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Computer Science Department

# Master Thesis

In Computer Science

*Specialty: GSI & ISIL*

## Project Title:

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ONLINE PLATFORM FOR LOGISTICS  
OPTIMIZATION SPECIALIZED IN DELIVERY

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# *Acknowledgement*

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# *Dedications*

To everyone who stood by me along this journey. *RAHOU ZINE EDDINE.*

# *Dedications*

In the name of of Allah the Merciful To my support in life and companions in my path in sorrow and joy To my dear parents To my dear brother Farouk and my brother Abdou . I dedicate this work, to which it is very happy primarily to have their advice and assistance and encourage . To the entire LAMRI family and the MECHTAM family. To my dear friends TAREK , ZINO , OAUIL , TAREK BERKAN , AHCENE HADOUCH for their support, availability, help and assistance Advice during the completion of this work.

*LAMRI SIDALI.*

# *Dedications*

I dedicate this work: To those who gave meaning to my existence. To you my dear parents. To my dear sister and brother for all their encouragement and all my friends especially those who helped me a lot To my brother, Farouk with whom I have shared wonderful academic years, and to all my friends who are, dear to me, or far away.

*BOUGHERBI TAREK.*

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# General Introduction

This memoir aims to offer a meticulous exploration of the development and realization of an online logistics platform specialized for delivery optimization. This work serves as the official introduction to the recounting of our journey, focused on the intersection of technology and entrepreneurship in the creation of this project. The choice of this idea was in response to the escalating demand for streamlined and cost-effective delivery solutions within the contemporary commerce landscape. As a collective effort, we embarked on a mission to redefine the operational dynamics of the logistics through the infusion of cutting-edge technology and strategic entrepreneurial decisions aiming to expand in the market. This narrative dissects the intricate technical and economic challenges faced during the conception and development of our platform. With a primary emphasis on efficiency, the platform integrates algorithms, data analytics, and artificial intelligence to optimize the target operations comprehensively. The technical aspects outlined in this memoir encompass the software development specifics and the successful implementation of convenient method, providing a detailed account of the platform's capabilities. Beyond the technical facets, we also explain our entrepreneurial decisions. From plans of securing initial funding to navigating the complex dynamics of the market, it unveils the strategic aspects and pivotal moments needed to be studied in order to establish the company. In general, we aim to delve deeper more rigorous look into what it takes to launch a startup

# Presentation of the project

## 1.1 Project Idea (Proposed Solution)

### 1.1.1 General information about delivery services

The impetus for our project emerged from a strategic endeavor to integrate artificial intelligence into the realm of delivery operations. Acknowledging the pivotal role of streamlined processes in transporting goods or services, our focus spans a spectrum of intricate tasks, including order processing, scheduling, efficient loading and unloading, and the orchestration of transportation.

In alignment with the challenges faced by both corporate entities and freelance deliverers, the crux lies in the imperative need for efficient delivery operations. The key components involve route optimization, the seamless integration of real-time tracking mechanisms, precision in inventory management, and effective communication channels with drivers.

A prevalent challenge confronting these entities is the absence or the difficulty of implementing such optimization within their logistic chains. This predicament arises from various factors, with a primary hindrance being the inconvenience of implementation. Additionally, the absence of a robust mechanism for tracking and assessment exacerbates the challenge. Our project aims to address and mitigate these impediments, offering a sophisticated solution that seamlessly integrates with existing logistic frameworks, providing an efficient and convenient mechanism for optimizing delivery operations and overcoming the challenges faced by companies and deliverers alike.

### 1.1.2 Challenges

In the realm of logistics, operational costs are profoundly impacted by non-optimized delivery processes. Excessive fuel consumption, added strain on vehicles leading to degradation, and heightened labor expenses collectively contribute to an unwarranted financial burden.

Efficient last-mile delivery strategies stand as the linchpin for customer satisfaction. Without specialized approaches, the likelihood of inaccurate and delayed deliveries increases, directly influencing the quality of service. This, in turn, erodes customer trust and satisfaction, potentially culminating in customer churn.

The essence of informed decision-making relies on accurate, data-driven insights. Inefficient delivery operations create a void in this crucial area, hindering the extraction of meaningful information. Neglected or inadequately recorded data further obstructs operations like market forecasting, making it challenging, if not impossible, to predict market trends based on comprehensive data analysis.

Expansion endeavors are intricately tied to the efficiency of delivery processes. Sub-optimal operations impede businesses from effectively reaching and serving new markets, curbing scalability opportunities. This challenge becomes a critical factor directly influencing the growth trajectory of the company.

Parcel security during transit is a perennial concern for delivery companies. While implementing robust measures, such as signature requirements, secure drop-off locations, and real-time parcel tracking, is essential, the inherent difficulty in executing these measures adds a layer of complexity to the delivery process.

The control and assessment of employee performance represent a formidable challenge in the absence of a structured mechanism. Identifying instances of time wastage becomes arduous, potentially resulting in considerable to immense losses, particularly for companies heavily reliant on efficient delivery operations.

### 1.1.3 Solution

Our proposed solution involves the implementation of a modular digital platform designed to comprehensively optimize various logistics operations. Central to our approach is the management of driver tracking and logging. The platform registers drivers, monitors their paths, and aligns them with designated delivery targets. Additionally, our system

emphasizes route optimization, leveraging artificial intelligence to calculate optimal routes based on user-provided target points. Adaptive algorithms continuously adjust these routes in real-time, ensuring responsiveness to dynamic operational needs.

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## 1.2 Added values:

**Enhanced and Accelerated Delivery Times:** One of the paramount added values of our project lies in significantly reducing delivery times through meticulous route optimization and real-time data utilization. By streamlining transit routes and harnessing live data insights, companies can achieve remarkable efficiency gains, minimizing delays and offering customers an unparalleled swift and reliable delivery experience.

**Ensured Operations for Heightened Trust:** Our platform ensures a transparent and accountable operational environment, instilling better trust among customers. The ability to monitor and verify driver performance fosters improved decision-making in human resources management. This assurance not only enhances customer confidence but also establishes a foundation for reliable and trustworthy service, strengthening the overall reputation of the company.

**Cost-Efficiency Leading to Increased Profitability:** A core facet of our project's added value is the attainment of cost-efficiency throughout the supply chain, translating to increased profitability for businesses. Through the reduction of distances, optimization of routes, and enhanced inventory management, our platform strategically diminishes fuel, labor, and storage costs. This heightened cost-effectiveness, coupled with efficient logistics practices, optimizes resource utilization, eliminating wasteful practices and fostering streamlined operations.

**Strategic Competitive Advantage:** Companies leveraging our platform gain a strategic competitive advantage by offering faster, more reliable, and cost-effective delivery solutions. Consistently meeting or exceeding customer expectations positions these companies as leaders in the market. This competitive edge not only attracts and retains customers but also differentiates businesses from their competitors, establishing a robust market position based on a commitment to excellence in service.

**Data-Driven Decision-Making Excellence:** Our project places a premium on

data-driven decision-making, utilizing advanced data analytics and cutting-edge technologies. By collecting and analyzing substantial data sets, companies gain invaluable insights into their operations, customer behaviors, and market trends. This empowers organizations to make informed choices, identify areas for improvement, and proactively address potential issues, fostering a culture of continuous improvement and adaptability.

**Enhanced Flexibility and Scalability:** The project provides companies with a heightened level of flexibility and scalability. Efficient processes enable swift adaptation to changing market demands, seasonal fluctuations, and unforeseen disruptions. This enhanced adaptability allows companies to scale their operations efficiently, ensuring a steady flow of goods without compromising service quality. This flexibility positions businesses to navigate dynamic market conditions while maintaining operational excellence.

**Greener environment :** Optimized traffic means lesser need for it : Less traffic results in a better environment due to reduced air pollution, lower carbon emissions, noise reduction, conservation of resources, improved water quality, enhanced biodiversity, safer conditions for pedestrians and cyclists, and increased use of sustainable transportation options. This leads to a more sustainable and healthier environment overall.

### 1.3 Work team

#### **BOUDJELABA HAKIM - Project Promoter:**

Boudjelaba Hakim assumes the pivotal role of our project promoter, providing indispensable guidance and support throughout the realization process. With a robust educational background in computer science, Hakim brings extensive teaching experience and a diverse technical skill set to the table. Proficient in programming, web development, and database management, he navigates challenges with ease. Currently pursuing a Ph.D. in Computer Science with a focus on Security in Big Data, Hakim embodies both academic rigor and practical expertise.

#### **BOUGHERBI TAREK - Software Engineering and Information System Specialist:**

Tarek Bougherbi is our adept handler of software engineering and information systems. His enthusiasm spans a wide spectrum of informatics aspects, from NLP and AI to specialized expertise in database conception, management, and integration. Tarek's skills

prove invaluable when dealing with platforms of any scale, offering the opportunity to fine-tune backends to precisely meet user needs. His versatility and depth of knowledge make him a linchpin in crafting robust and tailored solutions.

#### **LAMRI SIDALI - Senior Mobile app Developer:**

Meet Sidalil Lamri, our proficient Mobile Developer, specializing in cross-platform frameworks. Sidalil possesses a keen eye for UI/UX design, ensuring the creation of seamless and intuitive interfaces. His adaptability keeps him at the forefront of mobile tech trends, allowing him to optimize app performance for a smooth user experience. His expertise extends to API integrations and collaborative work, using tools like Git with finesse. Sidalil is a vital asset to any team aiming for exceptional platform integration.

#### **RAHOU ZINE EDDINE - Computer Systems and Cybersecurity:**

Rahou Zine Eddine contributes to the team as a passionate computer science enthusiast, with a particular focus on computer networks, algorithm design, and artificial intelligence. His inclination towards problem-solving and optimization, coupled with a solid foundation in cybersecurity, augments the team's capabilities. Eddine's comprehensive skills in algorithmic design and cybersecurity enhance the team's proficiency in tackling complex challenges and fortifying the project's security infrastructure.

## **1.4 Objectives of the project:**

### **1.4.1 Establish Leadership in Specialized Delivery Logistics**

#### **Services in Algeria**

Our foremost objective is to position our startup as the premier online platform, setting the standard for specialized delivery logistics services in Algeria. Through our digital platform, meticulously designed for comprehensive optimization, we aim to revolutionize the logistics landscape in the region. By providing efficient driver tracking, path monitoring, and precise route optimization, we aspire to be the go-to solution, fostering trust and reliability in the delivery logistics sector in Algeria.

### **1.4.2 Pioneer AI Solutions in Logistics Services**

At the core of our mission is the pioneering of artificial intelligence solutions within the logistics domain. We seek to be at the forefront of innovation by seamlessly integrating AI into our platform. By leveraging AI for route optimization and real-time adaptive algorithms, we aim to redefine logistics services with intelligence, efficiency, and foresight. Our commitment to pioneering AI solutions reflects our dedication to technological advancement and operational excellence.

