

**An-Najah National University**

**Faculty of Engineering and Information Technology**

**Department of Industrial and Mechanical Engineering**

**Course Title: Innovation and Entrepreneurship**

**First Semester 2024-2025**

**Action Plan Report**

**Project Name:** Pharma 3D

**Supervisor Name:** Dr.Maryam Hmoudah

**Group number:** 7

**Group Members:**

1. Mohammad Allan
2. Mohammad”Tarq” Fares
3. Farooq Sarrawi
4. Abdulrahman Abu Hasan
5. Muna Yameen
6. Rola Abu Shamma
7. Thraa Hadwi

**Date of submission: 2/11/2024**

**Table of Contents**

[1. Executive Summary 3](#_Toc180524476)

[2. Objectives and strategy of the company 3](#_Toc180524477)

[2.1 Startup Summary (What is the purpose of establishing this company? what problem are you addressing?) 4](#_Toc180524478)

[2.2 Mission - Mission 4](#_Toc180524479)

[2.3 Assumptions 4](#_Toc180524480)

[2.4 Company goals? 4](#_Toc180524481)

[3. Summary of management/core team 5](#_Toc180524482)

[3.1 Required job titles and specializations 5](#_Toc180524483)

[3.2 Proposed organizational structure of the company 5](#_Toc180524484)

[4. Products & Services 6](#_Toc180524485)

[4.1 Description of main products/services 6](#_Toc180524486)

[4.2 Service / Product Mechanism Description 6](#_Toc180524487)

[4.3 Suppliers 6](#_Toc180524488)

[4.4 Key Partners 7](#_Toc180524489)

[5. Market 7](#_Toc180524490)

[5.1 Main industry 8](#_Toc180524491)

[5.2 Geographic coverage areas 8](#_Toc180524492)

[5.3 Industry Analysis 8](#_Toc180524493)

[5.4 General analysis of competitors 8](#_Toc180524494)

[5.5 Pricing 9](#_Toc180524495)

[5.6 Where the product / service is sold: 10](#_Toc180524496)

[5.7 Means of promotion: how the product/service will reach the consumer 10](#_Toc180524497)

[6. Sales 11](#_Toc180524498)

[7. Financial Information 11](#_Toc180524499)

[7.1 Summary of Foundation Costs 12](#_Toc180524500)

[7.2 Summary of operational costs 12](#_Toc180524501)

[7.3 Funding mechanisms 13](#_Toc180524502)

[8. Financial Summary / Cash Flow Table 13](#_Toc180524503)

[9. Economic Indicators 14](#_Toc180524504)

[Financial Statements](#_Toc180524505) 10.

|  |
| --- |
| Executive Summary |

|  |  |
| --- | --- |
| **Pharma 3D** | Name of the proposed company |

**Executive Summary**

|  |
| --- |
| My project involves the design and development of a specialized 3D printing machine for pharmaceuticals, capable of printing customized medications that combine multiple treatments in a single pill. This innovative idea leverages 3D printing technology to meet modern medical needs, offering customized solutions to pharmacies and pharmaceutical companies.  **Product:**  The machine I designed will print multi-component medications based on tailored prescriptions, allowing a single pill to contain more than one active ingredient. I will provide pharmacies and companies with special medical-grade printing materials, compliant with global medical standards. As a mechatronics engineer, I will offer regular maintenance for the machines and continually develop them to meet evolving needs.  **Target Market:**   * **Pharmacies**: They will be able to print customized medications for customers based on doctors' prescriptions. * **Pharmaceutical companies**: These companies might use the technology to produce advanced or customized drugs. * **Hospitals and clinics**: Hospitals can also benefit from this technology to offer more personalized treatments to patients.   **Business Model:**   * **Selling machines** to pharmacies and pharmaceutical companies. * **Providing printing materials** continuously to ensure high-quality production. * **Offering maintenance and upgrades** for machines through service contracts.   **Development and Expansion:**  Initially, I will conduct medical testing in external labs to ensure quality. Later, I plan to establish my own lab for increased control and efficiency. I will collaborate with pharmacy experts to ensure the accuracy and safety of the printed medications.  **Marketing and Launch:**   * I will organize a major launch event upon announcing the product, after securing all necessary licenses from government authorities. * Focused marketing will target pharmacies and pharmaceutical companies through wide advertising campaigns. * I will expand the team gradually, based on the initial success of the project.   **Future Plan:**   * **Continuous development** of the machines based on user feedback. * **Increasing staff** with a focus on hiring experts in both pharmacy and technology. * **Market expansion** to global markets after achieving local success |
| Objectives and strategy of the company |

