

Proven Approaches to Procurement Risk Management: A Framework Review and Case Study of ISO 31000

Imane Sassaoui

LASTIMI laboratory, Mohammed V University in Rabat,
Graduate school of technology, Sale, Morocco
imane.sassaoui@research.emi.ac.ma

Jamila El Alami

LASTIMI laboratory, Mohammed V University in Rabat,
Graduate school of technology, Sale, Morocco
alamijamila1@gmail.com

Mustapha Hlyal

CELOG, ESITH School Casablanca,
Road of El Jadida, Casablanca, Morocco
hlyal@esith.ac.ma

Abstract

Many organizations struggle to effectively manage procurement risks, due to the complicated and dynamic nature of the procurement process. Each and every organization's activities include procurement, and the achievement of corporate objectives depends on the efficient and effective execution of this process. Yet, if not properly managed, the risks associated with procurement activities can have a severe effect on the performance of the business.

As a result, there is an increasing need for systematic and organized frameworks that help businesses in mitigating procurement risks and achieve profitable outcomes.

The purpose of this paper is to provide a comprehensive review of proven approaches to procurement risk management. The article will explore various risk management frameworks and highlight their key components. Furthermore, this paper will include a practical case study from the energy and infrastructure industry that demonstrates how ISO 31000, a widely recognized risk management standard, can be used to manage procurement risks in a large multinational corporation.

Keywords

Procurement, risk management, frameworks, ISO 31000, case study.

1. Introduction

In today's global and linked marketplace, effective procurement risk management is crucial for businesses to maintain business continuity and profitability. Supply chain disruptions, including reputational damage, unanticipated price increases, and delayed product delivery can have far-reaching consequences.

Therefore, implementing an effective framework for procurement risk management can help businesses in mitigating these risks and guaranteeing the success of their procurement procedures, leading to improved efficiency, cost savings, and a competitive advantage.

However, the process of implementing a framework for procurement risk management can be quite challenging and requires the allocation of resources as well as a clear strategy. Hence, organizations must interact with stakeholders and convince them of the framework's advantages in order to overcome these obstacles.

This research paper aims to explore the elements of effective frameworks for managing procurement risk and how businesses may incorporate them into their procurement procedures. It examines how businesses may assess the success of their procurement risk management strategies and gains the benefits of implementing a successful framework for managing procurement risk in terms of preserving business continuity.

1.1 Objectives

The objectives of the paper are to:

- Review procurement risk management frameworks
- Analyze the key components of each framework
- Present a practical case study of ISO 31000 applied to procurement risk management
- Identify best practices and recommendations for effective procurement risk management

2. Literature Review

In this section of the paper, the results of the study will be presented. These results have been obtained through the analysis and review of various articles, using the information and data collected during the research.

Procurement Risk Management:

Numerous researchers from various countries have conducted studies on the management of risks associated with procurement and supply chains. Chaudhuri et al. (2020) in a review of 91 articles proposed a conceptual framework to improve risk management in supply chains. Fan and Stevenson (2018) conducted a review of the literature on supply chain risk management (SCRM) to provide a comprehensive understanding of the development of SCRM research. The study reviewed 354 papers and analyzed the trends, patterns, and future directions of SCRM research. Bak (2018) by a systematic literature review (SLR) defined the research trends and future directions of supply chain risk management (SCRM). The study reviewed 114 articles and analyzed the research themes, methodologies, and gaps in SCRM research.

Risk management frameworks:

Implementing an effective risk management framework and supporting processes is crucial for organizations when performing risk assessment and analysis.

G. L. Schlegel, (2015) states that the framework should namely encompass four fundamental risk responses, as shown in Figure 1. Risk avoidance involves eliminating the risk from the supply chain, risk transfer involves transferring the ownership of the risk to another party, risk acceptance involves accepting the existence of the risk, and risk mitigation involves reducing the likelihood or impact of the risk.

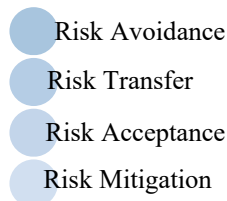


Figure 1. The Four Fundamental risk responses of a Framework

Additionally, the framework should explicitly outline the risk assessment process and include a monitoring and evaluation mechanism to ensure the response implemented remains relevant and effective over time.

The following are frameworks identified from literature:

- D. Bandaly, A. Satir, Y. Kahyaoglu and L. Shanker (2012) explained that Supply Chain Risk Management (SCRM) is mainly focused on supply chain risk.

