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IRRIGLOW: A Smart Irrigation System Supporting Digital Transformation and Green Economy in Algeria

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To my friends, thank you for your unwavering support and for celebrating this milestone with me

LEILA

Dedications

First, I would like to express my gratitude to my mother and father for all the sacrifices they made for my well-being, and for the constant support they gave me throughout my studies. May God Almighty bless them with health, a long life, prosperity, and happiness.

To my brothers and sisters: Daif Allah, Abdelkadder, Soumia , Fatima and Tadjou

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To Aymen, the team member and IT specialist, for his immense help, without whom this project would not have been possible.

I dedicate this humble work, my master's thesis, to all of you

Leïla

Abstract

This project explores the role of digital transformation and innovation in achieving a green economy in Algeria, a country currently facing the critical dual challenge of water scarcity and agricultural inefficiency. The aim of this work is to assess how digital technologies and innovative practices -specifically through the IRRIGLOW smart irrigation system- contribute to reducing environmental impact and promoting sustainable development in the Algerian agricultural sector. The methodology employed combines the technical development of a connected digital ecosystem (utilizing IoT sensors and predictive AI) with a strategic market approach, integrating PESTEL and SWOT analyses alongside comprehensive business modeling. By examining IRRIGLOW as a specific digital and green initiative, the results reveal that while the Algerian agricultural sector faces climatic vulnerability and infrastructural constraints, the integration of solar-powered, automated hardware can effectively mitigate water waste, prevent soil leaching, and ensure homogeneous crop growth. Furthermore, the findings indicate a strong potential for scaling such innovations when supported by a diversified business model, dedicated farmer training programs, and enhanced investment in agritech. Slated for commercial launch in April 2026, the study concludes that targeted digital transformation and innovations like IRRIGLOW are key drivers for maximizing agricultural productivity, securing water resources, and accelerating Algeria's transition toward a resilient, sustainable green economy.

Key words: Green Economy, Digital Transformation, Smart Agriculture, Precision Irrigation, Innovation, Environmental Sustainability, Algeria.

Code JEL: Q01, O30, O31, Q15, Q25, Q50

الملخص

يستكشف هذا المشروع دور التحول الرقمي والابتكار في تحقيق الاقتصاد الأخضر في الجزائر، وهي دولة تواجه حالياً تحدياً مزدوجاً يتمثل في ندرة الموارد المائية وضعف الكفاءة الزراعية. يهدف هذا العمل إلى تقييم مدى مساهمة التقنيات الرقمية والممارسات الابتكارية - وتحديداً من خلال نظام الري الذكي IRRIGLOW في الحد من الأثر البيئي وتعزيز التنمية المستدامة في القطاع الزراعي الجزائري. تعتمد المنهجية المتبعة على تطوير منظومة رقمية مترابطة تستخدم مستشعرات إنترنت الأشياء (IoT) والذكاء الاصطناعي التنبئي، إلى جانب اعتماد مقاربة استراتيجية للسوق تشمل تحليل PESTEL و SWOT ونمذجة شاملة للأعمال. ومن خلال دراسة IRRIGLOW كمبادرة رقمية وخضراء، أظهرت النتائج أنه رغم مواجهة القطاع الزراعي الجزائري لتحديات مرتبطة بالهشاشة المناخية والقيود البنيوية، فإن دمج معدات آلية تعمل بالطاقة الشمسية يمكن أن يساهم بفعالية في الحد من هدر المياه، ومنع انجراف العناصر الغذائية من التربة، وضمان نمو متجانس للمحاصيل. كما تشير النتائج إلى وجود إمكانات كبيرة لتوسيع نطاق هذه الابتكارات عند دعمها بنموذج أعمال متنوع، وبرامج تدريب موجهة للفلاحين، وزيادة الاستثمار في التكنولوجيا الزراعية. ومن المقرر إطلاق المشروع تجارياً في أبريل 2026. وتخلص الدراسة إلى أن التحول الرقمي الموجه والابتكارات من قبيل IRRIGLOW تمثل محركات أساسية لتعزيز الإنتاجية الزراعية، وتأمين الموارد المائية، وتسريع انتقال الجزائر نحو اقتصاد أخضر مرن ومستدام.

الكلمات المفتاحية: الاقتصاد الأخضر، التحول الرقمي، الزراعة الذكية، الري الدقيق، الابتكار، الاستدامة البيئية، الجزائر.

رموز JEL: Q01، O30، O31، Q15، Q25، Q50

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Introduction

Introduction

Since the dawn of history, human survival and development have been intrinsically linked to the ability to harness the forces of nature to ensure food security and the stability of societies. The simple water canals carved by ancient civilizations along riverbanks represented the first attempts to control resources, launching a long and continuous journey of agricultural evolution. The agricultural sector has undergone radical transformations; from the era of arduous manual labor and reliance on animal power, to the Industrial Revolution that introduced mechanization and complex hydraulic systems. Today, as we navigate the heart of the Fourth Industrial Revolution, agriculture is no longer a traditional manual practice relying on intuition and trial-and-error. It has evolved into an "exact science" and a fertile ground for technological innovation, where earth sciences intersect with computer science and big data to establish what is known as "Precision Agriculture."

Amidst this accelerated evolutionary trajectory, the concept of "Smart Irrigation" has emerged as an imperative response and a lifeline to confront contemporary environmental and climatic challenges. This concept transcends the traditional view limited to merely watering plants, representing instead an integrated digital ecosystem. It relies on merging "Internet of Things" (IoT) technologies to sense the pulse of the earth, with predictive algorithms powered by Artificial Intelligence (AI) to analyze data. The objective is to supply crops with precise, microscopic amounts of water and nutrients at the optimal time, automatically and entirely independent of constant human intervention. The goal here is not merely to reduce effort, but to maximize productivity from every single drop of water.

This technology derives its critical and urgent importance from stringent statistical realities. In its periodic reports, the Food and Agriculture Organization of the United Nations (FAO, 2024) explicitly states that "the agricultural sector depletes over 70% of the world's available freshwater resources." Furthermore, data from the World Bank (2023) highlights a severe inefficiency in traditional systems, revealing that up to 40% of agricultural water is lost to evaporation, runoff, and poor infrastructure before it even reaches the plant roots. Coupled with the massive demographic growth projected globally by 2050-for which the FAO warns that "a staggering 60% increase in global food production will be required"-pressures on food systems and water resources are increasing at an unprecedented rate. Addressing this inefficiency offers massive economic and environmental returns; research by McKinsey & Company (2023) estimates that adopting IoT and precision irrigation can reduce agricultural water consumption by 20% to 30% while simultaneously boosting crop yields by 10% to 15%. This reality dictates

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an urgent and radical transition towards precision irrigation methods-not as a supplementary option for improvement, but as an existential necessity to mitigate water stress and achieve the delicate equation of "water and food security."

On a local level, Algeria represents a living and tangible model of these global challenges. It is a nation possessing immense agricultural potential and unique environmental diversity, but conversely faces severe climatic pressures represented by fluctuating rainfall and advancing desertification. The strategic importance of this sector is immense; according to recent World Bank indicators, agriculture contributes approximately 12% to Algeria's Gross Domestic Product (GDP) and provides employment for a significant portion of the rural workforce. Official statistics issued by the Directorate of Agricultural Services (DSA) of the Tlemcen Province, for instance, confirm the vast and varied exploitation of agricultural lands covering expansive areas of cereals, fruit trees, and field crops. However, the noticeable decline in water tables and successive seasons of drought have elevated the rational and calculated management of water resources to a matter of national security and strategic survival for the local economy.

Today, agriculture is no longer limited to cultivating land and distributing water resources through conventional methods. The modern farm has evolved into a complex ecosystem that requires intelligent, precise, and data-driven management. Agricultural productivity and sustainability now depend on the farmer's ability to monitor and manage multiple interconnected variables simultaneously.

These variables include the physical and chemical condition of the soil-such as moisture, temperature, and pH-as well as climatic and weather factors, including rainfall, evapotranspiration rates, and accurate weather forecasting. In addition, effective farm management requires continuous supervision of irrigation infrastructure, assessment of pump and valve performance, optimization of water and energy consumption, and access to technical agricultural expertise to support decision-making throughout the crop lifecycle.

Managing these factors through traditional methods presents significant challenges, often leading to resource waste, increased operational costs, and reduced agricultural efficiency. In response to these growing challenges, the **IRRIGLOW** project was developed as an integrated technological solution that aims to simplify farm management and accelerate digital transformation in agriculture.

IRRIGLOW combines five complementary services within a single digital platform. First, an IoT sensor network continuously monitors soil conditions and provides real-time field data. Second, predictive artificial intelligence analyzes collected data alongside climatic information to optimize irrigation scheduling and support proactive decision-making. Third, an automation

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system executes irrigation operations automatically through intelligent control of pumps and valves. Fourth, a centralized dashboard enables farmers to monitor farm performance, consumption indicators, and operational outcomes through an intuitive digital interface. Finally, an instant agronomic assistance service provides technical guidance and expert recommendations to support farmers in addressing agricultural challenges and improving productivity.

Through this integrated approach, **IRRIGLOW** seeks to transform traditional agricultural practices into a smarter, more efficient, and sustainable farming model. Despite the immense and scientifically proven importance of these technologies, the farmer-especially in developing landscapes-still grapples with a set of difficulties that hinder the adoption of digital transformation. These challenges begin with the hardship of physically monitoring vast expanses, which consumes time and physical effort. They extend to severe losses caused by sudden, unpredictable climatic fluctuations that cannot be foreseen using traditional means. Finally, they culminate in the problem of "technological fragmentation." The few systems currently available on the market are often isolated and fragmented; a farmer is forced to use a separate app for the weather, a basic timer to program the pump, and paper records to calculate costs. This fragmentation confronts them with complex, disconnected tools that increase their cognitive and psychological burden, rather than serving as a facilitating instrument.

Faced with this apparent technological fragmentation and the growing need to digitize the agricultural sector to ensure its sustainability, the core problematic of this strategic research crystallizes in the following central question: **To what extent can smart irrigation systems improve farm management and support digital transformation in agriculture in Algeria?**

To comprehensively address this complex problematic and offer an applicable scientific and practical approach, we have deconstructed it into the following sub-questions, which this work will strive to answer:

- How can IoT, AI, and automation be integrated into a unified smart farming system?
- To what extent can a multi-service agricultural platform reduce water and energy costs while improving farm performance?
- How can a simple and user-friendly interface facilitate the adoption of smart technologies by traditional farmer

Chapter I:

Project Overview

Chapter I: Project Overview

1. The Project Idea
2. The Proposed Values
3. The Project Team
4. Project Objectives
5. Project Implementation Schedule

Chapter I: Project Presentation

In this chapter, we will present our project from different perspectives, starting with the origin of the idea as well as the added values proposed by our initiative. We will also highlight the technical aspects of the project.

1. The project idea

We will shed light on this new technology, which comes as a response to the needs of farmers and agricultural producers facing current climatic and water-related challenges. The most frequent problems encountered daily by the majority of farmers concern inefficient water management, yield losses due to water stress, and the difficulty of maintaining consistent crop quality. Based on what we have extracted from the study of the agricultural sector, we began searching for a solution that could meet these needs while optimizing the use of resources.

To better position our project, it is essential to understand the influence of using smart irrigation tools on the perceived quality of agro-food products. Traditional irrigation methods often lead to water waste and uneven distribution of nutrients, which directly affects the calibration and taste of the final products. IRRIGLOW is the solution for these producers. It is an intelligent and connected system designed to automate and optimize crop irrigation. The proposed solution, aimed at addressing the aforementioned problems, is represented in the form of a computer algorithm and a network of simple, easy-to-use sensors, which can also be referred to as smart farming.

The services and functionalities offered by IRRIGLOW include:

- Automation of irrigation based on real-time soil data.
- Remote monitoring of humidity, temperature, and nutrients.
- Predictive analysis to anticipate the water needs of plants.
- Direct improvement of agro-food quality through precise water supply.

Through our IRRIGLOW system, it has become easier for farmers to take care of their crops, increase the quality of their agro-food products, and significantly reduce water waste.

2. The Proposed Values

Every business project, regardless of its nature, offers one or more added values to its consumers. In what follows, we will specify the added values of our project based on the following criteria:

- **Modernity:** This is a modern system based on new technologies (Internet of Things - IoT). The foundation of this solution is accessibility through a mobile or web application, allowing the land to be controlled at one's fingertips.

- **Flexibility:** The system presents a high degree of flexibility; it can adapt to different types of crops (greenhouses, open fields) and be controlled from anywhere with an internet connection.
- **Research & Development (R&D):** Continuous research and development enable IRRIGLOW to meet the needs of the agricultural sector with an optimal quality/price ratio and to study the direct impact on the perceived quality of food products.
- **Cost Reduction:** Significant reduction in water and energy bills, as well as decreased agricultural losses related to drought or over-irrigation.
- **Eco-responsibility (or Sustainability):** By providing the plant with the exact amount of water it needs, the solution drastically limits the waste of water resources and prevents soil leaching (loss of nutrients). This places the agricultural operation within a sustainable and environmentally respectful approach.
- **Traceability:** The system collects and stores the complete history of irrigation cycles. This total transparency makes it possible to demonstrate the good agricultural practices employed, which constitutes a powerful marketing argument to increase consumer trust and the perceived quality of the final product.
- **Time Optimization:** The automation of the irrigation network frees the farmer from manual and time-consuming tasks of watering and field monitoring. The farmer can thus reinvest this valuable time in other strategic or commercial activities.
- **Consistency of Production:** By avoiding any water stress (lack or excess of water), plants benefit from homogeneous growth. This ensures regular calibration, uniform coloration, and standardized taste of the harvested fruits and vegetables, which is a major requirement of the agro-food industry.
- **Decision Support:** Beyond simple automation, the analysis of the collected data (Big Data) enables the system to provide relevant agronomic recommendations. The tool acts as a true technical assistant that helps the farmer anticipate the specific needs of their crops.

3. Project team

The team of this project is composed of two members and is represented as follows:

I am the founder of the IRRIGROW application, and I hold the position of Executive Director. Among my qualities, I can mention the following:

- I am responsible and dynamic.
- I am both a leader and a manager.
- I can manage stress.

- I know how to manage a team.
- I am creative and always have new ideas that can lead to new investments.

I am interested in languages, which has allowed me to learn several languages in addition to my mother tongue, Arabic. I am good in French and English.

I am also concerned with environmental issues.

ZENASNI Soumia, Professor and Researcher at the Higher School of Management in Tlemcen, HDR in Economics and Finance. I am interested in the following fields:

- ✓ Corporate Financial Management – Management Accounting
- ✓ International Finance and Corporate Finance
- ✓ Banking, Monetary, and Financial Economics
- ✓ Financial Econometrics

I hold the position of director I am responsible for:

- Conduct market research
- Manage relationships with industry professionals
- Define the company's marketing strategy

4. Project objectives

To better position a project, it is necessary to clearly define its objectives to be achieved in the short, medium, and long term, relying on solid foundations. This is where the SMART method comes in, a conceptual management and planning framework designed to help define clear, precise, and achievable goals. It consists of transforming a general intention into a concrete action plan by ensuring that the set objective systematically meets five fundamental criteria: it must be **Specific** (clearly defined without ambiguity), **Measurable** (quantifiable to track progress), **Achievable** (attainable based on capacities and resources), **Realistic** (relevant and useful in the overall context), and **Time-bound** (framed by a precise deadline) ([Doran, 1981](#)).

The integration of these five elements facilitates the tracking of project developments and the effective management of the various available resources. By establishing solid strategic foundations, this approach not only ensures good performance and continuous progress over the long term, but also optimizes organization, avoids misunderstandings, and maximizes the overall chances of project success.

The SMART method indicators for IRRIGLOW's short-term objectives are presented in the following table:

Tableau 1: SMART Method of the Project in the Short Term

Objective	Specific (S)	Measurable (M)	Achievable (A)	Realistic (R)	Time-bound (T)
Launch Strategy & Marketing Plan	We plan to design a robust launch strategy for IRRIGLOW's smart irrigation solutions , emphasizing an effective marketing plan over a period of three months.	We evaluate the performance of our marketing plan to measure the achievement of our goals, based on specific analysis tools (<i>e.g., farmer engagement metrics, pilot program sign-ups</i>).	We are developing a robust launch strategy by focusing on the implementation of our marketing plan. We have the necessary technical and agronomic resources that allow us to achieve our targeted objectives.	We have conducted market research (<i>including in the Tlemcen province</i>) demonstrating that our proposed smart farming services meet the specific needs of our target market facing water stress .	We estimate a duration of three months to be able to develop a solid launch strategy and define a strong marketing plan for IRRIGLOW .

Source: Developed by our team

Our objectives differ across the three time horizons, and they are presented in the following tables:

4.1. In the short term

Tableau 2: IRRIGLOW's Short-Term Objectives

The term	Objectives
The short term: brings together our objectives that we aim to achieve within twelve (12) months following the launch.	Install the IRRIGLOW prototype in three local pilot farms.
	Scientifically demonstrate the improvement of agro-food quality through our tool.
	Establish the first partnerships with agricultural cooperatives.

Source: Developed by our team

Tableau 3: IRRIGLOW's Medium-Term Objectives

The term	Objectives
The medium term: brings together our objectives that we aim to achieve starting from the second year.	Expand our activity by marketing the hardware and software solution on a larger scale.
	Reach the break-even point within two (02) years.
	Integrate new features based on artificial intelligence for weather prediction.