### **1.4.3 Expand Internationally, Particularly in Africa**

As part of our strategic vision, we aspire to extend our footprint beyond Algeria and embark on international expansion, with a primary focus on the African continent. By capitalizing on the success of our digital platform, we aim to introduce our optimized logistics services to new markets, contributing to the growth and efficiency of delivery operations on a broader scale.

### **1.4.4 Develop and Deliver Innovative Solutions for Impact Especially in Algeria**

In our pursuit of excellence, innovation stands as a key pillar. We are dedicated to continually developing and delivering innovative solutions that significantly enhance our startup's impact, particularly within the Algerian market. Our commitment to innovation encompasses not only the technological aspects of our platform but also extends to operational strategies, ensuring that we contribute meaningfully to the logistics landscape and overall societal progress in Algeria.

## 1.5 Project schedule:

		weeks															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	Choose the head- quarters of the in- stitution	X															
2	Preparing the re- quired documents.		X														
3	Obtaining funding			X	X	X	X										
4	Equipment instal- lation.							X									
5	Researching and hiring employees							X	X								
6	Improving the quality of platform services.								X	X	X	X					
7	Preparing Cloud infrastructure and servers for data storage and pro- cessing.										X	X	X				
8	Conducting initial experiments.												X	X			

		The weeks															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
9	Providing continuous support and maintenance for the main services.												X	X	X		
10	Advertising and marketing to target customer segments.													X	X	X	
11	Launching the platform and application.																X

Table 1.1: Project schedule

# Chapter 2

## Innovative Aspects

### 2.1 Nature of Innovations:

#### 2.1.1 Radical Innovations

##### **Accessibility for All:**

Our project introduces a radical innovation by prioritizing accessibility for all clients. By carefully selecting schemes and technologies, we eliminate the need for specialized software or expertise. Our all-in-one solution ensures that every user, regardless of technical background, can seamlessly utilize and benefit from our platform.

##### **Automation Excellence**

In the realm of automation, our project stands out with ready-to-use templates that are fully automated. The intuitive design guarantees a maximum quality user experience, sparing users from the complexities of logistics optimization decision-making. We've streamlined the process by providing essential features, minimizing user input and maximizing efficiency.

#### 2.1.2 Technological Innovations

##### **AI-Powered Efficiency:**

Leveraging the power of artificial intelligence represents a technological leap in our project. The platform employs AI to handle essential tasks such as rapid route optimization and

adjustment. This technological innovation not only maximizes the added value from AI but also simplifies the once complex task of integrating NP- complete problem approximations, making it accessible with just one click.

### **2.1.3 Market Innovations**

#### **2.1.4 Democratizing Logistics Solutions:**

Our project brings a market innovation by democratizing logistics solutions. The emphasis on accessibility ensures that our platform is not reserved for a select few with specialized knowledge. Instead, we open the doors for a broader audience, making logistics optimization accessible to a diverse range of clients, by focusing on letting the potential clients understand the importance of such operations to their economic flow.

#### **2.1.5 Continuous Innovations**

##### **Efficiency Evolution:**

Our commitment to continuous innovation is evident in our project's focus on efficiency. By automating essential logistics processes and leveraging AI, we set the stage for ongoing advancements. The platform's adaptability ensures that it evolves with changing industry dynamics, providing users with cutting-edge solutions and maintaining a competitive edge in the ever-evolving logistics landscape.

## **2.2 Fields of innovation:**

**Our project explore several fields , most importantly we mention:**

### **2.2.1 Route Optimization**

Our project introduces an improvement in route optimization, employing advanced algorithms and data analytics to redefine how goods move through the intricate web of supply chains. The optimization module of our logistics platform is not merely a conventional solution but a dynamic system that continually adapts to real-time variables. By harnessing predictive analytics and machine learning, in addition to the continuous

scanning of other live users routes to determine the state of the routes, the route optimization component anticipates potential disruptions, such as traffic or weather changes, and re-calibrates delivery routes on the fly. This innovation significantly enhances operational efficiency, reduces delivery times, and minimizes fuel consumption, positioning our platform at the forefront of accessibly, customizable, cutting-edge route optimization in the logistics domain.

## **2.2.2 Software Engineering**

The core of our project lies in the engineering of a robust software architecture that seamlessly integrates various components for a cohesive logistics solution. Our software engineering innovations incorporates modular design principles that facilitate scalability and flexibility. Moreover, our platform is designed to interface with diverse systems, promoting interoperability across logistics networks. This approach's first aim is to have the liberty to use any service or subservice without being obliged to integrate the entire platform.

## **2.2.3 Live Tracking**

Live tracking, a cornerstone of modern logistics (among many other domains), takes a leap forward with our project. We introduce a real-time tracking system that goes beyond conventional location monitoring. Our live tracking module provides granular insights into each step of the delivery process, offering detailed information on package conditions, handling procedures, and estimated time of arrival. Leveraging Internet of Things (IoT) devices, our live tracking feature transforms into a comprehensive logistics visibility tool.

## Market Strategic Analysis

### **3.1 Market Segmentation:**

#### **3.1.1 Potential Market**

#### **3.1.2 Unlocking Opportunity Across Sectors:**

Within the expansive landscape of logistics, the potential market unfolds as a realm of diverse opportunities. Freelance and contract drivers, operating independently, seek a solution that brings efficiency to their deliveries. Small and middle-scale companies, grappling with the challenges of optimizing logistics without incurring hefty costs, stand as key participants in this expansive market. Even large enterprises, recognizing the allure of cost-effective bulk route optimizations, emerge as potential stakeholders. The potential market encapsulates a broad spectrum of players, each presenting a unique set of needs and aspirations in the logistics optimization journey.

#### **3.1.3 Target Market**

##### **Precision Targeting for Maximum Impact:**

In contrast, our target market is a strategic selection aimed at achieving precision and maximum impact. Enterprises with limited logistics outsourcing capability, numbering approximately 730, become the focal point of our strategy. These entities, currently lacking the capacity to outsource logistics operations, represent a significant segment that can benefit immensely from our streamlined solution. Distribution centers of major

brands, around 80 in total, grappling with issues of theft and inefficiency, emerge as another critical target. Major companies in logistics and transport (at least 7) find our precalculated routing services as a catalyst for enhancing their operational processes. The deliberate targeting of freelancers and private deliveryman, estimated at 8,000, adds a layer of diversity to our client portfolio. This precision targeting within the target market ensures that our solution addresses the critical pain points and specific needs of key players in the logistics landscape, driving impactful change.

### 3.1.4 Justification

#### **Strategic Focus on the Target Market:**

Our choice to strategically focus on the target market is rooted in a meticulous analysis of diverse sectors and their unique challenges within the logistics landscape. The target market, consisting of enterprises with limited logistics outsourcing capability, distribution centers facing theft and inefficiency issues, major companies in logistics and transport, and freelancers/private deliveryman, has been selected with precision to maximize impact. Here's a justification for this strategic focus:

- **Critical Pain Points:** The target market represents entities facing critical pain points in their logistics operations. Enterprises with limited outsourcing capability encounter challenges that our solution directly addresses, offering them a streamlined alternative. Distribution centers grappling with theft and inefficiency find our platform as a potent solution to enhance security and operational efficiency.
- **Strategic Alignment:** Our platform aligns strategically with the needs of the target market. The provision of precalculated routing for major companies in logistics and transport aligns with their quest for enhanced processes, while freelancers and private deliveryman benefit from the platform's flexibility and adaptability to diverse use cases.
- **Untapped Potential:** The target market represents untapped potential where our solution can make a transformative impact. Enterprises with limited outsourcing capability are often underserved, presenting a significant growth opportunity. By strategically focusing here, we position ourselves to fill a critical gap in the market and establish a strong presence.

- **Diversity in Clientele:** The deliberate inclusion of freelancers and private deliveryman adds diversity to our clientele. This strategic move ensures that our platform caters to a wide range of users, from small independent drivers to major players in the logistics and transport sector, creating a comprehensive and inclusive solution.
- **Market Responsiveness:** The target market's responsiveness to our solution is evident in the identified pain points. By directly addressing these challenges, our platform becomes not just a service but a solution that brings tangible improvements to the operational efficiency and security of the entities within this market.

## 3.2 Growth potentiel:

### 3.2.1 initial and local

#### 1- Exposure:

with the platform's feature richness, comprehensiveness and its ability to adapt to the use case , coupled with the spread of information about about the importance of optimization in an enterprise delivery environment, along with the fact that the local market is witnessing a tendency towards digitization and a.i, the platform is projected to have an exponential surge in clients who will be aiming to utilize it.

#### 2- E-commerce:

it is no doubt that the local market is witnessing an explosion of e-commerce activity, and given the nature of this type of commerce, ie mostly buying from places that aren't necessarily nearby the client, this mechanism will be a prime factor in the expansion of delivery activity, directly and positively impacting our sales in a rapid manner, because for most company's scale or the individuals need, we'll be present to offer the compatible service.

#### 3- Startups:

indeed the local movement of startups' aid and encouragement will definitely increase the exposure to our platform, because what we aim to handle (optimization) plays an essential role in most enterprises.

#### 4- Recent events:

It has been statistically noticed that people's tendency to use delivery services has gone up after the pandemic, the market has already adjusted itself to a different position where people are leaning more on services from a distance, this has marked a trend in the recent years, a trend that isn't indicating a willingness to change for the current period.

#### 5- Modularity:

from a market survey, it appears that big companies prefer hardware GPS location tracking with specialized software, this is why we designed our software to be modular, companies can choose to upgrade the software that handles their data without sacrificing their current tracking option, they can use the same GPS data in our platform, subsequently tracking it and analyzing it by driver.

### 3.2.2 Regional:

Expanding an online product's reach from nearby countries to the global market involves a **strategic approach**, but this approach is much easier for modular online platforms due to the simplicity of exportation, the website and application are available for everyone around the globe.

#### Nearby countries:

countries that are directly nearby, especially Tunisia and Morocco will be the easiest to expand once the platform has gained enough exposure, the strategy will be a combination of market analysis and adaptation processes especially for payment, **the key element** here is that the countries nearby **are easier to travel to**, speak **similar languages**, more familiar, with a possibility of **establishing several Bureaus** in said region.

### 3.2.3 Global

**Global:** as for global expansion, the strategy consists of the following :

**Localization and Internationalization:** adjust some important parameters regarding the interface such as synchronizing with time zones and adding languages on the interface.

**Market Research and Analysis:** take a deeper look into the global market , preferably by country to gain more insight.

**Compliance with Regulations and Standards:** make an effort to study and apply different regulations from different countries.

