

ISM AGRIFARMS

AQUACULTURE SOLUTIONS



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Introduction: ISM Agrifarms

ISM AGRIFARMS, located in East Africa, boasts specialized expertise in the aquaculture industry. Our core strengths lie in delivering world-class solutions, encompassing turnkey design, equipment supply, installation, project management, and comprehensive training services. Through our strategic partnership with FIBROPOL, a renowned market leader based in Turkey, we collaborate on the manufacture of complete modern Aquaculture systems. Together, we excel in providing solutions for the installation of RAS Aquaculture systems



“
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”

Facts and Figures in Agriculture Sector

One of the most urgent concerns facing Africa's food systems is ensuring that 2.4 billion Africans have access to a nutritious and sustainable diet by 2050. The continent has grappled with a number of connected development issues, especially in battling persistent food insecurity and eradicating widespread poverty—the two core Sustainable Development Goals. Fish and other aquatic foods have a varied role in the food systems of Africa, serving as a source of livelihood, revenue, and vital micronutrients, especially for pregnant women and young children. Nevertheless, research, policy, and funding for development frequently ignore the present and future worth of fish and aquatic foods in Africa. It is suggested that this oversight leaves a number of avenues for addressing mal-

nutrition and food insecurity unexplored.

The majority of the fish consumed in Africa comes from catch fisheries that are based on rivers, interior lakes, and coastal systems. Africa generated only 2.7% of the global aquaculture share in 2019, despite the fact that aquaculture is one of the industries producing food that is expanding the quickest internationally. Despite this, the African aquaculture industry has maintained double digit average annual growth rates over the past 20 years in response to the continent's rising demand for fish. Despite this expansion, capture fisheries and aquaculture are unable to meet demand for fish in Africa due to a large disparity between production and demand. The fish supply gap is also anticipated to widen as a result of a sharp rise in fish



2.7%
GLOBAL MARKET SHARE

Africa generated only 2.7% of the global aquaculture share in 2019 despite the fact that aquaculture is one of the food supply industries expanding the quickest internationally.

Facts and Figures in Agriculture Sector

demand brought on by rapid income and population development, urbanization-related diet changes, and shifting consumer tastes. In addition to these rising demands, unmet nutritional needs are still present and are rising, especially for women of reproductive age, young children, and babies under the age of five. To address some nutritional inadequacies and the pricey individual and social repercussions, it is vital to increase fish supply, decrease waste and loss, enhance intra-regional and international fish commerce, and ensure equal distribution and access to fish.



To address some nutritional inadequacies and the pricey individual and social repercussions, it is vital to increase fish supply

Market Demand and Supply

Africa is home to some of the areas that are most vulnerable to climate change. The majority of northern and southern Africa would likely endure significant water stress due to climate change, while eastern, central, and western Africa will likely see increasingly intense rains and flooding. The availability of fish and the general wellbeing of participants in the food systems will be impacted by changes in precipitation and temperature patterns brought on by climate change. These changes will also stress inland lake, river, and oceanic ecosystems.

The potential fishery harvest in Africa's Exclusive Economic Zones (EEZs) is predicted to decline due to climate change. The actions of foreign fishing vessels in African Exclusive Eco-

nomics Zones (EEZs) are anticipated to have an impact on fish supply and access in Africa in addition to climate change effects. In conclusion, there are significant forces operating both outside and within fisheries and aquaculture systems that provide tremendous challenges and growing uncertainty for Africa's food systems. The governments of African nations and regional organizations have been forced to identify prospective investment possibilities and interventions in fisheries and aquaculture to address food and nutrition security as a result of these difficulties, which have been made worse by the unprecedented COVID-19 pandemic.



Kenyan Market



According to the FAO, aquaculture is the sector of food production that is expanding the quickest worldwide. According to research, 30 million tons of fish will be consumed worldwide by 2030, and since catch fisheries cannot satisfy this demand on their own, rapid aquaculture development is required. To meet the demand for fish, sub-Saharan Africa can only produce a little number of fish. Based on favorable climatic

conditions and an abundance of locations ideal for aquaculture production, this supply-demand mismatch presents significant potential, notably for the Kenyan aquaculture sector. In Kenya, the annual demand for fish is 600,000 tons, while the country currently produces only 400,000 tons. In addition to this significant output shortfall, annual fish consumption is barely 4 kilograms per person.



600K
TONNES

ANNUAL DEMAND FOR FISH

In Kenya, the annual demand for fish is 600,000 tons, while the country currently produces only 400,000 tons. Annual fish consumption is barely 4 kilograms per person.



Market Forecast for Tilapia (2023-2033)

Currently valued at US\$ 14.1 billion, the worldwide tilapia industry is expected to grow to US\$ 22.3 billion by the end of 2033. Over the following ten years, the demand for tilapia fish is anticipated to grow at a 4.6% CAGR.

