



Executive Summary

Equipe 20

Ecole Centrale Casablanca

Maroc

+212 693 085 362

salma.benslimane@centrale-casablanca.ma

PredictA is an AI-integrated predictive maintenance solution designed to optimize industrial operations by providing real-time monitoring, advanced alerting, and actionable recommendations to prevent machinery downtime.

Context –

In Morocco, the embrace of Industry 4.0 technologies signifies a stride towards enhanced operational efficiency. The integration of predictive maintenance across sectors like manufacturing, energy, and transportation emphasizes data-driven decision-making. Challenges in implementation, including infrastructure readiness and skill availability, have influenced adoption rates. Yet, initiatives by governmental bodies and technology providers have been pivotal in raising awareness, providing training, and facilitating the transition to predictive maintenance practices.

PredictA emerges in the era of Industry 4.0, addressing the critical need for advanced predictive maintenance in Moroccan industries. With the country's industrial sector increasingly embracing digital transformation, PredictA presents a timely solution to enhance operational efficiency and reduce downtime.

Market Opportunity –

The implementation of AI-driven predictive maintenance in Morocco faces a significant challenge due to the archaic nature of many manufacturing systems in our country. Moroccan industry, characterized by its reliance on traditional methods and older machinery, confronts a problematic gap when it comes to integrating modern, AI-based technologies. Many manufacturing plants in Morocco still operate with outdated machinery and infrastructure, which are not equipped for integration with advanced AI and IoT technologies. This older equipment often lacks the necessary sensors and connectivity options required for data collection and analysis, essential for predictive maintenance.

This gap in predictive maintenance not only leads to operational inefficiencies but also poses a risk to the entire supply chain's stability and reliability. The repercussions are multifaceted: unforeseen equipment failures incur hefty repair costs and revenue losses due to production halts, particularly impacting businesses with limited financial resilience.

Furthermore, the lack of predictive maintenance can erode a company's reputation, a cornerstone in maintaining competitive advantage and client trust. Consistent failures and inability to meet commitments can lead to a loss of confidence among partners and customers, potentially resulting in long-term business setbacks.

These challenges underline the need for a strategic approach that not only incorporates technological solutions but also addresses infrastructural upgrades, workforce training, financial support mechanisms, and policy reforms. Overcoming these obstacles is crucial for Moroccan industries to harness the full potential of AI in predictive maintenance, thereby enhancing efficiency, reducing downtime, and staying competitive in the global market.

PredictA aims to bridge this gap, offering a strategic approach to incorporate AI-driven predictive maintenance in a landscape dominated by outdated systems.

Problematic –

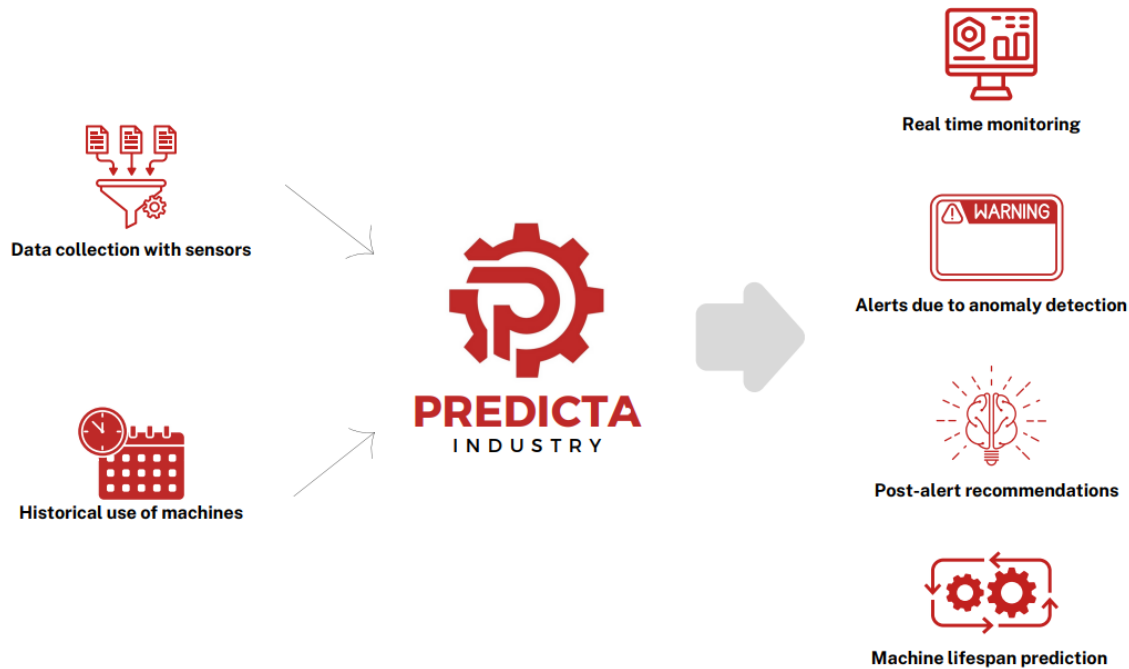
In what ways can the implementation of predictive maintenance practices be strategically introduced within Morocco's industrial landscape to effectively address the economic losses and operational disruptions caused by prolonged downtime due to equipment malfunctions and anomalies? Additionally, how can the accurate prediction of machinery lifespan be leveraged to optimize machine efficiency, minimize interruptions, and boost overall production output?