Source: Developed by our team

4.2. In the long term

Tableau 4 : IRRIGROW's Long-Term Objectives

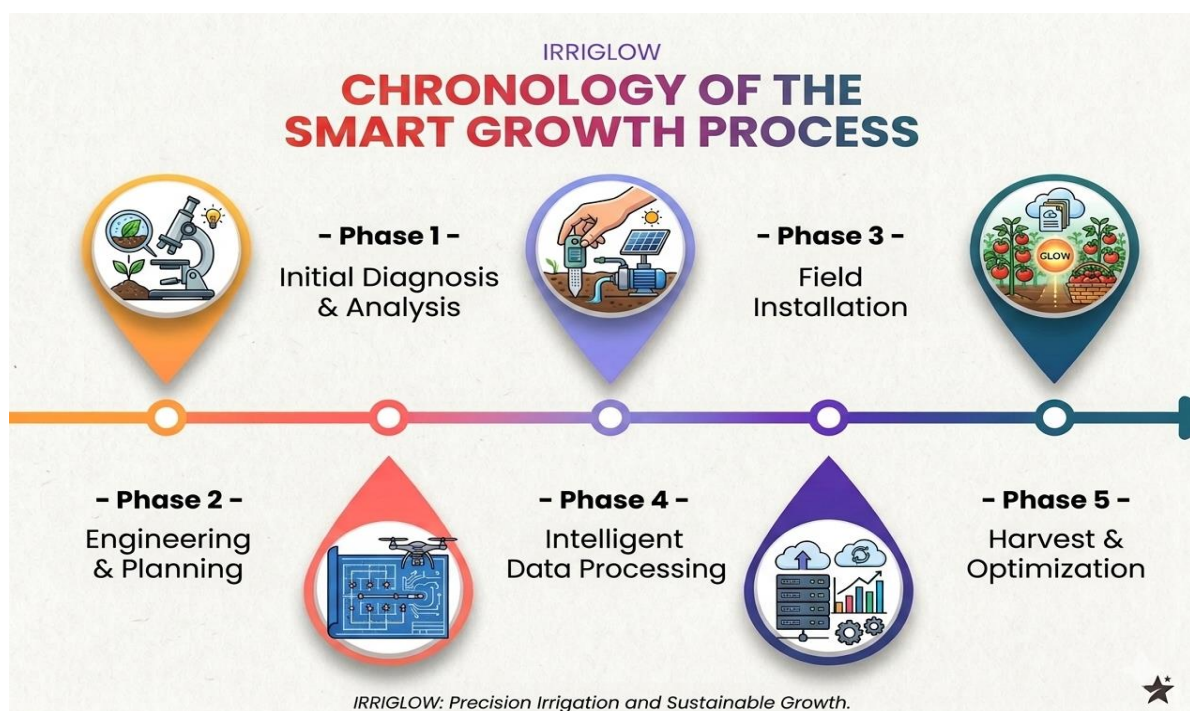
The term	Objectives
The long term: brings together our objectives that we aim to achieve starting from the fifth year following the launch. These objectives are essential to ensure a strong market presence and sustainable growth of the company.	Install IRRIGLOW technical hubs in Algeria's major agricultural regions to create jobs and support farmers.
	Become the most downloaded and widely used smart irrigation application among professionals in the agro-food sector.
	We aspire to build a strong reputation around the quality and reliability of our IoT solutions, thereby fostering customer loyalty and ensuring continuous growth.
	Establish ourselves as the national leader in agrotechnological services related to water optimization and agro-food quality.

Source: Developed by our team

5. Project Implementation Schedule

A rigorous strategic planning is the cornerstone of the success of any project, especially when it comes to materializing the vision of an innovative solution such as IRRIGLOW. Developing a clear roadmap makes it possible to precisely map out tasks and crucial milestones. This anticipation tool is essential to structure our long-term approach and ensure the achievement of the set objectives. The design and realization of the IRRIGLOW ecosystem (smart hardware and application) will extend over a period of approximately twelve months of continuous work, with a planned start in July 2026.

Figure 1: IRRIGLOW Roadmap



Source: Developed by our team

Interpretation of the IRRIGLOW Project Roadmap:

Phase 1: Genesis and Structuring

The first stage of our approach corresponds to the emergence and initial structuring of the project. This preparatory phase focuses on the precise definition of our smart irrigation concept. The formulation of IRRIGLOW's founding idea was carried out during January 2025. In parallel with the first reflections on our water optimization solution, the formation of our working team was completed over a period of two (02) months, in February and March 2025, in order to bring together the necessary skills for the realization of this agrotechnological project.

Phase 2: Strategic Planning

This phase is dedicated to defining our economic model and analyzing our target environment. The objective is to identify our competitive advantages, notably our predictive system powered by solar energy, and to structure our value proposition. The development of the Business Model Canvas (BMC), coupled with the market study and the detailed drafting of the Business Plan (including profitability assessment), was carried out intensively in parallel. These strategic tasks required two (02) months of joint effort, completed between February and April 2025.

Phase 3: Technological Development and Prototyping

This is the central stage dedicated to the materialization of the IRRIGLOW solution. Once the strategic foundations were validated, we focused on technical design. The development of our experimental prototype, which encompasses both the hardware product (sensor integration) and the software application (artificial intelligence algorithms), represents the longest effort of the project. This achievement extends over a period of nine (09) months of work, from May 2025 to January 2026, allowing us to reach an optimal level of technological maturity.

Phase 4: Legal Framework and Network Deployment

The realization of IRRIGLOW relies on rigorous strategic planning, where the prototyping phase, initiated in May 2025, constitutes a major technological pivot to validate the functionalities of our smart irrigation system. This technical stage, which extends over a period of nine (09) months until January 2026, enables us to reach a TRL 4 maturity level by demonstrating the effectiveness of predictive algorithms and solar-powered hardware integration. In parallel with this development, the official registration on the STARTUP.DZ platform at the end of June 2025 marked a crucial step in our institutional recognition, ensuring the viability of the solution before its final deployment in the field and its commercialization scheduled for April 2026.

Phase 5: Launch and Commercialization

The final stage of IRRIGLOW focuses on technical validation and regulatory compliance, processes that are indispensable to ensure smooth deployment and an optimal user experience in the agricultural market. This closing phase guarantees synergy between the mobile application and field sensors while structuring resource management to maximize the impact of our solution among farmers. The development of the software interface and the integration

Chapter I: Project Presentation

of smart features extend from May 2025 until the pre-launch in March 2026. In parallel, the management of administrative procedures, including obtaining licenses and preparing legal documents, requires rigorous monitoring over eleven (11) months, spanning from April 2025 to February 2026. Finally, IRRIGLOW's effective commercialization strategy will begin in April 2026, marking the official entry of our technology into the agrotechnology market.

The project implementation schedule is presented below in the following figure, comprising all the information previously mentioned.

Figure 2: Detailed Project Implementation Schedule

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Janvier 2025	Février 2025	Mars 2025	Avril 2025	Mai 2025	Juin 2025	Juillet 2025	Août 2025	Septembre 2025	Octobre 2025	Novembre 2025	Décembre 2025	Janvier 2026	Février 2026	Mars 2026	Avril 2026
	Préparation d'idée														
		Préparation du BMC													
		Etude de marché													
		Equipe de travail													
		Buseniss plan													
			Prototype (application et produit)												
			Documents et les licences, Développement du réseaux												
														Lancement	
														Commercialisation	

Source: Prepared by us using the EXCEL software

Chapter II : Innovative Aspects

Chapter II: Innovative Aspects

1. Nature of Innovations
2. Domain of Innovations

Chapter II: Innovative Aspects

In this chapter, we will address the innovative aspects of our project by specifying the nature and domains of innovation that characterize our solution.

1. Nature of Innovations

Our project is fully embedded in the field of agrotechnology, with an innovative approach focused on the intelligent management of water resources. Unlike conventional methods, our solution integrates artificial intelligence to optimize irrigation in real time, based on a detailed analysis of soil management.

This technological innovation is the result of rigorous technical development aimed at digitally and ecologically transforming the agricultural sector. By offering smart solutions directly applicable in the field, our approach enables a shift from systematic irrigation to precision irrigation, thereby ensuring maximum efficiency and enhanced sustainability of farming operations.

The nature of our innovation is structured around three major technological pillars:

- Artificial Intelligence and Predictive Analysis

The integration of AI algorithms enables a detailed analysis of soil management and real-time optimization of irrigation. These AI-driven analytical tools facilitate predictive agriculture and rigorous resource optimization.

- IoT Infrastructure (Internet of Things)

The development of specific IoT sensors enables continuous monitoring of soil conditions, water quality, and crop health, ensuring precise and consistent data collection.

- Sustainable Energy Autonomy

The integration of renewable energy systems (solar, wind, biogas) to power all technical operations, ensuring a minimal carbon footprint.

2. Domain of Innovations

IRRIGLOW's innovation is based on a smart application capable of processing environmental data to automate and rationalize water use. The application domain directly targets farmers and landscaping professionals, providing them with a reliable and autonomous decision-support tool.

2.1. Where does the name IRRIGLOW come from?

The choice of our project's name is not accidental. It was carefully designed to reflect our vision, our field of technical expertise, and the ultimate purpose of our solution. The appellation

IRRIGLOW is a fusion (a portmanteau) created from two strong linguistic concepts that define our identity:

IRRI: This is the direct root of the word ‘Irrigation.’ This prefix immediately positions our core business and field of activity (agrotechnology and water resource management). It clearly indicates to users the main function of our system.

GLOW: This English term, which translates as ‘to radiate,’ ‘to shine,’ or ‘to glow,’ was carefully chosen to illustrate the vitality of a crop in perfect health. A plant that receives a precisely measured supply of water and nutrients is a plant that ‘radiates’ health. Moreover, this term creates a subtle play on words through its resemblance to the English verb *GROW* (to grow, to cultivate, to thrive), thereby emphasizing our objective of improving crop growth and increasing agricultural yields.

2.2. Logo Design and Symbolism

The design of our visual identity is rooted in the desire to intuitively illustrate the core functionalities of our system. Thus, our logo is structured around three major visual elements. First, a central water droplet defines our core business: irrigation and the rigorous preservation of water resources. Next, a leaf meticulously integrated inside this droplet immediately guiding the mind toward agronomy, plant growth, and ecology. Finally, connectivity waves emanating from this ensemble symbolize the integration of cutting-edge technological tools, notably the Internet of Things (IoT) and Artificial Intelligence, which are essential for water management.

The harmonious union of these symbols reflects our direct promise to farmers. The combination of nature and technology sends a reassuring and hopeful message: “No longer worry about water scarcity or the management of your fields; we bring new life to your lands.”

Regarding the color palette, each shade in our graphic charter has been selected to convey the deep values and vision of our team:

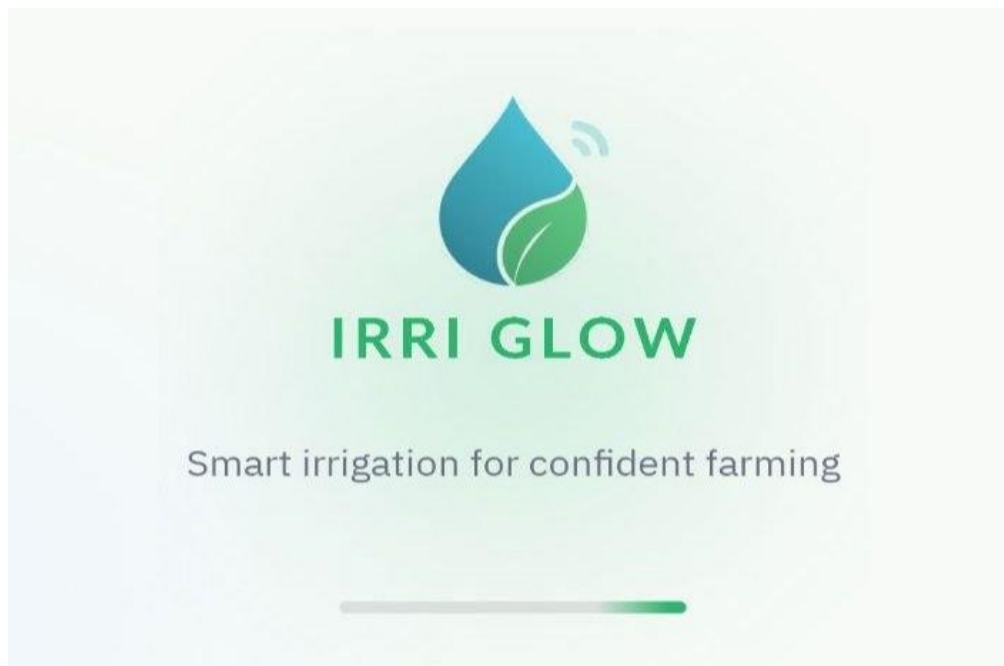
- **The Blue / Cyan Gradient:** This shade naturally represents water, but it also evokes digital innovation, serenity, and the professional rigor of our approach. It demonstrates our seriousness in developing intelligent solutions.
- **The Vibrant Green:** It embodies fertility, positive energy, and the vitality of nature. It reflects our passion for the agricultural field and our creativity in the face of current ecological challenges.
- **The Luminescence (The "Glow" Concept):** Beyond visual aesthetics, the transition of these colors into a luminous gradient embodies the core promise of our solution. The term “Glow” illustrates the direct impact of intelligent and measured irrigation on the crop itself: it symbolizes a plant that “glows” with health, reaching a superior agro-food

quality and optimal development. This visual approach perfectly conveys the idea that a precisely managed water resource gives rise to agricultural excellence and abundant harvests.

Our slogan is: « **Smart irrigation for confident farming** ».

In order to gain a deeper understanding of our strategic and technological vision, we invite you to review the visual identity of the IRRIGLOW project, as illustrated in the graphic below.

Figure 3: IRRIGLOW application logo with the slogan "Smart irrigation for confident farming"



Source: Developed by our team

Chapter III:

Strategic Market Analysis

Chapter III: Strategic Market Analysis

1. Project Plan
2. Marketing Plan

Chapter III: Strategic Market Analysis

The purpose of this chapter is to outline the commercial and competitive contours of our innovation. We will begin with a detailed segmentation of the market in order to define our target clientele. Following this identification, a comparative analysis of our strengths and weaknesses against established actors will be conducted-an essential step to consolidating our competitive advantage. Finally, we will design the marketing trajectories intended to propel IRRIGLOW's activity and capture new market shares.

1. Project Plan

The Business Model Canvas (BMC) is a powerful tool used by entrepreneurs and businesses to describe, design, evaluate, and rethink their economic model. It consists of nine core building blocks that capture the various aspects of a company, ranging from customer segments and value propositions to distribution channels and revenue streams.

This framework offers a holistic overview of a business, enabling entrepreneurs to visualize how all elements of their model interact and align to create value for their customers and generate revenue. By utilizing the BMC, enterprises can identify opportunities for innovation, understand their target market, and develop effective strategies to succeed in a constantly evolving business environment ([osterwalder, 2010](#)).

1.1. Added Values

The block values, solutions, and benefits that IRRIGLOW delivers to its users center on transforming agricultural efficiency through advanced technology. At its foundation, the system offers ultra-precise soil moisture and irrigation management, maximizing yield accuracy through the deployment of smart sensory hardware. This hardware is seamlessly integrated with intelligent automation, which utilizes custom software application to mitigate human error by fully automating watering and soil treatment processes. Consequently, this technological synergy leads to significant resource optimization, drastically reducing water waste and substantially lowering operational costs for farmers. By alleviating the physical demands of manual labor, the platform drives enhanced productivity, resulting in increased yields, improved overall crop health, and valuable time savings. Ultimately, all of these advanced capabilities are delivered through a user-friendly experience that successfully bridges the gap

Chapter III: Strategic Market Analysis

between complex software engineering and the practical realities of day-to-day farming practices.

1.2. Customer Segments

This block outlines the specific markets and user groups our enterprise intends to capture and support. For IRRIGLOW, our primary clientele consists of independent agricultural operators-ranging from small to large-scale farms-as well as agricultural businesses and cooperatives. Fully grasping the unique requirements and operational preferences of these demographics is fundamental to our strategy. Consequently, we are committed to delivering advanced technological solutions that align perfectly with their demands for quality, high performance, and continuous innovation.

1.3. Channels

This block describes the means by which the company communicates and delivers its value proposition to customers. Our distribution strategy for IRRIGLOW relies on several key pillars to ensure the visibility and accessibility of our technological solutions. First, our mobile application provides a user-friendly interface that allows farmers to manage their irrigation system, monitor their data, and interact with our expert network anytime and anywhere. Next, our direct sales approach and our partnerships with agricultural equipment distributors guarantee the physical availability of the hardware and rapid intervention for on-site installation at the farms. Regarding promotion, we employ a multi-channel approach, combining targeted digital marketing on professional social networks with an active presence at trade shows and conferences dedicated to the agricultural sector. This integrated distribution and promotional strategy enables us to maximize our reach, establish a bond of trust, and effectively connect with our target audience.

1.4. Customer Relationships

This block details the types of relationships the company establishes with its various customer segments, whether they are personal, automated, or community-based. To strengthen our relationships with the farmers and cooperatives using IRRIGLOW, we are implementing several key initiatives. First, we place a high priority on the user experience by actively collecting their field feedback and suggestions regarding our mobile application. This feedback helps us refine our algorithms and continuously improve our technology to better address their

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agricultural constraints. Next, our technical and agronomic support team is available 24/7 to answer any questions, address concerns, or respond to critical alerts from the irrigation system, thereby guaranteeing continuous and reassuring support. Finally, we reward our customers' long-term engagement (such as subscription renewals or hardware expansion) through exclusive benefits, such as advanced data analytics, priority software updates, or preferential maintenance rates. These initiatives aim to build a solid and lasting relationship of trust, which is absolutely essential in the agricultural sector.