**Global Marketing and Branding:**

**Payment and Currency Integration:** integrate global payment methods (such as visaCards and credit cards )

- **NOTE:** this step will require multi-nationalization of the enterprise due to regulations.

## 3.3 Competition:

When it comes to indirect competition, we face a multitude of local enterprises, and even though they don't treat the same problem, with the amount of resources of an already established company, it won't be difficult for them to catch up, this forces us to adapt as fast as possible.

As for direct competitors, there are multiple platforms that are give-or-take similar in terms of features, likewise they are already established, which means a step ahead if they want to implement our exact features, as well as separated feature providers, as an example, premium features in some websites optimize routes, other platforms can do live tracking.

## 3.4 Competitive edge:

**Speed:** Our AI models and their implementations came from an expertise and a lengthy process of trial and error, we offer a service that is impressively fast for the nature of the

problem at hand.

**Modular approach:** other companies offer an all or nothing service, we offer ease of integration and a wider range of choices and we don't force clients to use the all the platform services.

### 3.5 Extremely affordable pricing tiers:

when on a task to find similar services or a part of our service, the client is met with prices that are at least 8 times more expensive !.

### 3.6 adaptability:

we've detailed a response protocol to adjust to sudden needs, as well as panic scenarios , as well as establishing specific ways of technical procedures such as defining the process of migrations (from servers ) and feature integration, in other words, the platform is built to scale as much as possible (the chosen tech stacks , cybersecurity considerations ..).

### 3.7 consistency:

we strive to keep the performance the same and up at all the time and we've already established a scaling plan to adjust to the incoming needs of clients along with migration protocols.

# Chapter 4

## The production and organization plan

### 4.1 Production process:

#### 4.1.1 Requirement Analysis

- We will be working closely with stakeholders to gather detailed requirements, understanding the specific needs of the users, businesses, and any regulatory considerations.
  - There is a need to define user stories and use cases to guide the development process, we need scenarios to adjust our platform to the needs of the market .

#### 4.1.2 Breaking Down the Features

- We need to break down the identified features into smaller, more manageable tasks, similarly, we need to decompose complex functionalities into subtasks to simplify the development process.

#### **Prioritize Tasks:**

- Prioritize tasks based on their importance to the overall project and any dependencies between them.
  - Identify critical path tasks that could impact the project timeline if delayed.

#### **User Stories and Use Cases:**

- Write user stories and use cases for each feature or task.

- Ensure that user stories are detailed and provide a clear understanding of the expected user interactions and system behavior.

### **Create a Development Timeline:**

- Develop a project timeline or roadmap that includes milestones, deadlines, and deliverables.
  - Use tools like Gantt charts or project management software to visualize the schedule.

### **4.1.3 creating the system architecture:**

Designing a robust system architecture is crucial for the success of our platform. The architecture should be scalable, maintainable, and capable of handling real-time data processing.

#### **1- Components and Services:**

##### **Route Optimization Service:**

- Implements algorithms for efficient delivery route planning.
- Takes into account factors like traffic conditions, delivery time windows, and vehicle capacity.
- Communicates with the tracking service for real-time updates.

##### **Tracking Service:**

- Handles real-time tracking of delivery vehicles using GPS data.
- Provides location updates to the route optimization service for dynamic route adjustments.
- Sends real-time data to the frontend for live tracking features.

##### **User Management Service:**

- Manages user authentication, authorization, and user profiles.
- Controls access to various functionalities based on user roles (e.g., drivers, administrators).

##### **Reporting and Analytics Service:**

- Gathers and analyzes data for generating reports on delivery performance, route efficiency, and other key metrics.
- Provides insights for business decision-making and optimization.

**Notification Service:**

- Sends notifications to users about route changes, delays, or other important updates.
- Integrates with communication channels like email, SMS, or in-app notifications.

**2- Communication Between Services:**

- Use **APIs** for communication between microservices. RESTful APIs or GraphQL can be employed for simplicity and flexibility, in our case we will be initially relying on RESTful APIs
  - Implement asynchronous communication for non-blocking interactions between services.
  - Use message queues or event-driven architecture for real-time updates and notifications.

**3- Database Design:**

- Choose databases based on the specific needs of each microservice, For a start, a relational database : PostgreSQL is deemed suitable for user management, while a NoSQL database (e.g., MongoDB) could be used for tracking data.
  - Implement database sharding or partitioning to distribute the data load and optimize performance.

**4- Security Measures:**

- Multiple layers of security will be implemented, including network security, robust authentication, and data encryption. Role-based access control ensured proper user permissions. Regular updates and patches were applied to address security vulnerabilities.

**5- Continuous Integration/Continuous Deployment (CI/CD):**

- Robust CI/CD pipelines were established for automated testing, building, and deployment, enabling rapid and reliable delivery of updates and new features.

**6- Adaptability for Future Enhancements:**

- The architecture was crafted to be flexible and adaptable, facilitating future enhancements and the integration of new features. An iterative development approach was em-

braced to continually improve the system based on user feedback and changing requirements.

#### 4.1.4 Putting all together:

##### 1- Backend Development with Python Django:

###### Technology Choice:

- Our team selected Python Django as the backend framework for its robust features, scalability, and ease of development.

###### Database Integration:

- Django's ORM (Object-Relational Mapping) was utilized to interact with the chosen databases for various microservices.

- Models were defined to represent entities such as users, routes, and tracking data.

###### Authentication and Authorization:

- Django's built-in authentication system was employed for user management.
- Role-based access control (RBAC) ensured proper authorization for different user roles.

###### Business Logic:

- Backend services were implemented to handle business logic, such as route optimization algorithms and data processing for tracking updates.

###### RESTful API Development:

- Django REST Framework was used to develop RESTful APIs for communication between frontend and backend components.

- Serializers were employed to convert complex data types, such as Django models, into JSON for API responses.

###### Middleware and Security:

- Middleware components were added to handle cross-origin resource sharing (CORS) and other security-related concerns.

- Django's security features, such as protection against common web vulnerabilities, were configured.

##### 2- RESTful APIs:

###### Resource Endpoints:

- Well-defined API endpoints were created for each microservice, such as `/api/routes` for route data and `/api/track` for tracking updates.
- RESTful principles were followed, ensuring a stateless and standardized interface.

**Request and Response Format:**

- Standard HTTP methods (GET, POST, PUT, DELETE) were used to perform CRUD operations on resources.
- Responses were formatted in JSON for ease of consumption by both web and mobile clients.

**Authentication and Authorization:**

- Token-based authentication was implemented for securing API endpoints.
- User roles were enforced at the API level to control access to specific functionalities.

**API Documentation:**

- Swagger or tools like Django Rest Swagger were used to automatically generate API documentation.
- Detailed documentation was provided, including examples of requests and responses.

**3- Web Frontend (HTML/CSS/JS):****Technology Stack:**

- HTML for structure, CSS for styling, and JavaScript (or a JavaScript framework like React or Vue.js) for dynamic behavior.
- Webpack or a similar bundler was used to manage dependencies and optimize the frontend code.

**Responsive Design:**

- The frontend was designed to be responsive, ensuring a seamless user experience across various devices, including desktops, tablets, and mobile phones.

**User Interface (UI) Components:**

- UI components were developed for viewing and interacting with routes, tracking data, and other relevant information.
- Interactive maps were integrated to visualize routes and real-time tracking.

**AJAX Requests:**

- Asynchronous JavaScript and XML (AJAX) requests were used to interact with the RESTful APIs asynchronously, providing a smooth and responsive user experience.

**User Authentication:**

- The frontend integrated with the backend authentication system for user login/logout functionalities.
- Token-based authentication tokens were stored securely and sent with each API request.

**4- Mobile Frontend with Flutter:****Flutter Framework:**

- Flutter, a cross-platform mobile development framework, was chosen for building the mobile frontend.
- A single codebase was maintained for both iOS and Android platforms.

**Widget-based UI:**

- Flutter's widget-based architecture was leveraged to create a consistent and visually appealing user interface.
- Custom widgets were developed for displaying routes, tracking information, and other relevant data.

**RESTful API Integration:**

- The Dart programming language in Flutter was used to make HTTP requests to the backend RESTful APIs.
- Responses were processed and displayed within the Flutter application.

**Real-time Updates:**

- Flutter's native support for real-time updates was utilized for displaying live tracking information.
- WebSocket connections or periodic polling were implemented for real-time data synchronization.

**Platform-specific Features:**

- Platform-specific features, such as navigation and device-specific functionalities, were seamlessly integrated using Flutter plugins.

**5- Separate Interfaces for Route Visualization:****Web Interface:**

- A dedicated web interface was created to provide users with a visual representation of optimized delivery routes.

- Interactive maps, powered by libraries like Mapbox or Leaflet, were embedded for a dynamic user experience.

#### **Mobile Interface:**

- The mobile interface, developed with Flutter, included a map component for users to view delivery routes on their smartphones.

- Custom gestures and animations were implemented to enhance the mobile user experience.

#### **Real-time Tracking Views:**

- Both web and mobile interfaces featured real-time tracking views, allowing users to monitor the live progress of delivery vehicles.

- Real-time updates from the backend tracking service were reflected in the interfaces.

### **4.1.5 Route optimization algorithm:**

As a solution, we relied on a genetic algorithm because it has more of a defacto way of defining variables (entities or genes) which aids our special use case ie points from a map.

#### **Route Representation:**

- We represented each route as a chromosome in the genetic algorithm, where a chromosome is a sequence of genes representing locations or waypoints.

## **4.2 Initialization:**

We created an initial population of routes, employing a random or heuristic-based approach to generate diverse individuals.

## **4.3 Fitness Function:**

We developed a fitness function that evaluated the quality of a route based on factors such as total distance traveled or other relevant metrics.

## 4.4 Genetic Operators:

### 4.4.1 Selection:

We implemented selection mechanisms like roulette wheel selection, tournament selection, or rank-based selection to choose individuals based on fitness.

### 4.4.2 Crossover (Recombination):

We applied crossover to selected individuals, exchanging segments of genes to create new offspring and introduce diversity.

### 4.4.3 Mutation:

We introduced small random changes to offspring routes through mutation to maintain genetic diversity.

Evolutionary Process:

We iteratively applied selection, crossover, and mutation to generate new generations of routes, simulating natural selection and evolution.

## 4.5 Termination Condition:

We defined termination conditions, such as a maximum number of generations or reaching a satisfactory level of convergence, to conclude the algorithm.

## 4.6 Best Route Extraction:

We extracted the best route from the final generation, representing the optimized solution to the Traveling Salesman Problem.

## 4.7 Supplying:

The key point is that most of our capital is our main work time, we emphasize on competence, and we don't deal much with primary matters, most of our assets are one-time-fees, which allows us to focus more on refining the platform.