## Startup Summary :

|  |
| --- |
| The purpose of establishing this company is to offer innovative solutions in the pharmaceutical industry using 3D printing technology, enabling precise and efficient customization of medications. The company aims to address several key problems faced by the healthcare and pharmaceutical sectors, including:   1. **Personalized treatment:** Pharmacies and pharmaceutical companies struggle to provide medications that are tailored to each patient's specific needs. Our technology will allow pharmacies to print multi-component medications in a single pill based on individualized prescriptions. 2. **Cost and waste reduction:** 3D printing can reduce waste of drugs and active ingredients, lowering overall production costs and increasing operational efficiency. 3. **Improved patient experience:** Instead of taking multiple medications for different conditions, patients can take a single, customized pill that combines several treatments, making it easier to adhere to their treatment regimen and improving health outcomes.   The company will focus on developing innovative and technical solutions to meet the growing demands of the pharmaceutical market in a personalized and efficient manner |

## Mission – Mission

|  |
| --- |
| The company's mission is to enhance the quality of healthcare by providing innovative medical solutions through 3D printing technology for pharmaceuticals. We aim to empower pharmacies and pharmaceutical companies to offer personalized medications to patients in an efficient and precise manner, reducing costs, improving medical adherence, and enhancing patient health outcomes. The company is committed to developing sustainable technology and delivering high-quality services that meet the highest medical standards. |

2.3 Assumptions

|  |
| --- |
| In this section, the key assumptions that the project relies on for its success are outlined. The assumptions include:   1. **Demand for Customized Medications:** It is expected that the demand for personalized medications and treatments will increase, as patients and doctors seek more precise solutions to meet specific needs. 2. **Government Regulations and Licenses:** We assume that obtaining government licenses may take some time, but we are confident that we will eventually secure them, allowing us to market the product legally. 3. **Market Adoption of Technology:** The assumption is that pharmacies and pharmaceutical companies will be willing to adopt new technology and invest in purchasing the machines and specialized printing materials. 4. **Production and Development Costs:** It is assumed that the costs of producing and developing the machines and medical materials will be reasonable and allow for viable profit margins. |