1.5. Key Partners

This block identifies the collaborations and strategic alliances with other companies or entities that contribute to the success of the business model. Our key partners are essential players in the success of our company. They include a diverse range of collaborators, namely:

- **Suppliers of IoT sensors and electronic equipment:** They manufacture and provide the smart hardware (moisture probes, controllers) essential for data collection and irrigation automation.
- **Agronomists and soil experts:** They provide their scientific expertise on crop water requirements and soil conditions, which allows us to refine and optimize our software algorithms.
- **Agricultural equipment distributors and specialized technicians:** They facilitate the integration of our technology into the market and handle the installation, technical maintenance, and troubleshooting of our systems directly on the farms.
- **Business lawyer:** A legal expert specializing in the legal aspects of commercial transactions, intellectual property (protecting our technology), and financial operations. Their role is to advise us on how to structure our activities and transactions to minimize legal risks and maximize benefits. They draft and negotiate contracts, ensuring their compliance with current laws and regulations. Their role also includes representing us in the event of commercial disputes.

Together, we work in close collaboration to create synergies, develop innovative solutions, and achieve our common goals. Our key partners play a crucial role in our ability to offer added value to our customers and remain competitive in the market. By maintaining strong and mutually beneficial relationships, we strengthen our positioning and drive our long-term growth.

1.6. Key Resources

This block refers to the tangible, intangible, and human assets necessary to realize the company's business model. To ensure the smooth operation of our startup **IRRIGLOW**, we rely on several key resources across different areas:

- **Human resources:** They constitute a major asset, featuring technical and specialized profiles such as software developers (for the development and maintenance of the mobile application and artificial intelligence algorithms), IoT experts (for the integration and management of connected sensors), as well as sales and marketing managers to promote our solutions and support farmers in the field.
- **Physical and technological resources:** Our infrastructure includes a robust and secure database to store agro-climatic data, high-performance cloud servers, electronic components and spare sensors, powerful development computers, as well as a suitable facility or workshop for hardware assembly, testing, and logistics management.
- **Financial resources:** They play a crucial role in supporting research and development (R&D) and the production of the irrigation control units. They include our equity, grants related to technological and agricultural innovation, partners and investors who support our commercialization phase, as well as credit institutions to finance working capital and component inventories if necessary.

These key resources allow us to maintain our operational activity, guarantee the reliability of our technologies, and pursue the development of **IRRIGLOW** in an efficient and sustainable manner.

1.7. Key Activities

This block describes the core operational actions that **IRRIGLOW** must continuously execute to sustain its business model, deliver its value proposition, and maintain a competitive edge in the agrotech market. Our primary activities are structured across four critical operational pillars:

1.7.1. Continuous Software Development & AI Optimization

- **Application Maintenance & UI/UX Evolution:** Ensuring the mobile application remains robust, secure, and intuitive for farmers operating under diverse field conditions. This includes regular feature updates, bug fixes, and performance optimization.

- **Algorithmic Refinement:** Continuously training and updating our predictive machine learning models. By processing historical data, the system refines its ability to predict exact water requirements, minimizing waste and adapting to shifting climate patterns.

1.7.2. IoT Hardware Configuration & Quality Assurance

- **Sensor Calibration & Firmware Management:** Managing the technical setup, firmware flashing, and calibration of the physical IoT components (soil moisture sensors, temperature probes, and automated valve controllers) to ensure precise telemetry.
- **Hardware-Software Integration:** Conducting rigorous testing to guarantee seamless, low-latency communication between the physical hardware deployed in the fields and the cloud infrastructure powering the mobile app.

1.7.3. Agro-Climatic Data Analytics & Agronomic Modeling

- **Real-Time Data Processing:** Ingesting, cleaning, and analyzing massive streams of environmental data captured by field sensors alongside localized meteorological feeds.
- **Customized Recommendation Generation:** Translating raw data into actionable agronomic insights. This activity involves mapping data against specific crop profiles to generate precise, automated watering schedules tailored to the unique growth stage of each cultivation.

1.7.4. Technical Support, Lifecycle Management & Field Logistics

- **Proactive Network Monitoring:** Monitoring the operational status of deployed IoT networks remotely to detect hardware anomalies, battery depletion, or connectivity drops before they impact irrigation cycles.
- **Responsive Support Desk:** Providing 24/7 technical and agronomic assistance to resolve user issues rapidly, ensuring minimal downtime for critical farming operations.
- **Supply Chain & Maintenance Coordination:** Managing the logistics of hardware distribution, on-site installation oversight, and the coordination of technical partners for hardware maintenance or replacements.

1.8. Cost Structure

This block lists all the costs associated with creating and operating the company's business model, including both fixed and variable costs. The IRRIGLOW smart irrigation project incurs significant expenses to ensure its launch and technical viability, with an application and algorithmic technologies requiring an initial investment of 1,505,000 DZD, corresponding to the intangible assets of the first year. In parallel, fixed operating expenses amount to a total of 477,000 DZD for this same year, encompassing various essential recurring costs such as rent and rental charges valued at 240,000 DZD, the advertising and communication budget of 40,000 DZD, as well as technological maintenance and system update fees amounting to 25,000 DZD and 8,000 DZD, respectively. By combining this initial intangible investment and the annual fixed charges, the overall startup cost is estimated at 1,982,000 DZD, an amount to which are added complementary material investments including tangible assets of 700,000 DZD and the initial inventory of components valued at 750,000 DZD. These figures underscore the importance of meticulous financial management to ensure the long-term success and profitability of the project.

1.9. Revenue Streams

This block indicates the different sources of revenue generated by the company, such as product sales, subscriptions, licenses, etc. The revenues of the IRRIGLOW project are diversified, relying on four main sources that guarantee financial flexibility. First, training programs dedicated to farmers constitute the core of our financial income during the first year of operation, generating 10,000,000 DZD, or 84.03% of total revenue. In addition, the direct sale of our physical smart irrigation systems (IoT sensors and control boxes) generates 1,250,000 DZD, representing 10.50% of our revenues. To benefit from the platform's analysis services, professionals also purchase subscriptions to the mobile application, which generates 600,000 DZD (5.04%), while the broadcasting of targeted advertisements (ads) brings in an additional revenue of 50,000 DZD (0.42%). This strategic combination generated an impressive total revenue of 11,900,000 DZD in the very first year. These figures illustrate the viability of the business model and the IRRIGLOW project's ability to attract a solid user base, while modernizing agricultural practices and offering mutual benefits to professionals and the startup.

2. Marketing plan

In this way, we initiated a highly rigorous process, carefully evaluating every essential phase to architect our marketing strategy. Here is how it translates into action

Figure 4: Stages of strategic marketing



Source: Developed by our team

2.1. Business Analysis and Diagnosis

To build IRRIGLOW's strategy, we must first evaluate our current situation. This assessment rests on two pillars: the study of our internal operations and the analysis of our external environment.

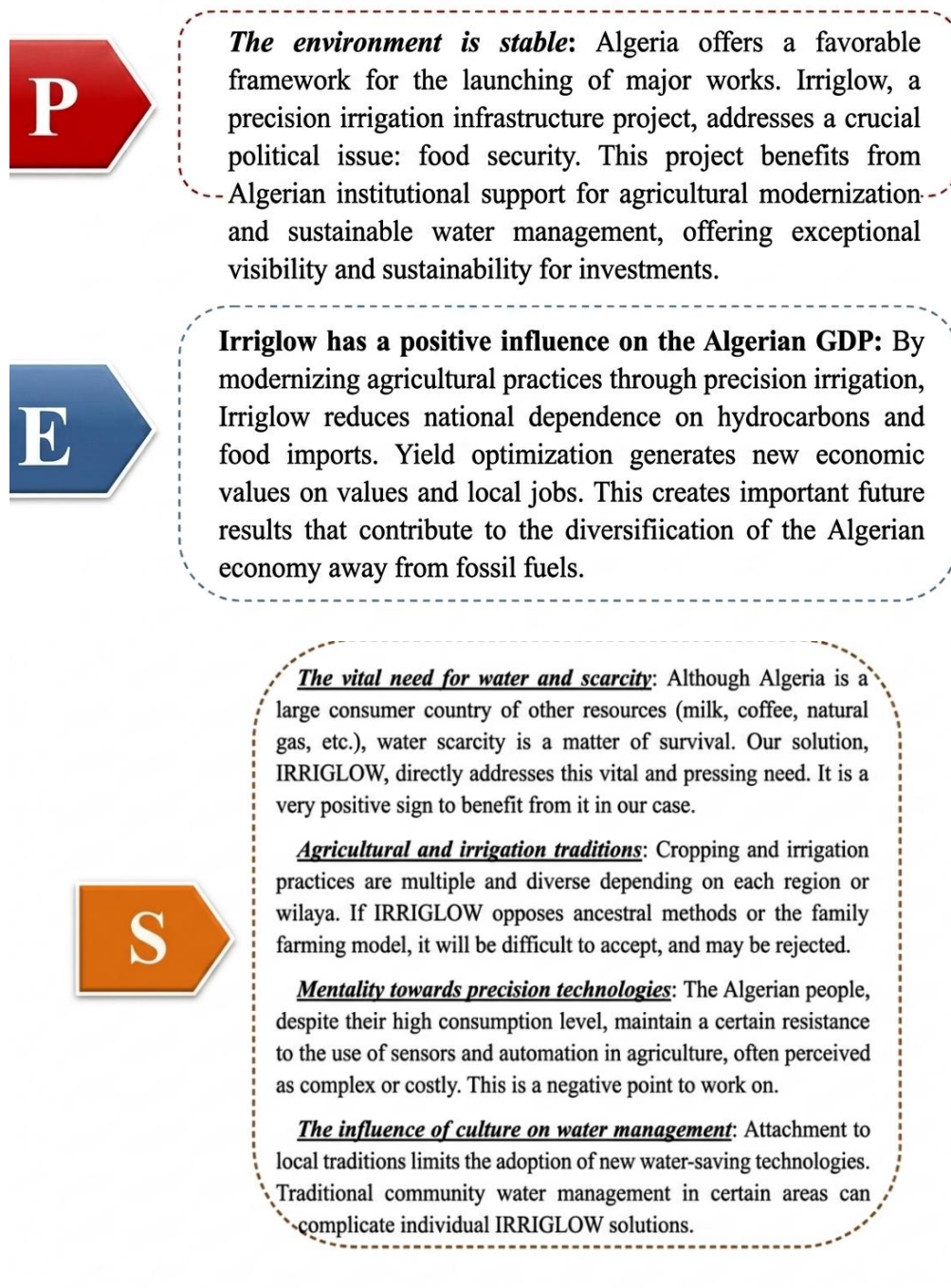
2.1.1. PESTEL Analysis

Let us begin by analyzing the external environment to observe its impact on the evolution of our business. We relied on the PESTEL analysis to develop the external diagnosis. PESTEL analysis is a strategic tool used by companies to evaluate the external factors that can influence their activity. It examines the Political, Economic, Sociocultural, Technological, Environmental, and Legal dimensions. By identifying these factors, businesses can better understand their external environment, anticipate opportunities and threats, and adjust their

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strategy to adapt to market changes. It is the acronym for Political, Economic, Social, Technological, Ecological, and Legal (khemri, 2015)

Figure 5: PESTEL Analysis of the IRRIGLOW application



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A Mobile Application: Central control point: Mobile phones are used by all society segments, implying that a mobile application the perfect, universally accessible interface for managing the smart irrigation system.

Internet Usage: Seamless integration: For many years, internet has become interwoven into the daily routine of everyone with computing tools. The system uses this for remote updates, data storage, and performance optimization.

Modern Technologies Usage: Resource optimization: Innovations in computing and sensor technologies increase annually. New software and hardware ease resource consumption, and the system incorporates these precision tools for ease of water management.



The system relies on the manufacturing of sensors and housings (a process managed to minimize impact). Exploitation of the service via the application generates a dramatic reduction in water, largely compensating for the footprint of the hardware production.



The project is subject to Algerian tax law: in terms of taxation, it involves the trade register, the tax on profits, VAT, etc. All these elements are necessary for the launch and development of each project. Initially, we begin by signing contracts with legally registered automotive professionals. We handle billing for certain automotive professionals who do not have a trade register, which is to say they are not legal.

Source: Developed by our team

2.1.2. SWOT Analysis

SWOT analysis is a strategic tool that allows companies to evaluate their strengths, weaknesses, opportunities, and threats. By identifying the internal and external aspects that influence their performance, organizations can develop effective strategies to capitalize on their advantages, mitigate their weaknesses, seize market opportunities, and confront potential threats. This strategic approach promotes informed decision-making and helps companies successfully navigate a competitive environment (khemri, 2015).

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After determining the external factors influencing the **IRRIGLOW** system, it is necessary to conduct an internal analysis. The SWOT analysis will involve developing an internal diagnosis of the project, while identifying our strengths, weaknesses, opportunities, and threats.

This analysis does not only concern our smart irrigation project, but competitor solutions as well. The following tables represent the components of the SWOT analysis for our project and those of our competitors:

Tableau 5 : Analyse SWOT du projet IRRIGLOW

Strengths (Internal Aspects)	Weaknesses (Internal Aspects)
* Continuous improvement of water optimization algorithms. * Simple AI algorithm and intuitive mobile interface, easy for farmers to use. * High creativity and motivation of the project team. * University education and support within the incubator ecosystem. * Optimal security of users' agricultural and environmental data. * Integration of the e-payment function for hardware purchases or service subscriptions.	* Lack of overall professional experience in the agricultural distribution market. * New project on the market and a tech brand image that is still being built among traditional farmers. * Potential difficulties in establishing initial strategic partnerships with large-scale operators or state authorities. * Risk of facing obstacles in customer retention if they prefer to return to their empirical and manual irrigation habits. * Need to bear high development, hardware production (housings/sensors), and software maintenance costs. * Facing strong potential competition from future players or imported

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* Customer assistance and on-site technical support for housing installation. * Offering multiple services (soil moisture monitoring, weather alerts, automation). * Innovative approach for agriculture (AgTech) in Algeria, with unique IoT and AI features that differentiate our solution from traditional methods. * Brand image focused on ecological transition, sustainability, and water savings. * Application perfectly compatible with Android and iOS systems, ensuring wide coverage. * Ability to capitalize on the heavy use of connected technologies by the new generation of farmers. * Concrete solutions to ease the daily management of problems related to water stress.	technologies well-positioned in the Algerian agricultural sector.
Opportunities (External Aspects)	Threats (External Aspects)
* Existence of an almost unexploited market space in AgTech and connected irrigation in Algeria.	* Possible new national or international competitors operating in the same field of smart agriculture.

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* Strong state support for certified Startup projects and food security solutions. * Proficiency and heavy use of social networks and digital tools by the target client base to stay informed. * Expansion: Opportunity to extend offerings to new major geographical areas (agricultural regions of the South and the High Plateaus), attracting new customers and increasing revenue. * Diversification: Our project offers synergy between hardware (sensors) and software, providing an opportunity to position ourselves well in the market compared to simple standalone applications.	* Challenges related to the security and confidentiality of strategic farm data. * Tax or customs disputes related to the import of certain electronic components and the payment of imposed taxes. * Competing companies (especially foreign ones) could launch low-cost or subsidized offers to capture large market shares. * Connectivity and internet access issues in isolated rural areas of Algeria, which could affect the sensors' ability to transmit data in real time to the application. * Encountering precision issues or hardware failures with the sensors, which would alter the quality of irrigation recommendations and damage the solution's credibility.
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Source: Developed by our team

Tableau 6: SWOT Analysis of Competitors

Strengths (Internal Aspects of Competitors)	Weaknesses (Internal Aspects of Competitors)
• Historical foothold: Strong presence and long-standing existence in the Algerian agricultural market. • Field knowledge: Deep understanding of local farmers' habits and expectations. • Sector experience: Greater professional experience in distributing traditional or imported irrigation equipment. • Established network: Customer support service and distribution channels already operational across the territory.	• Technical limitations: Presence of bugs and lack of optimization in their basic interfaces or irrigation applications. • Restricted offering: Offering a maximum of one or two services (e.g., simple time programming without data analysis or AI). • Lack of precision: Absence of verification and exact calibration of users' agronomic data. • Limited catalog: Lack of flexibility and restricted choice of solutions adapted to the diversity of soils and crops in Algeria.
Opportunities (External Aspects of Competitors)	Threats (External Aspects of Competitors)
• Digital visibility: Increasing use of social networks to broadcast varied content and capture the new generation of farmers. • Market potential: Evolution in a sector that is still largely open (almost empty field) regarding the transition to connected agriculture in Algeria.	• Offer rigidity: Risk related to the non-diversification of services faced with the arrival of integrated solutions (IoT + AI) like IRRIGLOW. • Adoption barrier: Low initial propensity of traditional farmers to adopt application-based solutions. • Transactional delay: Unavailability of online payment for purchasing services or spare parts among most current players. • Commercial fragmentation: Risk of losing focus and credibility by using social networks as the sole platform for services and research.

Source: Developed by our team

2.1.3. Measuring the Intensity of Competition

The smart IRRIGLOW system is new to the market, but this does not mean there are no competitors in the Algerian and international markets. We have studied our direct and indirect competitors while attempting to highlight their strengths and weaknesses. Let's begin with the existing competing solutions:

2.1.3.1. Direct Competitors

- **AITECH** AITECH is an Algerian agritech startup providing a management app that includes farm notifications, irrigation system control, weather forecasts, and remote watering features. Being present in the local market, AITECH is our most direct competitor. However, we can stand out by capitalizing on a deeper integration of Artificial Intelligence to offer true decision-making autonomy (sensor-based automation), whereas AITECH focuses heavily on remote control capabilities.
- **Aqua Edge** AquaEdge is an intelligent Moroccan application used in agriculture to help farmers manage irrigation accurately and efficiently. Although this system is effective, its exclusive focus on Morocco constitutes a weakness for the Algerian market, particularly regarding local after-sales service and the on-site physical installation of equipment, which represents a major competitive advantage for IRRIGLOW.
- **Farmonaut** Farmonaut is a satellite-based farming app that helps farmers monitor crop health, detect issues early, and manage fields more efficiently using remote sensing and data analysis. The potential weakness of this solution compared to IRRIGLOW lies in its reliance on satellite data. These inputs may lack microscopic precision at the soil level compared to the real-time data collected directly by the physical housings and sensors of our project.

