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INVESTMENT AND FINANCIAL MODEL FOR THE DEVELOPMENT OF ASAFETIDA PRODUCTION AND EXPORT IN AFGHANISTAN: RISKS, CASH FLOWS AND SCALE-UP STRATEGY

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Abstract — This article develops an investment and financial approach to assessing a project for the cultivation, processing, and export of asafoetida in Afghanistan. The study is based on an initial business plan containing five-year forecasts, a structure of initial investments, a personnel model, a marketing strategy, and a risk analysis. It is shown that the specifics of the project are determined by the long biological cycle of the crop, a high need for initial financing, and the need for simultaneous investments in land, processing, quality, and export infrastructure. The author's "4 F - Hing" model is proposed: Finance, Farming, Factory, Foreign Market — and a system of benchmarks for liquidity, investment sustainability, and export performance. The use of phased financing, scenario analysis, and "investment gates" is substantiated, whereby the transition to the next stage of scaling occurs after achieving specified operational KPIs. The results can be used by entrepreneurs, investors, and development institutions when structuring agricultural export projects in conditions of high uncertainty.

Keywords — asafoetida; investments; financial model; cash flow; Afghanistan; agribusiness; export; risk; scenario analysis; investment sustainability; processing.

ИНВЕСТИЦИОННО-ФИНАНСОВАЯ МОДЕЛЬ РАЗВИТИЯ ПРОИЗВОДСТВА И ЭКСПОРТА АСАФЕТИДЫ В АФГАНИСТАНЕ: РИСКИ, ДЕНЕЖНЫЕ ПОТОКИ И СТРАТЕГИЯ МАСШТАБИРОВАНИЯ

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Аннотация — В статье разработан инвестиционно-финансовый подход к оценке проекта по выращиванию, переработке и экспорту асафетиды в Афганистане. Исследование основано на первоначальном бизнес-плане, включающем пятилетние прогнозы, структуру первоначальных инвестиций, кадровую модель, маркетинговую стратегию и анализ рисков. Показано, что специфика проекта определяется длительным биологическим циклом культуры, высокой потребностью в первоначальном финансировании и необходимостью одновременных инвестиций в земельные ресурсы, переработку, обеспечение качества и экспортную инфраструктуру. Предложена авторская модель «4 F - Hing»: Finance (финансы), Farming (выращивание), Factory (переработка) и Foreign Market (внешний рынок), а также система ориентиров для оценки ликвидности, инвестиционной устойчивости и экспортных показателей. Обосновано использование поэтапного финансирования, сценарного анализа и «инвестиционных ворот», при которых переход на следующий этап масштабирования осуществляется после достижения установленных операционных KPI. Полученные результаты могут быть использованы

предпринимателями, инвесторами и институтами развития при структурировании проектов аграрного экспорта в условиях высокой неопределенности.

Ключевые слова — асафетида; инвестиции; финансовая модель; денежный поток; Афганистан; агробизнес; экспорт; риск; сценарный анализ; инвестиционная устойчивость; переработка.

АУҒАНСТАНДА АСАФЕТИДА ӨНДІРІСІ МЕН ЭКСПОРТЫН ДАМУДЫҢ ИНВЕСТИЦИЯЛЫҚ-ҚАРЖЫЛЫҚ МОДЕЛІ: ТӘУЕКЕЛДЕР, АҚША АҒЫМДАРЫ ЖӘНЕ АУҚЫМДЫ КЕҢЕЙТУ СТРАТЕГИЯСЫ