-J. Lark (2015) demonstrated that ISO 31000 Risk Management Standard is widely used and can be applicable to any industry, it is guided by the continuous improvement cycle of PDCA (Plan, Do, Act, and Check)

-Cyber Supply Chain Risk Management (C-SCRM) is mostly focused on cyber supply chain risks and is relatively new compared to the other two frameworks.

Table 1. Comparison Matrix of Risk Management Frameworks

Frameworks	Risk management methodology	Gaps and limitations/ Specifically related to procurement
Supply Chain Risk Management (SCRM)	Risk Identification Risk Assessment Risk Reporting and Decision making Risk Response Risk Performance outcome	Focused only on supply chain risks No mention of continuous improvement
ISO 31000 Risk Management Standard	Communication and Establishing the context Risk identification Risk Analysis Risk Evaluation Risk monitoring and review	General and not specific to any industry
Cyber Supply Chain Risk Management (C-SCRM)	Risk Identification Risk Assessment Determination of mitigation actions Risk monitoring	Focused only on cyber supply chain risk management

The comparison matrix shown in Table 1 evaluated the three risk management frameworks based on their risk management methodology, relevance to procurement, and support for continuous improvement. Among the evaluated risk management frameworks, the International Standard ISO 31000:2018 was determined to be the most suitable compared with the studied risk management frameworks for achieving consistent risk assessment. This is because it adheres to the PDCA principles for continuous development, and it is used globally.

Lalonde and Boiral (2012) insisted that ISO 31000 standard provides a valuable methodological and structured approach for organizations to manage their risks, including those related to the environment, public health, food safety, and supply chain interruption. However, they caution that users of the standard may encounter misconceptions when interpreting and implementing it, leading to potential pitfalls. Despite these challenges, they do not question the validity of the standard or its recommendations. Instead, they emphasize the importance of a systematic approach to risk management that ISO 31000 provides.

The focus of this paper is the implementation of the ISO 31000 as an optimal risk management framework in a large multinational corporation.

ISO 31000 Framework:

The ISO 31000 standard summarizes risk management into seven steps, as shown in Figure 2 and discussed next (ISO, 2018).

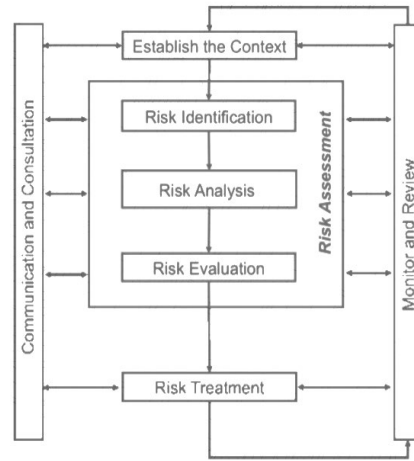


Figure 2. Risk management process proposed by the ISO 31000:2018 standard Source: ISO (2018)

According to (ISO, 2018), the ISO 31000 standard as described in Figure 2 was developed for the purpose of providing the principles and guidelines for managing any form of risk in a systematic, transparent and reliable manner, within any scope and context. It can be applied to an entire organization, in its various areas and levels, at any moment, as well as to specific functions, activities and projects.

We can conclude from the research and evaluation of several articles that the field of risk management frameworks has evolved through time, with a focus on procurement procedures in particular as a component of the supply chain. In order to support their procurement departments, firms must adopt a clear and methodical approach to the implementation of effective risk management frameworks.

3. Methods

The focus of this research is the implementation of ISO 31000 risk management standard in the procurement department of a global energy infrastructure solutions provider. The research approach consists of three steps as illustrated in Figure 3. Firstly, identifying the current situation and the primary issue. A literature review is also conducted to contextualize the research within the existing literature and justify the need for the study. Secondly, implementing the project on the procurement process. Finally, using relevant baseline measurements to measure and evaluate the impact and recommending solutions to the identified problems.

This paper concludes with an assessment of the project's outcomes and suggestions for potential future research areas. The participation of the business Cluster was integral to this project, as their contributions in meetings and collaborative workshops has ensured a convergence of results and appropriate interpretations for the sustainability of the improvements.

