Agricultural Drones-as-a-Service

High-Level Feasibility Study

Submitted to:

The Ministry of Digital Economy and Entrepreneurship

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Executive Summary

Agricultural Drones-as-a-Service is a startup aimed at supporting Jordan's agricultural sector through advanced drone technology. Intended to address critical challenges such as water scarcity and the need for increased cop production efficiency, it offers precision spraying, aerial surveillance, and data analysis services to enhance crop yields and sustainability. The service operates on a B2B model, where medium to large-scale farms and agricultural consulting firms form the primary target market, with vast underutilized agricultural land presenting significant opportunities for modernization.

The global agriculture drone market is projected to continue to grow driven by technological advancements and sustainable farming practices. This growth presents an opportunity for the venture to capture market share in Jordan by providing tailored drone services that improve productivity and resource management. The proposed services are precision spraying, aerial surveillance, and data analysis services.

The growing interest in drone technology in Jordan, exemplified by initiatives like the University of Leeds and Hashemite University project and startups like Sager Drone, indicates a market potential for such innovative solutions.

Drones equipped with high-resolution cameras, multispectral sensors, and GPS technology will collect precise data on crop health and environmental conditions. The inhouse software will analyse this data to offer actionable insights. Financial projections indicate profitability with potential for growth over the first five years. The project demonstrates high gross profit margins and a return on investment.

Key recommendations for successful implementation include engaging with regulatory bodies, implementing pilot projects, building stakeholder partnerships, launching marketing and educational campaigns, and investing in continuous research and development.

1. Introduction

Agricultural Drones-as-a-Service is a business start-up aiming to advance Jordan's agricultural sector through the integration of drone technology. This AgriTech start-up seeks to develop the software and deploy drones for aerial surveillance, water irrigation needs, large area crop monitoring, and precision spraying, enhancing crop yields while minimising resource use and labour costs. The proposed solution addresses key challenges in Jordanian agriculture, including water scarcity, the need for increased crop production efficiency, and the sustainable management of agricultural resources including fertilisers and pesticides. Agricultural Drones-as-a-Service's mission is to bring precision agriculture to Jordan and the MENA region, leveraging technology to create a more sustainable and productive agricultural environment.

2. Market Analysis

The agriculture drone market is growing rapidly, with the global market expected to increase from USD 2.61 billion in 2022 to USD 9.01 billion by 2028, at a compound annual growth rate (CAGR) of 22.94%[1]. This growth is driven by the increasing demand for more sustainable agricultural practices and the technological advancements in drone technology. In Jordan and neighbouring countries, where water scarcity and efficient resource management are critical, the economic potential for deploying drones in agriculture could contribute to the modernization of farming practices, potentially boosting the role of the agricultural sector in the national economy.

In Jordan, the target market for the startup includes medium to large-scale farms and agricultural consultants who are increasingly looking for advanced solutions to enhance productivity and sustainability. As reported by JEPA (Jordan Exporters & Producers Association for Fruit & Vegetables) there are 37 million dunums in Jordan that are considered suitable for agribusiness. Currently, less than 12 million dunums are in use. This implies that there is much more room for expansion and investments within the Jordanian agricultural business. The precision agriculture market in Jordan was valued at $1 million in 2018, with an estimated growth of about 12% between 2022 and 2028[2]. The different planned revenue models offer a scalable opportunity, aligning with global trends towards service-based solutions in agriculture. This model is particularly appealing in regions like Jordan, where technological adoption can vary widely between different sizes and types of farms.

The agricultural sector in Jordan has traditionally relied on conventional farming methods with limited use of advanced technology. However, there has been gradual adoption of modern agricultural practices, driven by the need to address challenges such as water scarcity, soil degradation, and the demand for higher crop yields. Technologies such as drip irrigation and greenhouse farming have seen significant uptake in recent year, particularly among medium to large-scale farms.

Drone technology, specifically, is still in its nascent stages within Jordan's agricultural sector. However, there is growing interest in its potential, as evidenced by initiatives like the collaborative project between the University of Leeds and the Hashemite University, which uses drones to tackle drought conditions in the Kingdom[3]. Additionally, startups like Sager Drone[4], are paving the way for broader adoption of drone technology in agriculture, further exemplifying the increasing exploration of innovative solutions to enhance agricultural efficiency in Jordan and the region.

Globally, companies like DJI and Precision Hawk have successfully harnessed drone technology to transform agricultural operations, demonstrating substantial

[1] Arizton Advisory & Intelligence. "Agriculture Drone Market Size, Growth, Demand Report." *Arizton Advisory & Intelligence*, www.arizton.com/market-reports/agriculture-drone-market.

