
Analysis of Industrial Maintenance Skills Needs and Competence Framework

Achieved result of the SMTMC project

Conducted by the four partner universities of Tunisia

In collaboration with academic and industrial stakeholders

Based on national data collection and expert validation

Used to design competence-based curricula in engineering education

1. Introduction

This document presents the results of a national analysis of industrial maintenance skills needs conducted under the SMTMC project. The objective was to identify key technical and transversal competences required by the Tunisian industry to modernise higher education programmes and improve graduate employability.

The study combined data collected from over 150 professionals across Tunisia with expert interviews and curriculum benchmarking. The findings formed the basis for the definition of a **Competence Framework** for Maintenance Engineering and related fields, which was later used to structure the new Master's and VET programmes delivered through the SMTMC project.

2. Objectives of the Study

- To identify the gaps between university-level training and the current needs of the industrial sector
- To define the core technical and transversal competences expected by employers in maintenance-related roles
- To provide a strategic reference for the design and revision of academic curricula

3. Methodology

The study relied on the following methodological steps:

- A structured questionnaire was administered to a sample of 153 professionals across four regions (Sfax, Carthage, Gabès, Jendouba), covering diverse industrial sectors
- Focus groups and interviews were conducted with representatives from industrial companies and training institutions
- A review of existing national and European curricula in maintenance engineering was conducted for benchmarking
- All data were triangulated to establish the final competence framework

4. Key Findings

- A strong demand for profiles capable of integrating **predictive maintenance, digital tools, and Industry 4.0 technologies**
- Persistent gaps in **communication, teamwork, and project management** among recent graduates
- A need to reinforce training in **diagnostics, data analysis, and decision-making in maintenance contexts**
- Employers emphasized the importance of **practical training, interdisciplinary approaches, and continuous learning capacity**

5. Competence Framework for Maintenance Engineering

The framework is structured around three main axes:

1. Technical Competences

- Predictive maintenance techniques
- Vibration and corrosion monitoring
- Automation and sensor integration

- Energy efficiency in maintenance systems

2. **Transversal Competences**

- Communication and documentation
- Teamwork and conflict resolution
- Problem solving and critical thinking
- Planning and quality assurance

3. **Digital and Innovation Competences**

- Use of digital platforms and simulation tools
- Data collection and analysis
- Technological watch and innovation management

This framework served as the reference for curriculum design under WP2 and WP3 of the SMTMC project.

6. **Transferability and Impact**

The methodology and framework are fully transferable. They can support other universities, ministries, or training centres wishing to:

- Align curricula with evolving labour market needs
- Improve graduate employability
- Establish structured dialogues between academia and industry
- Develop modular training pathways for initial and continuous education

7. **Conclusion**

The skills needs analysis and competence framework developed by the SMTMC project have laid the foundation for modern, relevant, and industry-driven education in maintenance engineering. The result provides a model for other institutions and countries aiming to bridge the gap between education and employment in technical sectors.