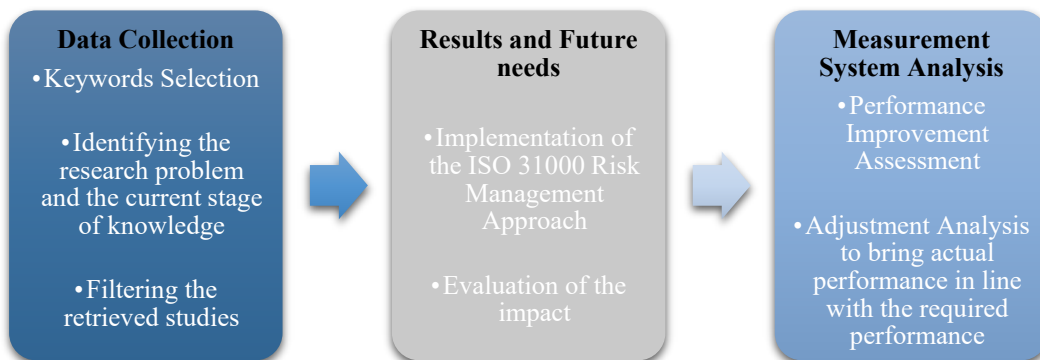


Figure 3. The three steps approach of research

4. Data Collection

The global economic recovery in 2021 following the Covid-19 pandemic has led to a high demand for raw materials, which is not in line with the slow restarting of production and transportation capacities, resulting in price increases and longer delivery times. Moreover, the consequences of the war in Ukraine since February 2022 have added to the complexity of the situation. Therefore, there is a complete uncertainty about the supply of a major energy infrastructure solutions provider, and procurement projects which are subject to high levels of risk. Consequently, there is a need to strengthen the risk management culture related to procurement and to give it the necessary importance as it remains one of the functions directly impacted by this unprecedented situation.

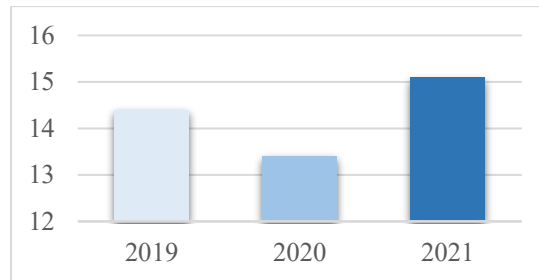


Figure 4. Procurement Turnover evolution from 2019 to 2021

4.1 Establishment of the context

The focus of the case study is on a multinational company that specializes in energy and infrastructure solutions, where its procurement function plays a crucial strategic role in its projects. The above graph shown in Figure 4 is a summary representation of the evolution of the procurement revenue from 2019 (Pre-Covid-19), that decreased by 6, 9 % in 2020, to 2021 (Post-Covid-19) and shows that the pandemic crisis has led to activity shutdowns, namely the progress of project sites, which has resulted in the suspension of procurement activity for specific families of each project. The main challenge of the procurement department is to strengthen the risk management culture and ensure uninterrupted business operations by collecting, organizing, and analyzing data related to the risk elements that have caused this complex situation.

Following the collection and analysis of data to determine its level of significance, workshops were conducted with 21 project buyers, 2 procurement coordinators, and the procurement leader to deliberate upon the most pertinent issues that were identified.

To measure the maturity of risk management at the Procurement Service level, a self-diagnostic questionnaire consisting of 20 qualitative questions has been developed. The questionnaire aims to assess the level of risk management maturity in the procurement department, based on the respondent's answers, the results show that procurement risk management maturity has a strong foundation but needs to strengthen its risk mastery.

Accordingly, it is essential to establish and implement a systematic approach, supported by a normative process and guidelines of the Risk Management Standard (ISO 31000), along with developing deployment of robust methods of risk mitigation.

4.2 Risk identification phase

In this initial identification phase, several risk workshops, which we called "Risk Workshops," were organized to identify the most comprehensive risk register possible, containing all risks related to procurement within the procurement function, grouped into risk categories.

The Table 2 below represents a sample of 5 identified risks from different categories:

Table 2. Risk Registry Sample

Risk Category	Risk Nature	Risk ID	Indicator
Economic	Price	RE3	Risk of price variation rate
Financial	Treasury	RF17	Requirement of advance payment by suppliers
Technical	Logistics	RT23	Risk of supply chain disruption
Legal	Compliance	RL13	Fraud and corruption
Image and Reputation	Environmental	RM22	Absence of responsible procurement policy

4.3 Risk Analysis Phase

Once the risk register has been established comprehensively through a series of "Risk Workshop" meetings, an analysis was conducted, taking into account the root causes of failures and the consequences and effects of these on the procurement function of the company. The analysis also involved conducting a Failure Mode and Effects Analysis (FMEA), where each category and sub-category of risk is linked to a specific root cause and failure effect, consolidated into a single table.

