

# HYDROPONICS

## INDIAN OUTLOOK



# Constantly growing population is expected to put significant pressure on existing food system

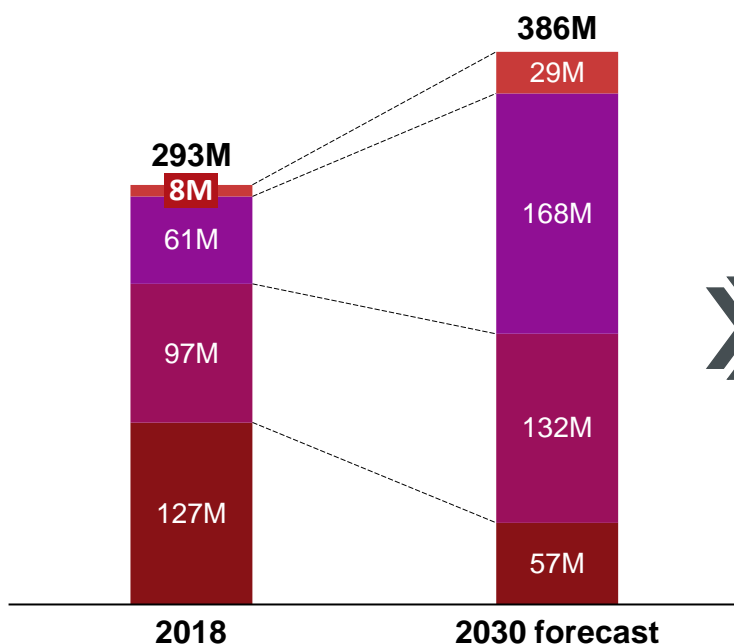
India is currently the 5<sup>th</sup> largest economy in the world and is projected to become the 3<sup>rd</sup> largest economy by 2030. India's population growth during the same period is projected to increase to **1.5 Billion**. It is one of the fastest growing world's economies and is on course to **witness a 4x** growth in consumer spend by 2030. **% of middle-income households** is expected to increase from the current **50% to 80%** propelling the growth in consumption. Growing population and increasing prosperity are expected to see an upward trend in expenditure of food. Indian households are expected to spend **35% of budget on Food** in 2025.

**Growing population, evolving customer preferences and increasing income** are expected to put significant stress on our existing food systems to secure our country's consumption and sustainable growth.

In order to cater our country's food needs, the country needs to focus on **Increasing food productivity output or Importing the delta of food needs**.

However, catering to the consumption needs of the country comes with its own set of constraints and challenges which require significant **monetary and non-monetary investments from public and private sector in addition to changes in policy** to enable sustainable growth.

## Evolution of the household-income profile in India



- ✓ By 2030, **1 in 2 households** would belong to the Higher Income or Upper Middle Income Segment
- ✓ **~70M** fewer lower income households by 2030 in comparison to 2018

Source: WEF Future of Consumption report

High (>\$40k) Upper Mid (\$8.5-40k) Lower Mid (\$4-8.5k) Low (<\$4k household income)



In order to accommodate the country's rising food consumption, the output needs to keep pace to accommodate the needs. There are two different ways through which output can be increased :

1. Increase area of land under agriculture
2. Improve productivity & operational efficiency

However, the solutions aren't as straight forward as they appear and come with their own set of challenges which have explored in detail below.

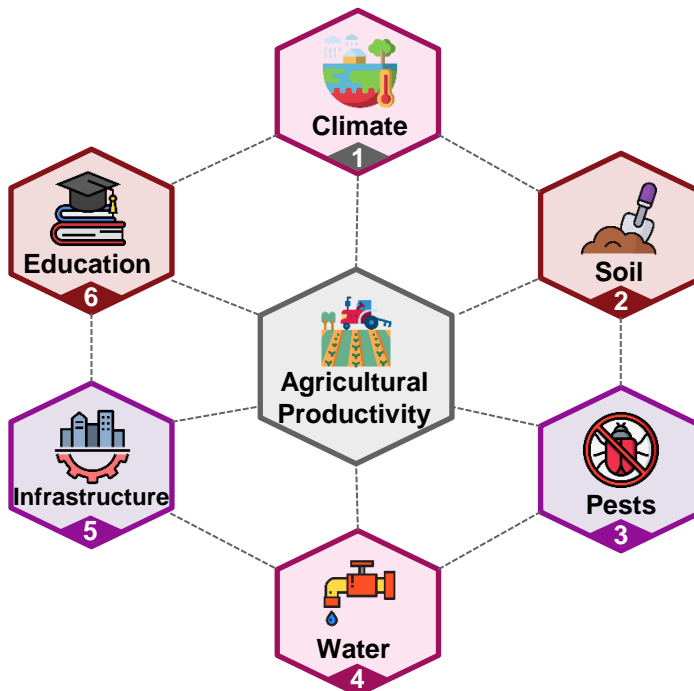
## Land under agriculture has been steadily declining and is not a viable option to increase agricultural output

Increasing the area under agriculture comes with its own set of challenges and is not an easy task. With growing population, rural to urban migration and infrastructure development , there's an increasing demand for land.