Due to its capacity to flourish and live in challenging environments, tilapia is a type of fish

that is widely farmed around the world. Tilapia aquaculture is also very economical and has the potential to bring fish producers long-term profitability. Technology developments and programs to encourage tilapia fish farming are also anticipated to have a positive impact on market growth in the future.

Scope of Service

ISM AGRIFARMS delivers world-class solutions, encompassing turnkey design, equipment supply, installation, project management, and comprehensive training services.

STEP
01

Project
Planning



STEP
02

Project
Management



STEP
03

Building
Phase



STEP
04

After Sales
Service



Project Roadmap

STEP

01

Concept

- Market analysis
- Business Plan
- Location Analysis
- Structural works & MEPs

STEP

02

Project
Handover

- Machine delivery
- Installation Process
- Project Commissioning

STEP

03

After sales

- Management
- Training
- Service and Maintenance

Project Cycle: Start to Completion

PROJECT CYCLE



Our Team

We comprise of a dedicate team of experts providing valuable insights and excellence required to build all our projects.



Omri Cohen

CHIEF EXECUTIVE
OFFICER (CEO)

Born in Israel, Omri has 25 years' experience building and managing companies, including 15 in East Africa. Omri is a co-founder of ISM Africa, and brings exceptional experience in cleantech and renewable energy. He earned a BA degree (cum laude) in Government, Diplomacy Management and Strategy from the Herziliya University.



Paul Williamson

CHIEF OPERATING
OFFICER (COO)

Born in Kenya, Paul has 15 years' experience building companies both in the United Kingdom and in East Africa. Paul is one of the cofounders of ISM Africa. and brings exceptional experience in supply chain management, entrepreneurship and organization strategy. He holds a Business Law Degree from the London Met University



RAS Process: Overview

This document features the pros and cons of RAS systems, examining the costs of establishing an operating a RAS facility and show a typical return on investment

Recirculating Aquaculture Systems (RAS) An aquaculture system is made up of the habitat, water recirculation and water treatment. RAS are closed-loop or semi-closed-loop water treatment systems designed for raising fish on land. Featuring a complex network of tanks, pipes, pumps and filters, RAS systems have a proven track record providing a tightly controlled environment that's conducive to the particular species being cultivated.

A RAS system is set up to reuse water by capturing and removing any waste. As a closed system it provides enhanced biosecurity, pro-

tecting fish from pathogens and predators and preventing escapes. Ultimately it allows farm operators to create an optimized environment for growth by providing ideal temperatures, water quality, feeding regimes and other factors.

Today's technological advances – better biofilters for removal of ammonia and nitrites; improved degassing technology; use of denitrification for the removal of nitrates; and advanced feed formulations that generate less waste – enable RAS systems to recirculate up to 98 percent of the water in the system.

Featuring a complex network of tanks, pipes, pumps and filters, RAS systems have a proven track record providing a tightly controlled environment



Advantages of RAS System



Easier to manage and control diseases



Thermal management to accelerate growth periods



A reduced physical footprint per kilogram generated in comparison to net pen or pond raising systems



Expected year-round growth because of controlled environment.



Improved water quality management to promote the health and development of fish



Advantages for the environment like reduced water use and discharge



Close proximity to end markets reduces carbon emissions, cuts distribution costs, and promotes local and domestic food security.

Factors to Consider in Site Selection

One of the key decisions when developing a RAS system is choosing the proper site, getting it wrong will be costly in the long-run. When choosing a location for your RAS system, you'll need to consider:

Water source: There should be adequate supply of quality water, with conducive water chemistry for rearing the desired species. The closer the source water is to your optimal rearing temperature, the more money you'll save on energy costs.

Energy resources and costs: There's no sugar-coating this: RAS systems require a lot of energy to run. You need to make sure power is plentiful, reliable and inexpensive. The key metric here is how much energy is expended per fish produced and the cost of that energy – or kilowatts per kilogram.

The geography of the site: Ensure the site has ample space to facilitate a cost-effective build-out. It should have easy access and space to handle the construction logistics

Solid waste disposal: Consider a rendering plant to manage the waste by turning it to fertilizer and selling.

Proximity to end markets: You want to be close to your markets in order to save time and money getting your fish to market. After all that's one of the key reasons to consider a RAS system in the first place.

Human resources: Find dependable and skilled labor force to staff your aquaculture establishment to be able to execute its vision.

Financial Factors to Consider

With RAS aquaculture systems, there are many factors to consider beyond the CapEx and OPeX. It is worth noting that RAS facilities have a higher initial capital investment.

Capital Costs

Costs associated with building the facility represent by far the highest capital outlay. As specialized industrial facilities, RAS-based fish farms need high-tech engineering and equipment, including sophisticated HVAC systems and water treatment systems for both intake water and effluent. As a result, there are a plethora of variables that might influence construction prices, and non-RAS expenses may occasionally account for up to 80% of the project's overall cost.