## Company goals?

|  |  |  |
| --- | --- | --- |
| 1. **Create a Marketing Plan:** Develop a short-term marketing plan targeting pharmacies and pharmaceutical companies, including creating promotional materials and organizing awareness campaigns. 2. **Build Customer Relationships:** Communicate with potential pharmacies and companies to identify their needs and build strong business relationships in preparation for the launch. 3. **Train the Team:** Prepare the workforce by providing appropriate training on using the machine and the new technologies associated with it. 4. **Launch a Trial Event:** Organize a trial event or presentation to draw attention to the new technology and engage doctors, pharmacists, and potential investors. | 1. **Conduct Tests on the Machine:** Conduct tests to ensure the efficiency and effectiveness of the 3D printing machine for pharmaceuticals after it has been set up. 2. **Obtain Initial Licenses:** Begin the process of obtaining the necessary government licenses within the next few months to ensure compliance with legal standards. 3. **Develop Medical Materials:** Currently working on researching medical materials and preparing them to fit the machine, while conducting necessary analyses in external laboratories to ensure their quality. 4. **Develop Drug Formulations:** Create new drug formulations that meet market needs and test their effectiveness and quality. | **Special/Short-term Goals** |
| based on that feedback to enhance performance and functionality   1. **Increase Brand Awareness:** Implement extensive marketing campaigns to enhance brand awareness and introduce the market to the new technology and its benefits. 2. **Diversify Products:** Explore opportunities to develop new or additional products, such as creating other medications or offering additional services related to 3D printing. 3. **Conduct Market Research:** Conduct market research to better understand customer needs and identify emerging trends in the pharmaceutical and technology industries. 4. **Train and Develop the Team:** Continue to develop the team’s skills through training and professional development programs to ensure the ability to handle new technical challenges. | 1. **Launch the Product in the Market:** Start the marketing process for the machine and customized medical materials, officially introducing them to pharmacies and pharmaceutical companies. 2. **Establish Laboratories After Market Study:** Plan to establish internal laboratories after conducting a market study for a period to better identify needs and market requirements, which will increase operational efficiency. 3. **Expand the Customer Base:** Increase the number of customers from pharmacies and companies through targeted marketing strategies and building strong relationships with healthcare providers. 4. **Develop Improvements to the Machine:** Gather user feedback on the machine and work on improvements | **Medium-term goals** |
| 1. **Form Global Strategic Partnerships:** Build strategic relationships with major global pharmaceutical companies and health organizations to expand impact and drive innovation. 2. **Achieve Market Leadership:** Aim to become a global leader in the 3D printing of pharmaceuticals, enhancing the company’s reputation as an innovator providing high-quality medical solutions. 3. **Sustainability and Social Responsibility:** Develop strategies for environmental and social sustainability within business operations, including using eco-friendly medical materials and contributing to improving healthcare in underserved communities. 4. **Achieve Significant Financial Returns:** Strive for long-term financial returns by diversifying revenue streams and achieving sustainable growth in new markets, while enhancing profitability. | 1. **Expand into International Markets:** Enter regional and international markets, expanding the business beyond the local market, with a focus on countries in need of innovative medical solutions. 2. **Establish a Research and Development (R&D) Center:** Set up an internal R&D center focused on improving 3D printing technologies for pharmaceuticals, developing new drug formulations, and innovating advanced medical solutions. 3. **Diversify Products and Services:** Expand the product portfolio to include other medical solutions based on 3D printing, as well as offering technical support and consultancy services to pharmacies and pharmaceutical companies. 4. **Invest in Advanced Technologies:** Adopt cutting-edge technologies such as artificial intelligence and big data to analyze patient needs and improve the process of developing personalized medications | **Long-term goals** |

|  |
| --- |
| Summary of management/core team |

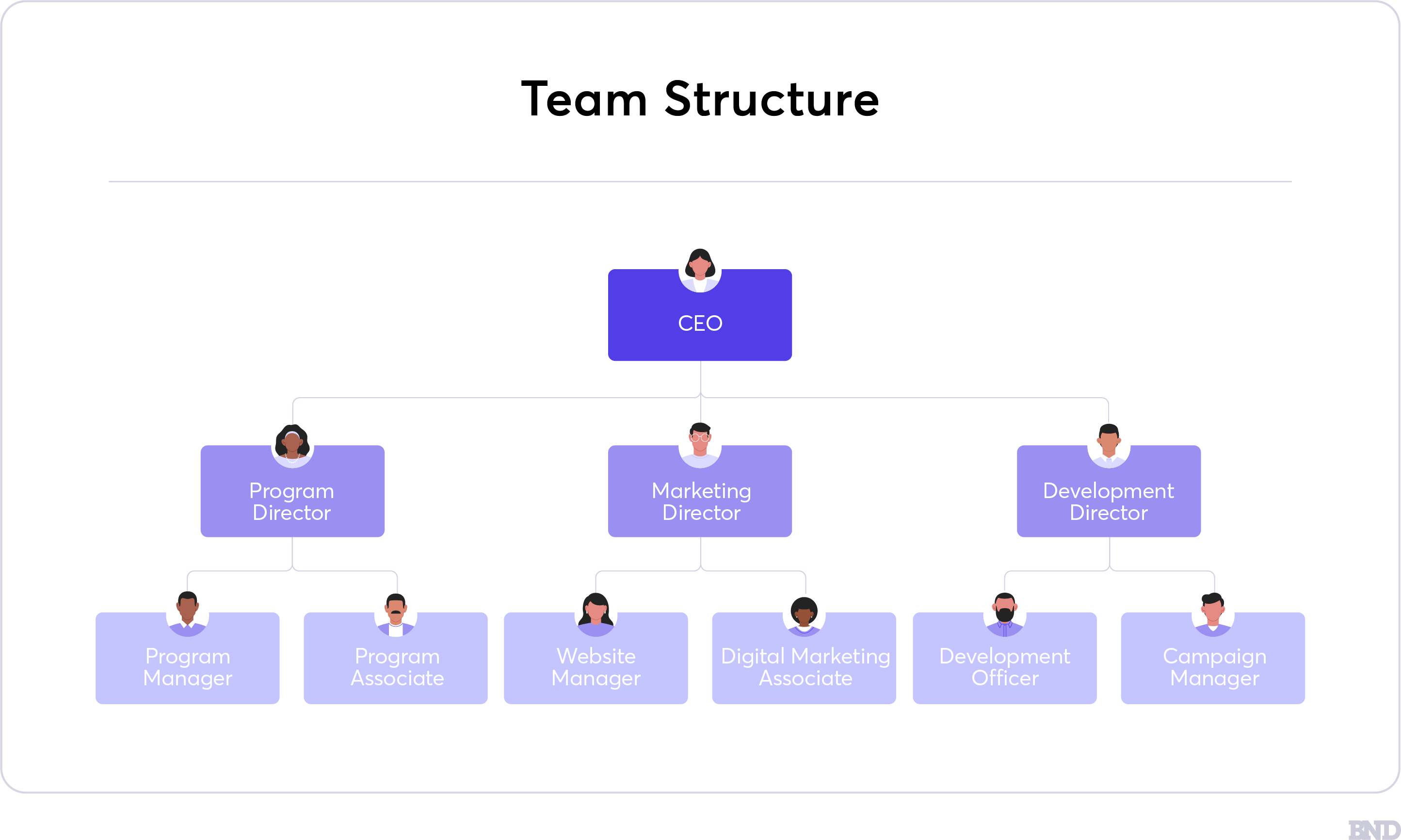
## Required job titles and specializations