2.1.3.2. Indirect Competitors

It is also crucial to consider indirect competitors, who offer similar solutions on an international scale:

- **Weenat** Weenat is a smart farming app that uses sensors to monitor soil and climate, helping farmers optimize irrigation.

- **Hydrawise** Hydrawise is a smart irrigation app that uses weather data and sensors to automate watering schedules, helping save water and maintain healthy landscapes.

These international applications have the advantage of deep experience and highly developed technologies. Nevertheless, they present weaknesses that can be exploited in the local market: they require the importation of expensive equipment (which is subject to customs duties) and lack local representation to support the Algerian farmer throughout the digitalization process of their farm.

2.1.3.3. Social Networks

Digital platforms and social networks have become deeply integrated into modern daily routines, and the agricultural sector is no exception. In this context, the IRRIGLOW project encounters a formidable indirect rival regarding information accessibility and versatility. For instance, Facebook, as the dominant global platform, recorded over 2.989 billion active users monthly in 2023. Currently, agricultural vendors, agronomists, and traditional irrigation specialists frequently leverage these platforms to establish professional pages. They utilize features like short videos and stories to showcase field operations, promote hardware such as pumps and pipes, and offer direct consultation to farmers. Consequently, these platforms serve as virtual storefronts, allowing traditional businesses to expand their reach without the need to develop proprietary software. From the consumer perspective, farmers actively use built-in search tools and specialized digital community groups to identify suitable suppliers and experts. They heavily depend on peer reviews and shared experiences to gauge a vendor's credibility prior to investing in new agricultural equipment or services. This dynamic prompts a valid and critical question from potential users: **What justifies the investment in a dedicated system like IRRIGLOW when conventional networking platforms already provide extensive agricultural information and supplier contacts?**

Addressing this challenge is crucial for IRRIGLOW, and the justification lies in the core nature of technological innovation. Primarily, while social platforms are restricted to communication and data sharing, IRRIGLOW functions as a comprehensive Internet of Things (IoT) ecosystem. Rather than serving as a networking tool, the application acts as a direct interface with the physical farm. By linking with intelligent field sensors, it empowers the user to fully automate watering cycles via Artificial Intelligence. A standard social media page is fundamentally incapable of conducting real-time soil moisture analysis or remotely activating

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irrigation pumps. Furthermore, from an operational standpoint, IRRIGLOW delivers a highly focused and distraction-free user experience, distinguishing itself from the chaotic information feeds typical of social media. The application's interface is specifically tailored for agricultural management, featuring dedicated modules for soil humidity tracking, weather updates, irrigation commands, water usage history, and technical support. This ergonomic design ensures that farmers can efficiently oversee their operations, conserve water, and access targeted help with minimal effort, offering a level of practical utility that general-purpose digital networks simply cannot provide.

2.2. Objectives and Marketing Strategy

After completing the market analysis, accurately targeting the clientele and their specific needs becomes a strategic imperative. A technological innovation like IRRIGLOW can appeal to several categories of operators by addressing various water management issues. To achieve this targeting effectively, it is essential to group industry actors who share similar irrigation behaviors and common environmental challenges into distinct segments. Here is the market segmentation to which we are directing our intelligent system:

2.2.1. Market Segmentation

- **The Potential Market** It encompasses all public or private entities whose activities directly depend on the management of water resources. This includes not only farmers but also nursery professionals, landscape designers, municipal services in charge of urban green spaces, and state institutions dedicated to water conservation.
- **The Target Market (Primary Segment)** This group primarily consists of farm owners (whether small, medium, or large-scale operations), agricultural cooperatives, and new investors engaged in land development, particularly in the High Plateaus and the Saharan South.

This segment was selected based on two fundamental criteria:

Climatic Vulnerability:

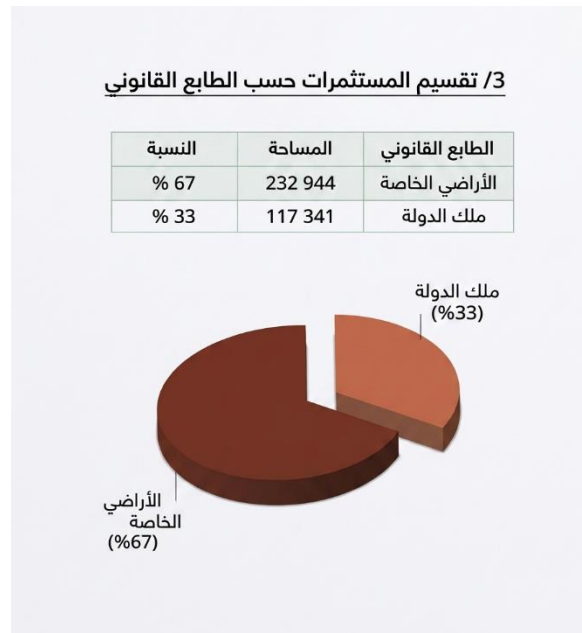
Crops are increasingly exposed to severe and unpredictable water stress at any stage of their growth cycle, which requires immediate responsiveness and strict micro-irrigation to prevent crop loss.

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The Economic Stake:

Farm owners are the economic actors most directly impacted by the cost of water waste and excessive energy consumption linked to pumping. Therefore, they are the most interested in connected devices (IoT and AI) capable of reducing their operational costs while maximizing agricultural yields.

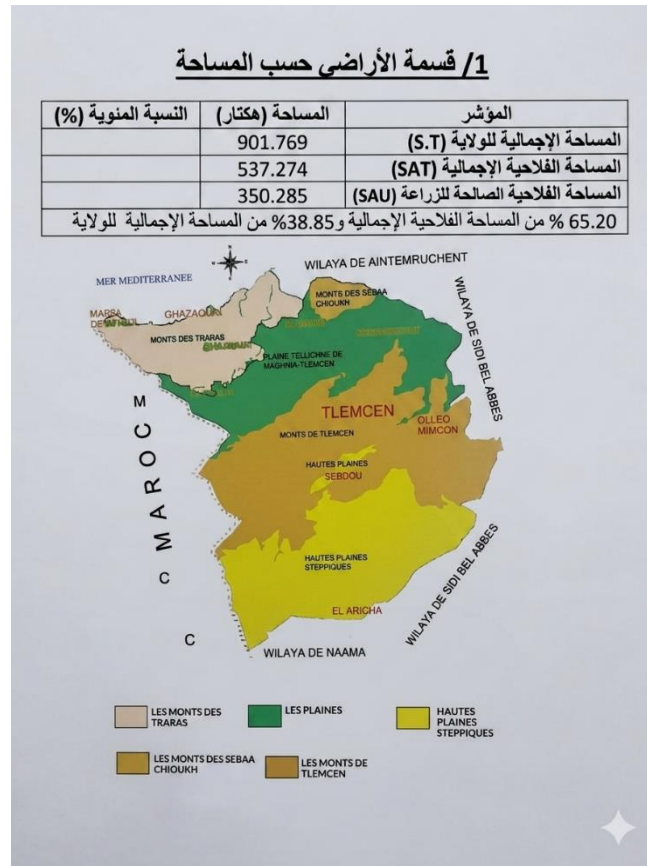
Figure 5: Distribution of Investments by Legal Status



Source: Developed by our team

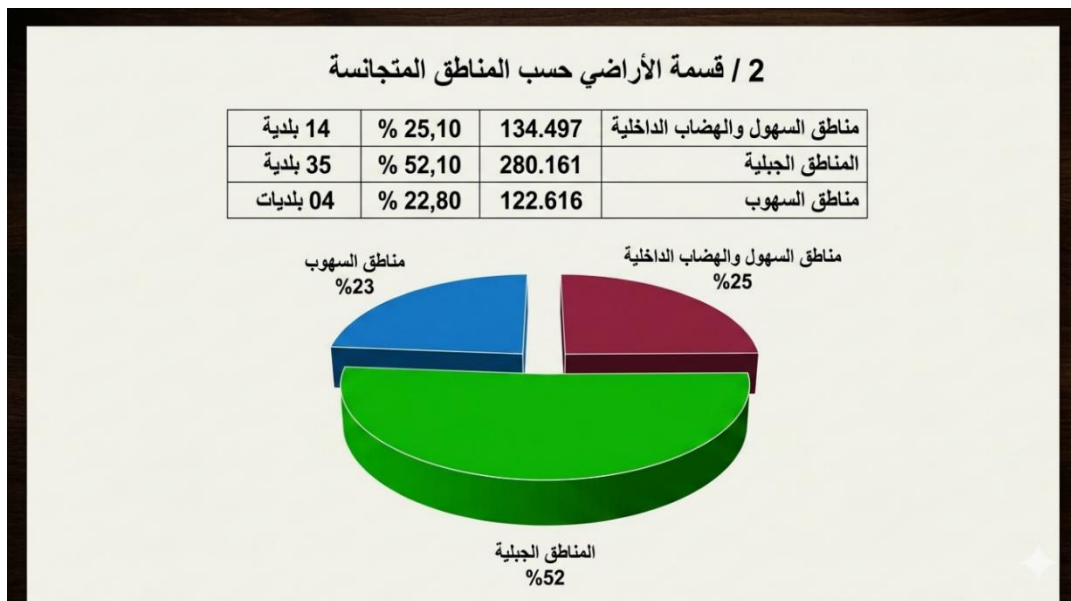
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Figure 6: Land Distribution by Area



Source: Developed by our team

Figure 7: Division of lands by homogeneous zones



Source: Developed by our team

2.2.2. Commercialization Strategy and Communication Plan

The successful introduction of a technological innovation like IRRIGLOW into the agricultural market relies on the development of a rigorous marketing strategy specifically tailored to the B2B (Business-to-Business) sector. Our action plan is structured around several complementary levers:

Direct field prospecting to build a bond of trust with our target audience, we prioritize human contact by organizing direct visits to farmers, cooperatives, and institutional stakeholders. The objective is to conduct concrete demonstrations of our intelligent system, prove the immediate return on investment (via the reduction of water and energy bills), and encourage professionals to sign preferential partnership agreements.

The digital ecosystem and social networks to increase our visibility, we are deploying a targeted dSigital strategy through the creation of professional accounts (Business Accounts) on major platforms: LinkedIn, Facebook, Instagram, and TikTok. LinkedIn is utilized to build high-level professional relationships (partners, investors), while Facebook (which is highly popular in Algeria) serves as our main educational showcase to broadcast our representative videos and popularize how our technology (IoT and AI) works.

Popularization and specialized influence to establish our credibility, our communication integrates strategic partnerships with qualified opinion leaders. In the AgTech sector, this translates into collaborations with influential agricultural engineers on social networks or content creators specializing in modern agriculture. These experts will be tasked with testing our solution, highlighting the reliability of our sensors, and explaining the benefits of our system to a targeted audience.

Customer support as a competitive advantage The SWOT analysis of our competitive environment reveals a major flaw in the current market: the lack of after-sales follow-up. IRRIGLOW transforms this market weakness into a strategic opportunity by placing customer support at the heart of its value proposition. Aware of the potential technological reluctance of farmers, we offer highly responsive technical support (available 24/7). User feedback, comments, and suggestions are continuously analyzed to optimize our application and adjust our services to their actual expectations.

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Loyalty building and event presence to consolidate our database and build long-term user loyalty, we are activating two additional channels:

- **B2B Email Marketing:** Periodic distribution of newsletters to our partners. These emails share agricultural market insights, agronomic advice, feedback from IRRIGLOW users, as well as updates regarding our system.
- **Professional events:** We participate in local and national agricultural exhibitions, as well as specialized seminars. These meeting spaces allow us to present our system live, offer exclusive promotional deals, and expand our brand awareness on a national scale.

2.3. Choice of Operational Means

Operational marketing constitutes the execution stage of the company's overall strategy, revolving around the fundamental concept of the "marketing mix." This systemic approach combines four inseparable levers of action: product, price, distribution, and communication policies. Its primary objective is to align the offering with the specific expectations of the clientele while achieving the organization's commercial goals. Indeed, it is through the synergy of a high value-added offer, carefully considered pricing, a relevant distribution network, and an impactful communication strategy that a company manages to forge a distinctive competitive advantage and ensure its long-term sustainability in a highly contested market (meera, 2012)

Figure 8: The marketing mix



Source: Ciliabule (2021), "The marketing mix, the marketer's toolbox", available on the website https://ciliabule.fr/wp-content/uploads/schema_4p-552x552.png, accessed on June 4, 2026.

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The operational strategy of the IRRIGLOW project revolves around the four core components of the marketing mix, which are detailed below:

2.3.1. Product

This component defines the technological offering placed on the market by the company. It encompasses not only the physical (hardware) characteristics of the product, but also its software functionalities, ergonomics, reliability, and its distinctive value proposition against the competition.

The IRRIGLOW offering stands out through the integration of cutting-edge tools based on the Internet of Things (IoT) and Artificial Intelligence (AI) applied to smart water management. Each component of our system is meticulously developed to meet the specific challenges of farmers, offering innovative precision irrigation functionalities tailored to their constraints. Our commitment to quality is reflected in a robust hardware design, built to withstand demanding environmental conditions, thereby ensuring durability and reliable performance in the field. To guarantee genuine optimization of water resources and accurate agronomic data, our sensors and algorithms are subjected to rigorous testing protocols, meeting the highest standards in the sector. Finally, the design of our digital platform aims to provide an intuitive and clear user interface, facilitating daily decision-making and enhancing the farmer's experience. By combining precision hardware engineering with an accessible software solution, we offer a comprehensive technological response to the needs of modern agriculture.

2.3.2. Price

The price dimension represents the financial investment required by farmers to integrate our smart irrigation solution. For IRRIGLOW, the pricing strategy is rigorously designed by taking into account various complex factors: the development costs of Internet of Things (IoT) equipment, the integration of artificial intelligence algorithms, the state of competition in the AgTech market, and above all, the perceived added value for the farmer in terms of yield optimization.

Our pricing model revolves around several key elements specifically tailored to the realities of the agricultural sector. Firstly, we ensure to offer competitive rates designed to guarantee a rapid and tangible return on investment (ROI), generated directly by the reduction in water and energy consumption. Secondly, we have implemented an advantageous discount policy aimed

Chapter III: Strategic Market Analysis

at our long-term partners as well as large agricultural cooperatives opting for large-scale hardware deployment. Finally, aware of the cash flow constraints often dictated by the seasonality of harvests, we offer optimal flexibility in payment terms. This translates into staggered payment facilities and modern, secure online transactional options for managing subscriptions to our data analysis platform.

2.3.3. Communication

This component encompasses all the means and marketing actions implemented to raise awareness of the technological solution, convince the target market of its relevance, and encourage its adoption. It includes sales promotion, direct marketing, public relations, and the sales force.

For IRRIGLOW, our strategic channels rely on a diversified communication approach specifically tailored to professionals in the agricultural sector (B2B). Sales promotion aims to encourage the rapid adoption of our smart system by offering attractive incentives, such as free trial periods for our monitoring application or discounts on the initial installation of IoT sensors. Direct marketing allows us to establish personalized contact with farmers and cooperative managers through targeted campaigns, notably by sending professional emails sharing case studies on water savings achieved. Public relations aim to build a strong brand image, focused on AgTech expertise and sustainable development, through our active presence at regional or national agricultural fairs, thereby consolidating our credibility. Finally, our sales force, composed of dynamic technical-sales advisors, plays an essential field role. It ensures direct promotion by conducting concrete demonstrations of the equipment right at the heart of the farms, thereby forging solid relationships of trust with farmers and generating long-lasting contracts.

2.3.4. Distribution

Distribution (or placement) refers to all the channels, processes, and partnerships established to deliver the company's product or service to the final customer. This encompasses the distribution channels used, logistics, the accessibility of the software solution, and any strategy aimed at making the offering available to the target audience.

We have carefully selected our distribution channels to effectively meet farmers' expectations and make our smart irrigation systems widely accessible. Adopting an

Chapter III: Strategic Market Analysis

omnichannel approach, we combine both physical distribution channels and an online infrastructure to offer a seamless acquisition journey and localized support. Thanks to our strategic partnerships with various professionals in the agricultural sector (cooperatives, irrigation equipment distributors), we are able to reach different market segments and connect with a broad audience of operators in the field. At the same time, the deployment of our online software solution and our presence on social networks guarantee immediate access to subscriptions, while facilitating direct interaction with our technical support. This combination of channels allows us to remain agile in the face of agrotechnological market developments and the specific needs of farmers, thereby strengthening our competitive position and our ability to provide continuous added value to our clientele.

2.3.5. Personnel (People)

This pillar encompasses all the human capital that structures and enhances IRRIGLOW's overall offering, requiring rigorous managerial and organizational oversight. At the core of this structure, the technical and founding team, comprised of skilled engineers and developers, guarantees the absolute reliability of the artificial intelligence algorithms and the robustness of the deployed IoT hardware. In parallel, the sales force is driven by technical sales advisors who act as true expert consultants, capable of demystifying high technology to establish a lasting, trust-based relationship with the operators. Finally, a highly responsive customer support team completes this ecosystem by offering daily assistance for navigating the interface and providing rapid, remote incident resolution.

