

Urbanizing Agriculture

Vertical Farming as a Potential Solution to Food Security Issues
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Introduction

As urbanization increases, classic agricultural systems appears to be an inefficient and costly structure due to environmental affects and food distribution distances. In response to these issues, urbanized agricultural systems have begun to enter the agriculture industry and vertical farming is the largest scale urbanized farming system that has been successfully implemented. This study investigates the current designing systems of vertical farming as well as the costs and benefits of these systems compared to that of classic agriculture.

Methodology

- Case study analysis of three different vertical farms already in use
- A cost/benefit analysis of vertical farming and classic agriculture
- Costs include construction costs, plant costs, treatment costs, etc.
- Benefits include production speeds, seasonal production, etc.

Literature Review

Examining the literature present for vertical farming, vertical farming is found to be an extremely effective form of farming. The three case studies presented show the various formations that vertical farming can achieve and the effectiveness of each in different environments. In Chicago, where the climate changes drastically from summer to winter, the indoor warehouse format works more effectively as it isolates the produce from harsh climate conditions and stabilizes those conditions year round. In Singapore, the outdoor lighting is advantageous for an outdoor exposed vertical farm system and finally in Japan, the combined vertical farming and business structure of the technologically advanced building integrates farming into every day life providing for lunch provisions and much more.



Case Study 1, Indoor/Outdoor Integrated Farm in Japan

Gallery of In Tokyo, A Vertical Farm Inside and Out - 7. (n.d.). Retrieved November 27, 2017, from <https://www.archdaily.com/428868/in-tokyo-a-vertical-farm-inside-and-out/5231ffefe8e44e2830000ac-in-tokyo-a-vertical-farm-inside-and-out-image>



Case Study 2, Vertical Farm Located in Singapore

Verel, P. (2014, September 4). Vertical Farming Visionary Brings Expertise to Fordham. Retrieved November 27, 2017, from <https://news.fordham.edu/inside-fordham-category/vertical-farming-scholar-brings-vision-to-fordham>



Case Study 3, Warehouse Vertical Farm in Chicago, IL

Schultz, P. (2014, June). Vertical Farming's Rise in Chicago. Retrieved November 27, 2017, from <http://chicagotonight.wttw.com/2014/06/23/vertical-farming-s-rise-chicago>

Traditional vs vertical farming

TRADITIONAL FARMING

VERTICAL FARMING

80% LAND
arable land already
IN USE



0% LAND

0.4 ha
vertical
farm = 4-8 ha land-based
traditional farm
depending on crop

50% of crops
planted are
NOT HARVESTED



90% of crops
planted are
HARVESTED

70% GLOBAL
FRESH WATER USED
FOR SOIL-BASED FARMING
50-80% of which is lost to
evaporation and runoff



70-95% LESS
FRESH WATER USED
FOR VERTICAL FARMING
using aquaponics or
aeroponics method of farming

FOOD MILES

On average food travels from
1,500 to 2,500 miles on its way
to our plate



LOCAL

Reduces the need for long distance
transport decreasing the need for
fossil fuel and ensuring quality

Spore. (n.d.). Retrieved November 27, 2017, from <http://spore.cta.int/en/article/traditional-vs-vertical-farming.html>

Conclusion

Vertical farming and urban agriculture techniques illustrates the ability to limit not only space taken by our food system but also the travel expenses that causes famine worldwide. Moving into urbanized areas, agriculture can become a more efficient and cost effective strategy to our food supply issues. This transition will not be simple or easy, the upfront costs of this system are high due to the necessary technology to grow for a large scale city; these costs, however, are worth the benefits. The world needs urbanization to accommodate the growth to 10 billion we expect to see by 2050. If we can alter our classic views and practices of agriculture, the world's habits, and habitats, can begin to change for the better.