


# Smart Agriculture and Food Storage System for Asia Continent: A Step Towards Food Security

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## ABSTRACT

Asia is the largest and most populous continent of Earth with an overall population of 446.27 crores. Housing this population drives various challenges in different aspects, in which providing healthy and nutritious food to each and every individual is most challenging. Unfortunately, because of certain production issues, farmers are not getting the desired throughput, and in some critical cases, situations lead to suicide. On the other hand, proper storage and distribution of these harvests are other challenges. Various models and IoT (internet of things)-based approaches have been presented and are available for implementation, but a dedicated layout combining the digitization of all the essential steps, starting from preparation of soil for agriculture to the making food available for every needy person, is still missing. In the paper, various related models have been studied, and an integral model is presented where integration of IoT is carried out with agriculture and with the food storage and distribution system.

## KEYWORDS

Farmer Suicide, IoT, Sensors, Smart Agriculture

## 1. INTRODUCTION

The alarming population of Asians country is not an only challenge in itself but the arrangements of their livelihood and to provide them with an adequate life style is a bigger challenge for the governments. Study shows (refer Figure 1 (left)) that the population of Asia pacific is expected to shoot by several Billions by 2050 (Max Roser n.d.). In all the other related essentials, proper food is most important and for that there is no any alternative except agriculture industry. Despite of various measures to increase the productivity and harvests, still there are an un-ignorable number of populations falling in undernourished category (refer Figure 1 (right)) (Max Roser n.d.). U.N. Secretary-General Ban Ki-moon has highlighted this issue in his address to world food security in Rome and stated that, “today, more than one billion people are hungry, and six million children die of hunger every year -- 17,000 every day. In 2050, the world will need to feed 2 billion more mouths -- 9.1 billion in all” (Joy Prakash Chowdhuri 2020).

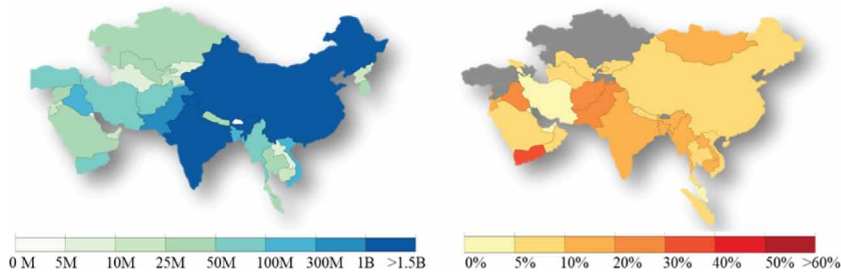
This is not it, people are not only dying because of hunger, more than several thousands of farmers are ending their lives by own, every year, some being besieged by bad weather, some by

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falling into a debt-trap. This problem is mainly persisting in the South Asia; in a country like India almost 300,000 farmers have committed suicide in last 20 years. The suicide rate among Indian farmers was 47 percent higher than the national average. And the sad truth is, in India agriculture is the largest employment sector but its contribution in GDP was only 15.2% in 2019 (India's shocking farmer suicide epidemic, 2015).

Figure 1. (left) Population projection by UN, 2050 (right) Share of Undernourished people



Another associated problem is the wastage of food. Surprisingly, around 20% of the grain and 42% of the vegetable and fruits produced in Asia continent is wasted. This percentage appears very huge when there are people starving to death and farmers are committing suicide. This is a global concern, worldwide; 1.3 billion tonnes of food - enough to feed 3 billion people - is lost every year. The regional representative of Asia Mr. Konuma, has mentioned, “Food and Agriculture Organization has estimated, if the wastage could be reduced by just one fourth, enough food can be saved to feed around 870 million people across the globe. He further suggested that the production should be increased by 60% anticipating the further increase in the world population, which is expected to be 9 billion by 2050 (As millions go hungry, Asia battles food waste, 2013).

In the proposed work the integration of IOT is carried out with existing agriculture system. With the technology exploration now almost everything is becoming smart with the adoption of technologies and the result obtained is fabulous and have encouraged the research fraternity to excel in every horizon. IOT is an emerging technology that can provide excellent control and monitoring of any existing systems with the help of various sensors and interactive platforms. With the help of IOT and few other technologies such as cloud storage, smart GPS, web integration, the agriculture system can be changed to enhance the productivity with least efforts and without any enormous change in the existing infrastructure.

The organization of subsequent sections is according to the ideal format of a research paper. The second section is highlighting the need and motivation of the proposed work, in section three a short literature review is presented highlighting the recent contribution made by other potential researchers, in section four the existing model of agriculture is discussed along with their limitations, in the same section a brief about IOT is given so that reader can develop the required understanding of the context. Later in the same section some important sensors are also described that will be used of the integration of IOT with existing system. after all these background and motivation in section five the actual model is proposed describing all the procedure in details, it is also mentioned in the same section how this model will resolve all the limitations of existing model. In section six, paper is concluded combining all the results and prospective of the model. In the later part of the section the future scope of the model is also presented.

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