[2] Statista. "Jordan: Revenue of Precision Agriculture Market 2028." Statista, 23 Aug. 2023, www.statista.com/statistics/1410107/jordan-revenue-of-precision-agriculture-market/. Accessed 1 June 2024

[3] https://jordantimes.com/news/local/university-leeds-hashemite-university-develop-project-using-drone-tackle-drought

[4] https://sagerdrone.com/blogs/inside-sager-the-leading-drone-data-solutions-company-in-jordan

improvements in crop yields and operational efficiency[5]. DJI, a leading drone manufacturer based in China, offers a range of agricultural drones designed for tasks such as crop spraying, mapping, and monitoring. Their drones are equipped with advanced features like high-precision Real-Time Kinematic (RTK) navigation, multispectral imaging, and intelligent flight planning, making them valuable tools for modern farmers. DJI's technology has been instrumental in reducing pesticide use, optimising irrigation, and increasing overall farm efficiency.

Similarly, Precision Hawk, a pioneer in the drone and data analytics industry from the United Sates, provides comprehensive solutions for precision agriculture. Their offerings include high-resolution aerial imagery, sophisticated data analysis software, and customised insights to help farmers make data-driven decisions. Precision Hawk's services have enabled farmers to monitor crop health more accurately, detect disease outbreaks early, and manage resources more efficiently.

By drawing inspiration from the successful models of these industry leaders, the service aims to bring similar advancements to Jordan's agricultural sector, leveraging technology to enhance productivity and sustainability.

The startup will introduce drone technology equipped with advanced sensing and imaging capabilities and options. The drones will utilise high-resolution cameras, multispectral and purpose sensors, and Global Positioning System (GPS) technology to provide precise data on crop health, growth patterns, and environmental conditions.

Hardware: The locally manufactured drone frames will be robust, designed to operate in various climate conditions typical of Jordan. They will include control systems and propulsion mechanisms to ensure stable operations[6].

Software: One of the important keys to AGRIDRONE's functionality will be its inhouse developed software systems, which include data management and analytics software and agricultural algorithms and AI integration. These systems will process the data collected during drone flights to generate actionable insights, such as identifying nutrient deficiencies, water stress, or pest infestations. The software will also enable the drones to plan and execute flight paths and spraying routines autonomously based on collected data and needs, maximising area coverage and minimising overlaps and gaps.

Integration Capabilities: The technology will integrate easily with existing agricultural management systems, allowing for data transfer and application. This integration will be critical in providing a holistic view of farm health and aiding in decision-making processes.

This detailed focus on technical capacities ensures that AGRIDRONE can offer a reliable, efficient, and user-friendly solution tailored to the needs and challenges of Jordanian agriculture.

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[5] Allied Market Research. "Agriculture Drones Market Size, Share, Growth | Industry Analysis 2030." *Allied Market Research*, June 2021, www.alliedmarketresearch.com/agricultural-drone-market.

[6] Fortune Business Insights. "Agriculture Drone Market Size, Share | Industry Analysis, 2027." *www.fortunebusinessinsights.com*, Apr. 2024, www.fortunebusinessinsights.com/agriculture-drones-market-102589.

3. Business Model

The venture will operate on a business-to-business (B2B) model, by providing tailored drone services to large and medium-scale farms as well as agricultural businesses in Jordan. This approach allows for customised solutions that meet the needs of each business client.

Service Tiers: The startup will offer different levels of service with each designed to suit various operational needs of agricultural businesses. These services will range from basic aerial surveillance to advanced crop spraying and detailed crop health analysis. This multi-service approach enables clients to select services that align with their specific agricultural operations and strategic goals.

Additional Revenue Streams: Apart from direct service fees, the venture will generate additional revenue by selling high-value agronomic data reports to agricultural researchers and government agencies. These reports will provide insights into larger-scale environmental conditions and crop growth patterns. Furthermore, the startup may offer training services for drone operation and data interpretation, adding an educational dimension to its offerings at a later stage.

Partnership Opportunities: To enhance its service capabilities, the startup will seek partnerships with agricultural equipment suppliers, software developers, and local universities. These collaborations will support technology integration and foster research initiatives, opening additional revenue channels and enhancing the overall service offering.

The proposed products or service are:

- **Aerial Surveillance**: This service uses drones equipped with high-resolution cameras to monitor crop conditions and other parameters across farming areas efficiently. Enabling quick identification of issues including pest infestations or water inconsistencies, saving time and reducing the need for on ground inspections**.**
- **Crop Spraying**: The drones will be used to precisely apply fertilisers and pesticides, ensuring targeted treatment and reducing waste and environmental negative impacts. This method is especially effective in hard-to-reach areas, improving coverage and accurate treatment efficiency.
- **Data Analysis and Reporting:** Drones will collect detailed agricultural data, which can be analysed to provide insights into crop health, soil conditions, and moisture levels and irrigation needs. These reports can support informed decision-making, helping farmers enhance yield predictions and optimise sustainable crop management practices.

These services are designed to work together, offering comprehensive solutions to modernise and improve the farming operation.

