

Analysis of Internet of Things for Fresh Agricultural Nutrients and Environmental Factors Product Transportation and its Applications

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Abstract—The research examines the transportation issues surrounding fresh agricultural products, presents evidence for the use of internet of things technology to optimize fresh agricultural product transportation, and summarizes the key components of this technology. Some measures to strengthen the use of internet of things technology in fresh agricultural product transportation are offered, and the application mode of IoT for fresh agricultural product transportation is established. Enough crop production is the greatest problem for humanity due to the world's constantly growing population. Since the world's population has crossed 8 billion, this issue is more urgent than ever. Since smart farming offers solutions to improve both the amount and quality of agricultural produce, it has gained popularity as a solution. This word refers to the process of automating tasks related to farming. In this research, a machine learning algorithm-based crop recommendation system for Indian agricultural areas is proposed. Additionally, a sensor system is ready to get direct data from fields.

Index Terms— Agriculture, Farming, Environmental, IoT, Machine Learning Products.

I. INTRODUCTION

The transmission of agricultural products has emerged as the primary development direction of e-commerce in rural areas as a result of the growth of this industry. One of the main ways that people in rural areas are able to rise out of poverty and become wealthy is through selling locally produced agricultural products to cities. Many agricultural products, including fish, poultry, eggs, fruits, vegetables, mutton, hog, and seafood, frequently need to be stored at low temperatures since they are perishable, delicate, and sensitive to pressure[1]. Fresh agricultural product transportation is challenging, which has had a significant impact on the growing trend of agricultural

products[2]. Based on their pertinent development experience, a few Information technologies is the backbone and essential element of contemporary transportation in many countries. To maximize the conveyance of fresh agricultural products, information technology application must begin. The Internet of Things (IOT) is a revolution in information technology development that has taken the lead in mainstream trends in the field.

II. INTERNET OF THINGS

All things considered, India's fresh agricultural product transportation system is still operating at a low level, with lengthy transit times, numerous connections, high process consumption, low efficiency, and little return on investment. The degree of transportation that is already in place does not meet the demands of the growing economy and society for fresh agricultural products. In particular, the following deadly issues with traditional fresh agricultural product transportation can be resolved by IOT[3]. Fresh agricultural product losses during transportation In general, the fresh agricultural product supply chain has the following links: market-distributor-distribution market-retailer; producer buyer seller origin market. It is usually necessary for a multi-link transport chain to be finished in one to two days; otherwise, it will be challenging to guarantee "fresh" and "green". In the transportation industry, "congestion" is still a pressing issue that needs to be resolved. Statistics show that in India, the average amount of waste in the transportation of agricultural products is 25%, compared to 3% or even less in wealthy nations. Consequently, when road resources are scarce, it is important to maximize the use of already-existing traffic facilities and equipment to lower the number of empty vehicle returns. In the event of congestion, prompt command and coordination can also help to relieve traffic strain. IoT technology must be used for all of these. Specifically, IOT can hasten the development of public information service platforms, management and comprehensive transportation systems, raise the bar for information resource standards, facilitate resource sharing, and foster the growth and intelligence of information services [3].

III. AGRICULTURAL PRODUCTS

Fresh agricultural products' safety during transportation B. Due to the fact that the current development is not suited for the conventional self-production and self-marketing circulation pattern. The wholesale market for fresh agricultural products, the trend of agricultural industrialization, or the number of prominent businesses engaging in long-distance sales are all on the rise[5]. Fresh agricultural products' transit radius will be greatly increased by this sales strategy, lengthening the trip and raising the risk of traffic accidents. The implementation of IOT technology is vital for the establishment of safety regulations and emergency management systems, as well as for optimizing control over transportation risk sources through facility testing and early warning systems[6]. The price of fresh agricultural product transportation When fresh agricultural products were available on the market, a sizable portion of them were unable to reach their destination in a timely manner because of freight rates and transportation capacity constraints; also, production and marketing were improperly divided, resulting in a comparatively high amount of waste[7]. As a result, the cost of transporting agricultural goods increased to 60% or more. In order to increase transport efficiency and quality by more precisely matching capacity and supply, a comprehensive transport information network must be built using IOT technologies. In this way, by utilizing freight resources to their fullest, transport expenses will be decreased[8]. Fresh agricultural products' energy use during transportation Relevant statistical data indicates that 39% of vehicles in India are now vacant. Fresh agricultural products must, on the one hand, be transported in refrigerated trucks. Owing to the unique design of these refrigerated trucks, it is frequently impossible for them to load up on the way back, and they are forced to return empty[10]. Due to insufficient information, vehicle-related information cannot be communicated in a timely manner, which leaves goods without vehicles or cars without commodities. To achieve dynamic data gathering, precise analysis, unified management, quick release and sharing, and industry-wide data resource interchange, IOT technology must be employed.