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Аңдатпа — Бұл мақалада Ауғанстанда асафетиданы өсіру, өңдеу және экспорттау жобасын бағалауға арналған инвестициялық-қаржылық тәсіл әзірленген. Зерттеу бес жылдық болжамдарды, бастапқы инвестициялардың құрылымын, кадрлық модельді, маркетингтік стратегияны және тәуекелдерді талдауды қамтитын бастапқы бизнес-жоспарға негізделген. Жобаның ерекшеліктері дақылдың ұзақ биологиялық циклімен, бастапқы қаржыландыруға деген жоғары қажеттілікпен және жер ресурстарына, өңдеуге, сапаны қамтамасыз етуге және экспорттың инфрақұрылымға бір мезгілде инвестиция салу қажеттілігімен айқындалатыны көрсетілген. Авторлардың «4 F - Hing» моделі ұсынылады: Finance (қаржы), Farming (өсіру), Factory (өңдеу) және Foreign Market (сыртқы нарық), сондай-ақ өтімділікті, инвестициялық тұрақтылықты және экспорттық көрсеткіштерді бағалауға арналған индикаторлар жүйесі ұсынылған. Кезең-кезеңімен қаржыландыруды, сценарийлік талдауды және «инвестициялық қақпаларды» қолдану негізделген, мұнда масштабтаудың келесі кезеңіне өту белгіленген операциялық KPI көрсеткіштеріне қол жеткізілгеннен кейін жүзеге асырылады. Алынған нәтижелерді жоғары белгісіздік жағдайында аграрлық экспорт жобаларын құрылымдау кезінде кәсіпкерлер, инвесторлар және даму институттары пайдалана алады.

Түйін сөздер — асафетида; инвестициялар; қаржылық модель; ақша ағымы; Ауғанстан; агробизнес; экспорт; тәуекел; сценарийлік талдау; инвестициялық тұрақтылық; өңдеу.

The original project calls for significant initial investments in equipment and land, a combination of equity, loans, and grants, and a five-year development period. This makes the project a useful example for analyzing how financial architecture should be synchronized with the biological cycle of a culture and the stages of market formation [4; 7; 15].

1. Introduction.

Investments in perennial agricultural crops differ from most commercial projects in that the cash cycle begins significantly earlier than the accumulation of stable revenue. For asafetida, this gap is particularly significant: based on the source materials, the period to the productive stage is estimated at approximately three to four years. At the same time, the enterprise must finance land, personnel, training, infrastructure, processing,

certification, and marketing. Therefore, simply comparing the future price of the product with current costs is insufficient to assess the viability of the project [1; 2].

The purpose of this article is to develop an investment and financial model for the development of an asafetida cultivation, processing, and export enterprise in Afghanistan. The objectives include an analysis of the investment structure, funding sources, operating cash flows, liquidity risks, scaling scenarios, and a system of investment KPIs. The scientific novelty lies in the synchronization of four components—agricultural, production, financial, and export—within the framework of the "4 F - Hing" model.

2. Materials and methods.

The empirical basis was formed by sections of the original project devoted to sales forecasts, start-

up costs, five-year cash flows, investment and financial activities, personnel, and risks. The project mentions equipment investments of approximately \$10,000, land acquisition of approximately \$12,250, a total investment outflow of \$138,520, as well as financing through the issuance of shares/stocks, loans, and a grant. These values are considered parameters of a specific project scenario, not average market standards.

Cash flow analysis, scenario analysis, break-even point assessment, stress testing, and risk-adjusted investment logic were applied. Since the initial project contained negative cash flows at certain stages, the emphasis was on liquidity and funding adequacy, not just accounting profit. This is consistent with the nature of a startup with a capital-intensive start-up period.

Table 1 - Financial blocks of the study

Block	The key question	Indicator
CAPEX	How many required to launch ?	Volume and structure investments
OPEX	What is it? price maintaining operations?	Operating expenses
Liquidity	Enough whether monetary funds ?	Cash runway
Sales	How is growing revenue ?	Pace sales /average price
Risk	What violates plan ?	Stress scenario

3. Specifics of the investment cycle of *asafoetida*.

A key feature is the misalignment of the cost schedule and the harvest schedule. Land, planting material, and maintenance require funding from the first year, while a significant resin flow is generated later. If a company simultaneously builds a processing plant, a second investment cycle arises. As a result, the project's risk is determined not only by whether the crop will be profitable at maturity but also by whether the company can finance the transition period.

