaknesses and Risks

Abr	Weaknesses	Abr	Risks
W01	There is a large number of ineffective calls to tender	R01	Failure to reach the goals and achieve the maintenance process within the defined deadlines.
		R02	Delays in the realization of projects and consequently a lack of timely acquisition of spare parts for the maintenance process.
W02	Some multi-year agreements were not subject to closing procedures at the end of the contract.	R03	Failure to discover a decrease or increase in contract value after the agreement expiry.
W03	There is a lack of the evaluation of contracted suppliers.	R04	Authorize the participation of failed suppliers in contracting and giving them quotas of orders.
W04	Lack of use of the prequalification procedure to check suppliers	R05	Delay in achieving maintenance programs due to the adoption of the call to public tenders, which takes time.
		R06	Financial losses resulting from advertising expenses for call to tenders.
W05	Absence of the purchase request document for small orders	R07	Obtaining supplies that are not monitored by an authorized person by the company.
		R08	Possibility of obtaining useless supplies.
		R09	Financial losses for the company due to the lack of a purchase order.
W06	Lack of deadlines control for orders	R10	The possibility of extending contracts deadlines due to the lack of control and monitoring of this deadlines.
		R11	Deterioration of equipment due to non-compliance with maintenance programs.
W07	Weak of procedures for following up and monitoring the execution of contracts	R12	A negative impact on the quality of provided supplies or services compared to those specified in the contract, due to the lack of monitoring.
		R13	Possibility to have financial losses due to the poor control procedures on orders.

Source: By the authors using the IA reports.

4.2.2. Defining probability of occurrence and impact of risks:

To determine the probability of occurrence and the impacts of risks, we requested the Procurement Office to give us this information using a qualitative approach according to the following Likert scale 5x5:

Likelihood	<i>Very likely</i>	<i>Likely</i>	<i>Possible</i>	<i>Unlikely</i>	<i>Very Unlikely</i>
		05	04	03	02
Impact Value	<i>Severe</i>	<i>Significant</i>	<i>Moderate</i>	<i>Minor</i>	<i>Negligible</i>
		05	04	03	02

We need this information to calculate the criticality of Risk, as discussed above:

$$\text{Criticality} = \text{Probability} \times \text{Impact}.$$

4.2.3. Defining Level of risks:

The Level of risk was also defined according to response of the Procurement Office using a qualitative approach with four ranges according to the following scale:

Criticality Range	<i>Reduced</i>	<i>Medium</i>	<i>Hight</i>	<i>unacceptable</i>
	01-04	05-09	10-15	16-25

This table will be used after defining the value of criticality of each risks, and then we will be able to establish the RM.

4.2.4. The Risk Matrix:

Using the information given by the Procurement Office, the RM is constructed as follows:

Table 05. Risk Matrix

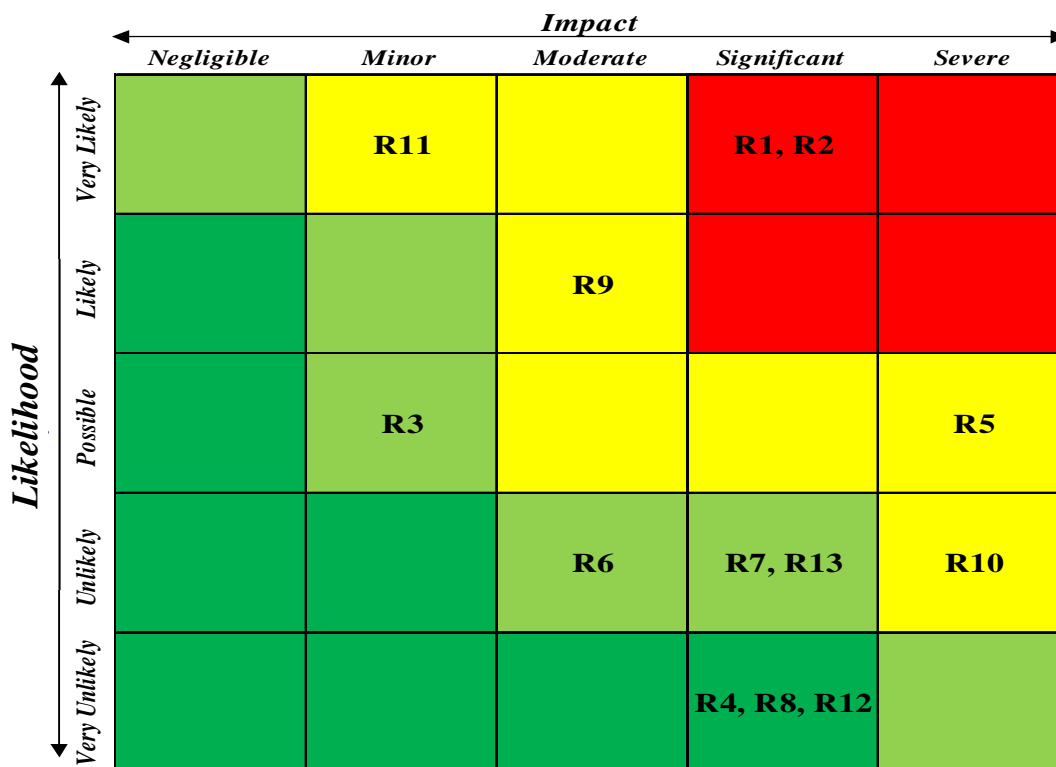
Weaknesses	W1		W2	W3	W4		W5			W6		W7	
	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
Likelihood	4	4	2	1	3	3	2	1	3	2	2	1	2
Impact	5	5	3	4	5	2	4	4	4	5	5	4	4
Criticality	20	20	6	4	15	6	8	4	12	10	10	4	8
Level*	U	U	M	R	H	M	M	R	H	H	H	R	M