IV. DATA COLLECTION AND INFORMATION SYSTEM

Essential components of IOT for the transportation of fresh agricultural product a mechanism for identifying agricultural products To make it easier for users to perceive and interact with the transportation environment inside the Internet of Things, everything should have a unique identification code [11]. Thus, the foundation for the use of IOT in the transportation of fresh agricultural products is the identity card of "things". Therefore, each fresh agricultural product should have an addressing code on it. After that, the identity of the product is documented using an identity authentication system, and all variables pertaining to the fresh agricultural products throughout transportation are included in the identity identification system. It is necessary to develop

the information and data gathering system for the fresh agricultural product transportation industry [12]. The information acquisition system based on sensing and identification technologies, as well as the input and output interface, are included in IOT . The information collecting system, which enables the implementation of large-scale and real-time basic information gathering, is the fundamental task of the information collection of IOT for the transportation of fresh agricultural products [13].The Internet of Things' integrated processing center ultimately, all types of data gathered are moved to 10T's integrated processing center [14]. The data processing center and the integrated transportation management platform make up the integrated processing center. Their job is to keep an eye on the gathering of all types of data, the real-time functional interaction between transportation components, and service demand [15]. Data processing centers store a lot of transport data and offer background technological support for automated integrated management platforms and intelligent data processing.

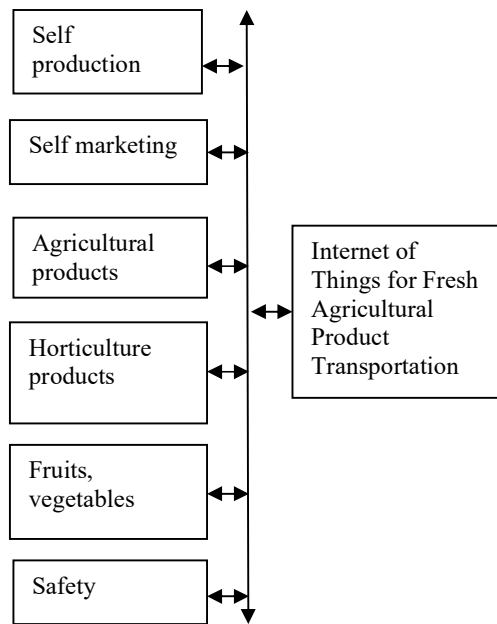


Figure 1. Block diagram

V. IOT APPLICATION

In order to realize the interaction between the entire transportation system group, the Internet of Things (IOT) takes the transportation system as a whole, which is made up of fresh agricultural products, transportation methods, and transportation infrastructure. A bottom-up model based on cloud computing IOT model for fresh agricultural product .To virtualized the things in the Internet of Things, fresh agricultural products, transportation, and transportation infrastructure must first be developed. Additionally, the running status data will be obtained by utilizing the precision of the traffic sensor. Next, formatting will take place at the "cloud computing of fresh agricultural products transportation" information center. Second, the information will be operational. The function of interaction between transport elements will be used in the "mirror" real-time transportation system, which will be transformed into a virtual representation.

Thereafter, six modules will be created, including emergency management, electronic toll collection, safe driving, transportation demand, and transportation planning.Third, the integrated management platform would display the overall transportation system's working state based on the data analysis. The transportation system's entire information generation, intelligent processing, and provision of decision support for fresh agricultural products will all be realized.