Pumps, air blowers, UV and ozone generators, gas management systems like degassers and low head oxygenators, and mechanical

filters like drum or disc filters are all significant capital expenses related to RAS. The cost of the fish tanks themselves is high, and the price may vary greatly depending on the material chosen (steel, concrete, or fiberglass). Expect capital costs to be higher if you are raising saltwater species since the materials, you choose must be able to withstand operation in a more corrosive environment.

Another large capital bucket to account for is your monitoring and control systems. This includes all your motor controls – for temperature, oxygen, pH, CO₂ and TGP sensors, to name a few – and of course automation capability to



open or close valves and control pumps, blowers, lighting and thermal systems. Finally, you need to consider the infrastructure that will house everything, including lab spaces, workshops, feed storage areas and offices. Since this will also have a direct impact on operating expenses such as heating and lighting, a great deal of thought must be given to efficient space utilization.

Operational Costs

Like in all finfish aquaculture endeavors, feed is frequently the biggest expense and is heavily reliant on the facility's biomass. RAS-based farms can, however, increase feed efficiency and decrease feed waste or overfeeding with the help of attentive feed experts and cutting-edge technologies, such AI-powered smart cameras. Additionally, feed manufacturers are creating improved feed formulas that are created especially for fish farms using RAS and that help preserve water quality and make operations easier.

Moving a lot of water and fish while operating on land also necessitates continuously producing compressed air and oxygen. The farm's layout must make pumping as effective as feasible. Choosing the right location can frequently help or hurt this attempt if the machinery needs a lot of pumping power.

Economies of scale will undoubtedly bring down costs. One that is simple to consider is food. The cost per kilogram will decrease as the farm purchases more feed, and you will have more clout to demand a particular formulation for your particular species to maximize performance.

The design, construction, and start of fish harvesting on the farm will take at least two to three years. Can you agree to terms that delay significant payments until the start of the harvest? Is your business zone located in a tax-friendly area?

Some of the Operational costs include: Recirculation, Physical treatment, Mechanical treatment, Physical treatment, Biological treatment, Chemical treatment, Unforeseen (10%), Electricity, Oxygen, UV Fluorescent Tubes, Chemicals, Fish Feed, Fish Farm Staff, Initial fish stock, Electricity Buildings, Wells, Sewage, Heating, Ventilation Air Condition, chemicals Wastewater, Office, laboratory, Depreciation (Ø-Service life 15 a)



Operational Costs

- Recirculation
- Mechanical treatment
- Physical treatment
- Biological treatment
- Chemical treatment
- Electricity
- Oxygen
- UV Fluorescent Tubes
- Chemicals & Fish Feed
- Fish Farm Staff
- Initial fish stock
- Wells & Sewage
- Heating, Ventilation & Air Condition
- chemicals Wastewater
- Office & laboratory
- Depreciation
- Unforeseen (10%)

Return on Investment

Anyone considering launching a RAS farm will have a few fundamental inquiries. Many variables, some of which is highlighted here but others that are particular to each opportunity, might affect the return on investment. Most of these questions have the response "it depends."

For instance,

- How much can I expect to earn?
- What is the initial cost?
- What animal is the most lucrative?
- Would the farm be created entirely from scratch on undeveloped ground or would an existing facility be considered?
- How much change would be required to make a facility, if one exists, functional?
- Will the investor produce their own feeds?
- Will they process the fish?

Below is a table of the expected ROI for different capacities, assuming that the farm does its own processing and sells at average price of USD 7



Return on Investment

200 TONNES* PRICES
IN USD

| | |
|---------------------|--------------|
| CAPEX (YR 1) | 2,268,000.00 |
| OPEX (YR 1) | 980,000 |
| YEAR OF ROI | Year 6 |
| ROI CASHFLOW | 252,000.00 |

500 TONNES* PRICES
IN USD

| | |
|---------------------|--------------|
| CAPEX (YR 1) | 3,118,500.00 |
| OPEX (YR 1) | 2,450,000.00 |
| YEAR OF ROI | Year 3 |
| ROI CASHFLOW | 31,500 |

1000 TONNES* PRICES
IN USD

| | |
|---------------------|--------------|
| CAPEX (YR 1) | 3,969,000.00 |
| OPEX (YR 1) | 4,900,000.00 |
| YEAR OF ROI | Year 2 |
| ROI CASHFLOW | 231,000.00 |

2000 TONNES* PRICES
IN USD

| | |
|---------------------|--------------|
| CAPEX (YR 1) | 7,938,000.00 |
| OPEX (YR 1) | 3,738,000.00 |
| YEAR OF ROI | Year 2 |
| ROI CASHFLOW | 462,000.00 |





CONSIDERING ONE OF OUR SOLUTIONS?

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