2.3.6. Processus (Process)

The process encompasses the entire customer journey, from the initial sales contact to after-sales support, optimized to provide a seamless and frictionless user experience. The operational workflow begins with an audit phase and the rapid installation of IoT sensors, scheduled in a way that avoids disrupting the farm's daily activities. This is followed by an onboarding and training protocol to familiarize the farmer with the digital interface. In routine operation, the service is fully automated: in-field data collection, predictive AI analysis, and the transmission of alerts are executed in real-time, minimizing the daily management effort required by the operator.

2.3.7. Preuves Physiques (Physical Evidence)

Physical evidence encompasses all the tangible and visual elements that materialize IRRIGLOW's quality promise and reassure users as well as investors. This is reflected, on the one hand, by the physical appearance of the sensors installed in the plots, whose industrial

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design, finish, and waterproofing immediately testify to high-quality engineering. On the other hand, the visual ergonomics of the mobile application, the clarity of the graphics, and the precision of the textual recommendations provided by the AI provide concrete proof of the system's modernity. Finally, the consistency of the brand identity, including professional contractual documents and presentation materials, validates the company's serious and premium positioning.

Chapter IV: Production and Organization Plan

Chapter IV: Production and Organization Plan

1. The Production Process
2. Procurement
3. Workforce
4. Key Partners

Chapter IV: Production and Organization Plan

In this section of the document, we will elaborate on the production process, procurement, as well as the employees or workforce. Finally, we will identify the key partners of our project.

1. The Production Process

Unlike a traditional service company that does not offer a tangible product, the IRRIGLOW project relies on a hybrid model combining hardware engineering and software development. While it does not involve heavy industrial processing of raw materials, our production process is nonetheless very real and rigorously structured to meet the requirements of the agricultural sector.

This production process revolves around three main axes:

- **Technological Assembly (Hardware):** This involves the acquisition and meticulous integration of electronic components (IoT sensors, microcontrollers, communication modules) to manufacture our smart irrigation units, specifically designed to withstand the constraints of the agricultural environment.
- **Software Development (Software):** This intangible phase concerns continuous programming, the integration of Artificial Intelligence algorithms, and the configuration of the interactive monitoring platform intended for farmers.
- **Quality Control and Configuration:** Before any field deployment, each complete system (physical equipment coupled with its software connection) undergoes a battery of rigorous internal tests to ensure its reliability, energy autonomy, and the accuracy of the collected data.

Thus, production at IRRIGLOW goes beyond the simple provision of services: it consists of designing, assembling, and configuring a complete, ready-to-use technological solution.

1.1. Partnership and Acquisition Strategy

Our operational approach relies on two acquisition scenarios to develop our network of professional partners (agricultural equipment distributors, cooperatives, agronomic experts, and technical installers):

Chapter IV: Production and Organization Plan

- **The Proactive Approach (Outbound):** Our team identifies and directly approaches key players in the agricultural sector. We present the IRRIGLOW ecosystem to them, highlighting the added value of our IoT and AI-based technology, as well as our sustainability goals. Once the partner is convinced, we formalize the collaboration by signing a partnership contract. This agreement allows them to be listed as an approved installer or distributor, thereby increasing their visibility and commercial opportunities among our farmer clients.
- **The Inbound Approach:** In this second scenario, professionals discover IRRIGLOW independently, attracted by our communication campaigns or recommendations from the agricultural community. They download our application or access our online portal to create a professional account. Upon submitting their profile, an affiliation request instantly appears on our administrator dashboard. The IRRIGLOW team then conducts a rigorous verification of the technical and legal information provided before contacting the professional to finalize the official signing of the contract.

In both cases, this onboarding and contracting process requires strict administrative follow-up, generating operational costs related to document management (printing agreements, confidentiality clauses, office supplies, and technical data sheets).

1.2. Customer Side (Acquisition and Integration)

Our main objective is to support an increasing number of farmers in optimizing their water resources, thereby strengthening our leadership position in the AgTech market. Farmers and cooperative managers can discover our IRRIGLOW solution through various channels: targeted digital campaigns on social networks, demonstrations at agricultural fairs, technical brochures, or through recommendations from other professionals in the sector.

Farmers wishing to modernize their irrigation infrastructure and take advantage of our smart services can easily download the IRRIGLOW application (available on Google Play Store and the App Store) or connect to our web platform. The onboarding process is intuitive: users create an account by entering their professional details as well as the specific characteristics of their farm (crop types, total area, soil type, and existing equipment). Once the general terms of use are accepted and the data is validated, the profile is activated. From then on, these professionals officially join our clientele and can manage their irrigation system remotely, while benefiting from our real-time agronomic recommendations, anytime and anywhere.

Chapter IV: Production and Organization Plan

2. Procurement

Unlike an exclusively service-based company, IRRIGLOW's business model requires a hybrid procurement strategy, covering both hardware equipment and digital resources (software).

For the first three (03) years of activity, focused on the launch, assembly of the first units, and deployment of the platform, our procurement mainly consists of:

- **Electronic components:** Moisture sensors, microcontrollers, and data transmission modules (IoT).
- **Hardware equipment:** Weather-resistant protective enclosures, wiring, and power systems (batteries, small solar panels).
- **Digital infrastructure:** Cloud hosting fees (servers) for agronomic data management and software licenses.
- **Administrative supplies:** Standard stationery (paper, pens) and official company stamps for contracting.

Starting from the fourth (04) year, accompanying the scaling of the project and the expansion of our field network, new operating expenses will be added to the initial procurement:

- **Bulk component purchases** for the industrialization of assembly.
- **Logistics and fuel costs** for travel related to installation and maintenance on farms.
- **Tools and maintenance equipment** for technical teams.
- **Workshop operating expenses:** Electricity, water, and maintenance associated with a larger assembly and storage space.

This increase in expenses is justified by the strategic investment planned during this year to scale up our production and expand our coverage of the agricultural market.

3. Workforce

The IRRIGLOW project begins its activity with a core founding team of four (04) key collaborators: an Executive Director, a Technology Engineer (IoT/IT), a Marketing Manager, and an Administrative Assistant.

The distribution of core missions is structured as follows:

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3.1. The Executive Director

- Strategic leadership and overall management of the startup's development.
- Supervision of accounting and the financial health of the project.
- Human resources management, including the recruitment of future talent.
- Final validation of partnership requests (cooperatives, distributors).
- Representing the company for the acquisition of major client accounts.
- Handling official communications and public relations.

3.2. The Technology Engineer (IoT & Software)

- Technical maintenance and supervision of the IRRIGLOW digital platform.
- Management and security of cloud databases (agronomic data).
- Deployment of updates and resolution of hardware (sensors) or software bugs.
- Technical support for digital communication tools (automated newsletters).

3.3. The Marketing and Sales Manager

- Active prospecting for the acquisition of new client farms.
- Continuous market research to identify new expansion opportunities.
- Brand management and moderation of the company's social media channels.
- Initial processing of platform subscription requests.
- Customer relationship management via digital channels (emails, messaging).

3.4. The Administrative Assistant

- Preparation of legal and administrative documentation (sales contracts, partnership agreements).
- First-level customer support and redirection of specific requests.
- Team schedule planning (daily and monthly schedules).
- Logistical organization of internal and external meetings.
- Operational coordination with suppliers and logistics partners.

Starting in the fourth year, to support our major investment phase and the scaling of our operations, the workforce will increase from four (04) to ten (10) people. These recruitments will aim to build field intervention teams:

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- **IoT Installation Technicians (02 people):** In charge of traveling to farms to install and calibrate the smart irrigation equipment.
- **Agronomic Advisors (02 people):** Dedicated to supporting farmers in interpreting the collected data and optimizing yields.
- **Maintenance Operators (02 people):** Mobilized for rapid technical interventions, repair, and preventive maintenance of sensors in the agricultural environment.

To guarantee the quality of these on-site interventions, IRRIGLOW imposes a strict compliance protocol. Following each installation or maintenance operation, the farmer must sign a technical acceptance certificate. This document certifies that the system has been successfully tested, that existing agricultural infrastructure suffered no damage during the intervention, and that the user received the necessary training to operate their equipment.

4. Key Partners

The IRRIGLOW project operates at the intersection of agriculture and new technologies (AgTech). Our smart irrigation solution requires a solid ecosystem, connecting our digital platform to the physical infrastructure of farms. To ensure the proper functioning of our IoT units and the accuracy of our recommendations, our activity relies on five (05) fundamental pillars:

- Supply of electronic components and IoT sensors.
- Connectivity and data transmission (M2M/IoT networks).
- Agronomic expertise and soil analysis.
- Technical installation and agricultural plumbing.
- Strategic and institutional support.

These services and resources are provided by specialized players, each in their field of expertise. Thus, our main partners are:

- **Technological hardware suppliers:** for the procurement of microcontrollers, moisture sensors, and smart valves.
- **Telecommunications operators:** to ensure the network coverage necessary for transmitting data from the fields to our servers.
- **Agronomic laboratories and experts:** to refine our AI algorithms according to the specificities of local crops.

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- **Installation technicians:** for the secure deployment of hardware on farms.
- **Incubators and accelerators (such as Axcela Hub and Afaq incubator):** for logistical support, startup hosting, and R&D.

For the launch phase of our solution, the initial network we aim to integrate comprises a minimum of fifteen (15) strategic partners from different fields, distributed as follows: three (03) technological component suppliers, two (02) telecom operators, four (04) agricultural experts or cooperatives, five (05) independent installation technicians, and one (01) institutional partner/incubator.

Chapter V : Financial Plan

Chapter V: Financial Plan

1. Costs and Expenses
2. Revenue (or Turnover)
3. Projected Income Statement
4. Projected Balance Sheet

Chapter V: Financial Plan

This chapter is dedicated to the financial study of the IRRIGLOW project. In what follows, we will detail our financial analysis by explaining the expenses inherent to the development of our solution, the projected revenue, the expected income statements, as well as the projected balance sheet, all based on an optimistic development scenario.

1. Costs and Expenses: Fixed Costs

For the **IRRIGLOW** project, the management of fixed costs is essential to ensure the financial stability of our AgTech startup. These expenses, which are independent of the volume of irrigation units produced, ensure the daily operation of our administrative and technical structure.

Fixed costs at IRRIGLOW represent stable and incompressible expenses incurred to maintain our business. Unlike variable costs that fluctuate according to our production, these expenses are planned annually to cover our core operational needs.

These charges mainly consist of:

- **Infrastructure and Telecom Services:** Telephone costs, internet subscriptions, and software services essential for managing our platform.
- **Maintenance and R&D:** Costs related to maintaining our equipment and constantly updating our AI system, ensuring the reliability of our solution.
- **Administrative and Legal Fees:** Accounting fees, legal fees, insurance, and various office supplies.
- **Communication:** Budget allocated to advertising to increase the visibility of the IRRIGLOW brand in the market.
- **Logistics and Occupancy:** Rent and rental charges, as well as travel and accommodation expenses necessary for field deployment.

The exhaustive breakdown and projected evolution of these costs from year N+1 to year N+4 are presented:

Figure 9: Fixed project costs according to the optimistic scenario for the first five years of activity

3) Charges fixes :	N	N+1	N+2	N+3	N+4
Assurances					
Téléphone	24000	26000	28000	30000	32000
Internet	36000	38000	40000	42000	44000
Autres abonnements(logiciel)	22000	26000	28000	30000	32000
Frais de déplacement et hébergement	15000	20000	25000	30000	35000
Eau, électricité, gaz	32000	36000	38000	40000	42000
Fournitures diverses	15000	20000	25000	30000	35000
Budget publicité et communication	40000	45000	50000	55000	60000
Loyer et charges locatives	240000	240000	240000	0	0
Expert comptable, avocats	20000	25000	30000	35000	40000
Taxes, impôts locaux	0	0	0	0	0
Autres charges	0	0	0	0	0
Maintenance	25000	25000	35000	40000	45000
Mise à jours de système	8000	12000	16000	20000	24000
TOTAL	477000	513000	555000	352000	389000

Source: Data processed by Excel software

2. Revenue (Turnover)

Revenue (turnover) reflects the total sum of income derived from the sale of goods or the provision of services by an entity over a defined financial year (bouscayrol, 2010). For IRRIGLOW, this metric represents the economic performance of our AgTech solution, generated by four complementary revenue pillars:

- **Total Subscriptions:** Recurring access fees to the IoT platform and remote management services.
- **Total Sales:** Direct sales of hardware (sensor kits and control units).
- **Total Training:** Support services and skills development for agricultural operators.
- **Total Ads:** Revenue from advertising spaces and strategic partnerships integrated into the interface.

2.1. Optimistic Revenue

2.1.1. Subscriptions for Farmers and Cooperatives

Figure 10: Revenue from platform subscriptions according to the optimistic scenario

<u>Abonnement</u>				
	Nombre d'abonnement	Mt d'abonnement par r	total des ab	Total par an
1	50	1 000,00 DZD	50 000,00 DZD	600 000,00 DZD
2	150	1 000,00 DZD	150 000,00 DZD	1 800 000,00 DZD
3	400	1 000,00 DZD	400 000,00 DZD	4 800 000,00 DZD
4	900	1 000,00 DZD	900 000,00 DZD	10 800 000,00 DZD
5	1200	1 000,00 DZD	1 200 000,00 DZD	14 400 000,00 DZD

Source: Data processed by Excel software

2.1.2. Sale of Irrigation Control Units (Hardware)

Figure 11: Revenue from the sale of control units according to the optimistic scenario

<u>Ventes</u>				
Année	Unité vendue	prix unitaire	Total	
1	50	25 000,00 DZD	1 250 000,00 DZD	
2	150	25 000,00 DZD	3 750 000,00 DZD	
3	400	25 000,00 DZD	10 000 000,00 DZD	
4	900	25 000,00 DZD	22 500 000,00 DZD	
5	1200	25 000,00 DZD	30 000 000,00 DZD	

Source: Data processed by Excel software

2.1.3. Revenue from Training (Technical and Agronomic Support)

Figure 12: Revenue generated by training sessions according to the optimistic scenario

<u>Formations</u>				
Année	Nombre de formations	nbr de participants	Mt de formés	total
1	20	20	25 000,00 DZD	10 000 000,00 DZD
2	30	40	25 000,00 DZD	30 000 000,00 DZD
3	40	70	25 000,00 DZD	70 000 000,00 DZD
4	60	100	25 000,00 DZD	150 000 000,00 DZD
5	100	130	25 000,00 DZD	325 000 000,00 DZD
<i>Adds</i>				

Source: Data processed by Excel software

2.1.4. Revenue from Advertising Spaces (Partnerships)

Figure 13: Revenue generated by advertisements according to the optimistic scenario

<u>Adds</u>			
Année	nombre d'adds	montant d'adds	total
1	10	5 000,00 DZD	50 000,00 DZD
2	15	5 000,00 DZD	75 000,00 DZD
3	25	5 000,00 DZD	125 000,00 DZD
4	50	5 000,00 DZD	250 000,00 DZD
5	80	5 000,00 DZD	400 000,00 DZD

Source: Data processed by Excel software

3. Projected Income Statements

The income statement is a fundamental financial document that outlines the economic performance of a business over a specific accounting period, typically a fiscal year. It comprehensively summarizes all the expenses incurred and revenues generated by the company's activities during that timeframe ([koskas, 2013](#)).

In accordance with the standards of the Algerian Financial Accounting System (SCF), the structure of this statement is built around two main accounting categories: operational expenses and costs, which are grouped under class six (06) accounts, and revenues or receipts, which fall under class seven (07) accounts. The figures presented in the remainder of this section illustrate the projected income statements for the IRRIGLOW project over its first five years of operation, developed exclusively on the basis of our optimistic development scenario.

Chapter V: Financial Plan

Figure 14: Income Statement according to the optimistic scenario

3	ELEMENTS	N	N+1	N+2	N+3	N+4
4	Vente et produits annexes	11900000	35625000	84925000	183550000	369800000
5	Variation des stocks de produits finis et en-cours	0	0	0	0	0
5	Production immobilisée	0	0	0	0	0
7	Subvention d'exploitation	0	0	0	0	0
3	Production de l'exercice	11900000	35625000	84925000	183550000	369800000
9	Achats consommés	750000	900000	1500000	3000000	4000000
0	Services extérieurs et autres consommations	477500	513500	555500	352500	389500
1	Consommation de l'exercice	1227500	1413500	2055500	3352500	4389500
2	Valeur Ajoutée d'Exploitation	10672500	34211500	82869500	180197500	365410500
3	Charges de personnel	2160000	2160000	2160000	3600000	3600000
4	Impôts et taxes et versement assimilés					
5	Excédent Brut d'Exploitation	8512500	32051500	80709500	176597500	361810500
6	Autres produits opérationnels	0	0	0	0	0
7	Autres charges opérationnelles	0	0	0	0	0
8	Dotations aux amortissements et provisions	277500	277500	277500	277500	277500

Chapter V: Financial Plan

<i>Reprise sur pertes de valeurs et provisions</i>	0	0	0	0	0
Résultat opérationnel	8235000	31774000	80432000	176320000	361533000
<i>Produits financiers</i>	0	0	0	0	0
<i>Charges financières</i>	0	0	0	0	0
Résultat financier	0	0	0	0	0
Résultat Ordinaire Avant Impôt (ROAI)	8235000	31774000	80432000	176320000	361533000
<i>Impôts exigibles sur l'activité ordinaire</i>	0	0	0	0	93998580
<i>Impôts différés sur l'activité ordinaire</i>	0	0	0	0	0
TOTAL DES PRODUITS DES ACTIVITES ORDINAIRES	11900000	35625000	84925000	183550000	369800000
TOTAL DES CHARGES DES ACTIVITES ORDINAIRES	3665000	3851000	4493000	7230000	102265580
RESULTAT NET DE L'ACTIVITE ORDINAIRE	8235000	31774000	80432000	176320000	267534420
<i>Eléments extraordinaires (produits)</i>	0	0	0	0	0
<i>Eléments extraordinaires (charges)</i>	0	0	0	0	0
Résultat extraordinaire	0	0	0	0	0
RESULTAT NET DE L'EXERCICE	8235000	31774000	80432000	176320000	267534420

Source: Data processed by Excel software

4. Projected Balance Sheet

The projected balance sheet is an essential financial statement that provides a snapshot of the company's financial position at a specific point in time, typically at the end of the fiscal year. This document is divided into two main sections: assets, which represent all the tangible and intangible resources controlled by the entity, and liabilities (including equity), which detail the sources of funding, namely shareholders' equity and debts. Its preparation allows the IRRIGLOW management team, as well as potential partners and investors, to analyze the startup's financial structure and understand how funds are mobilized to support our AgTech

Chapter V: Financial Plan

solution (koskas, 2013). For the purposes of this study, this financial projection spans the first five (05) years of operation.