## 4.8 provided workforce:

our project will be providing an estimated 14 work posts in different I.T and non I.T related fields such as designers and A.I experts, furthermore we will certainly need aid regarding the economic side once we advance towards a more complete company, in response to this need we will hire at least 2 marketers and establish an accounting/sales department.

## 4.9 Key partners:

**we will have several partners most of which will be clients to our platform , of them we mention:**

Research institutions and universities for collaboration on AI algorithms and advancements, Technology providers for infrastructure, hardware, and software components, Clients and customers requiring Route optimization solutions.

Clients requiring deliverer tracking Transport agencies. Tourism agencies.

# Chapter 5

## Plan financier

### 5.1 Financial plan

#### 5.1.1 Costs and Charges

These tables represent the initial calculated detailed financial elements of our projects, the complete tables are found in the Annex

	history			forecast					Source
DZD	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5	
Server hosting	/	/	/	590,000	712,500	855,000	2,565,000	5,130,000	Local hosting services (ecoSnet or DzHosting)
Cloud services	/	/	/	106,000	106,000	238,800	420,000	420,000	Local VPS providers
Cyber security services	/	/	/	200,000	200,000	420,000	420,000	500,000	Service offeres
Regulatory Compliance	/	/	/	80,000	80,000	80,000	80,000	80,000	Purchases regulatory advice services from the local market
Network services	/	/	/	120,000	120,000	240,000	350,000	500,000	Local market, compliant with hosting service
APIs	/	/	/	40,000	250,000	250,000	250,000	500,000	application programmable interfaces for view optimization and Local E-pay api
UI / UX	/	/	/	20,000	40,000	65,000	-	-	user interface and user experience designer service
Patent and Intellectual Property	/	/	/	0	0	0	0	0	Difficult to estimate but will be included
Domain names	/	/	/	30,000	150,000	150,000	150,000	150,000	Local providers for domain name registrations
Routing AI model	/	/	/	-	-	300,000	-	-	artificial intelligence model for specific routing use cases
Profiling AI model	/	/	/	-	-	-	400,000	-	artificial intelligence model for advanced user profile routing
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1,186,000</b>	<b>1,658,500</b>	<b>2,598,800</b>	<b>4,635,000</b>	<b>7,280,000</b>	

Figure 5.1: Intangible assets.

- Physical installations such as servers, computers, offices, cabinets, etc...

DZD	history			forecast					Source
	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5	
High-end PC & upgrade	/	/	/	450,000	300,000	300,000	1,000,000	400,000	Calculated specifications
Mid-end PCs & upgrades	/	/	/	300,000	150,000	150,000	300,000	350,000	Calculated specifications
I.T equipment	/	/	/	40,000	80,000	20,000	20,000	250,000	Calculated specifications
NAS (network attached s	/	/	/	115,000	.	.	.	600,000	Calculated specifications
Networking devices	/	/	/	50,000	20,000	.	100,000	.	routers, 4g modems
Locale equipment	/	/	/	900,000	120,000	120,000	120,000	120,000	Door, Decoration, banner, visual design
Treasury	/	/	/	185,000	160,000	100,000	100,000	100,000	
security cameras	/	/	/	150,000	350,000	20,000	20,000	400,000	Local market
alarm system	/	/	/	200,000	20,000	200,000	150,000	30,000	Local market
extra equipment	/	/	/	150,000	35,000	35,000	35,000	500,000	AC, printers....
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2,540,000</b>	<b>1,235,000</b>	<b>945,000</b>	<b>1,845,000</b>	<b>2,750,000</b>	

Figure 5.2: Tangible assets.

- Other operational costs such as renting an apartment, electricity and gas costs, Algeria Telecom, equipment insurance, headquarters, etc...

	history			forecast				
DZD	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5
Rent and Utilities	/	/	/	2,050,000	2,050,000	2,050,000	2,050,000	2,050,000
Employe benfitis	/	/	/	150,000	350,000	400,000	510,000	630,000
Sponsoring	/	/	/	150,000	350,000	450,000	500,000	600,000
advertisement	/	/	/	400,000	1,000,000	500,000	500,000	1,000,000
maintanance	/	/	/	100,000	250,000	250,000	400,000	700,000
Employee Training	/	/	/	-	-	600,000	600,000	600,000
Insurance	/	/	/	-	-	-	-	-
research assistance l	/	/	/	-	-	-	800,000	800,000
Transportation	/	/	/	30,000	30,000	30,000	30,000	30,000
gas,electricity,water b	/	/	/	220,000	270,000	350,000	350,000	400,000
Content Creation and	/	/	/	70,000	70,000	70,000	70,000	70,000
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3,170,000</b>	<b>4,370,000</b>	<b>4,700,000</b>	<b>5,810,000</b>	<b>6,880,000</b>

Figure 5.3: Other operating expenses.

- Staff expenses:

	history			forecast														
DZD	N-2	N-1	N	N+1			N+2			N+3			N+4			N+5		
				Base salary	Num	TOT	Base salary	Num	TOT	Base salary	Num	TOT	Base salary	Num	TOT	Base salary	Num	TOT
Founders	/	/	/	63,000	3	195,000	100,000	6	600,000	150,000	6	900,000	180,000	6	1,080,000	200,000	6	1,200,000
Markter	/	/	/	42,000	3	126,000	42,000	6	252,000	90,000	6	300,000	90,000	6	300,000	90,000	6	300,000
Accountant	/	/	/	67,000	0	0	67,000	1	67,000	85,000	1	85,000	85,000	1	85,000	85,000	1	85,000
Receptionist	/	/	/	42,000	1	42,000	42,000	1	42,000	90,000	1	50,000	90,000	1	50,000	90,000	1	50,000
Network aid engineer	/	/	/	90,000	0	0	90,000	0	0	125,000	1	125,000	125,000	1	125,000	125,000	1	125,000
AIengineer	/	/	/	80,000	0	0	80,000	0	0	100,000	1	100,000	100,000	1	100,000	100,000	1	100,000
Full stack Aid develop	/	/	/	90,000	0	0	90,000	1	90,000	140,000	2	280,000	140,000	2	280,000	140,000	3	420,000
social media manage	/	/	/	41,500	1	41,500	41,500	1	41,500	95,000	1	55,000	95,000	2	110,000	95,000	2	110,000
CSR (Customer Serv	/	/	/	40,000	1	40,000	40,000	2	80,000	60,000	2	120,000	60,000	2	120,000	60,000	2	120,000
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>			<b>444,500</b>			<b>1,172,500</b>			<b>2,015,000</b>			<b>2,250,000</b>			<b>2,510,000</b>
<b>Yearly total</b>						<b>5,334,000</b>			<b>14,070,000</b>			<b>24,180,000</b>			<b>27,000,000</b>			<b>30,120,000</b>

Figure 5.4: Staff expenses.

## 5.2 Cost, revenue, earning:

**Generating revenue:** A detailed analysis of the expected income from the multitude of services we offer

	history			forecast				
<u>DZD</u>	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5
Costs	/	/	/	12,230,000	21,333,500	32,423,800	39,290,000	47,030,000
Revenue	/	/	/	13,389,600	25,368,000	77,928,000	126,144,000	238,620,000
Earning	/	/	/	1,159,600	4,034,500	45,504,200	86,854,000	191,590,000

Figure 5.5: Costs and Revenues

	history			forecast														
DZD	N-2	N-1	N	N+1			N+2			N+3			N+4			N+5		
				price	Num	total	price	Num	total	price	Num	total	price	Num	total	price	Num	total
direct optimiz	/	/	/	140	270	37,800	100	500	50,000	100	500	50,000	100	500	50,000	100	500	50,000
Tier1	/	/	/	800	225	180,000	800	350	280,000	800	700	560,000	800	1,100	880,000	800	3,000	2,400,000
Tier2	/	/	/	3,200	125	400,000	3,200	220	704,000	3,200	320	1,024,000	3,200	510	1,632,000	3,200	800	2,560,000
Tier3	/	/	/	8,000	15	120,000	8,000	30	240,000	8,000	35	280,000	8,000	45	360,000	8,000	300	2,400,000
optimizations in #	/	/	/	60	3,500	210,000	45	11,000	495,000	45	20,000	900,000	45	30,000	1,350,000	45	55,000	2,475,000
Anon-data	/	/	/	450,000	0	0	450,000	0	0	450,000	1	450,000	450,000	2	900,000	450,000	5	2,250,000
APIs	/	/	/	300	60	18,000	300	150	45,000	300	300	90,000	300	600	180,000	300	1,000	300,000
Custom featur	/	/	/	150,000	1	150,000	150,000	2	300,000	150,000	20	3,000,000	150,000	30	4,500,000	150,000	35	5,250,000
driverProfile	/	/	/			0			0	800	50	40,000	800	200	160,000	800	500	400,000
DP,Ads	/	/	/			0			0	10,000	10	100,000	10,000	50	500,000	12,000	150	1,800,000
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>			<b>1,115,800</b>			<b>2,114,000</b>			<b>6,494,000</b>			<b>10,512,000</b>			<b>19,885,000</b>
Yearly total						13,389,600			25,368,000			77,928,000			126,144,000			238,620,000

Figure 5.6: Sales and related products optimism

# Chapter 6

## The experimental prototype

### 6.1 Brief explanation of the application:

We offer a range of services designed for comprehensive and efficient solutions. Our services are:

#### 6.1.1 Platform Service:

Our Web platform serves as the central hub for clients and companies to manage and optimize their delivery services. Clients and companies create accounts, gaining access to our delivery services. Admins can create two types of accounts — moderators, who influence delivery paths and information, and deliveryman accounts, accessed through a specialized mobile app. This app, integrated with maps, allows deliverymen to efficiently carry out deliveries. Our AI algorithms optimize delivery paths for admins and moderators, ensuring the best routes for delivering orders. The platform enables real-time tracking, providing admins and moderators with the ability to monitor drivers and order statuses.

#### 6.1.2 API Service:

Recognizing the diversity in systems used by companies, we offer a robust API service. This API allows seamless integration with existing systems and applications, providing companies with the flexibility to incorporate our optimized delivery solutions into their unique workflows. By offering this integration service, we empower companies to enhance

their delivery operations without disrupting their established processes.

### 6.1.3 Mobile App for Delivery workers:

Our dedicated mobile app caters to deliverymen, providing a user-friendly interface for efficient delivery operations. Integrated with maps, the app displays optimal delivery paths, allowing deliverymen to navigate through their routes seamlessly. The app also offers the flexibility to modify paths in response to obstacles. Additionally, deliverymen can update the status of each order, marking them as delivered or rejected after completion. This mobile app serves as a dynamic tool, empowering deliverymen with the information and flexibility needed to execute deliveries effectively.