The Table 3 below represents the FMEA analysis of the risk categories previously mentioned at the risk identification phase:

Table 3. FMEA Analysis of the identified risks

Risk Category	Risk Nature	Risk ID	Indicator	Root cause of failure	Failure effect
Economic	Price	RE3	Risk of price variation rate	<ul style="list-style-type: none"> • Post-Covid economic recovery • Imbalance between supply and demand • Increasing concentration of raw material production sites 	<ul style="list-style-type: none"> • Difficulty in remaining competitive • Realization of losses / Exceeding the initially planned budget
Financial	Treasury	RF17	Requirement of advance payment by suppliers	Uncertain economic context	Cash-flow issue (Working Capital Requirement - WCR)
Technical	Logistics	RT23	Risk of supply chain disruption	<ul style="list-style-type: none"> • Saturated global hubs • confined areas 	Strong impact on Project delays/Rupture
Legal	Compliance	RL13	Fraud and corruption	Suppliers not aware of ethical and compliance values	Deterioration of brand image
Image and Reputation	Environmental	RM22	Absence of responsible procurement policy	Lack of awareness about the importance of Responsible Purchasing	Penalties for non-compliance with environmental standards

4.4 Risk Evaluation Phase

At this stage we employed the SCORING method for its ability to estimate the significance of each risk identified by leveraging the expertise of the FMEA team. The risk is determined by evaluating three criteria: Severity, Occurrence, and Detectability, and their degree of importance is determined. As shown in the Risk Map, Figure 5, we can conduct a risk evaluation by merging the severity and occurrence criteria, which can be represented through a synthetic risk map obtained by combining the pre-defined qualitative scale of severity and occurrence levels provided by the FMEA team.

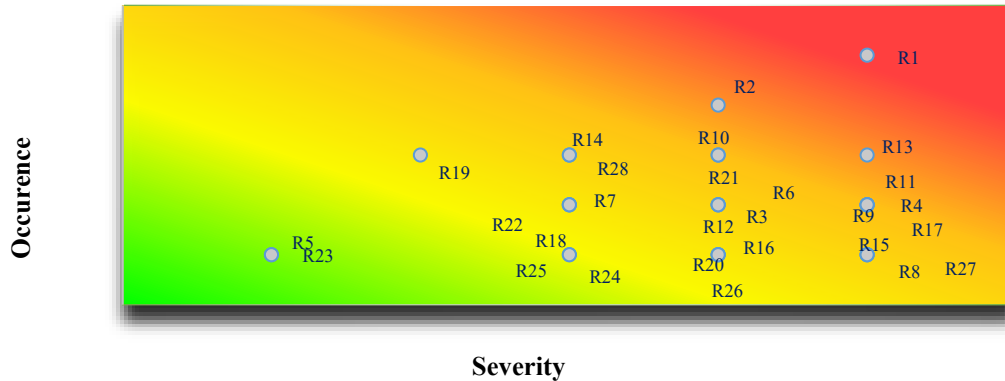


Figure 5. Risk Map

This step was followed by a risk prioritization which will allow us to identify risk ranges, in other words, from what level of criticality we will indicate that the risk is non-critical, the risk is to be monitored, or the risk is to be treated with priority.

To do this, an ABC analysis of all risks was established. The criticality threshold selected for this prioritization according to the SCORING method is as shown in the Figure 6, the criticality threshold diagram is based on the scoring method, which is used to prioritize and address the most critical risks.

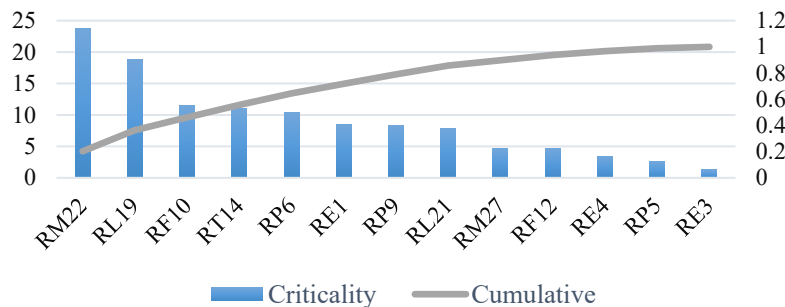


Figure 6. Criticality threshold diagram according to the SCORING method

4.5 Risk Treatment phase

In the context of risk monitoring and review, it is crucial to follow the ISO 31000 standard guidelines to ensure that all the results obtained previously are gathered and considered. This includes identifying the highest priority risks and developing an action plan to address them.