This allows us to formulate the principle of financial synchronization: the term of the capital raised should be no shorter than the period of biological maturation plus the period of achieving sustainable sales. Short-term debt requiring early repayment can create a liquidity crisis even in a positive long-term economic environment. Therefore, the financing structure should include a sufficient share of long-term capital, grants, or deferred repayment.

4. Structure of initial investments.

Start-up investments can be rationally divided into five groups: land and site preparation; planting material and fieldwork; processing equipment; warehouse and logistics; quality, certification, and commercial launch. This division allows us to distinguish between assets that create production capacity and expenses that create market access. For an export project, both groups are critical: equipment without certification does not ensure sales, and marketing without consistent quality does not ensure repeat contracts [4; 11].

Table 2 - Investment packages project

Plastic bag	Content	Effect type
A. Field	Earth, seeds, care	Future harvest
B. Recycling	Drying, grinding, packaging	Added price
C. Quality	Laboratory, procedures, certification	Market access
D. Logistics	Warehouse, consolidation, transport	Reliability supplies
E. Commerce	B2B sales, CRM, exhibitions	Contracts / revenue

Investment priorities should depend on the project stage. At the initial stage, the field and minimal infrastructure are critical; before the first commercial harvest, processing and quality are key; after stable batches are confirmed, marketing and export network expansion are key. This prioritization reduces the risk of capital being tied up in facilities that are not yet supplied with raw materials.

5. Sources of financing and cost of capital.

The initial financial plan utilizes a blended financing approach: equity, debt, and a grant. For a project with a long lead time, this combination makes economic sense, as different sources cover different risks. Equity bears the entrepreneurial risk, the grant can finance socially significant elements—training, sustainable agriculture, employment—while debt is more appropriately allocated to assets with a predictable cash flow.

The weighted average cost of capital in Afghanistan is difficult to determine using a single market rate due to the limitations of the financial system and the high risk premium. Therefore, for management decisions, it is preferable to use a range of discount rates and test the stability of the NPV at several values. Investors should see not just one "exact" estimate, but rather a threshold beyond which the project loses its attractiveness.

6. Revenue and pricing architecture.

Revenue depends on four variables: the physical volume of marketable resin, the yield of recycled products, the average price, and the proportion of batches sold directly. The initial project assumes annual sales growth of approximately 10% in the mature phase. For analysis, this rate should be considered a baseline scenario, which should be supported by contracts and actual order dynamics, rather than assumed automatically [5; 6].

Pricing architecture must differentiate between raw materials, industrially prepared resin, powder/mixture, and premium certified products. The more advanced the processing, the higher the potential price, but the greater the demands on quality, packaging, and working capital. Therefore, average price growth is a quality indicator of business development only when margins and sales velocity are simultaneously monitored.

7. Operating expenses.

The initial staffing model includes approximately 30 employees: field workers, processing technicians, packers, quality control specialists, logistics specialists, sales specialists, and management specialists. This means that the payroll is formed even before the plant reaches full capacity. In the financial model, it's important to distinguish between fixed and variable costs: administrative staff and basic infrastructure create a constant workload, while packaging, transportation, and some field work grow with volume.

For monitoring, the recommended ratio is $OPEX - to - Sales = OPEX / Revenue$. During the startup phase, it may be higher than one, but in a mature model, it should steadily decline. Logistics - to - Sales and Quality - cost - to - Sales should be monitored separately: excessive reductions in quality costs can improve OPEX in the short term, but worsen export prices and increase complaints.

8. Cash flow and liquidity problem.

The initial project shows negative operating cash flows at certain stages and significant investment outflows. For a startup, this is not an automatic sign of non-viability, but it does require a predetermined liquidity reserve. The critical indicator is cash. runway: the number of months a company can finance its liabilities without a new influx of capital.

