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Hydroponics: Indian outlook

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India is currently the 5th largest economy in the world and is projected to become the 3rd 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

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₹64 Lakhs* (all

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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.**

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.



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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.

The 2nd 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 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

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:

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 witness continued growth. Listed below are the reasons that keep the Hydroponics journey on an upward trajectory.

- **Need for locally grown food:**
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

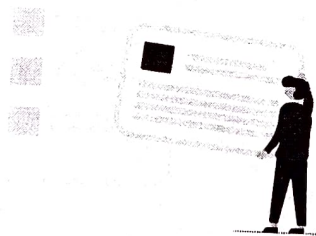
- **Minimal Wastage:** Crops are grown in an extremely controlled environment thereby minimizing wastage. Additionally, the shorter supply chain aids in minimizing the post-harvest wastage
- **Traceability of Produce:** Hydroponic farms are usually located closer to urban centers. This gives them a shorter supply chain and provides the ability to reach directly to the customer

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