|  |  |  |
| --- | --- | --- |
| Number needed | Description of experience and qualifications | Job Title |
| 1-2 | Bachelor's degree in Mechatronics Engineering with experience in automation and machine design, specifically in 3D printing technology. Ability to troubleshoot and optimize mechanical systems. | Mechatronics Engineer |
| 1 | Degree in Pharmacy with experience in drug formulation and pharmaceutical production. Knowledge of regulatory requirements for drug safety and efficacy. | Pharmaceutical Specialist (Pharmacist) |
| 1 | Degree in Biomedical Engineering with expertise in medical materials and device compliance. Experience in adapting materials for 3D printing applications is a plus. | Biomedical Engineer |
| 1 | Experience in pharmaceutical quality assurance and control processes. Familiarity with regulatory standards for pharmaceuticals and medical devices. | Quality Control Specialist |
| 1 | Strong background in pharmaceutical regulatory affairs, with knowledge of government licensing processes and healthcare regulations. | Regulatory Affairs Manager |
| 1 | Experience in pharmaceutical or healthcare marketing, with proven ability to create and execute marketing strategies. Strong network with pharmacies and medical companies is preferred. | Marketing and Sales Manager |
| 1 | Hands-on experience in chemical or pharmaceutical testing. Knowledge of lab protocols and safety procedures is essential. | Laboratory Technician |
| 1-2 | Experience in technical support, preferably in medical or mechanical devices. Ability to troubleshoot issues and provide maintenance guidance to clients | Customer Support Specialist |
| 1 | Experience in pharmaceutical research, specifically in drug formulation development. Knowledge of emerging trends in medical technology is an asset. | Research and Development (R&D) Scientist |
|  |  |  |