The following figures illustrate the projected balance sheet for the IRRIGLOW project, detailing the asset and liability components, developed exclusively according to our optimistic development scenario.

Figure 15: Projected balance sheet (assets) under the optimistic

ELEMENTS	N	N+1	N+2	N+3	N+4
ACTIE COURANT					
<i>Immobilisation incorporelles</i>	1505000	450000	450000	450000	450000
<i>Immobilisation corporelles</i>	700000	700000	700000	700000	700000
<i>Terrain</i>					
<i>Bâtiment</i>					
<i>Autres immobilisation corporelles</i>				3000000	3000000
<i>Immobilisation en concession</i>					
<i>Immobilisation en cours</i>					
<i>Immobilisation financière</i>				15000000	30000000
<i>Prêt et autre titre financiers non courants</i>					
ACTIE NON COURANT	2205000	1150000	1150000	19150000	34150000
<i>Stock et encours</i>	750000	825000	907500	998250	1098075
<i>Créance et emplois assimilés</i>					
<i>Clients</i>	600000	1500000	4000000	9000000	12000000
<i>Autres débiteurs</i>					
<i>Impôt et assimilés</i>					
<i>Autres créance et emplois assimilés</i>					
<i>Disponibilités et assimilés</i>					
<i>Placements et autres actifs financières courants</i>				46289025	64656985
<i>Trésorerie</i>	7155000	31336500	78724500	108007725	258627940
ACTIE COURANT	8505000	33661500	83632000	164295000	336383000
TOTAL ACTIE	10710000	34811500	84782000	183445000	370533000

Source: Data processed by Excel software

Chapter V: Financial Plan

Figure 16: Projected balance sheet, assets, according to the optimistic scenario

CAPITAUX PROPRES					
<i>Capital émis</i>	400000	400000	400000	1500000	1500000
<i>Fond d'investissement</i>	200000	200000	200000	0	0
<i>Comptes courants d'associés</i>	1250000	1250000	1250000	0	0
<i>Résultat</i>	8235000	31774000	80432000	176320000	267534420
<i>Autre capitaux propres</i>					
<i>Part de la société consolidant</i>					
CAPITAUX PROPRES	10085000	33624000	82282000	177820000	269034420
PASSIF NON COURANTS					
<i>Emprunt et dettes financières</i>	250000	250000	0	0	0
<i>Impôt différé passif</i>					
<i>Autres dettes non courants</i>					
<i>Provision et produits constatés d'avance</i>					
PASSIF NON COURANT	250000	250000	0	0	0
PASSIFS COURANT					
<i>Fournisseurs et comptes rattachés</i>	375000	937500	2500000	5625000	7500000
<i>Impôts</i>					93998580
<i>Autre dettes</i>					
<i>Trésorerie passif</i>					
PASSIF COURANT	375000	937500	2500000	5625000	101498580
TOTAL PASSIF	10710000	34811500	84782000	183445000	370533000

Source: Data processed by Excel software

Chapter IV :

Experimental Prototype

Chapter IV: Experimental Prototype

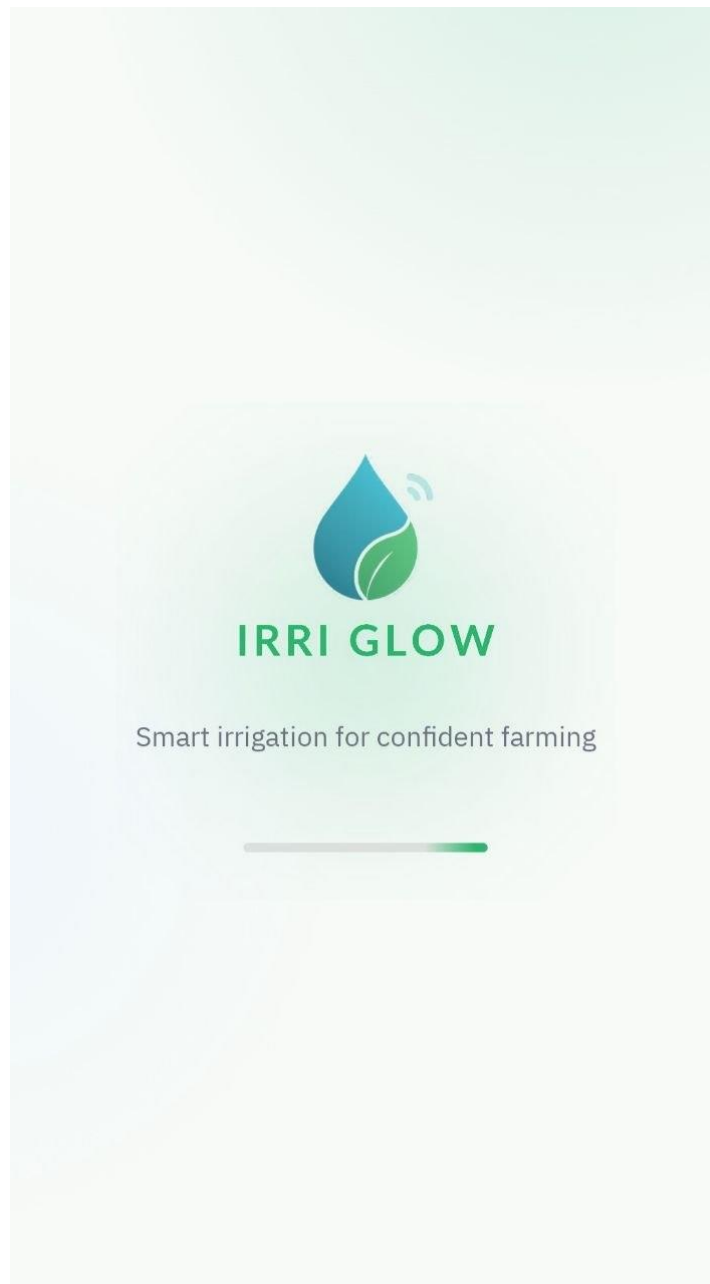
1. Application Access Page (or Login Page)
2. Application Home Page

Chapter IV: Experimental Prototype

In the first chapter, we introduced IRRIGLOW, which is a mobile application compatible with Android and iOS systems. In this chapter, we will focus primarily on the experimental prototype of the project. The following figures illustrate the functionalities of this application.

1. Application Access Page

Figure 17: Application access page



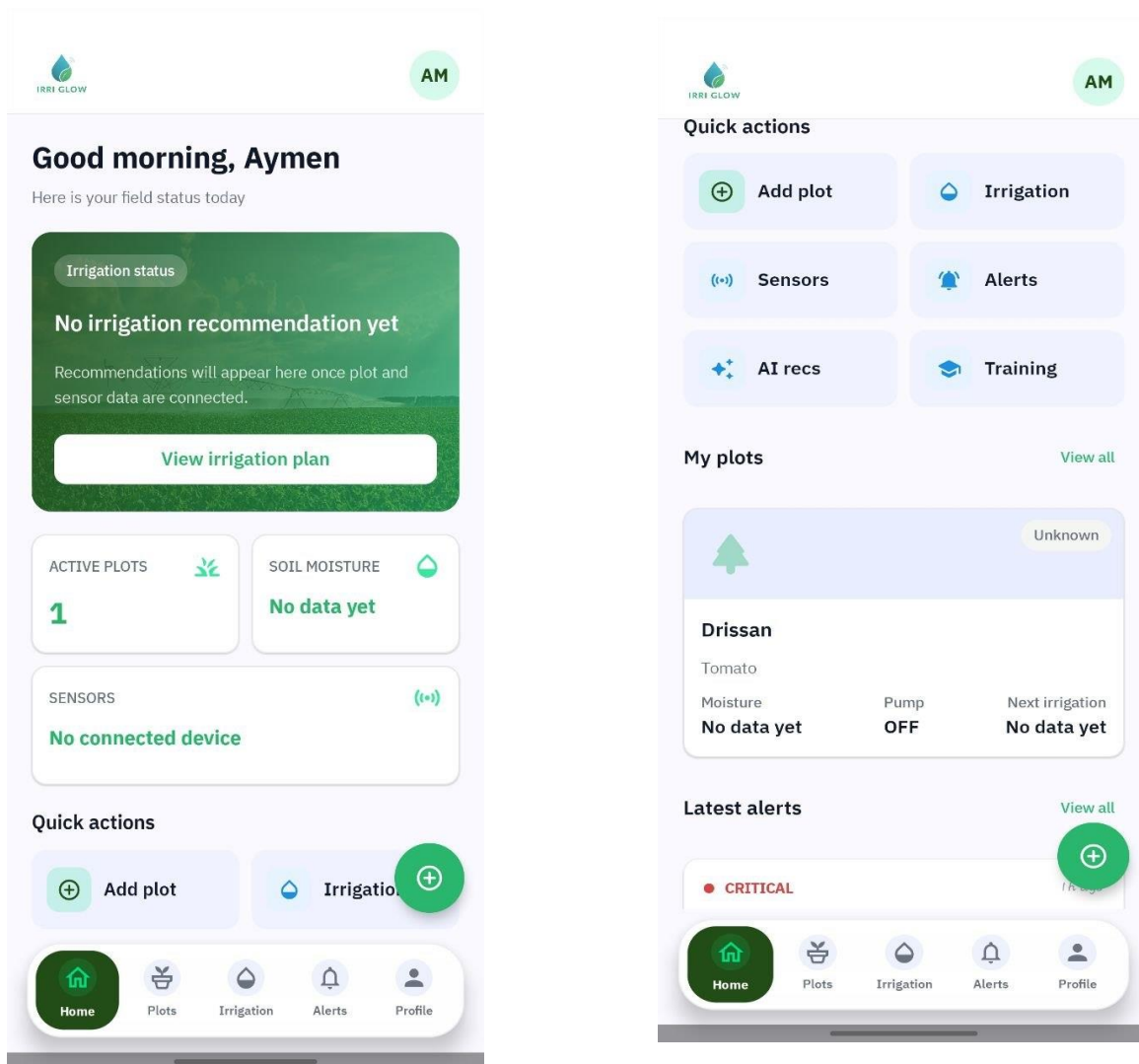
Source: Developed by our team

Interpretation:

Upon opening the application, this loading page appears. It features a clean, light background highlighting the IRRIGLOW logo (combining a water drop and a green leaf) as well as our slogan "Smart irrigation for confident farming." A loading progress bar is also visible. This minimalist design visually specifies our field of activity, focused on agriculture and smart irrigation.

2. Application home page

Figure 18: IRRIGLOW application home page



Source: Developed by our team

Interpretation:

This page represents the main dashboard of the Irriglow application. It provides the user with an instant overview of the current state of their field. From this central interface, they can consult irrigation recommendations, track the number of active plots, check soil moisture data, and monitor the connection status of their sensors. Quick action shortcuts (such as adding a new plot) and a bottom navigation menu facilitate easy access to the application's other features.

Figure 19: New Plot Setup Interface (Step 1 of 4)

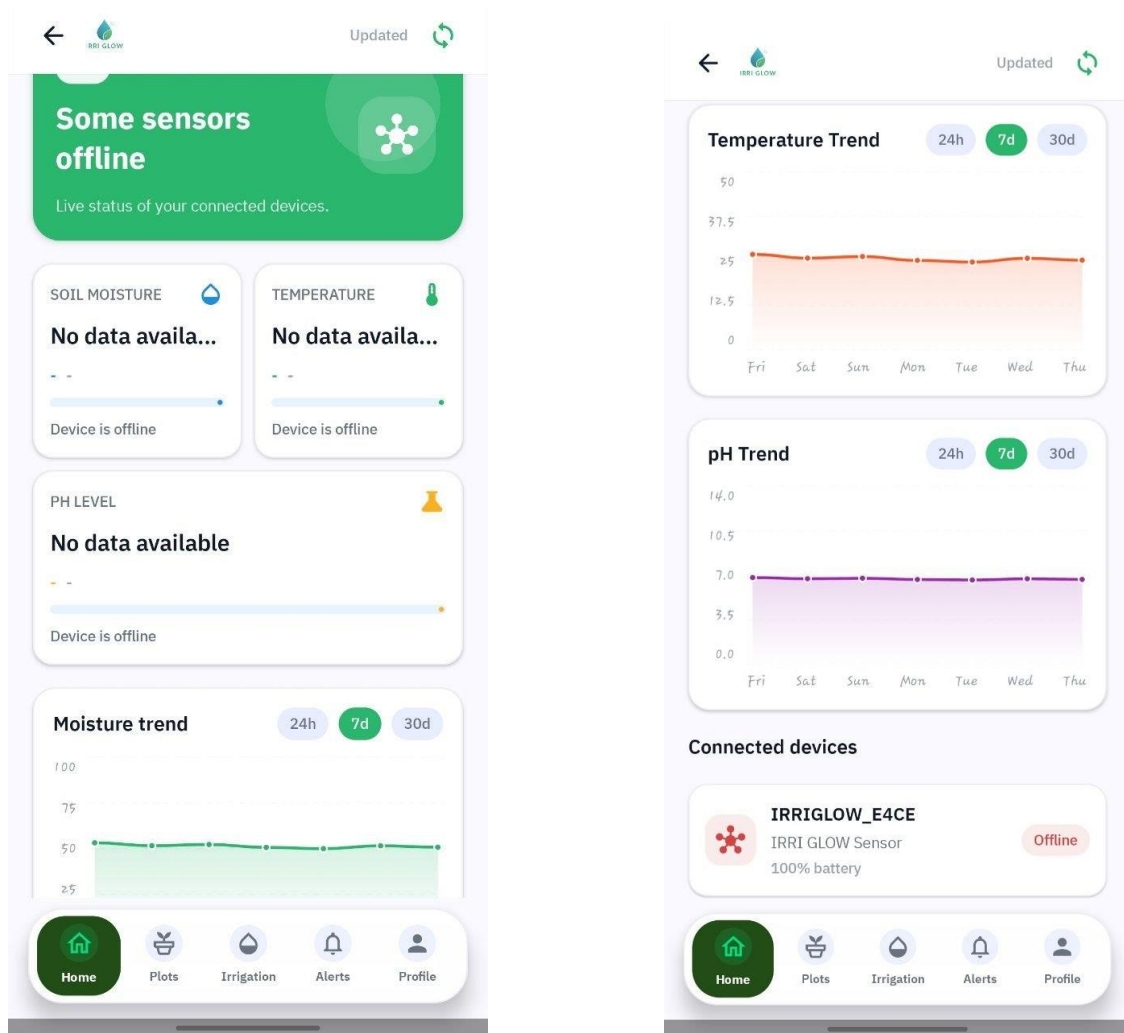
The image displays two mobile application screens. The left screen, titled 'New Plot Setup' (Step 1 of 4), is a form for creating a new plot. It includes fields for 'Plot name', 'Crop type' (with a dropdown menu showing 'Tomato, wheat, pepper...'), 'Plot size', 'Size unit' (with a dropdown menu showing 'm²'), and 'Sowing date' (with a date picker). Each of these fields has a red border and a red error message 'This field is required.' below it. At the bottom, there is a 'Continue >' button. The right screen, titled 'My plots', shows a dashboard for existing plots. It features a 'Track crop status, moisture, and irrigation timing' header with a green '+' button. Below this are two summary cards: 'ACTIVE PLOTS' with the value '1' and 'NEEDS IRRIGATION' with the value '0'. A search bar labeled 'Search plots' is present. Below the search bar are four filter buttons: 'All' (green), 'Healthy' (grey), 'Warning' (grey), and 'Critical' (grey). A plot card for 'Drissan (Tomato)' is shown, indicating 'No status yet', 'MOISTURE LEVEL No data yet', and 'ACTION REQUIRED No data yet'. At the bottom is a navigation bar with icons for Home, Plots (active), Irrigation, Alerts, and Profile.

Source: Developed by our team

Interpretation:

This image displays the first screen of a multi-step guided process used to register a new agricultural field within the application. The purpose of this specific step, titled "Plot basics," is to collect fundamental identification and agronomic data about the plot through a structured form. This form requires the user to input specific details, including a "Plot name" to assign a custom and recognizable name to the field, a "Crop type" via a dropdown menu, and the "Plot size" along with its corresponding "Size unit." The form also includes a field for the "Sowing date," accompanied by a clarification that the application will use this data later to estimate the crop's growth stage. The image currently shows the interface in a validation state, where the essential input fields are highlighted with a red outline and a warning message stating "This field is required". Consequently, the system prevents the user from proceeding to the next step via the "Continue" button until all of these mandatory details have been successfully entered.