During the period of 1991 and 2019, India has lost over 3 million hectares of agricultural land while the urban regions have gained ~9 million hectares area.

## Productivity & Operational Efficiency are heavily correlated to several factors that negatively influence and can have a cascading effect on output

There six key factors that threaten the agricultural output and are key areas that cause operational inefficiencies Improving agricultural productivity and addressing the operational inefficiencies is key to bridge the gap between output and consumption.





## Import

The 2<sup>nd</sup> way to meet our country's food requirements is by importing the delta in the food needs of our population. Reliance on food imports can have several negative consequences for a country like India.

- ✓ Dependence on foreign countries
- ✓ Economic instability
- ✓ Impact on domestic agriculture
- ✓ Food safety concerns
- ✓ Environmental impacts

As seen above, the number of variables that can impact the agricultural productivity are high. However, with latest technological advancements there are methods available that are within the reach of humans that can help control the uncertainty that these variables bring to the table.

One of the most spoken about technology is the **adoption of Hydroponics** to produce our food.

**Adoption of Hydroponics can help achieve the food security and make nations self-reliable through sustainable practices.**

Hydroponics is a type of agricultural method that does not use soil to grow crops. The term Hydroponics comes from the Greek words “hudor” for water and “ponos” for work, it essentially means “water-working”.

Hydroponics uses science and engineering to efficiently mimic the vital elements of a plant's natural environment, delivering precise quantities of nutrients at appropriate times. The advancements in science, technology and ability to process data has led to the culmination of the modern Hydroponics.

Modern Hydroponics is a highly precise, data driven, automated and scalable farming solution. Hydroponics systems today are extremely sophisticated with systems in place to monitor the pH, level of nutrients, temperature of the water and the amount of light being received by the plants. Hydroponics enables a sustainable way of growing crops.

The Food and Agriculture Organization (FAO) of the United Nations has been implementing hydroponic farming in areas of the world that suffer from food shortages. There are currently projects in the pipeline to establish large hydroponic farms in Latin America and African countries.

## Hydroponics offers a host of benefits that overcome the existing issues that plague today's conventional method of farming

**Higher Yield**

**Continuous Production**

**Control Over Produce**

**Toxin Free**

**Less Water Consumption**

**Faster Distribution**

**Season Agnostic**

**Predictability of Prices**

- ✓ **Higher Yield:** The controlled growing conditions, efficient use of resources, space optimization, reduced pest & disease pressure and the higher number of production cycles provides a higher yield.
- ✓ **Continuous production:** The controlled environment and faster growth rates of crops enables multiple harvests in the year throughout the year.
- ✓ **Control over produce:** Hydroponic systems allows for precise control over the nutrient solution that is delivered to the plants. Additionally, disease & pest management and environmental factors provides greater control over the produce
- ✓ **Toxin Free:** There is very minimal need for the usage of pesticides in hydroponics over traditional agriculture and the controlled nutrient delivery prevents the usage of excessive fertilizers which in turn helps produce toxin-free output
- ✓ **Less Water Consumption:** Reduced soil evaporation, recirculating water mechanisms and controlled environments helps save a lot of water. Hydroponic method of growing crops consumes ~90% lesser water than traditional farming.
- ✓ **Faster Distribution:** Shorter growth times, predictable crop yields, reduced post-harvest handling and reduced transportation time as farms can be located closer to the urban areas enables faster distribution.
- ✓ **Season Agnostic:** Two of the most important parameters that influence agriculture - Soil and Climatic conditions are virtually irrelevant in Hydroponics. Hence, any crop can be grown in any region of the world without having to worry about the external environment.
- ✓ **Predictability of Prices:** Unpredictability in prices is often due to a gap in Supply Vs Demand. With Hydroponics we have a predictable yield and reliable input prices which helps predict the prices of the commodities.