In order to achieve intelligent transportation of fresh agricultural products by government-led enterprises as the mainstay, market-oriented business model, the Internet of Things (IOT) applies the unified collection, storage, sharing application information acquisition method throughout the application process and makes use of cloud computing, network communication, and wireless communication technologies. These technologies also make

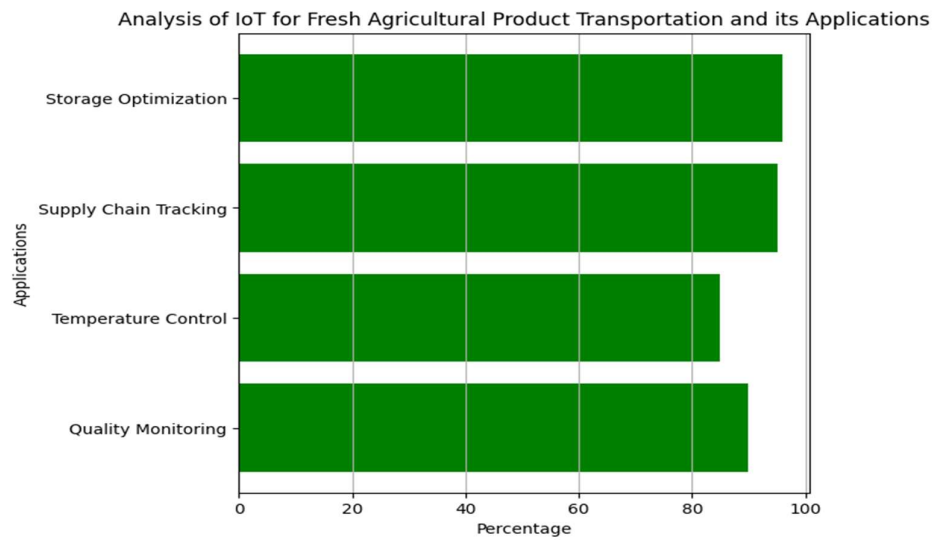


Figure 2. Agricultural Industrialization

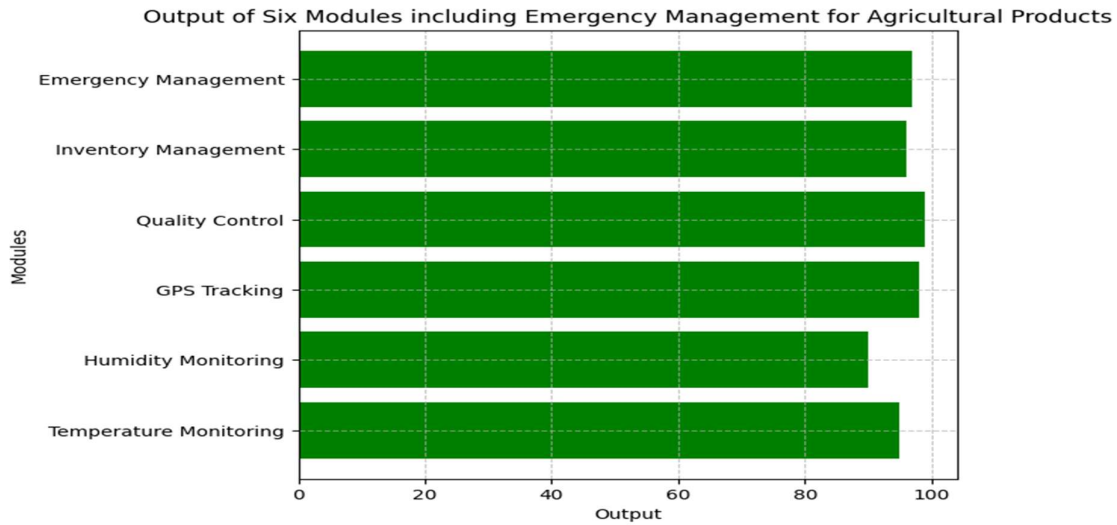


Figure 3 Output of Six Modules including Emergency Management for Agricultural Products

comprehensive transportation information integration, unified collection, unified storage, unified distribution, and information sharing possible. Techniques for encouraging the use of IOT in the delivery of fresh agricultural goods Whether there are several promotion methods in place is one of the most important criteria for the application promotion and sustained development of IoT for the transportation of fresh agricultural products. These strategies are primarily intended to support the sustainable construction and service of the application of IoT in the transportation of fresh agricultural products, thereby creating a win-win situation around information services, forming a virtuous circle of win-win cooperation in the industrial chain, and generating greater economic and social benefits. The government, business, and market are the three main forces behind this, and they have the ability to effectively address the issues of fresh farm product safety, high cost, low energy consumption, and high loss rate. Toll collection with electronic means driving safely Emergency preparedness Information hub for the amputating Transport infrastructure data Transport-related data Information on recently harvested crops A. Concerning the government. Coordinated and unified planning for the growth of the Internet of Things business. India's information sector may become more competitive as the IOT sector grows. But since the IOT sector in India is still in its infancy, it is imperative that the government make clear the industrial technology roadmap for the sector's growth from the standpoint of national strategic planning and establish