The revenue projections for the first five years of the start-up show a significant increase across the three main services: Aerial Surveillance, Crop Spraying, and Data Analysis and Reporting. Each service shows growth in demand over the five years:

- **Aerial Surveillance**: Quantity demand increases from 75 to 200 dunums, with stable pricing leading to revenue growth from JOD 37,500 in Year 1 to JOD 100,000 in Year 5.
- **Crop Spraying**: More growth in demand, doubling or more every year from 40 to 150 dunums, with corresponding revenue increases to JOD 75,000.
- **Data Analysis and Reporting**: Starts with a smaller base but shows a consistent increase, with revenue growing from JOD 10,000 to JOD 40,000 in 5 years.

Total revenues show steady growth from JOD 67,500 in Year 1 to JOD 215,000 in Year 5, reflecting on the scaling of operations and market penetration.

Itemised revenues and total annual revenues are summarised in the table below:

Table 1 Revenue projection

Description/year	1	2	3	4	5
Aerial Surveillance (area in dunum)	75	100	125	150	200
Aerial Surveillance (JOD per dunum)	500	500	500	500	500
Subtotal Aerial Surveillance (JOD)	37,500	50,000	62,500	75,000	100,000
Crop Spraying (area in dunum)	40	60	100	125	150
Crop Spraying (JOD per dunum)	500	500	500	500	500
Subtotal Crop Spraying (JOD)	20,000	30,000	50,000	62,500	75,000
Data Analysis and Reporting (unit)	10	10	15	30	40
Data Analysis and Reporting (JOD per unit)	1000	1000	1000	1000	1000
Subtotal Data Analysis and Reporting (JOD)	10,000	10,000	15,000	30,000	40,000
Total Revenues (JOD)	**67,500**	**90,000**	**127,500**	**167,500**	**215,000**

The following charts show the product mix by revenue and by quantity. The analysis reveals a balanced distribution between the three product lines, both in terms of quantity and revenue. Aerial Surveillance and Crop Spraying, the flagship products, both reveal growing demand and revenue over the years. Additionally, Data Analysis and Reporting, while representing a small portion of the revenue is an added value to the product portfolio.