## It isn't all smooth sailing in the Hydroponics ship. Failing to stay vigilant and cautious could tilt the tide

The methodology comes with its own share of downsides and can quickly become expensive. It is fair to say that adoption of Hydroponics is not for the average regular farmer or the lower-middle income population of the country. Mentioned below are some of the risks associated with Hydroponics:

Technical Knowledge	System Vulnerability
Capital Intensive	Varying Nutritional Value
Limitation on type of crops	Water Borne Diseases
Reliance on Power/Electricity	Low Return on Investment (RoI)

*Additionally, the sustainability of Hydroponics can be at risk due to the higher prices of its crops*

As per our analysis, despite the feasibility of multiple production cycles in Hydroponics, unit economics of crops grown through conventional farming at scale is more lucrative than Hydroponic farming. The operating costs incurred in Hydroponics are significantly higher and add up to the cost of the commodity. So, regularly consumed crops grown hydroponically would cost more than a conventionally grown crop over large areas.

**The benefits of Hydroponics outweigh the risks it poses and is expected to witness a continued growth in the near future**

The Hydroponics market in India is still nascent relative to markets such as US, UK, Europe, Singapore and China. However, there is a growing acceptance of Hydroponically grown vegetables and fruits in India attracting several large players to make investments in Hydroponic farms. Additionally, adoption of Hydroponics witnessed a **50% growth in residential markets** with urban residents setting up mini hydroponic farms within their houses for vegetables.

According to Meticulous Research, as of 2020, the Hydroponics market in India stood at **13.90 million USD** and witnessing an accelerated growth of **18% CAGR**. Currently, India is lagging in comparison with its Asian counterparts **China** and **Japan** but has ample reasons to cheer as it is expected to see continued growth in the near future. Listed below are the reasons that keep the Hydroponics journey on an upward trajectory:

## Reasons for continued growth in Hydroponics

*Locally Grown Food*

*Technological Advancements*

*Food Security*

*Agri-tech Startups*

*Diversity of Choice*

*Access to Capital*

*Minimal Wastage*

*Traceability of Produce*

- ✓ **Need for locally grown food:** Food security, sustainability and increased focus on individual health has led to an increase in locally grown food. Consumers are taking actions to support local food systems by growing their own food or sourcing food from local farmers and markets
- ✓ **Technological advancements:** Advancements in technology have helped improve the efficiency and effectiveness of Hydroponic systems. Automation and control systems further reduce the operational cost of running Hydroponic farms
- ✓ **Food security:** The ability to produce food year-round with efficient use of resources aids in food security. Further, the predictability of supply chains with Hydroponics ensures a reliable and consistent supply of fresh produce
- ✓ **Evolving consumption preferences and diversity in choice:** Indian agriculture is heavily dependent on food grains. With evolving consumption preferences and diversity in choice, consumption of agri-produce that are not native to Indian climate has risen. Hydroponics enables to produce crops such as berries, saffron, peppers, zucchinis, green leafy vegetables etc. without having to depend on climatic conditions
- ✓ **Access to capital:** Setting up a Hydroponic farm is capital intensive. Affordability is a key issue. However, with access to VC money and Indian government promoting and subsidizing innovation in agriculture has led to a growth in the Hydroponics farms
- ✓ **Agri-tech startups that aid in Hydroponic farming:** There are several start-ups in India that aid / provide individuals and corporates set up and maintain the Hydroponic farms. They bring awareness by educating the people and provide Farming as a Service (FaaS) offering
- ✓ **Minimal Wastage:** Crops are grown in an extremely controlled environment thereby minimizing wastage. Additionally, the shorter supply chain aids in minimizing the post-harvest wastage
- ✓ **Traceability of Produce:** Hydroponic farms are usually located closer to urban centers. This gives them a shorter supply chain and provides the ability to reach directly to the customer cutting out middlemen



## How Can We Help ?

Avalon Consulting can help you to take advantage of the rising Hydroponic industry. Our expertise and prior experience ensure that we provide outcome-based strategic and implementation advice to our clients throughout the value chain.



**Assess entry opportunities** into the Hydroponics segment



**Concept design and implementation** of network of farm service centers



Conduct a **feasibility study** for crops, market size of the crops, sales channels, etc.



**Optimizing production** to maximize yield and quality while minimizing costs and resources

## About Us

Avalon Consulting is an Asia-focused strategy and management consulting firm. We collaborate with our customers to help them devise and implement winning strategies that drive sustainable change. Our focus is on practical and customized solutions which provide an outsized impact on client performance and profitability.

Avalon Consulting is ranked #8: Best Consulting Firms in Asia-Pacific for Strategy Consulting by Vault Rankings. We are the only Indian Consulting firm to feature in the top 10.

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# Our Values – The Avalon EDGE

## E

### ENTREPRENEURSHIP

Enterprising ownership to transform ideas into pragmatic and profitable solutions

## D

### DEDICATION TO EXCELLENCE

Commitment to premier quality and highest standards in everything we do

## G

### GREAT VALUE CREATION

Focus on delivering maximum client impact through innovation and collaboration

## E

### ETHICAL APPROACH

Respect, fairness and transparency in all our interactions

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