unified policies for the resources needed for its advancement usage. It can establish a strong strategic basis in this way for the advancement and use of IOT in the transportation of fresh agricultural goods. Given that the transportation system is involved in a variety of extremely Standardization is a crucial technological foundation in its development process, allowing for complete and integrated decision-making. Developed nations frequently exploit a number of technology patents they have mastered and international standards to their advantage in order to reap large rewards. India should also keep enhancing the Internet of Things standard system and encourage the integration of systems and infrastructure. Given that the transportation system is involved in a variety of extremely standardization is a crucial technological foundation in its development process, allowing for complete and integrated decision-making. Developed nations frequently exploit a number of technology patents they have mastered and international standards to their advantage in order to reap large rewards. India should also keep enhancing the Internet of Things standard system and encourage the integration of systems and infrastructure.

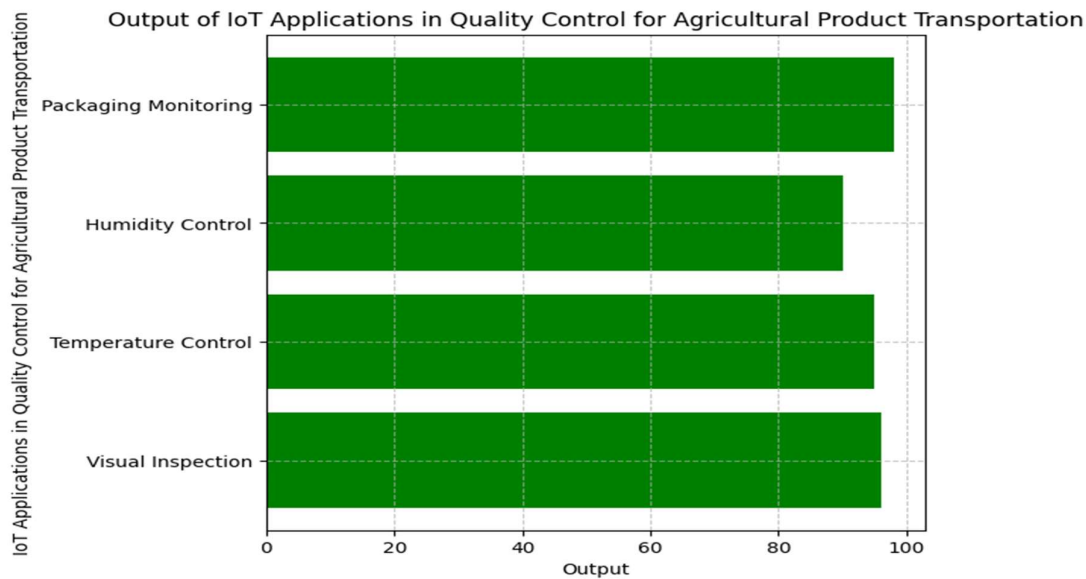


Figure 4 Output of IoT Applications in Quality Control for Agricultural Product Transportation

Concerning the businesses Execute the IOT demonstration and pilot project for the conveyance of recently harvested agricultural goods The IOT initiative for newly harvested agricultural goods. The implementation of the core businesses of the supply chain for fresh agricultural products, scientific research and technical support from scientific research institutes, leadership from transportation departments, and collaboration from local people's governments are all necessary for the successful completion of the transportation project. To guarantee the project's seamless execution, all partners must be connected. In order to create a solution that is useful for the application of industrialization to promote organization and the development of IOT for fresh farm products, the conditional area and leading enterprises that can conduct a fresh farm products and conscious of IOT in the supply chain for fresh agricultural should be chosen. Utilize vehicle-road collaboration technologies to their fullest One of the main goals of creating IOT for the delivery of fresh agricultural products is to increase safety. Using truck-road collaborative system technology is a major way to increase the safety of transportation.

Therefore, advanced information and communication technologies must be used to interact and share vehicle-to-vehicle, vehicle-to-road, and car-to-vehicle information, promote information exchange and deep processing among the participants, and effectively assess potential transportation risks in order to truly achieve the application effect of IOT in the transportation of fresh agricultural products.