*-H:Hight, R:Reduced, M: Medium, U: Unacceptable

Source: By the authors.

Through the risk matrix, we can create a graphic representation, as shown in Figure 06, which helps us to have a look at the distribution of observed risks, and know those in the critical risk area:

Figure 06. The Risk Matrix Mapping.



Source: By the authors.

Through this map, we can say that the priority of the company from a viewpoint of internal audit must pay attention to risks 1, 2, 5, 9, 10 and 11 as a priority, taking into account the high degree of criticality.

4.3. Follow up on recommendations and Corrected Risk Matrix:

In order to clarify the dynamics of this RM, we have exploited the Internal Audit data regarding its tasks performed in order to follow up on the recommendations during its first mission; we have summarized the follow-up recommendations as shown in the following table:

Table 06. Company actions to follow up audit recommendations.

Weakness	Risks	Recommendations	Respect of Recommendations				Vulnerability fixed		
			Applied	In progress	Not applied		Yes	Partially	No
					Yes	Postponed			
W1	R01	RC1	X					X	

— The classic methodology of audit team does not take into consideration the Risk Matrix Approach in its tasks, so it only lists the risks by observed weakness, not by criticality, probability of occurrence and impact.

— About the Risk Matrix, we deduct that 46.15% of risks investigated have an unacceptable and high level, in audit point view they have the priority of control, the others risk have a medium level with 30.77% and reduced level with 23.08%.

— The audit team consider all risks are homogenous with the same weighting, so for the company these risks have the same priority in matter of recommendations without any prioritizing considering the level of risks, this approach have a negative impact, and may have difficulties for both company and audit team if the volume of risks is important so it request a large allocation of resources.

— Through our exploitation of the information about procedures provided by the company to track the audit recommendations, we note that 60% (06) of recommendations have been respected and applied, while 20% (02) of them have not been applied, and the other 20% (02) which the achievement is under process.

— Taking into consideration the Risk Matrix Approach, these measures taken by the company to follow-up the audit recommendations, led to the control of 57.1% (04) of the weaknesses, 14.3% (01) were partially controlled, and 28.6% (02) have not been controlled.

— About the avoided risks by controlling 57.1% of weaknesses, they are reduced from 2011 to 2015 with -61.54%, as follows in table 07 a detail of this evolution:

Table 07. Control of Risks

Risk criticality	Nbre of Risks		Nbre of Risks		Δ
	2011	%	2015	%	
Reduced	3	23.08%	1	20.00%	-66.67%
Medium	4	30.77%	1	20.00%	-75.00%
Hight	4	30.77%	2	40.00%	-50.00%
Unacceptable	2	15.38%	1	20.00%	-50.00%
Total	13	100.00%	5	100.00%	-61.54%

Source: By the Authors

— Using the above information, we can setup a corrected Risk Matrix Mapping, after the company has taken the necessary measures to correct the observed weaknesses:

Figure 07. Corrected Risk Matrix Mapping

		<i>Impact</i>				
		<i>Negligible</i>	<i>Minor</i>	<i>Moderate</i>	<i>Significant</i>	<i>Severe</i>
<i>Likelihood</i>	<i>Very Likely</i>		R11		R2	
	<i>Likely</i>					
	<i>Possible</i>					
	<i>Unlikely</i>					R10
	<i>Very Unlikely</i>				R4	

