Part 2

Read the article on 'Vertical Farming' in the Insert Booklet, Part 2, Pages 4-5 and answer Questions 11 - 25.

Vertical Farming

By 2050, the world's population is expected to grow to 9.7 billion people, and feeding it will be a huge challenge. Due to industrial development and urbanization, we are losing arable lands every day. In 2015, scientists reported that the Earth had lost a third of its arable lands over the previous 40 years.

We don't know how much more we are going to lose in the next 40 years. Increasing food demand due to a growing population along with ever decreasing arable lands poses one of the greatest challenges facing us. Many believe that vertical farming can be the answer to this challenge. Is vertical farming the future of agriculture? Let's find out!

Vertical farming is the practice of producing food on vertically inclined surfaces. Instead of farming vegetables and other foods on a single level, such as in a field or a greenhouse, this method produces foods in vertically stacked layers commonly integrated into other structures like a skyscraper, shipping container or repurposed warehouse.

Using Controlled Environment Agriculture (CEA) technology, this modern idea uses indoor farming techniques. The artificial control of temperature, light, humidity, and gases makes producing foods and medicine indoor possible. In many ways, vertical farming is similar to greenhouses where metal reflectors and artificial lighting augment natural sunlight. The primary goal of vertical farming is maximizing crops output in a limited space.

There are four critical areas in understanding how vertical farming works:
1. Physical layout,
2. Lighting,
3. Growing medium, and
4. Sustainability features.

Firstly, the primary goal of vertical farming is producing more foods per square meter. To accomplish this goal, crops are cultivated in stacked layers in a tower life structure. Secondly, a perfect combination of natural and artificial lights is used to maintain the perfect light level in the room. Technologies such as rotating beds are used to improve lighting efficiency.

Thirdly, instead of soil, aeroponic, aquaponic or hydroponic growing mediums are used. Peat moss or coconut husks and similar non-soil mediums are very common in vertical farming. Finally, the vertical farming method uses various sustainability features to offset the energy cost of farming. In fact, vertical farming uses 95% less water.

Preparation for Future: even though it is likely that more and more people move out from the city now, by 2050 the majority of the world population is expected to still live in urban areas, and the growing population will lead to an increased demand for food. The efficient use of vertical farming may perhaps play a significant role in preparing for such a challenge.

Vertical farming allows us to produce more crops from the same square footage of growing area. In fact, 1 acre of an indoor area offers equivalent production to at least 4-6 acres of outdoor capacity.[5] It also allows us to produce crops with 70% to 95% less water than required for normal cultivation.

Crops in a field can be adversely affected by natural calamities such as torrential rains, cyclones, flooding or severe droughts—events which are becoming increasingly common as a result of global warming. Indoor vertical farms are less likely to feel the brunt of the unfavorable weather, providing greater certainty of harvest output throughout the year.

The financial feasibility of this new farming method remains uncertain. The financial situation is changing, however, as the industry matures and technologies improve. Vertical farming takes place in a controlled environment without the presence of insects. As such, the pollination process needs to be done manually, which will be labor intensive and costly.

Vertical farming technologies are still relatively new. Companies are yet to successfully produce crops at scale and make it economically feasible to meet the growing food demand. The performance of farms like AeroFarms will determine how important a role vertical farming will play in the future to face the challenge of growing food demand.

It is worth noting, however, that technologies developed for vertical farms are also being adopted by other segments of the indoor farming sector, such as greenhouses, which can utilize natural sunlight, albeit requiring much more real estate and longer routes to market.

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Questions 11 - 20

Answer the following questions. For each question write no more than THREE words that must be taken from one point in the text. DO NOT write full sentences.

11 According to experts, how much of the world's agricultural lands have been lost??

……(1)

12 What is the most significant problem created by population growth?

……(1)

13 What form of outcome is produced utilizing the vertical farming technique?

……(1)

14 What is the benefit of using metal reflectors and artificial lighting?

……(1)

15 What technology is utilized to improve the quality of light?

……(1)

16 Where are people likely to reside in the future?

……(1)

17 Considering the growing space, what can we anticipate from vertical farming?

……(1)

18 What might be the most serious threat to a field's crops?

……(1)

19 What is yet unknown about vertical farming?

……(1)

20 What must be done by hand due to vertical farming's limitations?

……(1)

(Total for Questions 11 - 20 = 10 marks)

Questions 21 -25

Indicate your answers to the questions below by marking a cross for the correct answer ☒. If you change your mind about an answer, put a line through the box ~~☒~~ and then indicate your new answer with a cross ☒.

21 What is not true about the factors that contribute to vertical farming? (1)

- ☐ **A** Overpopulation.
- ☐ **B** Industrial development.
- ☐ **C** Decreasing agricultural areas.
- ☐ **D** More people moving into the city.

22 What is right about CEA technology? (1)

- ☐ **A** This method involves a combination of indoor and outdoor land usage.
- ☐ **B** Temperature, light, and humidity are all regulated using this technique..
- ☐ **C** It is also called greenhouses.

☐ **D** The main goal is to make the space more eco-friendly.

23 What is not used to grow food in vertical farming? **(1)**

☐ **A** Hydroponic growing mediums.

☐ **B** Coconut husks.

☐ **C** Non-soil mediums.

☐ **D** Peat moss.

24 According to the text, what may we anticipate in the year 2050? **(1)**

☐ **A** 68% of population is expected to do vertical farming.

☐ **B** Vertical farming will become one of the most competitive industries.

☐ **C** There will be a food crisis.

☐ **D** Cost of land will be more expensive.

25 What can be implied in the last paragraph? **(1)**

☐ **A** The vertical farming is not worth doing.

☐ **B** Using natural light is better than artificial one.

☐ **C** Vertical farming will be more popular because it takes less space.

☐ **D** The vertical farming might be redundant to the indoor farming like greenhouse.

(Total for Questions 21 - 25 = 5 marks)

TOTAL FOR PART 2 = 15 MARKS