**Note:** Initially, I will need a limited number of employees to ensure efficient project operations:

**Marketing and Sales Manager/ Mechatronics Engineer**/**Pharmaceutical Specialist** /**Lab Technician**

## Proposed organizational structure of the company



|  |
| --- |
| Products & Services |

## Description of main products/services

|  |  |  |
| --- | --- | --- |
| **Customer benefit** | **Differentiators/Characteristics (Competitive Advantage)** | **Product/Service** |
| - Allows pharmacies to produce personalized medications on-demand. - Reduces inventory costs by printing as needed. | - Customizable designs to print multi-component medications. - User-friendly interface for easy operation. - High precision and speed in printing. | 1. 3D Printing Machine for Pharmaceuticals |
| - Ensures high quality and safety in printed drugs. - Tailored solutions for unique patient needs. | - Proprietary formulations designed for optimal printing. - Compliance with medical regulations and standards. - Versatile for various types of medications. | 1. Specialized Medical Materials |
| - Ensures smooth integration of 3D printing technology into existing workflows. - Reduces downtime and maximizes efficiency. | - Expertise in both engineering and pharmaceutical fields. - Ongoing support for machine operation and maintenance. - Custom training programs for staff. | 1. Consultation and Technical Support |

## Service / Product Mechanism Description

Processes for Producing the Product or Service

Cooling System

3D Printer

Mixer

Raw materials

Distribution Channels

Storage Facilities

Raw Materials: Specialized polymers, active ingredients, and excipients.

Mixer: Equipment for blending the raw materials thoroughly.

3D Printer: The main equipment for additive manufacturing of medications.

Cooling System: A controlled environment for cooling the printed products.

Storage Facilities: Proper storage for maintaining product quality until distribution.

Distribution Channels: Logistics and partnerships with pharmacies and healthcare providers

## Suppliers

|  |  |  |
| --- | --- | --- |
| Conditions of sale/purchase | Supplier-provided portal |  |
| - Cash sale or credit terms (30-day payment period). - Discounts available for bulk orders. | Raw materials |  |
| - Upfront payment or installments (depending on order size). - Standard lead time of 2 to 4 weeks. | Packaging Material Suppliers |  |
| - Purchase in cash or financing options available. - 1-year warranty with maintenance options. | 3D printing suppliers |  |
| - Cash sale with the option for installment payments (6 months). - Discounts for educational institutions. | PC and Electronic Component Suppliers |  |
| - Cash purchase or deferred payment options (up to 3 months). - Comprehensive training included with purchase. | Device and Equipment Suppliers |  |
| Cash sale or installment plans (up to 12 months). - Custom designs available upon request. | Office Furniture Suppliers |  |
| - Payment upon delivery or negotiated credit terms. - Flexible shipping options based on urgency. | Logistics and Distribution Partners |  |

## Key Partners

## بدنا نعدلو

|  |  |  |  |
| --- | --- | --- | --- |
| **Domain** | **Partner** | **Nature of partnership** | **#** |
| Funding | Mohammed Alhamoud | Partner with capital |  |
|  | bank | Loan Financing |  |
| Distribution | Al Barq Company | Distribution of the product to various Palestinian territories |  |
| Promote |  |  |  |
| ...... etc |  |  |  |

|  |
| --- |
| Market |

## 5.1 Main industry

The company operates in the **pharmaceutical industry**, focusing on **3D printing technology** for the development and manufacturing of medications. This industry includes:

* **Drug Development:** Researching and developing drug formulations using 3D printing techniques to meet market needs.
* **Drug Manufacturing:** Producing medications that contain multiple components, providing customized solutions for patients.
* **Distribution:** Distributing 3D-printed medications to pharmacies and healthcare facilities.

## 5.2 Geographic coverage areas

The company targets the following geographic areas:

1. **Local Market :** Focus on cities and towns within the Palestinian territories to establish a strong local presence and meet the immediate needs of healthcare providers and pharmacies.
2. **Regional Market :** Expand operations to neighboring countries in the Middle East, leveraging regional trade agreements and partnerships to distribute products.
3. **International Market :** Explore opportunities for exporting products to international markets, particularly those with a demand for innovative pharmaceutical solutions.

**Additional Considerations:**

* **Market Research:** Conduct thorough market research to identify specific needs and regulations in each targeted geographic area.
* **Distribution Networks:** Establish effective distribution networks to ensure timely delivery and accessibility of products in the targeted regions.