Regarding the market in addition to providing strong assistance in areas like money and policy, the government must actively plan and direct relevant firms in order to solve the difficulties with standardization and technology. Due to their market orientation, the transportation sector and new agriculture businesses both feel that integrating their industries from an economic perspective is essential. As a result, they may quickly forge industrial alliances, accelerating the adoption of IOT for the delivery of fresh agricultural products in our nation.

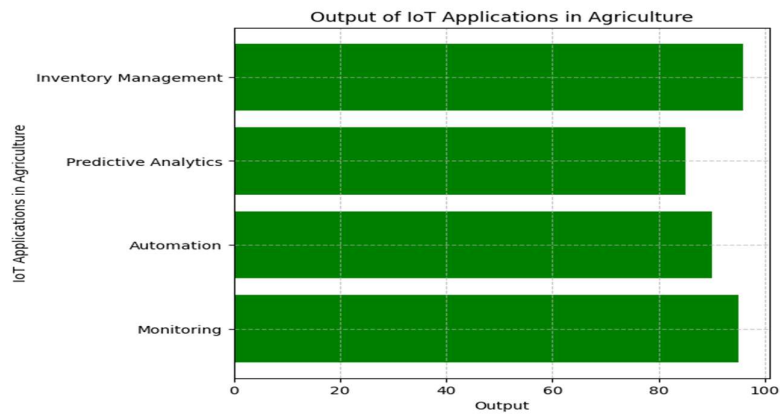


Figure 5 IoT Applications in Marketing of Transportation of Fresh Agricultural Products

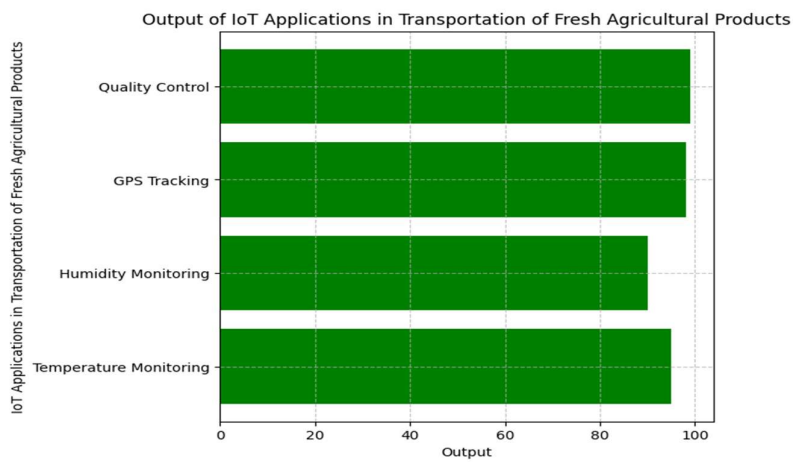


Figure 6. IoT Applications in Transportation of Fresh Agricultural Products

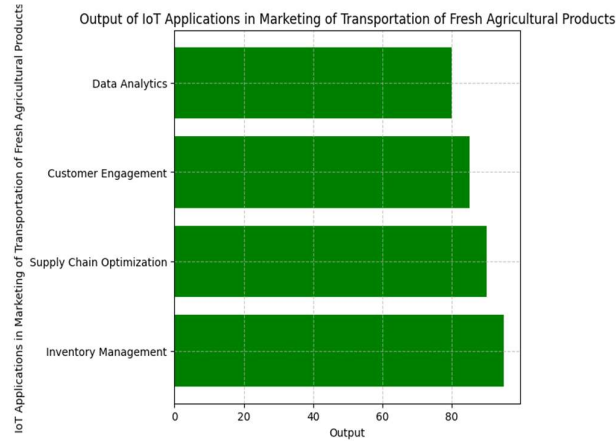


Figure 7. IoT Applications in Agriculture

VI. CONCLUSION

Given the current state of globalization in the economy as well as agricultural industrialization, India adheres to the policy planning of the creation of "agriculture, rural areas, and farmers" by addressing and resolving the

transportation issues of fresh agricultural products. IOT is the newest network and a scientific and technical revolution that will last an age. It is now regarded as one of the key ways to advance the movement of contemporary fresh agricultural goods. The problem of India's fresh agricultural product circulation will be resolved more skilfully in the near future.

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