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Recommendation System for An Optimized Packaging

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Abstract-This paper provides comprehensive research on the different methods by which the food packets are packaged. The food wastage occurs due to multiple reasons starting from wrong packing, excessive packages being available at the same time. There are also instances when an expired food package is just resent to the market with just a new expiry label. The methods proposed in this paper tries to avoid wastage of food, gives suggestions for expired food and solutions for taking control of the whole food packaging system.

Introduction

In today's world there is an increase in the distance in space and time between the farm and the consumer. The packaging systems are one of the ways through which both these people get aligned. These packages need to guarded as these serve as the main component through which the farmer and the consumer are benefited. Thus, there is a necessity to facilitate the protection, transportation, and storage of these food products. An optimized packaging system saves food from being wasted, and adding to it, it also has the potential to further decrease food waste. Recent times show a need to have a reduction in the resource usage, the environmental impact of the wastage, and a way to nourish the undernourished society.

The Agri-food supply chains (AFSCs) comprises of several activities. The main aim of it is to provide the agricultural products from the farms to the consumers tables and also to satisfy the consumers' demands [1]. The supply chain mainly includes cultivation, harvesting, processing, distribution, and storage activities that are related to the crops [2]. Most of these activities can be performed by involving the farmers, cooperatives, regulators, transporters, research institutes, traders, retailers, and consumers [3]. The Figure 1 presents an outline AFSC actors.

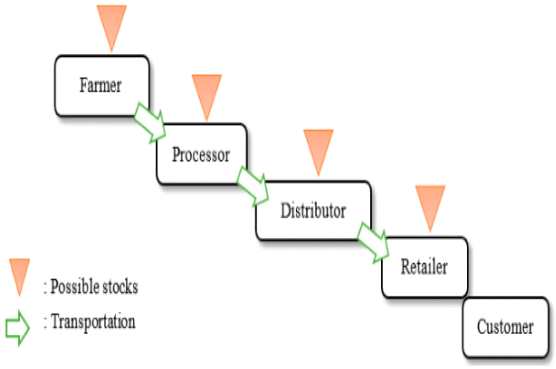

Figure 1: The generic AFSCs ([2,3])

The main components of the packaging system are to contain, to protect, to facilitate handling, and to communicate the information. The main functions or components are depicted in figure 2.

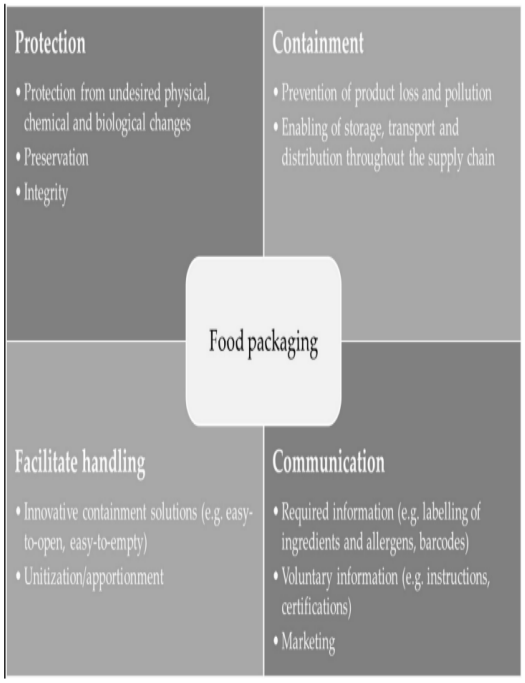

Figure 2: The packaging functions based on [4,5]

The main contribution of this are as follows:

- A recommendation system for packaging food products
- To analyze the expired products and give suggestions
- To analyze the reason for the packages being returned
- To give suggestion for reusing the surplus food package

Related Work:

Throughout world, one third of all food the produced is lost or wasted through the supply chain [6]. This has resulted in a direct economic loss of up to US$ 1 trillion per year globally [7-9]. The food loss indicates the crop/food losses that occur during the agricultural production and handling the postharvest and its storage. Both the retailers and consumers discard their food at some point of time [10]. There can be a wide number of reasons to why a food loss and wastage occurs. Some of the factors include environmental components that occur during the growing and harvesting of crops [11]

Efforts are in the process in recent years to have developed a three-step approach of targeting, measuring, and reducing the wastage and loss of food. Non-Governmental Organizations (NGOs), and other organizations try to solve the problem. Furthermore, there have been the wastage around the world have been depicted (Lipinski et al. 2017).