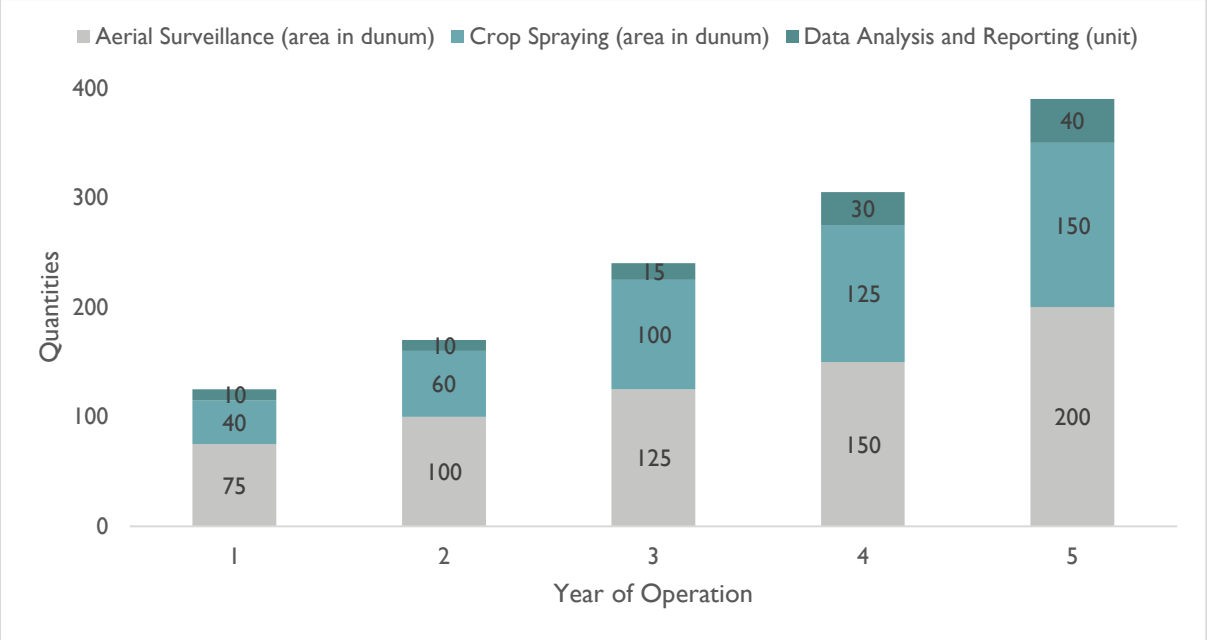

Figure 1: Product Mix by Quantity

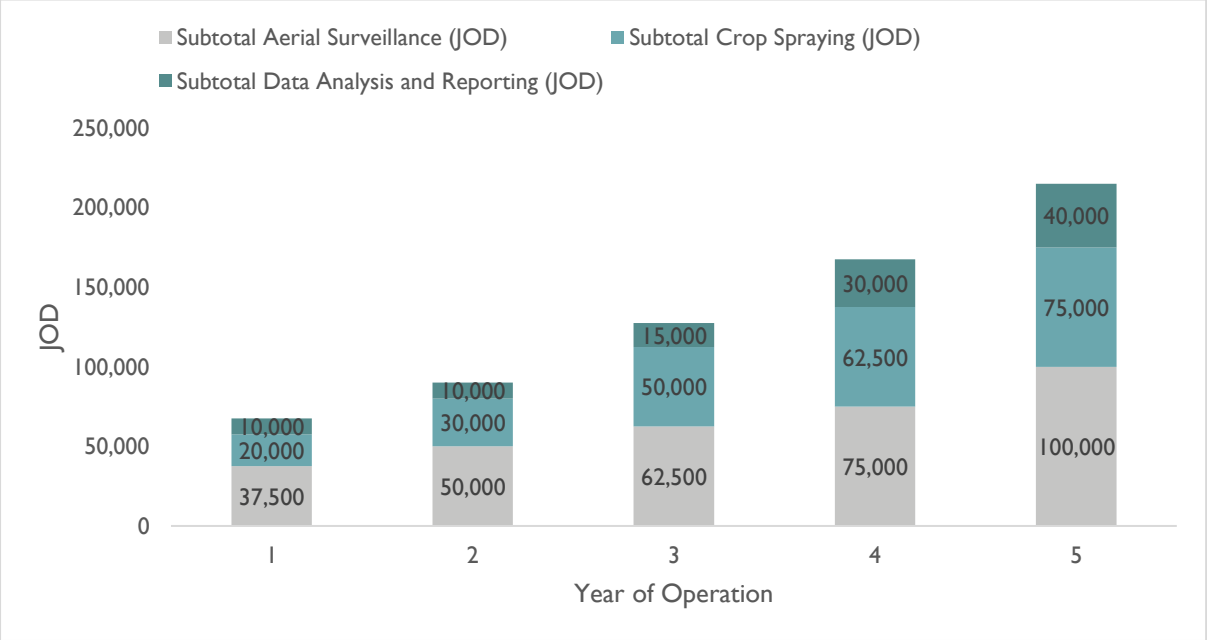

Figure 2: Product Mix by Revenue

4. Technical Analysis

The cost of goods sold (COGS) for each service are aligned with the quantity demanded, showing controlled costs across the services:

- **Aerial Surveillance**: COGS remains relatively low compared to revenue, growing from JOD 750 to JOD 2,000, suggesting a high gross margin for this service.

- **Crop Spraying**: This service has higher COGS, ranging from JOD 2000 in Year 1 to JOD 7,500 in Year 5, tracking with the increased demand and revenue.
- **Data Analysis and Reporting**: COGS is minimal, indicating that this service is highly profitable with low variable costs.

The total COGS increased from JOD 2,850 in Year 1 to JOD 9,900 in Year 5, which is a modest increase relative to the growth in revenue, indicating improving operational efficiency and economies of scale.

The table below outlines the projected COGS over five years:

Table 2: Cost of Goods Sold – Five Year Projection

Description / Year	1	2	3	4	5
Aerial Surveillance (dunums)	75	100	125	150	200
Aerial Surveillance (JOD per unit)	10	10	10	10	10
Subtotal Aerial Surveillance (JOD)	750	1,000	1,250	1,500	2,000
Crop Spraying (dunum)	40	60	100	125	150
Crop Spraying (JOD per dunum)	50	50	50	50	50
Subtotal Crop Spraying (JOD)	2,000	3,000	5,000	6,250	7,500
Data Analysis and Reporting (unit)	10	10	15	30	40
Data Analysis and Reporting (JOD per unit)	10	10	10	10	10
Subtotal Data Analysis and Reporting (JOD)	100	100	150	300	400
Total COGS (JOD)	2,850	4,100	6,400	8,050	9,900

Team composition is stable throughout the years, with an increase in drone operators from 1 to 6 in Year 5 as the business grows. Specialised roles in drone operations, agricultural science, data analysis, and development are essential to the operation of startup, however the operation is not labour intensive.

Table 3: Manpower recruitment plan – five-year projection:

Title / Year	1	2	3	4	5
CEO	1	1	1	1	1
Drone operator	1	2	4	5	6
Agricultural Scientist	1	1	1	1	1
Data analyst	1	1	1	1	1
Developer	1	1	1	1	1
Total Headcount	**5**	**6**	**8**	**9**	**10**

The table below provides an overview of human resource costs, accounting for social security and health insurance expenses. Social security contributions were computed at 14.25% of the gross salary, following the guidelines set by the Social Security Corporation.