The action plan should include all the necessary actions that need to be implemented to treat the identified risks, along with the elements of the (Responsible, Actor, Consulted, Informed) RACI tool. This tool helps to clearly define the roles and responsibilities of team members involved in the risk treatment process. By including the RACI tool in the

action plan, team members can better understand their roles and responsibilities, which helps to improve communication, reduce confusion, and ensure accountability.

In addition, the action plan should include key performance indicators (KPIs) to monitor progress and measure success, as well as signals to indicate the status of implemented actions. This ensures that the risk treatment process is effective and efficient, and that progress is being tracked and reported.

The Table 4 presented below is a sample of the action plan that has been selected by the procurement team in accordance with the previously established guidelines, it provides a list of actions, responsible parties, and deadlines for the identified risks.

Table 4. Sample of the selected action plan

Risk ID	Risk Definition	Severity	Action	R	A	C	I
R12	Financial health of suppliers	23.68	Conduct an in-depth financial analysis to evaluate the supplier's health and make a forecast regarding the risk of financial failure.	Purchasing Leader	Purchasing Coordinator	Supplier	Project Buyer
R6	Political stability (Supplier's Country)	18.8	Ensure strategic monitoring of the elements of stability that can have an impact on purchasing Ex: volatility of currencies or interest rates.	Purchasing Coordinator	Supplier	Purchasing Leader	Project Buyer
R1	Price variation risk	11.5	Provide for contractual clauses for price revision/Implement framework contracts	Supplier	Project Buyer	Purchasing Coordinator	Project Leader

The plan includes a comprehensive list of actions that the procurement team has identified as necessary for addressing the most critical risks, and it also outlines the responsible parties (RACI), and progress status for each action. The proactive approach adopted by the development of this action plan demonstrates the commitment of the procurement team to effective risk management, and the readiness to tackle potential threats to critical risks.

5. Proposed Improvements

To make the implementation of the ISO 31000 standard more practical in the procurement function of the company, it is essential to adopt proven methods and tools that help in the effective identification and mitigation of risks, with a particular emphasis on ensuring ongoing improvement of the process. In this regard, several improvements can be proposed.

5.1 Digital solution: Streamlining Procurement Risk Management with an integrated and automated Tool

Relying on digital technology, especially an automated risk management tool, would be a valuable added value for the procurement function and would allow for tracking the process by referring to the guidelines of the ISO 31000 standard. The digital integrated tool is very useful because it allows data collection and automatic generation of results in the form of graphs, risk maps, and automated action plans.

Along with a user guide that can serve as a roadmap for any procurement team member seeking to use the tool effectively.

The proposed digital tool includes the following features:

- Flexible customization of risk assessment standards

- Real-time monitoring and alerts
- Facilitation of communication with stakeholders
- Centralization of documents management and storage
- Generation of automated risk reports and analytics
- Integration with the Enterprise Resources Planning software (ERP)

5.2 Supplier Selection: Pre-selection phase supplier assessment

Effective procurement and supplier risk management relies on a key factor, which is anticipation. Identifying potential risks that could disrupt the normal procurement process well in advance enables the company to proactively address any potential failures and their cascading effects on the entire supply chain.

Therefore, it is essential to conduct a preliminary analysis of the supplier by integrating risk factors such as priority risks into the pre-selection phase of the supplier selection process. This analysis should also take into account not only the cost factor but also a multicriteria analysis with associated weighting, which includes an assessment of the overall risk related to the consulted suppliers. As it is important to note that a lower cost supplier does not necessarily equate to the best supplier.

By incorporating a thorough risk assessment into the supplier pre-selection phase, the company can choose suppliers who provide the best overall value and reduce any hazards or potential risks related to their activities.

6. Validation

Beyond financial gains, the implementation of the ISO 31000 standard will promote a culture of risk awareness and continuous improvement in the procurement department, and will in particular provide:

- Improved risk identification and management: The procurement department will be better equipped to recognize and manage possible risks in a timely and efficient manner according to ISO 31000's systematic approach to risk identification and management.
- Increased effectiveness and efficiency: The procurement department can optimize the risk management procedures by adhering to ISO 31000, which may result in more effective and efficient procurement procedures.
- Improved reputation: Adopting ISO 31000 will show the company's dedication to best practices in risk management and can improve its standing among stakeholders.
- Reduced costs: The procurement division may be able to prevent costly supply chain delays and interruptions by taking a proactive approach to risk management.
- Improved Compliance: by adopting the ISO 31000 standard, the procurement department can be assisted in meeting risk management-related legal and regulatory obligations.
- Increased stakeholders trust: in the procurement department's capacity to manage risks and safeguard the company's interests can be attained by implementing ISO 31000.
- Improved decision-making: The procurement department may make consistent decisions about procurement operations with better knowledge and assurance if risk management is approached consistently.