## 6.2 Hardware environment:

We employed a laptop for programming tasks and utilized various smartphones with distinct specifications to conduct thorough application testing.

- LENOVO laptop for programming:
  - Processor : Intel (R) Core (TM) i5-4300U CPU @ 1.90 GHz 2.50 GHz.
  - RAM : 6.00 GB.
  - Type of system : Windows 7 - 64 bits.
- Poco X3 NFC smartphone:
  - Android version : Android 12.
  - RAM : 6.00 GB.
- Samsung Galaxy Note 9:
  - Android version : Android 10.
  - RAM : 6.00 GB.
- Redmi note 10:
  - Android version : Android 12.
  - RAM : 6.00 GB.

## 6.3 Software environment:

### 6.3.1 Android studio:

Android Studio is the official Integrated Development Environment (IDE) for Android app development, based on IntelliJ IDEA. On top of IntelliJ's powerful code editor and developer tools, Android Studio offers even more features that enhance your productivity when building Android apps.

### 6.3.2 visual studio code:

Visual Studio Code is a very powerful code-focused development environment expressly designed to make it easier to write web, mobile, and cloud applications using languages that are available to different development platforms and to support the application development lifecycle with a built-in debugger and with integrated support to the popular Git version control engine.

### 6.3.3 Insomnia:

Insomnia is an open source desktop application that takes the pain out of interacting with and designing, debugging, and testing APIs. Insomnia combines an easy-to-use interface with advanced functionality like authentication helpers, code generation, and environment variables.

## 6.4 Used programming languages:

### 6.4.1 Dart:

Dart is a general purpose programming language. It is a new language in the C tradition, designed to be familiar to the vast majority of programmers.

Dart is purely object-oriented, class-based, optionally typed and supports mixin based inheritance and actor-style concurrency.

### 6.4.2 Flutter:

Flutter is an open-source mobile application development SDK primarily developed and sponsored by Google, used for developing applications for Android and iOS as well as being the primary method of creating applications for the Google Fuchsia operating system.

Flutter is written in C, C++, and Dart, and uses the Skia Graphics Engine. It offers a rich set of fully customizable widgets for building native interfaces, including the beautiful Material Design library and Cupertino (iOS-avored) widgets, rich motion APIs, smooth natural scrolling, platform awareness, and hot reload which helps to quickly build UIs without losing state on emulators, simulators, and any hardware for iOS and Android.

### 6.4.3 Python:

Python is an easy to learn, powerful programming language. It has efficient high-level data structures and a simple but effective approach to object-oriented programming. Python's elegant syntax and dynamic typing, together with its interpreted nature, make it an ideal language for scripting and rapid application development in many areas on most platforms.

### 6.4.4 Django:

Django, a robust web application framework, is crafted in the Python programming language, adhering to the Model-View-Template (MVT) design pattern. Known for its rapid development feature, Django proves to be highly sought after, particularly for its efficiency in quickly transforming client requirements into functional applications.

Renowned for its succinct tagline, "The web framework for perfectionists with deadlines," Django emphasizes precision and speed in application development.

## 6.5 Presentation of graphical interfaces:

### 6.5.1 Website pages:

#### 1- Sign in page:

In Figure 6.1, we observe the sign in page of the website, representing the initial step for users to access the platform. This page serves as the gateway for individuals to input their credentials securely. Users are prompted to enter their information, following which they can initiate the login process by clicking the designated "Sign in" button.

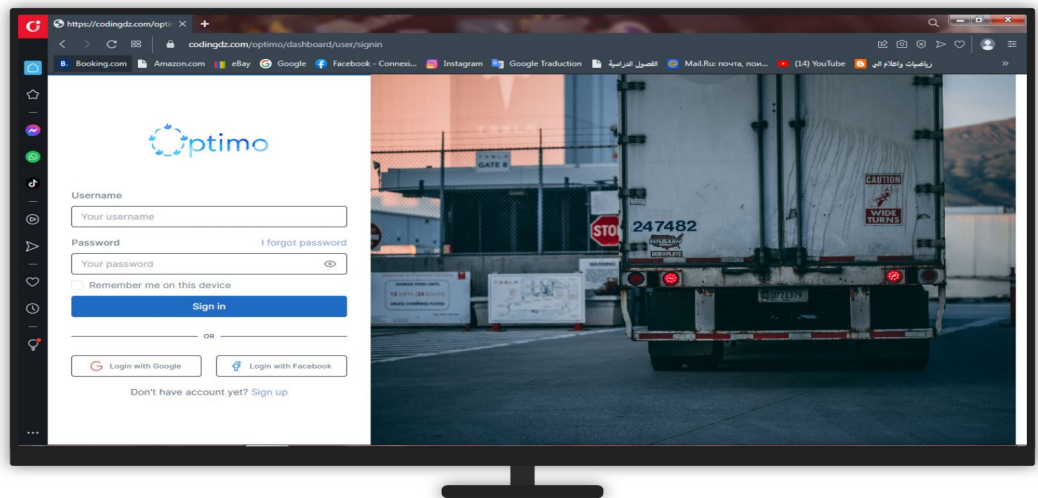


Figure 6.1: Sign in

## 2- Sign up page:

In Figure 6.2, we present the signup page, offering a streamlined process for clients or companies without existing accounts to create one effortlessly. The page prompts users to input their relevant information, ensuring a comprehensive profile creation. Once the required details are filled, users can initiate the account creation process by clicking the "Sign up" button.

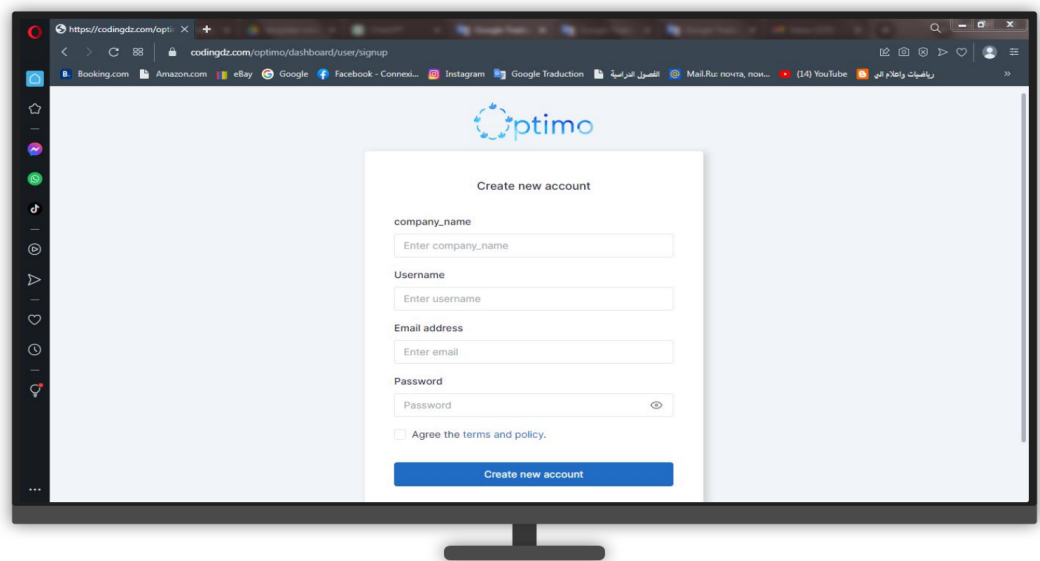


Figure 6.2: Sign up

### 3- Home page:

In Figure 6.3, we unveil the Home page, a comprehensive dashboard that serves as the focal point for overseeing the vital statistics of deliverymen and overall delivery operations. This interface offers a panoramic view of key metrics, providing valuable insights into the performance and efficiency of delivery processes.

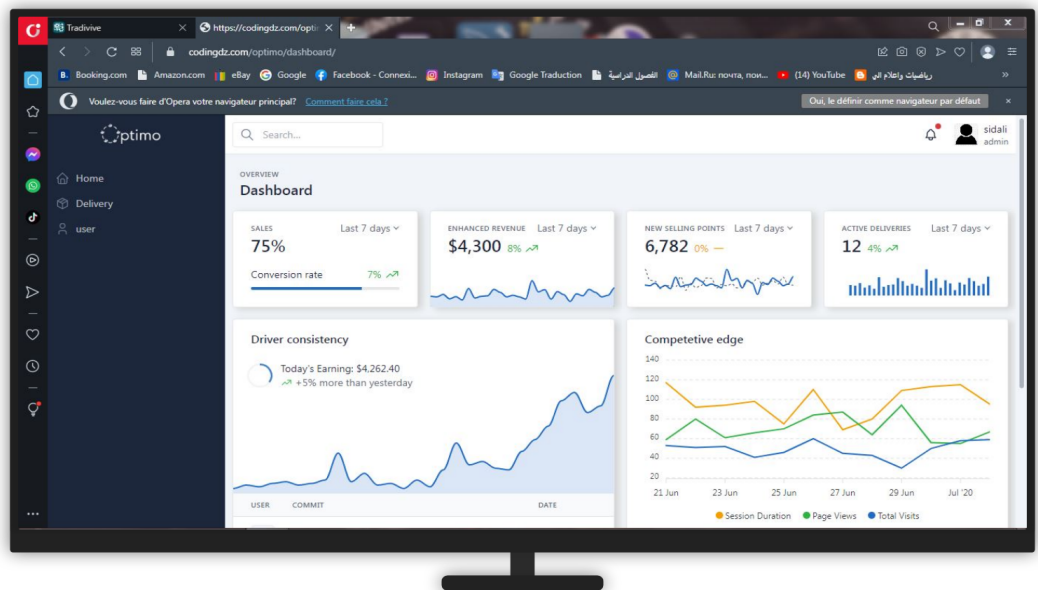


Figure 6.3: Home page

#### 4- Delivery page:

In Figure 6.4, showcases the Delivery Operations Overview, offering a comprehensive display of all ongoing and completed delivery operations. The interface meticulously presents pertinent details such as the status, date, and assigned deliveryman for each operation, facilitating efficient tracking and management. Notably, a prominent feature includes a button allowing the creation of new delivery operations.