Table 4: Manpower total cost – five-year projection

Title / Year	1	2	3	4	5
CEO	14,400	15,120	15,876	16,670	17,503
Drone operator	5,400	11,340	23,814	31,256	39,382
Drone operator	5,400	5,670	5,954	6,251	6,564
Agricultural Scientist	5,400	5,670	5,954	6,251	6,564
Data analyst	5,400	5,670	5,954	6,251	6,564
Total HR Salaries (JOD)	**36,000**	**43,470**	**57,551**	**66,679**	**76,577**
Social Security Cost (JOD)	**5,130**	**6,194**	**8,201**	**9,502**	**10,912**
Health Insurance Cost (JOD)	**1,500**	**1,800**	**2,400**	**2,700**	**3,000**
Total HR Cost (JOD)	**42,630**	**51,464**	**68,151**	**78,881**	**90,489**

The setup costs for Agricultural Drones-as-a-Service will include the purchase of drone hardware, software development, and establishing the operational infrastructure. Additionally, expenses related to regulatory compliance and initial marketing efforts to introduce the service to the Jordanian market will be significant and based on the services provided.

Significant initial investments are planned in Year 1 with JOD 30,000 allocated to drones and accessories, a vehicle, and initial research and development (R&D), followed by JOD 10,000 annually in drones and accessories. Total capital expenses (CapEx) of JOD 50,000 are critical for establishing the necessary operational capacity to deliver the projected services.

Table 5: Capital Expenditures Cost – five-year projection

Description / Year	0	1	2	3	4	5
Drones and accessories	10,000		10,000		10,000	
Car	10,000					
Initial R&D	10,000					
Total CapEx (JOD)	**30,000**	**0**	**10,000**	**0**	**10,000**	**0**

5. Financial Analysis

5.1. Financial Study Assumptions

The feasibility study is based on the following key assumptions:

Discount Rate: The study employs a conservative discount rate of 14%, reflecting a cautious approach to valuation.

Financing Structure: The project is entirely financed by equity. This conservative approach avoids the financial leverage and thus underestimates project value, given the lower cost of debt compared to equity.

Terminal Value: The project assumes a zero-terminal value at the end of year five, aligning with the study's conservative outlook.

Cash Flow Projection: Cash flows beyond year five are excluded from the analysis, focusing on the initial project phase.

Tax Rate: The assumed tax rate of 0% complies with Jordan's income tax law.

Depreciation Rate: Capital expenditure (CapEx) is depreciated at an annual rate of 20%. Any deviation from this rate may impact projected profitability but not project feasibility, as depreciation is a non-cash expense.

Working Capital Assumptions:

Operational liquidity requirements are guided by the following assumptions:

- **Cash Reserves**: The project will maintain cash equivalent to 30 days of projected annual operational expenses, ensuring robust liquidity management.
- **Accounts Receivable (A/R) Collection Period**: The average collection period for receivables is 45 days, reflecting expected credit sales conversion into cash.
- **Accounts Payable (A/P) Payment Period**: The average payment period for payables is 0 days, indicating the time frame for settling supplier obligations.
- **Inventory Management**: Inventory levels will be maintained to cover an average of two months of sales quantity, ensuring optimal stock levels to meet demand efficiently.

Capital expenditures expected to be incurred in the first year were included as part of the initial costs of the project.

Provisions were made within the initial cost to cover any potential negative net free cash flow that may arise during the first five years of operation, if needed.

5.2. Financial Study:

5.2.1. Projected Working Capital

This table shows that the net working capital needed for the project for the first year of operation is JOD 13,033, which has to increase steadily year over year to reach JOD 37,179 in the fifth year of operation. The steady increase in the working capital comes to cover the rapid increase in the project operations and mainly the increase in the projected revenues.

Table 6: Working capital projection (JOD)

Description / Year	1	2	3	4	5
Cash	4,120	4,967	6,497	7,471	8,654
Cash Accounts Receivable (A/R)	8,438	11,250	15,938	20,938	26,875
Inventory	475	683	1,067	1,342	1,650
Accounts Payable (A/P)	-	-	-	-	-
Net Working Capital	13,033	16,900	23,501	29,750	37,179
Changing in Working Capital		3,867	6,600	6,249	7,429

5.2.2. Project Initial Cost

The project's initial cost is projected to be JOD 43,033, consisting of JOD 30,000 as CapEx and JOD 13,033 as working capital.

Table 7: Initial Cost Summary (JOD)

Description/Year	JOD
CapEx	30,000
Provisions for first year(s) negative net cash flow	
Net working capital	13,033
Total Initial Cost	**43,033**

5.2.3. Projected Income Statement

The projected income statement indicates that the project will generate a profit of JOD 9,205 in the first year of operation. Furthermore, net profits are expected to increase gradually over the study period, reaching JOD 91,250 in the fifth year of operation.