It is proposed $Calculate\ Runway = Cash\ Available / Average\ Monthly\ Net\ Cash\ Burn$. If the ratio drops below 9-12 months until the expected next funding round or commercial harvest, management should implement a liquidity

conservation plan: deferring optional CAPEX, accelerating prepayments on B2B contracts, grant funding for training, and phasing in capacity.

Table 3 - Signals financial control

Indicator	Green zone	Yellow Zone	Red Zone
Cash runway	>12 months.	6–12 months.	<6 months.
Share B2B prepayments	It's growing	Stable	It's decreasing
OPEX/ revenue	It's decreasing	Without changes	It's growing
Share marriage / discounts	Low	Hesitates	It's growing

9. Working capital.

The export model creates a working capital requirement between the procurement/collection of raw materials and the receipt of payment from the overseas buyer. The longer the logistics route and the longer the payment delay, the greater the gap. To reduce capital requirements, partial prepayment, letters of credit or other secure payment methods, shipment consolidation, and negotiated delivery schedules are advisable.

Particular attention should be paid to inventory. Too little inventory increases the risk of contract failure; too much inventory freezes funds. Optimization should be based on ABC / XYZ logic across product types and markets. For premium lots with high margins, a higher safety stock is acceptable, provided the storage quality is stable.

10. Break-even point.

The volume breakeven point can be defined as $QBE = FC / (P - VC)$, where FC is the fixed costs, P is the average unit selling price, and VC is the variable cost per unit. For a multi-product model, the weighted average marginal contribution must be used. This formula is particularly useful when choosing between selling raw resin and processed product: a higher processing price is justified if the increase in marginal contribution offsets the additional fixed costs.

The managerial purpose of the break-even point is to determine the minimum capacity of the processing center. If in-house raw materials don't provide this capacity, contract processing for third-party farmers or the purchase of resin are possible. This transforms the plant from a proprietary asset into an infrastructural hub for the value chain.

11. Investment indicators.

A mature investment decision requires calculating the NPV, IRR, discounted payback period, and profitability index. However, in conditions of high uncertainty, these indicators must be accompanied by an analysis of the underlying assumptions. A positive NPV with an optimistic price and ideal occupancy is not sufficient. The investor must understand the sensitivity of the NPV to yield, price, launch delay, and logistics costs.

A minimum stress set is proposed: a 15% price reduction; a 20% yield reduction; a 12-month commercial launch delay; a 25% increase in logistics costs; and a combined scenario. If a project maintains acceptable liquidity in at least three of the four single stresses, its financial architecture can be considered more resilient.

12. Project risk matrix.

The main risks include political and regulatory, agro-climatic, technological, quality, logistics, market, and financial ones. These are interconnected: transport delays can degrade quality, a decrease in quality can degrade price, and a decrease in price can degrade liquidity. Therefore, the traditional "probability x damage" matrix should be supplemented with an analysis of cascade effects.

Table 4 - Risk matrix and financial response

Risk	Financial consequences	Measure
Delay harvest	Late revenue	Reserve liquidity
Decrease prices	Fall margins	Contracts / diversification
Growth of logistics	VC growth	Alternative routes
Quality discrepancy	Discounts / Refunds	QA and certification
Regulatory restrictions	Delay payments	reserve + compliance

13. Author's model "4 F - Hing".

The "4 F - Hing" model includes four synchronized circuits: Farming - biological readiness and raw material base; Factory - processing and quality; Finance - capital, liquidity and profitability; Foreign Market — contracts and exports. An investment decision is considered balanced only when the development of one component does not critically outpace the others. For example, a large plant without guaranteed raw materials creates underutilization, while expanding plantings without a market creates excess inventory.

The proposed integrated readiness index is calculated as $R_4 F = \min(\text{Farm, Factory, Finance, Foreign})$, where each component is scored from 0 to 1. Using the minimum rather than the average value reflects the "bottleneck" logic: the weakest component constrains the entire system. If Finance = 0.45 and the other indicators are high, scaling should be postponed until liquidity strengthens.