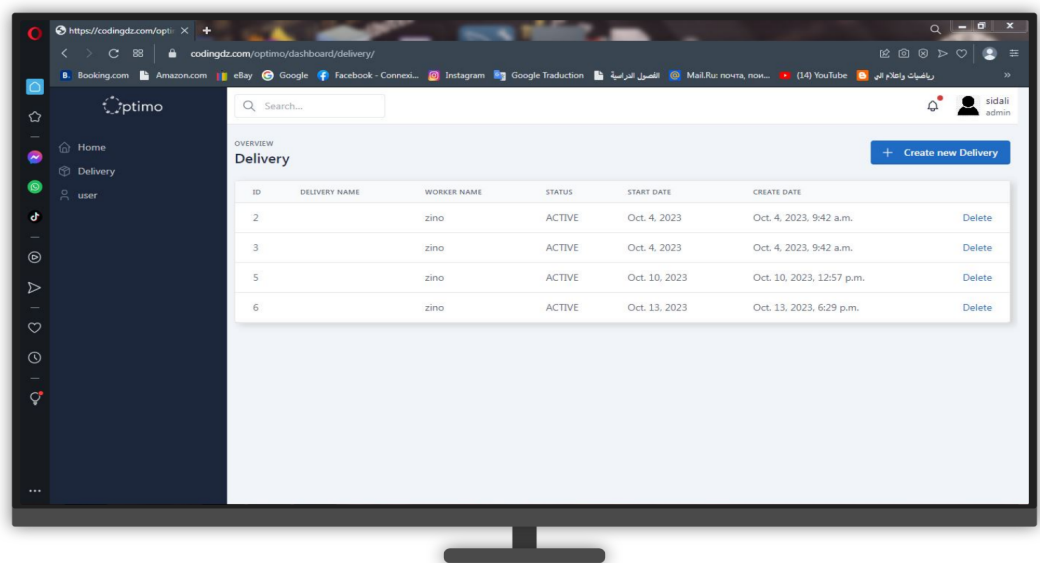


Figure 6.4: Delivery page

## 5- New delivery creation page:

In Figure 6.5, we introduce the Delivery Management page, a powerful tool for administrators and moderators to handle the order placement and optimization of routes. This page facilitates the addition of orders along with their detailed information, offering two convenient methods—utilizing the map for location input or manually entering coordinates. A key feature is the "Optimize Route" button, leveraging our algorithm to dynamically generate the most efficient delivery path for the deliveryman. Once the optimal route is determined, administrators can seamlessly assign the delivery operation to an available deliveryman.

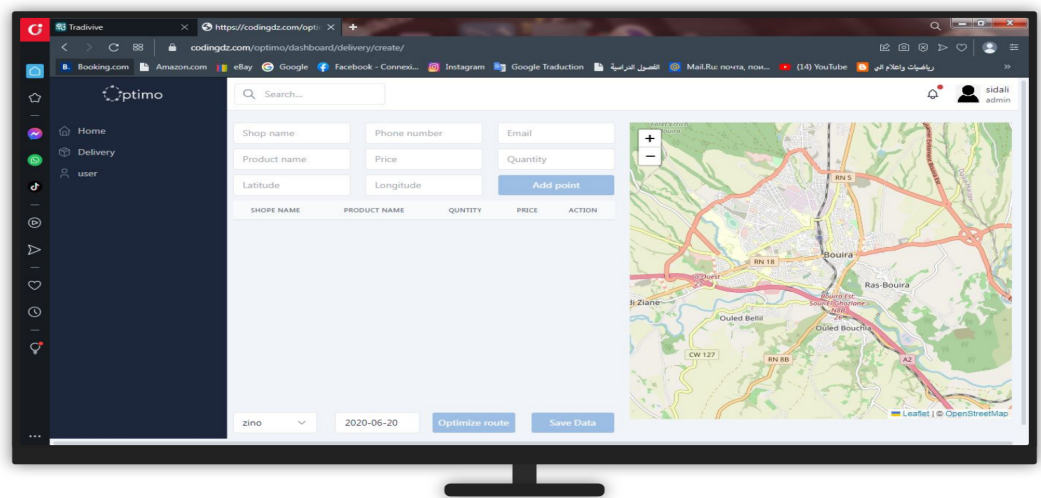


Figure 6.5: New delivery creation page

### 6- Users page:

In Figure 6.6, unveils the Users Page, a centralized platform empowering administrators and moderators to oversee their workforce comprehensively. This interface provides a comprehensive view, presenting all registered workers, allowing seamless management of user accounts. Also, administrators and moderators possess the authority to create new user accounts through "Create User" button.

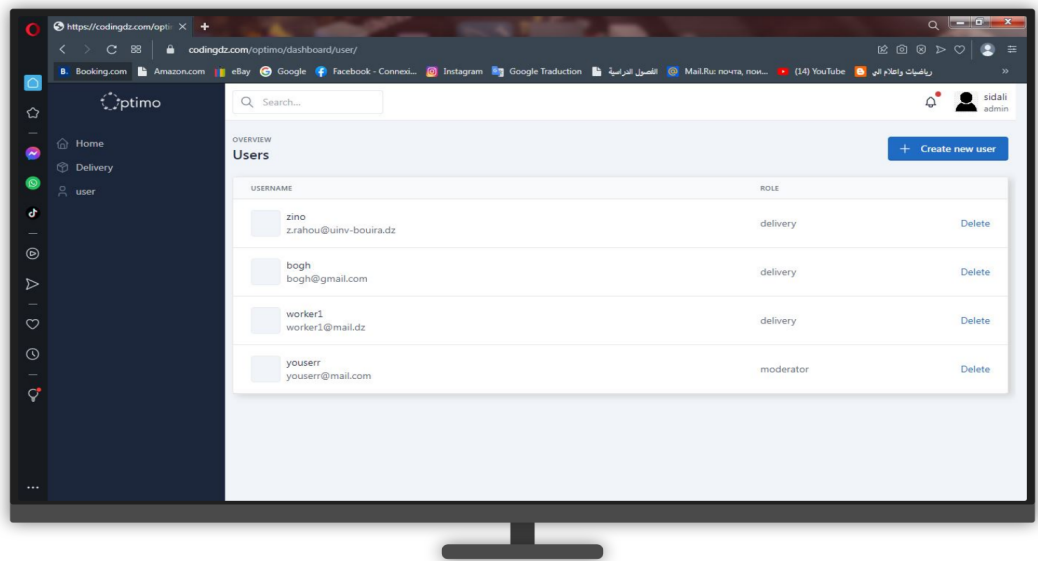


Figure 6.6: Users page

## 7- New user creation page:

In Figure 6.7, introduces the New User Creation Page, a dynamic interface granting moderators and administrators the ability to expand their workforce. This page facilitates the creation of new users, offering a nuanced approach by allowing the designation of two user types: Moderator or delivery worker.

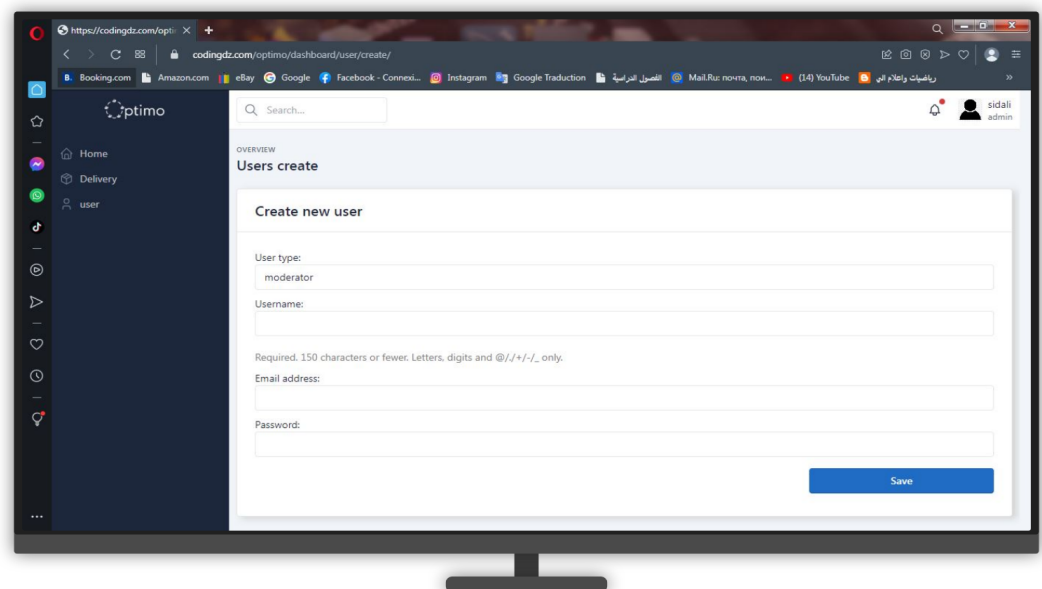


Figure 6.7: New user creation page

### 6.5.2 API:

In Figure 6.8, we present a snapshot of our API Service within the Insomnia platform, showcasing the robust integration capabilities offered by our system. This interface provides a comprehensive view of the API, allowing developers and system integrators to interact with our services seamlessly.

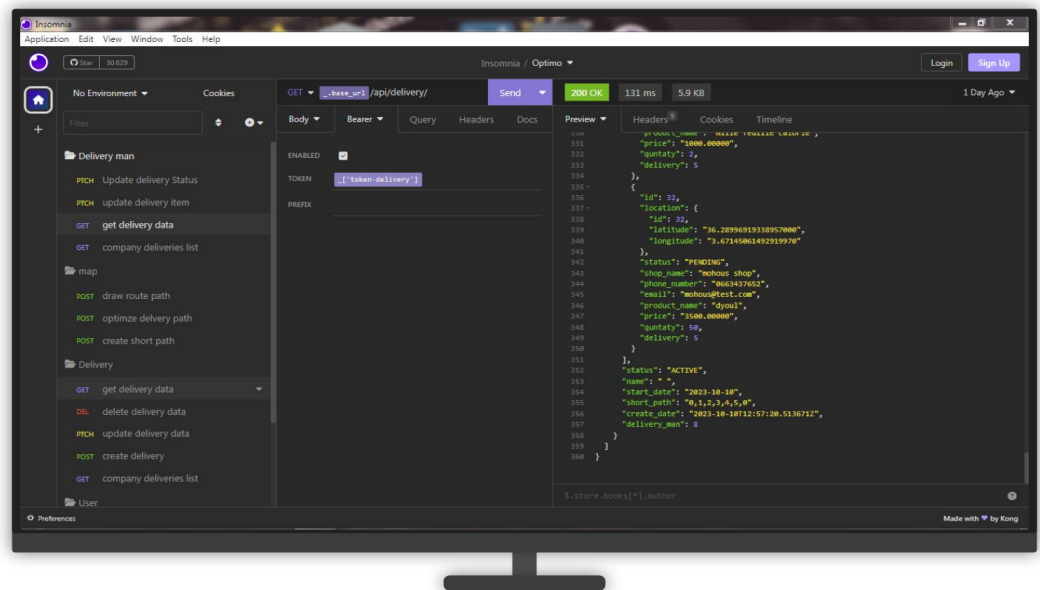


Figure 6.8: API

### 6.5.3 Mobile app interfaces:

#### 1- Splash screen:

In Figure 6.9, captures the loading phase of our application, offering a glimpse into the meticulous process of preparing the state management. This crucial step signifies the initialization of the app, ensuring a seamless and responsive user experience. During this phase, the app establishes a connection with our API, laying the foundation for robust communication and data exchange.