Table 8: Projected Income Statement (JOD)

Description/Year	1	2	3	4	5
Total Revenues	67,500	90,000	127,500	167,500	215,000
COGS	2,850	4,100	6,400	8,050	9,900
Gross Profit	**64,650**	**85,900**	**121,100**	**159,450**	**205,100**
OpEx	49,445	59,603	77,959	89,651	103,850
Net Profit Before Tax and Depreciation	**15,205**	**26,297**	**43, 141**	**69, 799**	**101,250**
Depreciation	6,000	8,000	8, 000	10,000	10,000
Net Profit Before Tax	**9, 205**	**18,297**	**35, 141**	**59, 799**	**91,250**
Tax Expense	-	-	-	-	-
Net Profit	**9,205**	**18,297**	**35,141**	**59,799**	**91,250**

In the first year of operation, the project is expected to generate positive profit margins, and revenue growth will increase the gross and net profit margins in the following years. In the fifth year of operations, the gross profit margin is expected to be 95.4%, and the net profit margin is 42.4%.

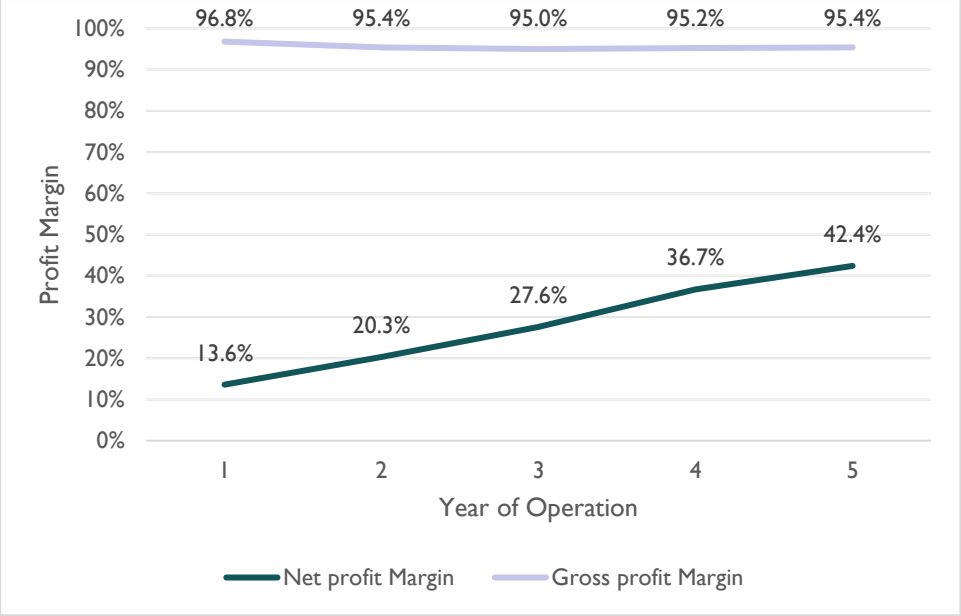

Figure 3: Gross vs Net Profit Margin

On the asset management side, the study shows that the return on investment will increase steadily from 21.4% in the first year of operation to 144.8% in the fifth year.

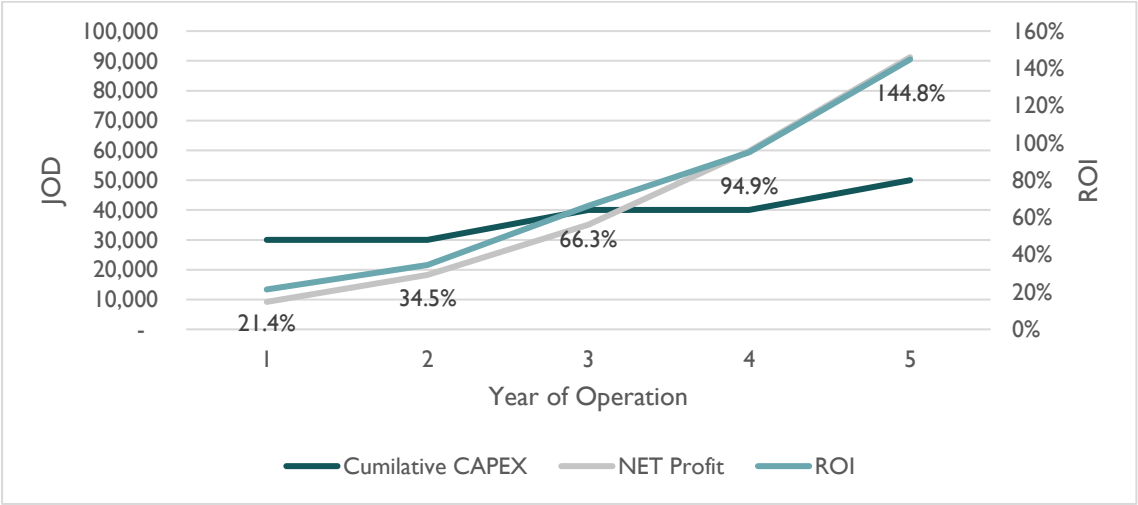

Figure 4: Return on Investment

5.2.4. Projected Free Cash Flow Statement

The table below demonstrates that the project can generate a positive free cash flow from the first year of operation, JOD 11,830. Moreover, due to the projected expansion in business operations, the project is expected to generate a steady positive net free cash flow growth in the following years. By the end of your five, the projected free cash flow is expected to reach JOD 83,071.