14. Investment gate (stage - gate).

, four investment gates are proposed. Gate 1 – confirmation of agronomic suitability and contracts with farmers. Gate 2 – confirmation of raw material volumes and pilot processing. Gate 3 – obtaining the necessary quality documents and the first B2B contracts. Gate 4 – scaling capacity after confirmation of repeat sales and positive marginal profit.

Each gate links capital expenditures to actual KPIs achieved. This approach is particularly useful in conditions of high uncertainty, as it replaces one major, irreversible decision with a series of smaller ones. The investor retains the ability to adjust scale, technology, and market as information becomes available.

15. Scenario analysis.

The conservative scenario assumes slower sales growth, a delay in reaching planned yields, and high logistics costs. The baseline scenario assumes moderate growth. The accelerated scenario assumes early B2B contracts, a higher share of processed products, and a reduction in intermediary margins. The primary comparison criterion is not the maximum profit in the accelerated scenario, but the ability of each scenario to maintain solvency.

In the conservative scenario, the priority is to preserve cash Runway; in the basic scenario, achieving operational breakeven; in the accelerated scenario, preventing working capital overload. Therefore, the financial strategy should evolve with the growth stage, rather than remain fixed for five years.

16. Export strategy as a financial instrument.

Marketing is typically considered an expense, but in B2B exports, contract structure directly impacts financing. Advance payments, minimum order quantities, long-term contracts, and delivery schedules reduce cash flow uncertainty. Therefore, a commercial team should be evaluated not only by revenue but also by the quality of its contract portfolio.

It is proposed Contracted Revenue Ratio = $\frac{\text{Contracted Sales}}{\text{Planned Sales}}$. The higher the proportion of planned revenue confirmed by

contracts or firm orders, the lower the risk of working capital investments. To scale up processing, it is advisable to establish a minimum threshold for this ratio, such as an internal corporate standard approved by investors.

17. Social and environmental return on investment.

The project creates effects not fully reflected in the commercial NPV: jobs, training, development of legal sources of income, and lower water intensity compared to some traditional crops. For development institutions, these effects may justify grant or concessional financing of individual components [3,4; 8; 9].

It is recommended to separate the commercial and extended investment impacts. The commercial impact includes the enterprise's cash flows. The extended impact includes the number of jobs created, increased farm incomes, the proportion of women and youth in education, water savings, and the volume of legal agricultural exports. This distinction makes the project understandable to both the private investor and the donor organization.

18. Practical recommendations.

1) Raise capital in stages, synchronizing it with the stages of biological and commercial development. 2) Do not finance large-scale processing expansion until the feedstock base is confirmed. 3) Maintain a liquidity reserve covering the long gap until harvest. 4) Use B2B prepayments and long-term contracts as a tool for financing working capital. 5) Conduct an annual stress test of NPV and cash flow. 6) Separate investments in quality and certification from “ optional” marketing expenses, as they determine market access.

For the investor council, a quarterly panel of eight KPIs is recommended: R 4 F, cash runway, OPEX / Sales, share of processed volume, share of certified lots, Contracted Revenue Ratio, gross margin, and revenue concentration by largest market. This system allows you to see not only the financial results of the previous period but also your readiness for the next stage of growth.

Conclusion.

1. The investment attractiveness of asafoetida is determined by high potential profitability and export demand, but the financial sustainability of the project is limited by the long period before the productive harvest [4,6,12-15].

2. The main risk is the asynchronous nature of investments and cash inflows. Therefore, the capital structure must take into account the biological cycle and provide for sufficient liquidity.

3. Mixed financing of equity, debt and grant funds can be effective if the purpose of each source is clearly defined.

4. The author's model “4 F - Hing ” shows that scaling is only possible with a balanced readiness of the field, processing, finances and the external market.

5. The stage - gate approach reduces the irreversibility of decisions and allows the investor to increase investments as raw materials, quality, and contracts are confirmed.

6. For Afghanistan, the development of such a project is capable of combining commercial returns with employment, export diversification and resource conservation [8-11].

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