Solution –

PredictA is a pioneering AI-integrated solution, designed to transform industrial maintenance. It combines a real-time monitoring dashboard with an advanced alerting system, allowing industries to predict anomalies, and provide recommendations for a better performance.

PredictA can integrate into existing industrial environments, leveraging IoT and machine learning technologies. It stands out with its ability to use multiple and fast sensors, provide recommendations, and retraining the models on the new Data 2 times a year.

According to our discussion with ONEE, our solution could save up to roughly 8% to 12% over preventive maintenance's costs, and up to 40% over reactive maintenance's costs.



Key Features, Added Values:

- **Real-Time Monitoring Dashboard:** Enables visualization of machine health and performance, providing insights into long-term trends.
- **Advanced Alerting System:** Utilizes sophisticated algorithms for anomaly detection and predictive alerts and RUL (Remaining Useful Life), minimizing unplanned downtimes.
- **Recommendation System:** Offers actionable recommendations for maintenance, optimizing machine efficiency and production output.
- **Retraining the models continuously:** Retraining the ML algorithms on the new data 2 times per year for a better accuracy.

Advantages –

PredictA's advanced features offer comprehensive benefits for industrial maintenance.











Firstly, its real-time monitoring and interactive dashboards provide a granular view of machinery operations. This feature facilitates immediate identification of irregularities, enhancing preventive measures.

The warning and alert system is sophisticatedly tiered, allowing for a differentiated response based on the severity of issues detected. This ensures efficient allocation of maintenance resources.

Post-alert, PredictA doesn't just flag issues; it provides tailored recommendations based on the specific problem and machine history, guiding maintenance teams towards the most effective solutions. Furthermore, the capability to calculate the Remaining Useful Life (RUL) of machines is a game-changer. This feature enables predictive planning, significantly reducing unexpected breakdowns and extending machine lifespans. By forecasting maintenance needs, PredictA not only ensures optimal machine performance but also contributes to substantial cost savings by reducing the need for urgent, unplanned repairs.

This detailed understanding of machinery health translates to improved operational reliability and productivity, positioning PredictA as a vital tool in the industry's shift towards smart, data-driven maintenance strategies.