Table 9: Free Cash Flow (FCF) Projection (JOD)

Description/Year	0	1	2	3	4	5
Cash-in Flow						
Net Profit		5,830	13,797	28,766	51,424	80,500
Depreciation		6,000	8,000	8,000	10,000	10,000
Injected Capital	43,033					
Total Cash-in Flow	**43,033**	**11,830**	**21,797**	**36,766**	**61,424**	**90,500**
Cash-out Flow						
Initial Cost	43,033		10,000	.	10,000	.
Changes in Working Capital			3,867	6,600	6,249	7,429
Total Cash-out Flow	**43,033**	**-**	**13,867**	**6,600**	**16,249**	**7,429**
Free Cash Flow	**-**	**11,830**	**7,930**	**30,166**	**45,175**	**83,071**

Based on these results, the project's feasibility indicators demonstrate its viability, with a net present value of JOD 84,966 and a profitability index of 2.97. Moreover, the project's internal rate of return (IRR) is expected to be 56.75%, indicating feasibility is not sensitive to changes in market conditions.

5.3. Sensitivity Analysis

To assess the project's sensitivity to market conditions, a sensitivity analysis was conducted involving six unfavourable scenarios:

- Decrease projected revenues by 5% while keeping other variables constant.
- Decrease projected revenues by 10% while keeping other variables constant.
- Increase operational expenditure by 5% while keeping other variables constant.
- Increase operational expenditure by 10% while keeping other variables constant.
- Increase initial costs by 5% while keeping other variables constant.
- Increase initial costs by 10% while keeping other variables constant.

Table 10: Sensitivity analysis outcomes

Sensitivity Scenario	Net Present Value (NPV)	Profitability Index (PI)	Internal Rate of Return (IRR)
Original case	84,966	2.97	56.75%
Drop in revenues by 5%	63,698	2.48	46.96%
Drop in revenues by 10%	42,431	1.99	36.69%
Increase in OpEx by 5%	72,173	2.67	50.45%
Increase in OpEx by 10%	59,380	2.37	44.13%
Increase in initial cost by 5%	82,815	2.83	54.31%
Increase in initial cost by 10%	80,663	2.70	52.05%

The sensitivity analysis shows that the project is feasible and not sensitive to unfavourable market conditions. Under all the above-mentioned scenarios, the project's economic feasibility is strong and viable. The drop-in revenues have a more dramatic impact on the project viability than the increase in the OpEx or initial cost by the same magnitude. It is recommended that investors check and further study the market to ensure that the projected revenues are achievable within the thresholds of the proposed initial cost and operational expenditures.

6. Integration with Other Sectors

The startup's services are not only pivotal for direct agricultural applications but also hold potential for integration with other sectors, enhancing its utility and marketability. This integration can drive innovation and efficiency in various ways:

Government and Policy Making: Data gathered by Agricultural Drones-as-a-Service can assist government agencies in monitoring agricultural practices, ensuring compliance with environmental regulations, and managing resources more efficiently. This data can be used for policy development, especially in areas related to water usage and crop rotation practices, which are critical in arid regions like Jordan.

Environmental Management: The precise application of pesticides and fertilisers, made possible through drone technology, can reduce runoff and pollution. Environmental agencies could use this data to track the impact of farming on local ecosystems and develop better strategies for sustainable agriculture.

Climate Change: Universities and research institutions can utilise the data provided by the startup for various studies, such as the effects of climate change on crop yields, pest behaviour, and crop disease patterns. This collaboration can also lead to the development of new agricultural technologies and practices.

Technology Development: By integrating with tech companies specialising in AI and data analytics, the startup can enhance its data processing capabilities, providing even more detailed insights to farmers. This could include predictive analytics for crop yields and soil health monitoring, which would be groundbreaking in precision agriculture.

These integrations highlight the multifaceted applications of drone technology in agriculture and beyond, presenting opportunities for cross-sector collaboration that could amplify the benefits of startup's services across Jordan.

7. Entrepreneur Persona

The optimal entrepreneur persona for leading Agricultural Drones-as-a-Service in Jordan would ideally combine several key attributes: technical expertise in drone technology, a deep understanding of agricultural sciences, and strong entrepreneurial skills to navigate and grow in a competitive market.

Technical and Agricultural Knowledge: The leader must have a robust understanding of both the technical aspects of drones, including their operation and maintenance, and the agricultural applications such as crop monitoring and data analysis. This dual expertise will be crucial for aligning the technology with the practical needs of Jordanian farmers.

Entrepreneurial Skills: Strong business acumen is essential for navigating the complexities of starting and scaling a tech-based company in an emerging market. Skills in strategic planning, marketing, and financial management will help establish and expand the business effectively.

Regulatory Navigation: Given the regulatory challenges associated with drone operations in Jordan, particularly concerning security concerns, the entrepreneur should be adept at liaising with government bodies and securing the necessary approvals and compliance.