Table 5. Residual criticality of risk RF12

Risk ID	Indicator	Agreed Impact	Severity	Occurrence	Detectability	Criticality
RF12	Financial health of suppliers	43%	0.0215	3	4	0.258
RF12	Financial health of suppliers	43%	0.0215	3	2	0.129

-Reduction in residual criticality: The risk's detectability decreased from 4 to 2, as shown in the table 5, following the implementation of the risk assessment action. This indicates an increase in the company's ability to recognize and manage potential risks related to supplier financial health because the likelihood of the risk being discovered has decreased. As part of the advantages of implementing the ISO 31000 standard in the company's procurement

department, is that the overall reduction in the residual criticality of the risk has decreased as a result of the decreased detectability.

7. Conclusion

This research paper was conducted on procurement risk management frameworks and their benefits. The study is based on a real case of a prominent multinational in the energy and infrastructure sector, highlighting the advantages of adopting a structured and transparent approach to managing procurement risks.

Initially, we started by identifying the issue and the current state, with the aim of framing the retrieved studies and connecting them to the main problematic faced by the procurement department of the company. Afterwards, we opted for a relevant risk management framework to empower the department overall profitability and evaluated the potential impact. Ultimately, we determined the gap between actual and required performance, and examined the factors that need to be adjusted, as detailed in the suggested improvements.

As for our findings in this captivating field, they only constitute a starting point for potential future research, such as:

-Exploring strategies for integrating sustainability considerations into procurement risk management, researchers can help organizations balance their social and environmental responsibilities with their financial goals. Therefore, how can procurement professionals effectively integrate sustainability considerations into their decision-making processes when it comes to procurement risk management?

-What strategies can the procurement function use to effectively mitigate supply chain disruptions and ensure business continuity in this VUCA (volatile, uncertain, complex, and ambiguous) world?

-The future of procurement technologies can also assist organizations in identifying new opportunities and challenges associated with these technologies. Hence, what role do emerging technologies such as IoT, Blockchain, AI, and Machine learning play in effectively managing risks to achieve optimal results in procurement risk management?

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Biographies

SASSAOUI Imane: is a Ph.D. Student at EMI School (Ecole Mohammadia d'Ingénieurs), Mohamed V University, Rabat, Morocco, with a specialization in International Logistics. She earned her Engineering Degree in Industrial Engineering from ESITH School (Ecole supérieure des Industries de Textile d'Habillement), Casablanca, Morocco in 2022. Her research interests lie in the areas of Supply Chain Resilience, Risk Management, and Sustainability.

El Alami Jamila: is the Director of the National Center for Scientific and Technical Research. Her professional career began as a research professor at the National Center for Coordination and Planning of Scientific and Technical Research (currently known as CNRST), and then at the School of Technology in Salé, which is part of the Mohammed V University in Rabat. She later joined the National Center for Scientific and Technical Research, where she held various positions, including Director of the Laboratory of Analysis of Systems, Information Processing and Industrial Management, Head of the Department of Scientific and Technical Affairs, and Interim Director. She has published several articles in indexed scientific journals. Madam Jamila El Alami holds a State Doctorate in Applied Sciences from the Mohammedia School of Engineering, which is part of the Mohammed V University in Rabat. She also holds a Preparatory Certificate for Research and a State Engineering Diploma from the same school.

Hlyal Mustapha: is currently Manger of the Centre of Excellence in Logistics (CELOG), Associate Professor at the Laboratory of Systems Analysis, Information Processing and Industrial Management (LASTIMI), professor at ESITH School Casablanca for over twenty years. He holds a PhD in Science and Technology from the University of Mohammed V in Rabat, an Executive MBA in Supply Chain Management from Laval University in Canada and an engineering degree from the National School of Textile Arts and Industries (ENSIAT) in Roubaix. He has more than ten years of experience as an expert in training engineering for European and UNESCO projects and more than ten years of experience in industry as a production manager and logistics and information systems manager.