Figure 20:Sensor Status Dashboard

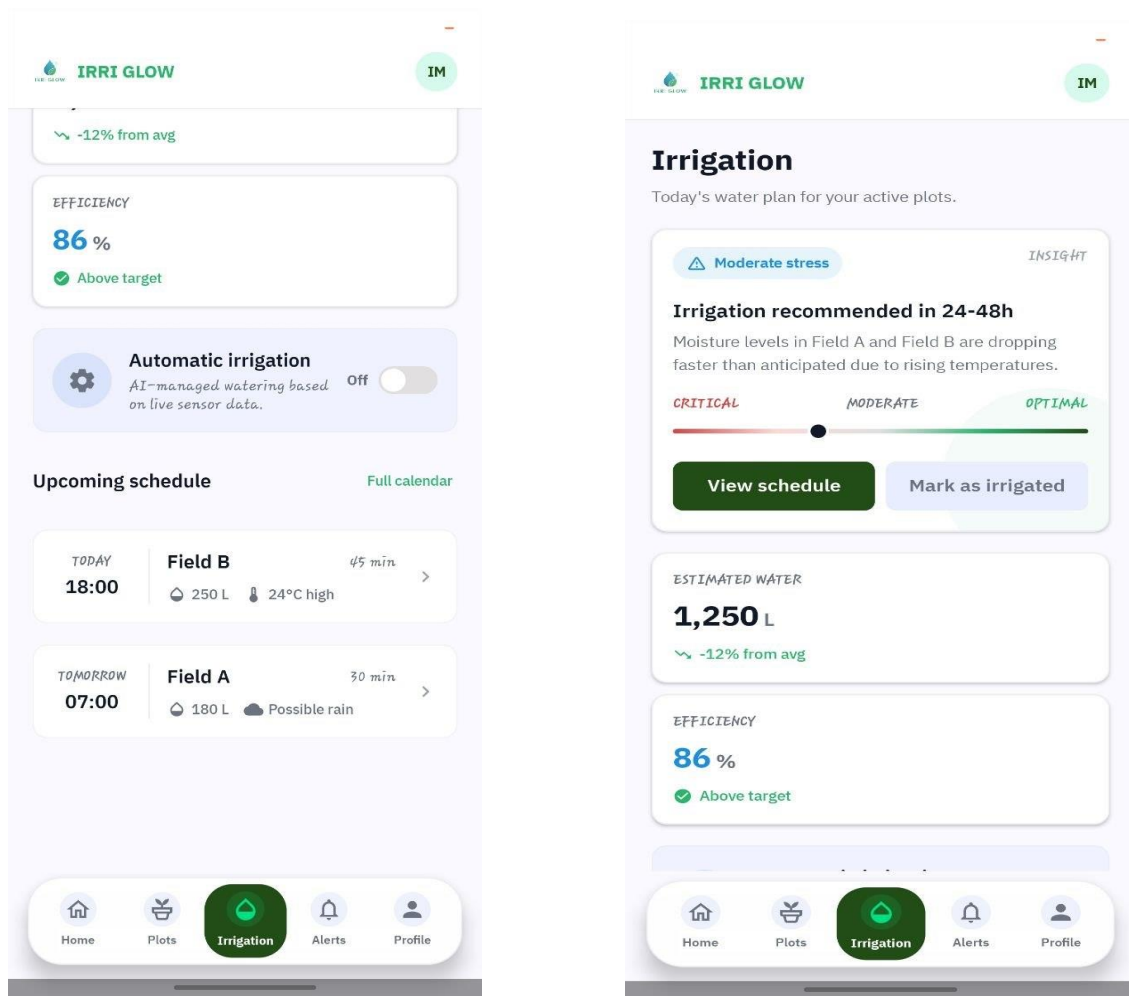


Source: Developed by our team

Interpretation:

The interface features a historical trend monitoring capability through interactive charts for "Temperature Trend," "pH Trend," and "Moisture trend," which allow the user to analyze data precisely across flexible timeframes including 24 hours, 7 days, or 30 days. In parallel, the "Connected devices" section enables comprehensive management of sensors linked to the application, such as the "IRRIGLOW_E4CE" sensor, while displaying vital technical details including battery status. Furthermore, the interface provides a summary of the general status through cards that display current readings for essential agricultural indicators-soil moisture, temperature, and pH level-enabling the user to perform real-time, direct monitoring of the farm's condition.

Figure 21: Irrigation Management Dashboard

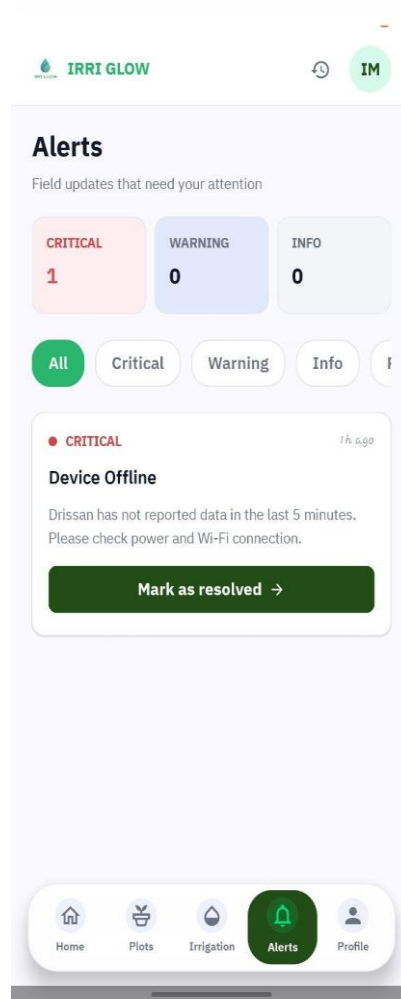


Source: Developed by our team

Interpretation:

The pictures show the "Irrigation" section of the Irriglow application, providing a comprehensive overview of water planning and system performance. The interface offers actionable insights, such as recommending irrigation within 24-48 hours due to moderate soil stress and rising temperatures in Field A and Field B. Users can view their upcoming irrigation schedule, which details specific watering times, volumes, and environmental conditions like high temperatures or potential rain. Furthermore, the dashboard monitors system performance metrics, including estimated water usage (currently at 1,250 L, which is 12% below average) and an irrigation efficiency rating of 86%, which is marked as being above the target. Finally, the app allows for the manual control of "Automatic irrigation," an AI-managed feature that uses live sensor data to regulate watering.

Figure 22: System Alerts Dashboard



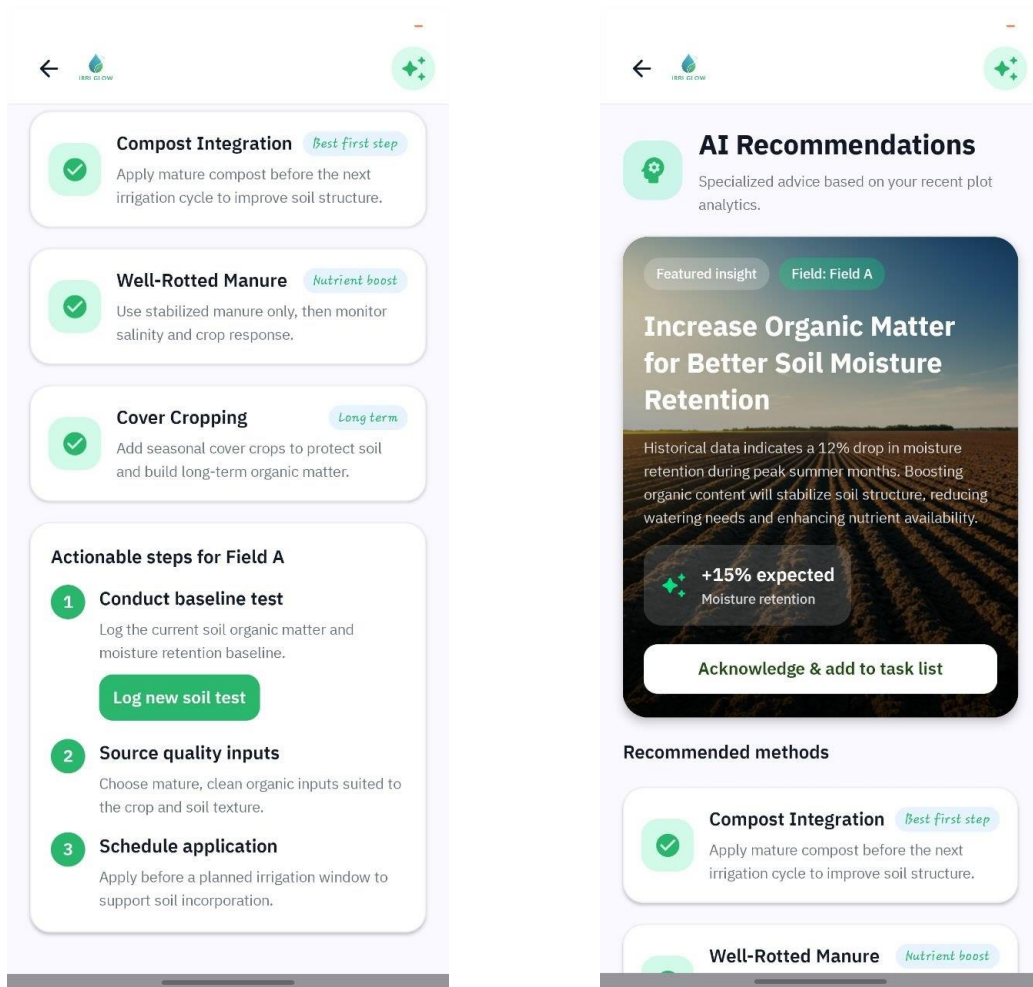
Source: Developed by our team

Interpretation:

The alert interface in the Irriglow application, serves as a central tool designed to provide immediate field updates that require intervention or monitoring. This organized and dynamic interface offers a top-level statistical summary that categorizes alerts by severity-critical, warning, or info-granting the user a comprehensive overview of system status.

When urgent updates arise, the active alert details are clearly displayed, specifying the nature of the issue and recommended actions. To ensure operational smoothness, a "Mark as resolved" option allows the user to update the system status once a technical or environmental issue is addressed, reflecting the application's adaptability to the changing operational conditions of field devices.

Figure 23: AI-Powered Agricultural Recommendations

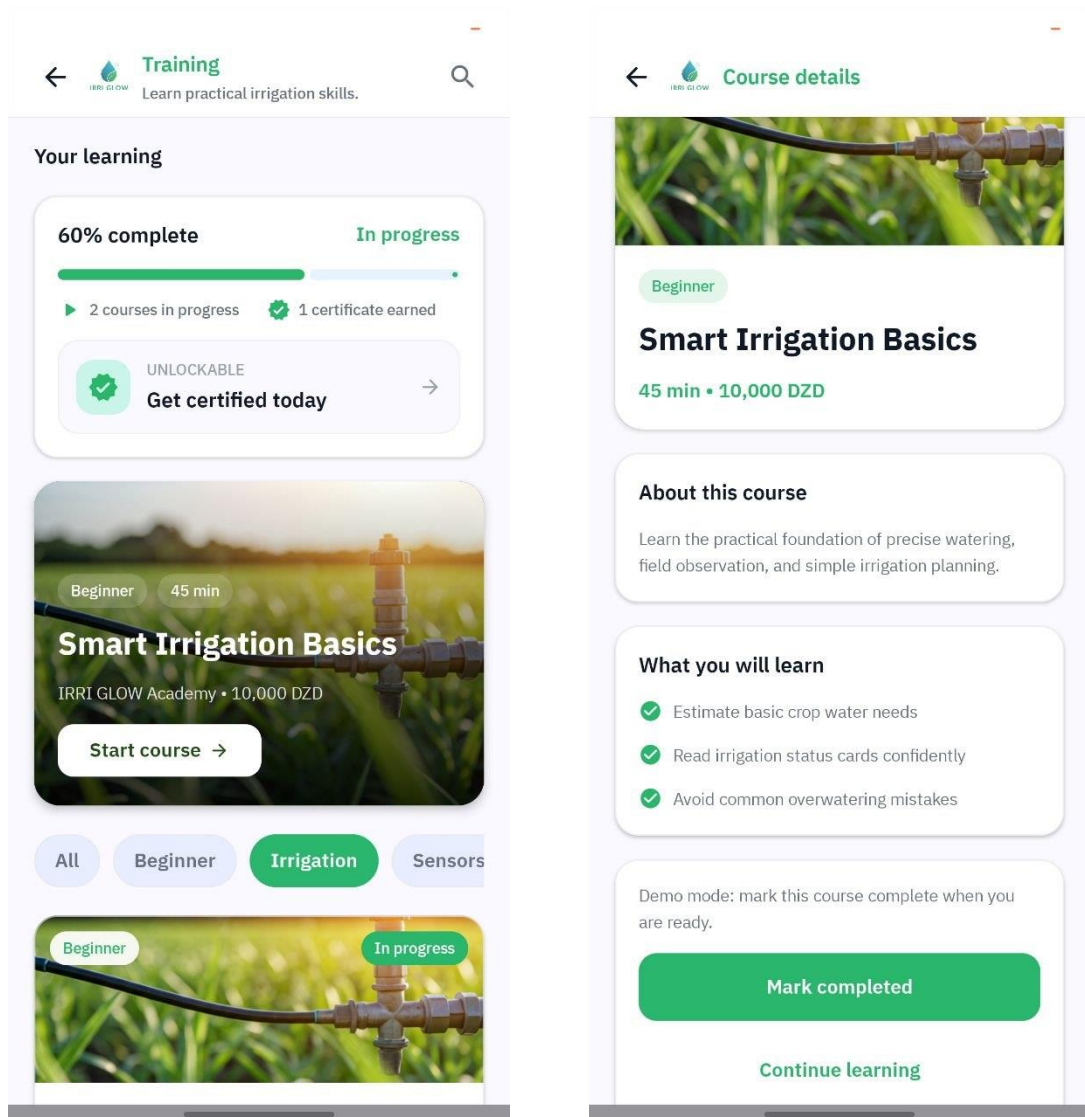


Source: Developed by our team

Interpretation

The AI recommendations feature in the Irriglow application, serves as a specialized advisory tool that leverages recent plot analytics to provide actionable agricultural insights. By analyzing historical data, the application identifies specific needs for fields, such as increasing organic matter in "Field A" to enhance moisture retention and soil structure. To support these improvements, the system suggests proven methods like compost integration, the use of well-rotted manure, and cover cropping, while providing a structured, step-by-step roadmap for implementation-including conducting baseline tests, sourcing high-quality inputs, and scheduling applications-to ensure optimal soil health and operational efficiency.

Figure 24: Irriglow Training Academy

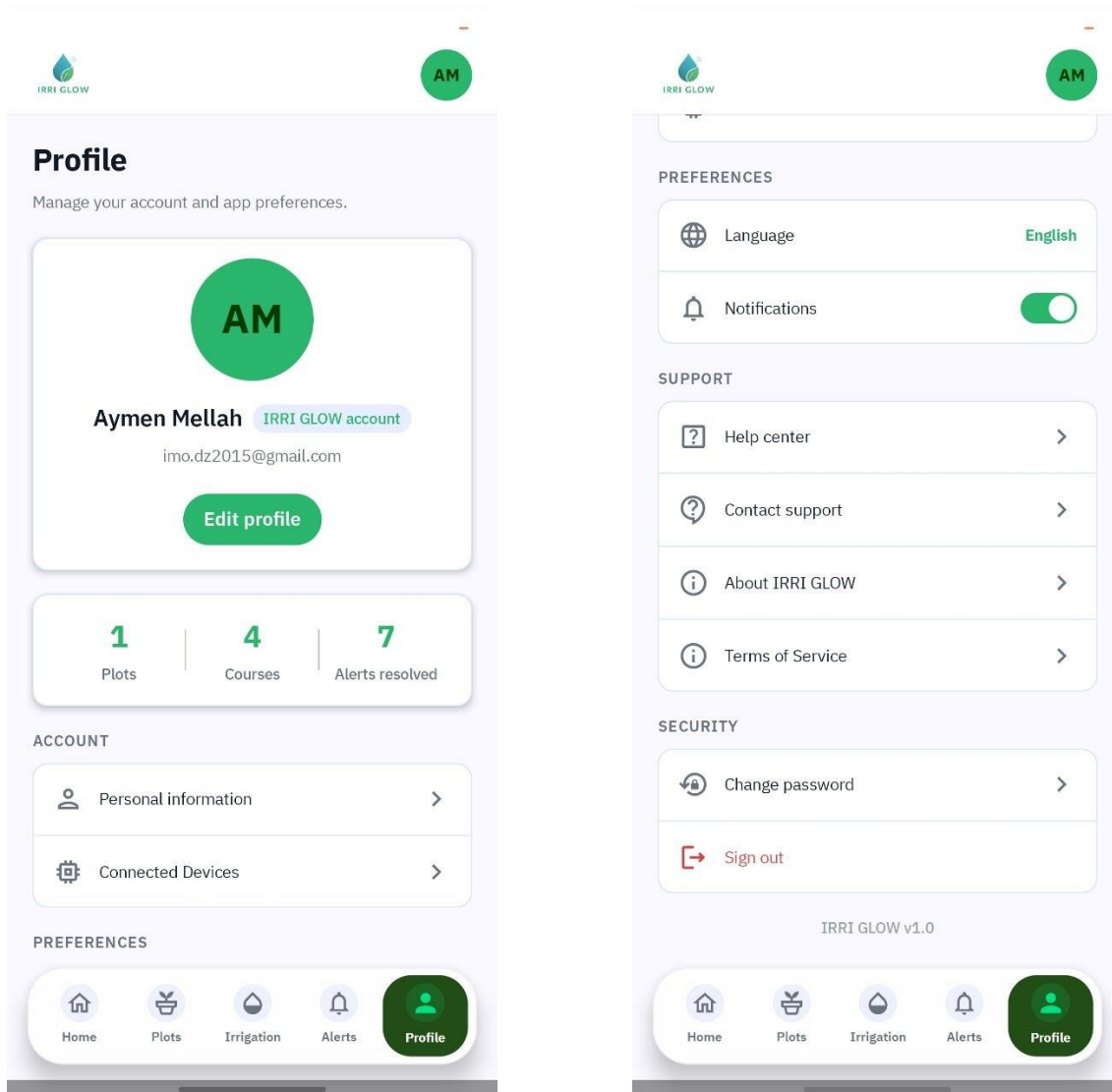


Source: Developed by our team

Interpretation:

The IrriGlow training platform is a comprehensive educational suite designed to equip users with practical skills for effective water management. The interface organizes courses by difficulty level-ranging from beginner modules like "Smart Irrigation Basics" to advanced topics such as "Irrigation Efficiency"providing clear information on course duration and associated costs in DZD. By detailing specific learning objectives, such as estimating crop water needs and avoiding overwatering errors, the application enables users to track their progress, mark lessons as completed, and systematically build their expertise in precision irrigation and plant water stress detection.