Vision and Leadership: The ability to inspire and lead a team, driving them towards a shared vision of innovative and sustainable agriculture, will be critical. The leader must also be capable of fostering partnerships and collaborations across various sectors, including government, academia, and industry.

This entrepreneurial profile not only suits the immediate needs of launching the startup but also supports its long-term vision of revolutionising agriculture in Jordan through technology.

8. Stakeholders

The success of this venture in Jordan will hinge on engaging a diverse array of stakeholders, each playing a unique role in the ecosystem:

Farmers and Agricultural Consultants: The primary users of its services, who will benefit directly from enhanced crop management and increased yields. Their feedback will be vital for refining the service offerings.

Government Regulators: Since drone operations can be sensitive due to security concerns, close coordination with regulatory bodies is essential to ensure compliance with local laws and to possibly influence policy adjustments that favour agritech advancements.

Agritech Investors: Financial backers, including venture capitalists interested in sustainable and innovative agricultural solutions, will be crucial for funding the initial setup and scaling of operations. Their involvement will also add credibility to the venture.

Technology Partners: Companies that provide drone hardware, software, or data analysis capabilities could be key partners. Collaborating with tech firms will help it stay at the forefront of technology, ensuring that the services offered are based on the latest advancements.

Academic Institutions and Research Bodies: Partnerships with universities can facilitate R&D and provide a scientific basis for the services offered by the startup. These institutions can also help in validating the data and interpreting the results for better agricultural practices.

Environmental Groups: Collaboration with environmental organisations will help align the startup's operations with sustainable practices, ensuring that the environmental impact of new technologies is minimised.

Engaging these stakeholders effectively will require transparent communication, demonstrations of value, and the cultivation of trust and mutual benefits, all of which are essential for its long-term success.

9. Risk Assessment and Mitigation

Successfully deploying Agricultural Drones-as-a-Service in Jordan entails navigating several risks:

Risk	Impact	Likelihood	Risk Mitigation Technique
Technological Malfunctions	Drones are susceptible to operational failures, which could lead to data loss or inaccurate data collection.	Moderate	Implementing rigorous testing protocols and maintaining high-quality hardware standards will be crucial to mitigate this risk.
Regulatory Challenges	In Jordan, the use of drones is tightly regulated due to security concerns.	Moderate	Building a strong relationship with regulatory authorities and staying abreast of changes in legislation will be essential. Engaging in advocacy for favourable agritech policies could also be beneficial.
Market Adoption Rates	The adoption of new technologies in traditional farming communities may be slow due to scepticism or a lack of technological literacy	Moderate	A comprehensive outreach and education program explaining the benefits and cost savings of using drones in agriculture will be key to overcoming this barrier.

Risk	Impact	Likelihood	Risk Mitigation Technique
Competition	While drone technology in agriculture is still emerging in Jordan, global advancements suggest potential future competition, both locally and from international firms.	Low	Establishing a strong market presence early and continuously innovating will help in maintaining a competitive edge.

Addressing these risks proactively with strategic planning and contingency are important for the smooth operation and long-term sustainability of the venture.

To ensure the successful implementation of the startup, it is important to engage with regulatory bodies by proactively working with the Jordanian authorities. This collaboration will help navigate and potentially influence the regulatory landscape for drones, easing their deployment across farms. Engaging in advocacy for favourable agritech policies could also be beneficial in mitigating regulatory challenges. Additionally, implementing rigorous testing protocols and maintaining high-quality hardware standards will mitigate risks associated with technological malfunctions. Initiating pilot projects in various regions will showcase the technology's benefits, refine the business model based on actual data, and provide a proof of concept for potential customers and investors. Building strategic partnerships with technology providers and universities is also essential. These partnerships will enhance technological capabilities and align the project with national agricultural goals. To address market adoption rates, developing marketing and educational campaigns to raise awareness about the benefits of drone technology in agriculture, targeting farmers, agricultural cooperatives, and agribusinesses. Establishing a strong market presence early and continuously innovating will help in maintain a competitive edge as global advancements suggest potential future competition. Furthermore, continuous investment in research and development is necessary to keep technology offerings competitive as new advancements and competitors emerge.

10. Conclusion

This high-level feasibility study reveals a business opportunity driven by the potential for significant enhancements in agricultural productivity and sustainability through drone technology. As Jordan faces unique challenges such as water scarcity and the need for efficient agricultural practices, the proposed services are highly relevant.

In conclusion, the project demonstrates promising feasibility indicators based on the assumptions formed during the development of this study. Nonetheless, entrepreneurs

are advised to conduct additional analysis on projected demand, initial costs, and operational expenses to mitigate potential risks associated with adverse market conditions that could jeopardize its validity.

Disclaimer

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Founders and investors considering this project are advised to conduct further analysis on projected adoption rates, development costs, and ongoing operational expenses. This additional scrutiny will help mitigate potential risks related to technology challenges, changes in regulations, market penetration, and competitive pressures.

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