Figure 6.9: **Splash screen**

## 2- Login screen:

In Figure 6.10, we present the App Login Screen, a pivotal entry point for delivery personnel to access our application. This interface is designed for simplicity, requiring deliverymen to input their username and password before clicking the "Login" button to gain access to the app.

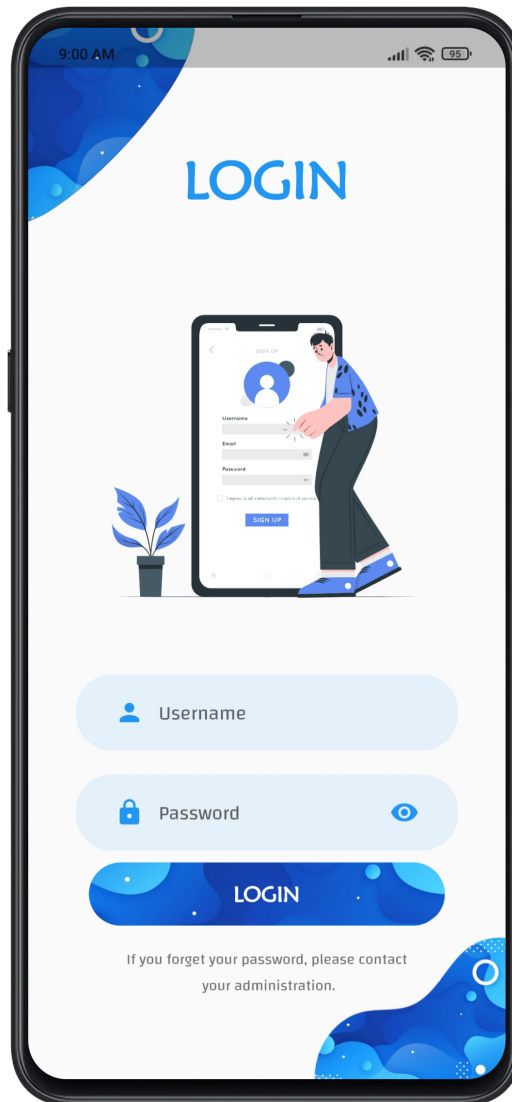
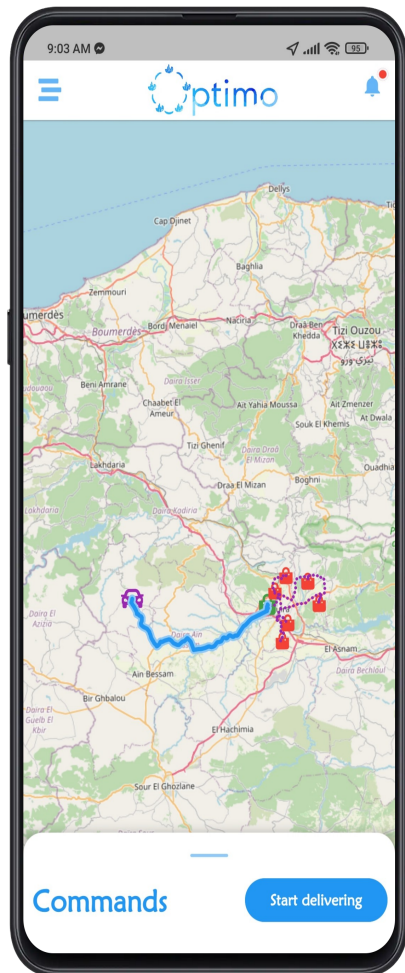


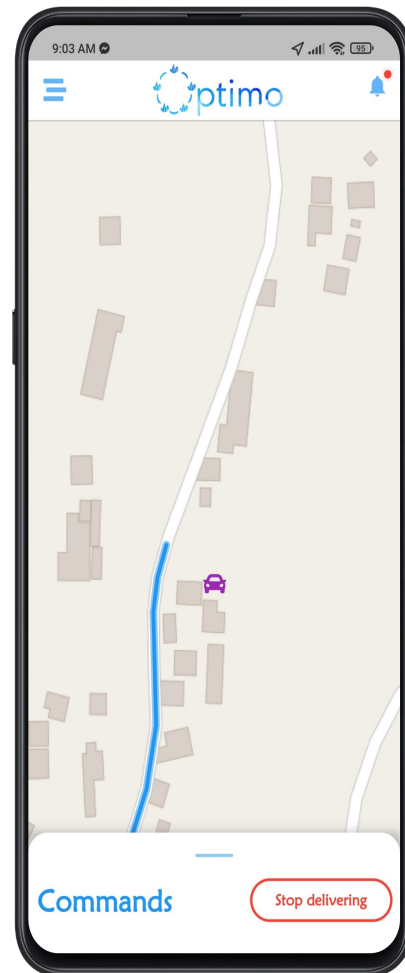
Figure 6.10: Login screen

### 3- Map screen:

In Figure 6.11(a) and 6.11(b), we present the Map Screen, a pivotal component accessible to deliverymen upon logging into the app. This screen provides visual representation of the optimal delivery path, intelligently calculated to guide the deliveryman from their current location to the specified coordinates of assigned orders. Upon clicking the "Start Delivery" button, the app transitions to real-time tracking. The Map dynamically updates to track the driver's live location, offering precise directions and ensuring an efficient and responsive delivery operation.



(a)



(b)

Figure 6.11: Map screen

#### 4- Orders screen:

In Figure 6.12, we unveil the Orders Information and Status interface, a critical component within the app for deliverymen. This screen displays comprehensive information about assigned orders, including crucial details such as Shop name, command id, price, phone number, delivery status, and any relevant notes.

Deliverymen can manage each order by utilizing the "Delivered" button upon successful delivery or the "Canceled" button if a delivery needs to be canceled.

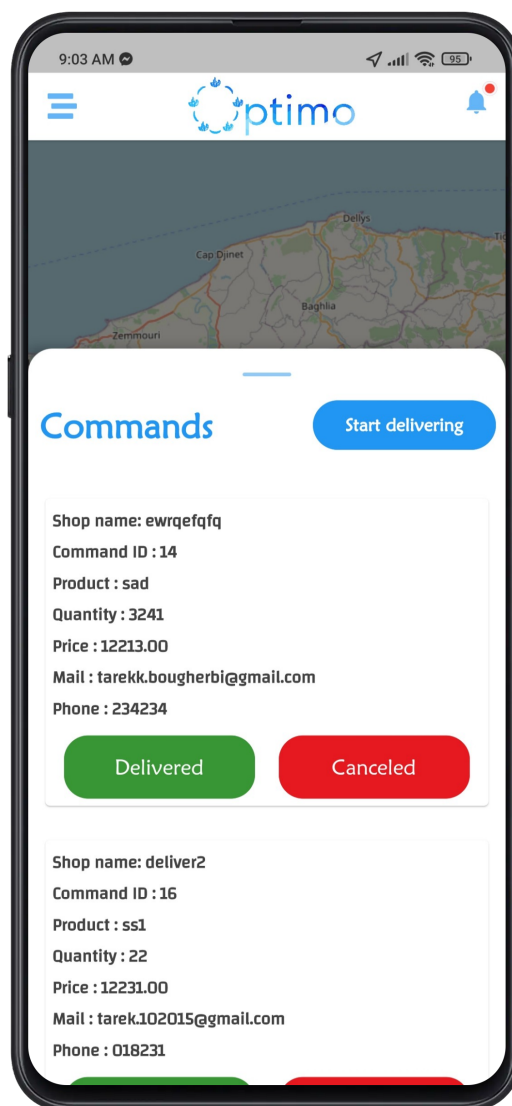


Figure 6.12: Orders screen

# General conclusion

In conclusion, this memoir encapsulates the technical intricacies and economic considerations integral to the development of our online logistics platform. The journey involved a systematic approach to algorithmic design, data analytics, and the integration of artificial intelligence—all directed toward achieving delivery optimization within the supply chains. In essence, we can say that these pages reflect a technical documentation of a venture that successfully harnessed the potential of technology to optimize logistics operations. As our work gets more and more exposition, it will help the development cycle by gaining deeper insight through feedback, offering us the possibility to make it more suitable , enhancing the on-demand feature and perhaps adjusting the less used ones, in addition , we're optimistic that we will be able to implement our future prospects finally launching the startup in the local market .

# Annex

ACTIF									
thousand DZD	REALISATION			PREVISION					
	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5	
Intangible assets	-	-	-	###	1,658,500.00	2,598,800.00	4,635,000.00	7,280,000.00	
tangible assets	-	-	-	254,000.00	1,235,000.00	945,000.00	1,845,000.00	2,750,000.00	
Terrain									
Building									
Other intangible assets									
assets in concession									
Current assets	-	-	-	-	-	-	-	-	
Financial assets	-	-	-	-	-	-	-	-	
equity accounted securities									
Other participations									
Other assets									
Non current financial loans and securities									
Differentiated active taxes									
<b>ACTIF NON COURANT</b>	-	-	-	1,440,000.00	2,893,500.00	3,543,800.00	6,480,000.00	10,030,000.00	
Stocks et outstandings	-	-	-	-	-	-	-	-	
Receivables and similar uses	-	-	-	-	-	-	-	-	
Clients									
Other debtors									
Taxes and similar									
Other receivables and similar uses									
Availability and similar	-	-	-	-	-	-	-	-	
Investments and other current financial assets									
Treasury				###	###	###	###	###	
<b>Current active</b>	-	-	-	5,174,304.00	22,539,624.00	77,788,344.00	150,442,104.00	330,939,904.00	
<b>Total active</b>	-	-	-	6,614,304.00	25,433,124.00	81,332,144.00	156,922,104.00	340,969,904.00	
<b>PASSIF</b>									
	REALISATION			PREVISION					

Figure 13: Budget of a startup(ACTIVE)

PASSIF								
	REALISATION			PREVISION				
thousand DZD	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5
Net capital								
Em.Capital				###	3,000,000.00	3,000,000.00	3,000,000.00	3,000,000.00
NON-called								
Revaluation st.d				1,186,000.00	1,658,500.00	2,598,800.00	4,635,000.00	7,280,000.00
Primes et réserves- Réserves Consolidées								
Net result				4,094,304.00	16,885,320.00	54,768,720.00	72,173,760.00	185,017,800.00
Other capital/new					4,094,304.00	20,979,624.00	75,748,344.00	147,922,104.00
Part de la société consolidante (1)								
<b>Net capital</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>8,280,304.00</b>	<b>25,638,124.00</b>	<b>81,347,144.00</b>	<b>155,557,104.00</b>	<b>343,219,904.00</b>
Non-current passive								
Financial debt				.				
passive tax								
other non current debt								
provision								
<b>Non current passive</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
passive current								
Suppliers and attached account								
Taxes								
other debts								
Passive treasury								
<b>Passive current</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Total passive</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>8,280,304.00</b>	<b>25,638,124.00</b>	<b>81,347,144.00</b>	<b>155,557,104.00</b>	<b>343,219,904.00</b>
verification of passive/active balance								