## **5.3Industry Analysis**

|  |  |  |  |
| --- | --- | --- | --- |
| **High** | **medium** | **Very low** | **Threat** |
|  | 1 |  | Threat to available alternative products |
|  | 1 |  | Threat of future entry of similar/alternative products |
|  |  | 1 | Current competition between existing companies |
|  | 1 |  | Supplier Bargaining Power |
|  | 1 |  | Consumer Bargaining Power |

Conclusion:

The company enjoys a strong competitive advantage due to the weak current competition in the market, as there are no other companies working on the same project. However, caution should be taken regarding the threat of alternative products and the entry of new competitors in the future. The company should focus on leveraging this uniqueness to expand its market share and continuously innovate to maintain its advantage in the future.

## 5.4General analysis of competitors

Currently, there is no competition for the 3D printing machine in the market. However, in terms of pharmaceuticals, our pricing will be competitive because there are no costs for transportation or storage, along with many other advantages that our products offer.

5.5 Pricing

**Pricing Guidelines**

1. **Price Level Limit:**
   * Currently, we are controlling the prices of our products during this period because there is no competition in the market for the 3D printing machine or pharmaceuticals. We will conduct comprehensive market research to understand potential price limits in the future.
2. **Discounts for Specific Segments:**
   * At this stage, we will not offer discounts on prices, as we want to maintain the fair value of our products. Instead, we will focus on providing added value through the quality of the products and services.
3. **Demand Flexibility Compared to Price:**
   * The demand for our products may be somewhat flexible concerning price, especially in the pharmaceutical side. However, at this time, we will not offer any price reductions, as we believe that the value and quality of our products will attract consumers.

5.6 Where the product / service is sold:

 **Selling in Local Stores:**  
We will collaborate with local pharmacies and retail stores to distribute 3D printing machines and pharmaceuticals.

 **Public Markets:**  
Participation in public markets to increase the visibility of our products and make them accessible to consumers.

 **Export Abroad:**  
Exploring opportunities to export products to international markets as demand grows.

 **Selling Online:**  
Establishing an online platform to facilitate the purchasing process and reach more customers.

5.7 Means of promotion: how the product/service will reach the consumer

 **Advertising Campaigns:**  
Launch targeted advertising campaigns through social media platforms and local media outlets to raise awareness about our 3D printing machines and pharmaceuticals.

 **Workshops and Demonstrations:**  
Organize workshops and live demonstrations in collaboration with pharmacies and healthcare institutions to showcase the capabilities and benefits of our products.

 **Partnerships with Healthcare Professionals:**  
Collaborate with pharmacists and healthcare providers to recommend our products to their patients, enhancing credibility and trust.

 **Online Marketing:**  
Utilize SEO strategies, email marketing, and social media marketing to reach a broader audience online and drive traffic to our website.

 **Trade Shows and Expos:**  
Participate in industry-related trade shows and expos to network with potential customers and partners while showcasing our innovative products

6. Sales

**Sales Plan Summary for the 3D Printing of Medications Project Over 10 Years**

1. **Years 1 to 3:**
   * **Launch and Establishment Phase:**
     + Preparing the product and launching it in the local market.
     + Building relationships with pharmacies and medical companies by offering machines on a trial basis.
     + **Sales rate** will be slow at first due to the novelty of the technology.
     + **Marketing** includes promotional campaigns and large launch events targeting local customers.
     + **Expectations**: Selling a limited number of units in the first year with gradual growth over the next two years.
2. **Years 4 to 6:**
   * **Early Growth Phase:**
     + Increasing the spread of machines in the local market and raising user awareness of the technology.
     + **Periodic updates** to machines will contribute to increased revenue by upgrading machines every two years.
     + **Market share** will grow as new users prefer your company due to the widespread presence of your machines.
     + Begin planning for international market expansion.
     + **Expectations**: A significant increase in sales, with exploration of opportunities in regional markets.
3. **Years 7 to 10:**
   * **Maturity and Expansion Phase:**
     + **International expansion**: After achieving stability in the local market, focus will shift to international expansion, starting with regional markets and then global ones.
     + **International competition**: Despite the potential entry of new competitors, your company will remain preferred due to its strong market share and long-standing presence in the local market.
     + **Mandatory updates and maintenance** will continue to provide a key source of revenue through ongoing machine improvements.
     + **Expectations**: A major expansion in the customer base and sustained sales growth in international markets.