Source: By the Authors

What is important in this situation to the audit team according to the RMA, that risks with an unacceptable and high level are still existent, as it is noted that R2, R10, R11, that the weaknesses has not been controlled. About the risk R2, it is related to the projects of building power plant, which are a large projects that are not carried out by a small power plant like F'kirina (subject of study), but by the CEEG company (A subsidiary affiliated to the Sonelgaz group), on an other hand, taken into account the specificity of these projects, it is difficult to consider the presence of the constructors/builders in the national territory, which is considered in some way as a failure in the international competition, which can waste opportunities abroad and create an internal monopoly that would suggest non-competitive prices. This is why this risk is still exists, and we can consider it as strategic risk since it took time, and it depend of a strategic measure that must be undertaken by the high level management. For R10, R11, the Procurement Office informs us that the weaknesses was controlled since 2017 (Out of the study's period), and it took time usually because of the major change in regulations.

5.2. Assumptions study:

1) *The Risk Matrix Approach is used as an effective tool in controlling the level of risk:*

As we have already discussed above, the risk matrix contributes effectively to clarifying the probability of occurrence, the impact of the risk, and the degree of its criticality, which is an added value for the company, and by distributing these risks according to a matrix, it helps to identify risks that have a significant degree of criticality and giving it the necessary priority, and this is what we did not notice in the audit mission in the company subject of study, where the same priority is given to all risks, and this will contradict the priorities of internal audit in monitoring the most important risks, and it can be difficult to put in place a huge volume of procedures and measures if this matrix contains a large number of risks.

2) *Internal audit plays an important role in risk assessment:*

This has been verified through two perspectives, the first is traditional, where the weaknesses in the internal control system of the procurement cycle are defined by internal audit, who made the necessary recommendations to overcome them, which constitute an added value for the company, The second, is a contemporary perspective where internal audit intervenes in risk management, but its intervention is carried out by evaluating and identifying potential risks in terms of its independence and objectivity in fact-finding, but all responsibility remains with the Top management of company in the risk management system, what has been declared by the relevant professional and normative bodies like the IIA.

3) *The Risk Matrix Approach is used by the auditors to assess risks:*

As we have seen, the internal audit has all the independence in choosing the necessary tools in identifying and evaluating the risks such as the Matrix of Risks, which will help it in forming an objective and rational judgment on the control of risks, and knowing the degree of their criticality and their level, which will also help him in identifying the high-level risks that must be given importance, as well as giving priority to providing the necessary measures to control them.

This approach has not been adopted at the level of the company, except in the context of safety and environment and not at the level of internal auditing of the procurement cycle.

5.3. Recommendations:

— The reliance on the Risk Matrix Approach is an important matter in Enterprise Risk Management, and the Internal Audit can use it by its independence in choosing the necessary tools to complete auditing mission and allowing it to provide an objective guarantee about the company policy on risk control.

— Risk Matrix Approach will allows the internal audit team to have probability of occurrence of risks and their impact on the company maintenance planning, which is considered important to focus on a high criticality risk with a priority for the audit team, therefore efforts and procedures must be harnessed to control them before others, especially if there is a high volume and varied risks, this situation can be observed with the consolidated statement of risks at high management level of the company.

— The Inspectorate of the Finance attached to the general management, which performs some of the internal audit tasks, must actively participate by giving objective recommendations regarding the evaluation of suppliers, and everything related to weakness and providing the tools that it judges appropriate to rationalize the stocks in the institution to avoid all risks about failure to rich maintenance programs.

— It seems clear that the second audit mission was planned on the goals of the first mission four years later, therefore, we can state that during this period another kind of risks may threaten the safety of the company, and we conclude it is necessary to carry out regular and periodically planned internal audit tasks to achieve the company's goals with performance.

— The company need to pay attention to the factor of feedback and benefit from the experiences return of other power plants by sharing the various audit reports, whether from the audit function or the existing inspectorate at the company level, this can rich and develop the risk culture of the employees, especially in the absence of a risk management office.

— With the contribution of internal audit team reports and suggestions, the company should study the adoption of central register project of risks that affect the procurement cycle due to

its direct relationship with maintenance operations and equipment, as it serves as a reference and guide for employees to know the measures must be taken to control this risks, as well as standardizing the classification of risks to know the priority of each one.

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