Figure 25:User Profile and Account Management



Source: Developed by our team

Interpretation:

The Profile interface in the Irri Glow application serves as a central hub for account management and application customization. It provides an overview of account statistics, such as the number of managed plots, completed courses, and resolved alerts. Users can access sections to update personal information, manage connected devices, and adjust app preferences like language settings and notification toggles. Additionally, the interface includes support resources-such as the help center and terms of service-as well as security options to change passwords or sign out of the application, which currently runs on version 1.0.

Conclusion

Following a meticulous examination and an in-depth exploration of every facet of the IRRIGLOW project, we can now synthesize our primary findings. To conduct this comprehensive study, we adopted a multi-dimensional approach that encompassed a thorough analysis of the agricultural market, a detailed financial evaluation, and the development of a clear, explanatory prototype. The transition toward a fully digitized and automated ecosystem represents a pivotal milestone in our developmental journey, marking a significant leap forward in modernizing local agricultural practices.

To turn this vision into reality, we navigated through several critical research phases. Primarily, our market study was firmly grounded in official, quantitative data provided by the Directorate of Agriculture of the Tlemcen Province. Relying on these robust statistics, rather than traditional subjective questionnaires, enabled us to accurately assess the real-world needs of the region, understand the exact nature of the agricultural landscape, and identify the most pressing challenges faced by local farmers. The empirical evidence highlighted a strong, urgent demand for modern technological solutions to combat resource scarcity.

Guided by these official metrics, we systematically prioritized our application's features based on immediate necessity and overall value addition. Consequently, automated irrigation management powered by the Internet of Things (IoT) emerged as our core priority. This was closely followed by AI-driven predictive analytics, real-time soil moisture monitoring, and advanced water consumption optimization. This strategic hierarchy allows us to channel our efforts and resources into the most critical areas, effectively addressing the genuine operational needs of the regional agricultural sector.

This data-driven foundation directly facilitated the calculation of our projected revenues. Subsequently, we conducted realistic, on-the-ground cost estimates to rigorously measure the project's financial feasibility and long-term profitability. A major milestone in our timeline was the creation of an experimental prototype, achieved through a highly fruitful collaboration with specialists in software programming and embedded systems. This successful synergy has profoundly reinforced our motivation to continue the entrepreneurial process and bring our startup to life. The full realization of IRRIGLOW—an intelligent mobile application dedicated to agro-technology and precision irrigation—will require an optimized development cycle of twelve (12) months. This timeline sets our official commercial launch in the market for April 2026.

Conclusion

Fundamentally, the strategic convergence of IoT and Artificial Intelligence for crop management offers an exceptionally cohesive and comprehensive "user experience." By unifying a diverse array of advanced technological features under a single, centralized platform, we are building a definitive tool designed to meet every requirement of the modern farmer (regarding smart irrigation). This consolidation not only ensures a far more efficient coordination of vital water resources but also drastically simplifies daily operations for our clients. Farmers can now leverage cutting-edge technological expertise through an integrated system that autonomously adapts to the unique physiological and topographical needs of their specific plots. By aligning our efforts with strategic partners, we aspire to catalyze productivity within this essential sector, delivering outstanding service while ensuring the optimal exploitation of natural resources.

Furthermore, the practical usability of an application that processes and presents complex agronomic data relies heavily on intuitive design architecture. A clean, streamlined, and user-friendly interface is paramount; it facilitates seamless navigation across various analytical dashboards, allowing users to rapidly interpret key crop indicators without requiring advanced technical training. The integration of responsive customer support, highly customizable irrigation cycles, and continuous user testing will further guarantee a frictionless, deeply satisfying experience for the farming community.

In addition, our comprehensive market analysis, supported by regional agricultural figures, confirms that there is currently no local application offering the bespoke, all-encompassing ecosystem that IRRIGLOW intends to provide. This notable gap in the market represents a monumental opportunity in the agro-tech sphere, allowing us to fulfill an unaddressed need exacerbated by modern climate challenges and severe water shortages. By capitalizing on this early-mover advantage, we can secure the long-term sustainability of our enterprise while establishing ourselves as indisputable pioneers capable of outmaneuvering future competitors. Through relentless innovation and the delivery of a highly distinctive, integrated solution, our ultimate goal is to become the absolute market leader in this rapidly expanding niche.

Finally, the agricultural sector is extraordinarily vast and in a constant state of evolution, propelled by innovations in both digital process management and fundamental agronomic practices. While our project is heavily concentrated on the modernization of irrigation systems—a critical component of today's ecological and economic transition—it is vital to acknowledge that continuous, on-the-ground improvements in traditional farming play an equally indispensable role. Therefore, even as IRRIGLOW champions the integration of AI and IoT,

Conclusion

we remain deeply rooted in the practical realities of the land and the core principles of sustainable development.

This report has comprehensively outlined our entrepreneurial journey, integrating all the necessary information, statistical data, and strategic insights that may prove beneficial for future studies, scalable expansions, and prospective agricultural developments.

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Appendices

Appendix 01: Business Model Canvas

Business Model Canvas

Project Name:

IRRI GLOW

Date:

26/06/2026

Key Partners  Sensor and Irrigation Hardware Manufacturers Agricultural Distributors and Cooperatives Government Bodies and Agricultural Associations Agricultural Research Institutes and Universities Agricultural Investors IT developers: for user interface creation and integration with existing systems. Agonomists: to provide their expertise on agricultural issues.	Key Activities  Research and Development (R&D) Software Development and Maintenance Manufacturing and Assembly Marketing and Sales Customer Support and After-Sales Services	Value Propositions  Ultra-precise Soil Moisture and Irrigation Management Reducing water waste Increased Yields and Improved Crop Health Intelligent Automation Developing the agricultural sector Facilitating irrigation, reducing farmers' tasks, and saving time. User-Friendly Experience Reduced Operational Costs	Customer Relationships  Proactive Customer Service Regular Software Updates Loyalty and Training Programs Online User Community	Customer Segments  Large-scale Farmers Agricultural Businesses and Cooperatives Small and Medium-sized Farmers Environmentally Conscious Organizations
Key Resources  Technology (AI and Algorithms) Intellectual Property Human Capital Physical Assets Financial Capital			Channels  Direct Sales Partnerships with Agricultural Equipment Distributors Web Platform and Mobile Application Agricultural Trade Shows and Conferences Digital Marketing	
Cost Structure  R&D Costs Manufacturing and Hardware Costs Salaries and Personnel Costs Marketing and Sales Costs			Revenue Streams  Sale of IRRIGLOW systems Farmer trainings App Download and Subscriptions: Ads	

Appendice 02: Statistics

وصحة التقدم لكل بلدية لليوم الخامس و الخمسون (55)

العدد التقديري للمستمرات الفلاحية الغير معية بعملية الإحصاء

27/07/2024

100%

الجنة هي

بلدية	العدد التقديري للمستمرات الفلاحية المواد احصائها	العدد الإجمالي للمستمرات الفلاحية المحصاة	تقدم سير العملية (%)	العدد التقديري للمستمرات الفلاحية الغير معية بعملية الإحصاء	الزوف عن الإحصاء	الدخلي عن الشاطئ	المستمرات في حالة نزاع	عدم وجود المستمر	انصهار المستمرات عن طريق البيع أو الشركة	زحف الامتداد	عدد المستمرات الفلاحية المواد احصائها بعد التحين	تقدم سير العملية بعد التحين (%)
تلمسان	600	482	80,33%	120	21	18	0	6	0	75	480	100,42%
عين صغار	1020	861	84,41%	175	6	11	0	158	0	0	845	101,89%
عين تالوت	1139	1202	105,53%	4	0	0	0	4	0	0	1135	105,90%
الرمشي	1002	1030	102,79%	0	0	0	0	0	0	0	1002	102,79%
القبول	1057	1093	103,41%	0	0	0	0	0	0	0	1057	103,41%
صيرة	1300	1300	100,00%	0	0	0	0	0	0	0	1300	100,00%
الغزوات	368	373	101,36%	14	0	10	0	4	0	0	354	105,37%
السواقي	761	780	102,50%	0	0	0	0	0	0	0	761	102,50%
حمالة	851	870	102,23%	18	18	0	0	0	0	0	833	104,44%
القصور	1125	1195	106,22%	0	0	0	0	0	0	0	1125	106,22%
واد لحضر	547	565	103,29%	30	0	30	0	0	0	0	517	109,28%
عين لفة	1440	1490	103,47%	0	0	0	0	0	0	0	1440	103,47%
أولاد ميمون	590	503	85,25%	90	0	83	1	1	5	0	500	100,60%
عمير	1690	1643	97,22%	103	0	79	0	0	24	0	1587	103,53%
عين يوسف	653	657	100,61%	0	0	0	0	0	0	0	653	100,61%

100,18%	547	0	0	0	0	0	0	0	100,18%	548	547	زنانة
105,56%	810	0	0	0	0	0	0	0	105,56%	855	810	ابن سنوس
109,41%	776	0	0	0	0	0	0	0	109,41%	849	776	باب العسة
102,19%	365	0	0	0	0	31	0	31	94,19%	373	396	دار بلموراسن
101,11%	900	0	0	0	0	0	0	0	101,11%	910	900	فلاوسن
101,86%	805	0	0	0	0	25	0	25	98,80%	820	830	الغزابل
100,10%	1013	0	0	0	0	0	0	0	100,10%	1014	1013	سعة شيوخ
104,99%	842	0	1	4	3	115	45	168	87,52%	884	1010	لوتي بن هذابل
109,50%	1032	0	0	0	0	0	0	0	109,50%	1130	1032	بن سكران
103,93%	713	0	25	0	0	1	0	26	100,27%	741	739	عين تحالة
101,46%	1098	0	5	0	2	0	0	7	100,81%	1114	1105	الحناية
107,47%	1875	0	0	0	0	0	0	0	107,47%	2015	1875	مقبة
100,00%	677	0	0	13	6	3	0	22	96,85%	677	699	حمام بوطرارة
105,78%	952	0	0	0	0	14	0	14	104,24%	1007	966	السواحلية
103,47%	662	0	0	0	0	0	0	0	103,47%	685	662	مسيرة التوافة
101,38%	939	0	0	0	0	0	0	0	101,38%	952	939	عين فلاح
102,84%	1128	0	0	51	10	25	6	92	95,08%	1160	1220	العرشة
107,25%	593	0	0	0	0	0	0	0	107,25%	636	593	سوق الثلاثاء
107,76%	850	0	0	0	0	0	0	0	107,76%	916	850	سيدي العبدلي
104,93%	1076	6	0	5	32	0	31	74	98,17%	1129	1150	سيدر
100,63%	1420	0	0	0	0	0	0	0	100,63%	1429	1420	ابن واروسون
100,00%	605	0	0	0	0	0	0	0	100,00%	605	605	سيدي مجاهد
103,70%	1244	0	5	27	0	14	0	46	100,00%	1290	1290	ابن بوسعيد
100,00%	571	0	0	0	0	0	0	0	100,00%	571	571	مرسى بن مهيدي

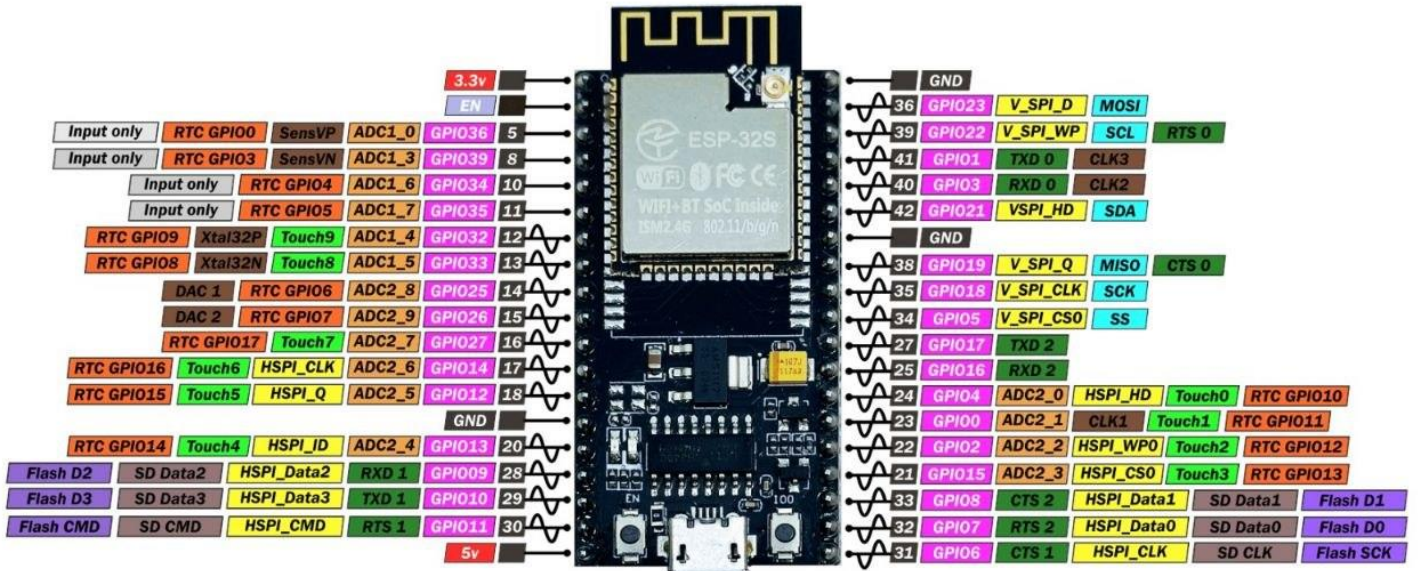
27/07/2024

104,29%	676	22	0	2	0	65	30	119	88,68%	705	795	الدروقة
120,52%	1121	0	0	0	1	0	5	6	119,88%	1351	1127	سبدي الخيلاني
122,82%	390	0	0	0	0	0	0	0	122,82%	479	390	بنو خلد
111,88%	1153	0	0	0	6	0	0	6	111,30%	1290	1159	الوهابي
100,38%	528	143	0	17	0	40	0	200	72,80%	530	728	هني
106,13%	375	0	0	0	0	0	0	0	106,13%	398	375	مبات
104,39%	751	0	0	0	0	0	0	0	104,39%	784	751	أولاد وياح
100,00%	630	0	0	0	0	0	0	0	100,00%	630	630	بوخلو
112,22%	900	0	0	0	0	0	0	0	112,22%	1010	900	بنو علاء
105,24%	840	0	0	0	0	0	0	0	105,24%	884	840	عين عرابية
100,65%	767	143	96	0	0	94	0	333	70,18%	772	1100	شوان
100,00%	290	0	0	0	0	120	0	120	70,73%	290	410	مصفورة
108,42%	499	0	0	0	0	19	0	19	104,44%	541	518	بنو صليل
103,95%	608	0	0	0	0	0	0	0	103,95%	632	608	عين كيرة
104,57%	44610	389	161	292	61	797	162	1862	100,38%	46650	46472	المجموع

Appendice 03:

ESP32 NODEMCU-32S ESP-32S Kit

PINOUT



www.mischianti.org (CC) BY-NC-ND



Appendice 04: Incubation Certificate



الجمهورية الجزائرية الديمقراطية الشعبية
وزارة التعليم العالي والبحث العلمي
المدرسة العليا لإدارة الأعمال تلمسان
حاضنة الأعمال



الرقم: 033 / م.ع.ا.ح.أ. 2025

شهادة توطين المشروع

تشهد مديرة حاضنة الأعمال المدرسة العليا لإدارة الأعمال - تلمسان أن المشروع:

IRRI GLOW

للطلبة التالية أسمائهم:

الاسم واللقب	السنة	القسم	التخصص
عرايبي ليلي	الثالثة	الطور الثاني	تسويق غذائي
/	/	/	/
/	/	/	/

تحت إشراف الأساتذة التالية أسمائهم:

الاسم واللقب	الرتبة	التخصص	الصفة
زناسني سميرة	أستاذ	مالية و مؤسسات	مشرف رئيسي 1
/	/	/	مشرف رئيسي 2
/	/	/	مشرف مساعد

مُسجَل و مُوطِن على مستوى حاضنة الأعمال المدرسة العليا لإدارة الأعمال تلمسان السنة الجامعية: 2025/2024، في إطار القرار الوزاري 1275 المؤرخ بتاريخ 27 سبتمبر 2022 المعدل و المتمم بالقرار 008.

سلمت هذه الشهادة بطلب من المعني لإدلاء بها في حدود ما يسمح به القانون.

التاريخ: 2025/12/16

مديرة الحاضنة

د. زناسني سميرة
مديرة حاضنة الأعمال