Proposed Method:

The proposed system suggests a recommendation system that gives an optimal packing approach. The various components of the proposed system is as follows:

- A recommendation system for packaging food products
- To analyze the expired products and give suggestions
- To analyze the reason for the packages being returned
- To give suggestion for reusing the surplus food package

Expiry system

The optimization of the packaging is done so as to reduce the wastage of the food products. There are many probable cases where the packaging is returned back to the main producer. This expiry system tries to identify the reason behind the food package getting expired. All the packets have a barcode and the details regarding the packets are stored in the barcode. The barcode of all the packets is stored in a database and is held in a cloud. Whenever a packet is returned back to the producer for any reason, or when a packet gets expired the database is updated. This process will eliminate the scenario where an expired packet is misused. The process followed by the model to optimize the expired packets is depicted in figure 3.

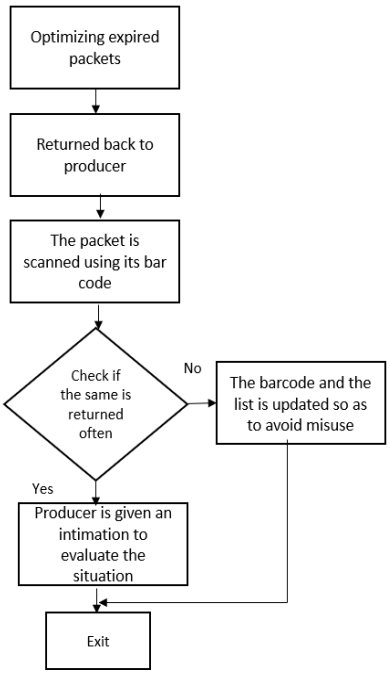

Figure 3: Flow of the optimized expired packets scenario

The packets that have been expired are taken for processing. The packets are returned back to the producer. The barcode is used to get the details of the packets that have been returned. A check is made to determine if the same packet has been returned often. If the same packet has been returned frequently, it indicates the packet is available in surplus. Hence, an intimation can be given to the manufacturer of the product to stop producing the product. If not, the process goes to the next stop of updating the list stored in the cloud. Once the list is updated, the evaluation system is called. The flow of the evaluation system is depicted in the figure 4.

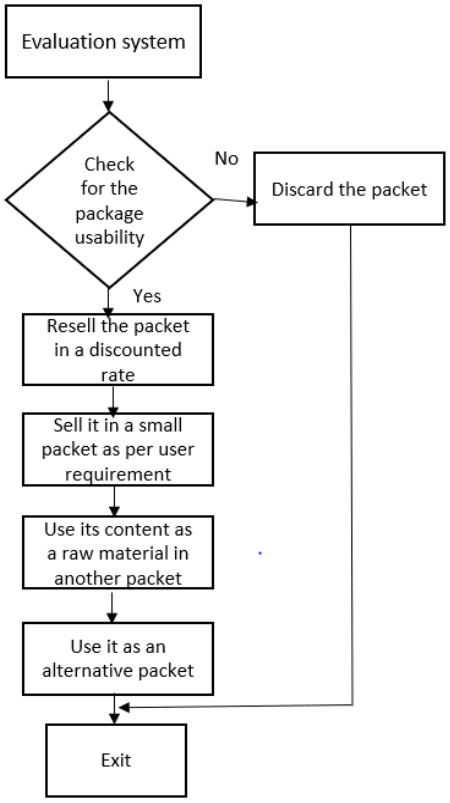

Figure 4: The flow of the Evaluation system

Evaluation system

The usability of the returned packets is verified. If the contents of the packet are found to be in a bad condition, it is discarded. If the contents are in good condition, the producer has many options to use those contents. The packet can be resold in a discounted rate. The other option is to open the packet and give it as small packets as per the demand. This method will impose the rule that no packet is left wasted. The next option is to use the contents of the packet as raw materials and if possible, construct or develop a new product that can be packeted and sold. The last option is to recommend this packet as an alternative to some other packets which are in demand.

Result Analysis

The proposed approach is compared with the existing approaches. The harvest scheduling approach uses a fixed scheduling through which the packaging is done and sold. In the seasonal based approach, the packaging of the contents is done based on the season. The proposed approach is found to depict a good performance when compared to the existing approaches.

Conclusion:

This paper proposed a model that can be used to minimise the wastage of the food packets. The packaging needs to be made in such a way that it is optimised. There are possibilities for the packets to get expired, this paper proposes different methods through which these expired packets can be used.

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