**Factors Influencing Sales Growth:**

* **Machine spread**: The more machines spread across local and international markets, the more new users will trust the technology, leading to increased sales.
* **Increasing global demand for medication**: With the growing need for more efficient medication production solutions, your advanced machines will be a distinctive alternative.
* **Updates and maintenance**: Mandatory updates every two years will ensure continuous revenue, along with regular maintenance that increases as the machines age.

**Conclusion:**

* **Local and international expansion** will strengthen the company’s position and ensure sustainable growth.
* **Ongoing revenue** from machine sales, periodic updates, and maintenance.
* The company will achieve sustainable growth over the next 10 years with entry into international markets.

|  |
| --- |
| 7.Financial Information |

## Summary of Foundation Costs

|  |  |  |
| --- | --- | --- |
| Cost | Item | # |
| 5000$ | 3D Printing Machines demo | 1 |
| 7000$ | Electronic Devices | 2 |
| 5500$ | Furniture | 3 |
| 4000$ | Licenses and Permits: | 4 |
| 120000 | Vehicles | 5 |
| 20000$ | The opening event | 6 |
| 161500% | Total |  |

## 7.2Summary of operational costs

Fixed operating costs

|  |  |  |
| --- | --- | --- |
| Cost/Month | Item | # |
| 6500$ | Salaries of employees |  |
| 10$ | Water |  |
| 150$ | electricity |  |
| 65$ | Internet |  |
| 90$ | Insurances |  |
| 100$ | Hospitality |  |
| 1000$ | Rent calculation for the shop |  |
| 7915$ | Total |  |

Variable operating costs

|  |  |  |
| --- | --- | --- |
| Cost/Month | Item | # |
| 100000$ | Raw materials |  |
| 1000$ | advertisements |  |
| 2000$ | Fuel (Gas, Solar) |  |
| 300000$/Year = 25000$/Month | 3D Printing Machines |  |
| 10000$ | Laboratory fees |  |
|  |  |  |
| 138000$ | Total |  |

Summary of operating expenses

|  |  |
| --- | --- |
| 7915$ | Fixed operating expenses |
| 138000 | Variable operating expenses |
| 145915 | Total |

## 7.3Funding mechanisms

|  |  |  |  |
| --- | --- | --- | --- |
| source | Ratio | Amount |  |
| Personal Investment | 50% | 300000$ | Personal criticism |
|  | 0% | 0 | Investors |
|  | 0% | 0 | Grant |
| Bank for 5 years | 50% | 300000$ | Bank |

Note: The bank takes a fixed rate of 3.75% every year

8.Financial Summary / Cash Flow Table

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Net Profit After Tax | Income Tax (15%) | Net Profit | Expenses | Revenue | Foundation Costs | **Year** |
|  |  |  |  | 100000$ | 16150$ | 2024 |
|  |  |  |  | 200000$ | 0$ | 2025 |
|  |  |  |  |  | 0$ | 2026 |
|  |  |  |  |  | 0$ | 2027 |
|  |  |  |  |  | 0$ | 2028 |
|  |  |  |  |  | 0$ | 2029 |
|  |  |  |  |  | 0$ | 2030 |
|  |  |  |  |  | 0$ | 2031 |
|  |  |  |  |  | 0$ | 2032 |
|  |  |  |  |  | 0$ | 2033 |

Hypothesis: The project is 10  **years old**

**Repeat the columns for 10 years in the previous table**

9.Economic Indicators

1. Rate of return

RoR= [ )Net Profit After Tax (​/ (Total Investment)]\*100

2024 : RoR=[(-207415/161500)]\*100 = -128.4%

2025 : RoR=[(45972/161500)]\*100=28.5%

2026:RoR=[(215973/161500)]\*100=133.7%

1. Capital Recovery Period

 **2024:** (−207,415)

 **2025:** (−207,415)+(45,972)=−161,443

 **2026:** (−161,443)+(215,973)=54,530

1. Break-even point

Break-even Point= Total Fixed Cost /[Selling Price per Unit−Variable Cost per Unit]

Achieved in 2025, showing the transition to profitability.

Note: Use the repetitions that are described in the article.

10.Financial Statements

Cash Flow Statement

Income Statement

Balance sheet