Business Model Canva –

Value proposition  <ul style="list-style-type: none"> Real-time machine performance monitoring. Predictive maintenance alerts to prevent breakdowns. Cost savings and efficiency improvements for industrial clients. 	Customer Segments  <ul style="list-style-type: none"> Manufacturing industries. Processing plants. Any sector with reliance on heavy machinery. 	Channels  <ul style="list-style-type: none"> Direct sales to businesses. Online marketing and industry events. Partnerships with machinery manufacturers.
Key Partnerships  <ul style="list-style-type: none"> Machinery manufacturers. Industry experts. Technology partners. 	Key Resources  <ul style="list-style-type: none"> AI and machine learning technology. Skilled engineers and data scientists. Robust IT infrastructure. 	Cost Structure  <ul style="list-style-type: none"> Research and development costs. Marketing and sales expenses. Operational and staffing costs.
Customer Relationships  <ul style="list-style-type: none"> Dedicated support and maintenance. Training for clients on using the dashboard and alert system. Regular updates based on customer feedback. 	Key Activities  <ul style="list-style-type: none"> Developing and improving AI algorithms. Marketing and sales activities. Customer support and relationship management. 	Revenue Streams  <ul style="list-style-type: none"> Subscription fees for dashboard access. Charges for additional services like custom alerts and analytics.
		Environmental Impact  <p>Environmental sustainability through efficient energy use and reduced waste</p>

Current Situation –

PredictA has successfully moved from an initial conceptual phase to active development. The team has dedicated significant effort to understand the unique needs of industry operators, maintenance managers, and technicians in the context of industrial predictive maintenance.

Conceptualization and Ideation:

- In-depth analysis of the challenges faced by industry professionals in managing and maintaining industrial equipment.
- Identification of crucial pain points and opportunities for improvement in predictive maintenance and machinery oversight.

Business Model Development:

- Development of a detailed business model, highlighting customer segments, revenue streams, and a strong value proposition tailored for the industrial maintenance sector.
- Exploration of strategic partnerships, distribution channels, and customer relationship strategies to maximize the solution's market impact.

Technical Development and MVP Definition:

- Collaborative efforts with industry experts and technologists to design PredictA's technical framework, focusing on IoT integration, AI-driven analytics, and real-time monitoring.
- Definition of a Minimum Viable Product (MVP) that emphasizes essential features such as real-time machinery health monitoring, predictive alerts, and maintenance recommendations.

Market Readiness & Potential Clients –

Targeting Morocco's burgeoning industrial sectors like manufacturing, energy, and transportation, PredictA is well-positioned to become an indispensable tool for modernizing maintenance practices. The interest shown by major industry players, including ONEE, underscores the market's readiness for PredictA.

Foundation team and Contributors –

Prof. Mohammed El Rhabi: Head of the Mathematics, Computer Science, and Data Science Department at ECC.

- Contribution: Oversight of the technical and scientific aspects of the project, research, and development supervision.

Prof. Anas Sibari:

- Contribution: Oversight of the business aspect of the project.

3rd year students: Hamza Drioua, Ejjoufari Wadie, Elhansali Ossama.

- Contribution: Source of inspiration for our spin-off, generously shared their technical knowledge and resources, enabling us to adapt and tailor the concept to our specific case.

Benslimane Salma: 2nd year student engineer at the Ecole Centrale Casablanca.

- Contribution: Led the technical aspects of the project, including the development of the Minimum Viable Product (MVP). Played a crucial role in architecting the solution and ensuring its technical feasibility.

Nahli Ghita: 2nd year student engineer at the Ecole Centrale Casablanca.

- Contribution: Took a lead role in developing the business plan. Conducted market research, identified potential use cases, and contributed to the overall business strategy.

Saadioui Badreddine: 2nd year student engineer at the Ecole Centrale Casablanca.

- Contribution: Led the technical aspects of the project, including the development of the Minimum Viable Product (MVP). Played a crucial role in architecting the solution and ensuring its technical feasibility.

Salehi Abderrahmane: 2nd year student engineer at the Ecole Centrale Casablanca.

- Contribution: Led the technical aspects of the project, including the development of the Minimum Viable Product (MVP). Played a crucial role in architecting the solution and ensuring its technical feasibility.

Sellakh Jaafar: 2nd year student engineer at the Ecole Centrale Casablanca.

- Contribution: Took a lead role in developing the business plan. Conducted market research, identified potential use cases, and contributed to the overall business strategy.