Figure 14: Budget of a startup(PASSIVE)

En milliers DZD	REALISATION			PREVISION				
	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5
Annexed sales				###	###	###	###	###
finished product stocks variation								
cours								
Im.production								
operating grant								
<b>Accounting production</b>	-	-	-	13,389,600.00	25,368,000.00	77,928,000.00	126,144,000.00	238,620,000.00
Bought consumables				133,896.00	253,680.00	779,280.00	1,261,440.00	2,386,200.00
External services and other consumptions				2,677,920.00	5,073,600.00	###	18,921,600.00	35,793,000.00
<b>Consommation de l'exercice</b>	-	-	-	2,811,816.00	5,327,280.00	16,364,880.00	20,183,040.00	38,179,200.00
<b>Added value</b>	-	-	-	10,577,784.00	20,040,720.00	61,563,120.00	105,960,960.00	200,440,800.00
Personnel expenses				5,334,000.00	1,407,000.00	2,418,000.00	27,000,000.00	3,012,000.00
Taxes & assimilated								
<b>Gross Operating Surplus</b>	-	-	-	5,243,784.00	18,633,720.00	59,145,120.00	78,960,960.00	197,428,800.00
other operational products								
other operational expenses				669,480.00	1,268,400.00	3,896,400.00	6,307,200.00	11,931,000.00
Depreciation charges, Provisions				480,000.00	480,000.00	480,000.00	480,000.00	480,000.00
Reversal of value losses and provisions								
<b>Operating income</b>	-	-	-	4,094,304.00	16,885,320.00	54,768,720.00	72,173,760.00	185,017,800.00
Financial products								
Financial expenses								
financial result								
<b>Ordinary profit before tax</b>	-	-	-	-	-	-	-	-
Tax payable on ordinary income								
Deferred tax on ordinary income								
Total revenue from ordinary activities	-	-	-	-	-	-	-	-
Total expenses for ordinary activities	-	-	-	-	-	-	-	-
<b>Net income from ordinary activities</b>	-	-	-	-	-	-	-	-
Extraordinary items (products)								
Extraordinary elements (charges)								
Extraordinary result	-	-	-	-	-	-	-	-
<b>NET RESULT FOR THE YEAR</b>	-	-	-	4,094,304.00	16,885,320.00	54,768,720.00	72,173,760.00	185,017,800.00

Figure 15: Expected income statement

En Milliers DZD	REALISATION			PREVISION					
	En milliers DZD	N-2	N-1	N	N+1	N+2	N+3	N+4	N+5
Cash flow from operating activities	.	.	.	.	.	.	.	.	.
Net result for the year				4,094,304.00	16,885,320.00	54,768,720.00	72,173,760.00	185,017,800.00	
Adjustments for:									
Amortization and provisions				480,000.00	480,000.00	480,000.00	480,000.00	480,000.00	480,000.00
Variation in deferred taxes									
Stock variation									
Change in customers and other receivables									
Change in suppliers and other debts				.	.				
Capital gains or losses on sale, net of taxes									
Cash flow generated by activity (A)	0	0		4,574,304.00	17,365,320.00	55,248,720.00	72,653,760.00	185,497,800.00	
Cash flow from investment operations	.	.		0	0	0	0	0	0
Disbursements on acquisition of fixed assets				2,400,000.00					5,000,000.00
Collections on disposals of fixed assets									
Impact of variations in consolidation scope (1)									
Cash flows related to investment operations (B)	0	0		- 2,400,000.00	.	.	.	- 5,000,000.00	
Cash flow from financing operations	.	.		.	.	.	.	.	.
Dividends paid to shareholders									
Capital increase/ ASF share									
Capital increase/Startup share									
Injection into associated current account ASF									
ASF capital repayments (in nominal value)									
ASF associated current account reimbursements									
Cash flows linked to financing operations C	.	.		0	0	0	0	0	0
Cash flow variation for the period (A+B+C)	0	0		2,174,304.00	17,365,320.00	55,248,720.00	72,653,760.00	180,497,800.00	
Opening cash flow (Beginning of period)				3,000,000.00	5,174,304.00	22,539,624.00	77,788,344.00	150,442,104.00	
Trésorerie de clôture (Fin de la période)	.	.	.	5,174,304.00	22,539,624.00	77,788,344.00	150,442,104.00	330,939,904.00	
Cashflow variation	0	0	0	5,174,304.00	22,539,624.00	77,788,344.00	150,442,104.00	330,939,904.00	

Figure 16: Treasury accounts

# Annex 2

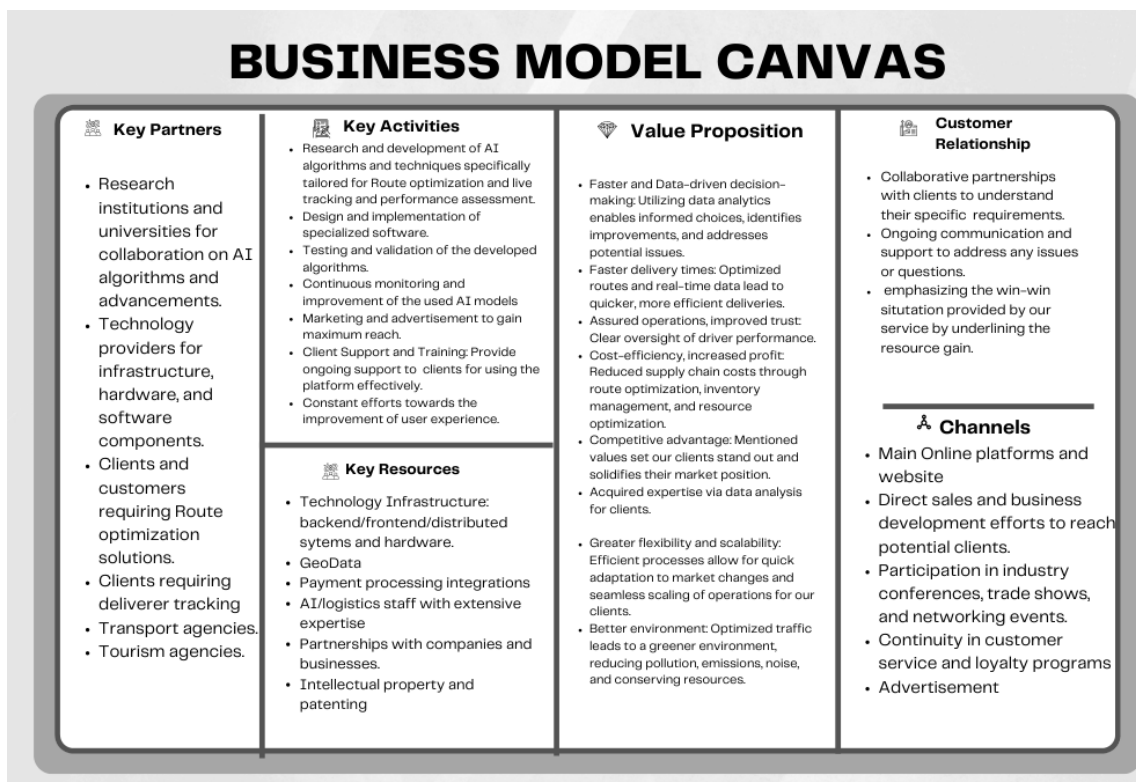


Figure 17: BMC

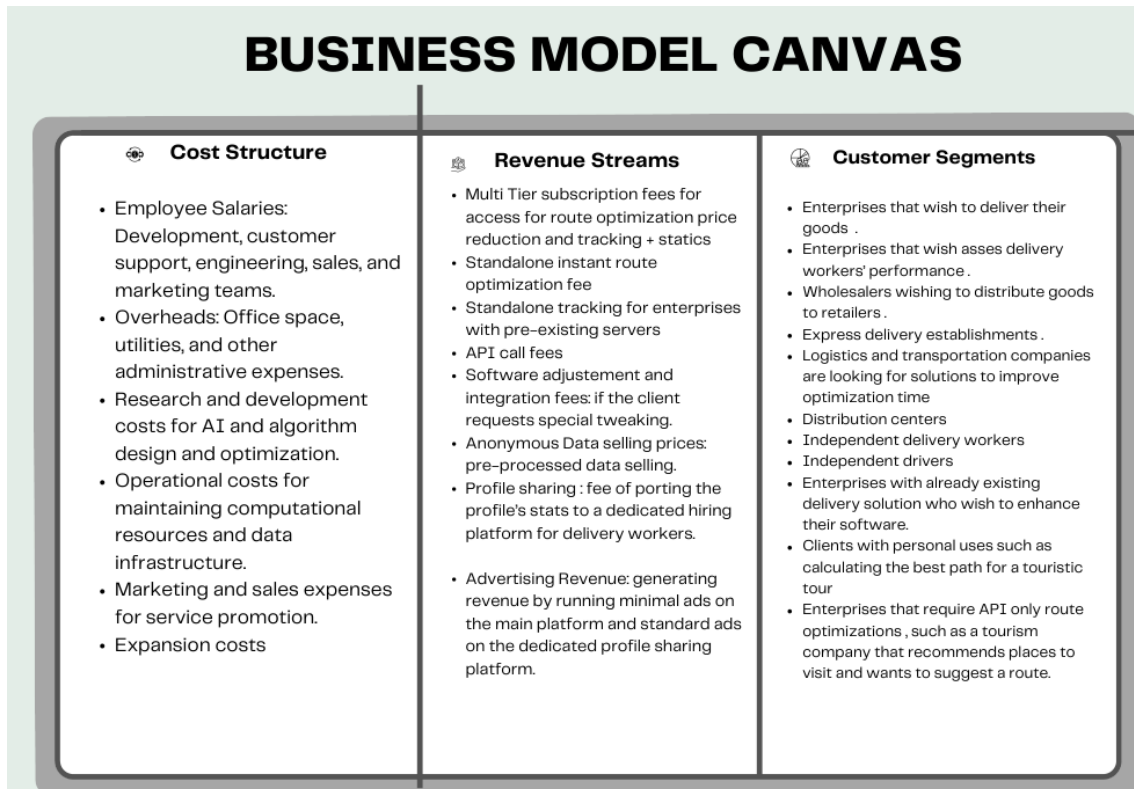


Figure 18: BMC