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Jackfruit Flour: Halal Processing Technologies and Application of Hazard Analysis Critical Control Point (HACCP)

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ABSTRACT

The jackfruit (*Artocarpus heterophyllus Lam*) is the world's most significant fruit. It is abundant in South East Asia, such as Malaysia and Thailand. Jackfruit contains various vitamins and minerals, including vitamin A, vitamin C, thiamine, and riboflavin, as well as calcium, potassium, iron, sodium, zinc, and niacin. Jackfruit pulp protein, dietary fibre, and carbohydrate percentages are 1.9%, and 1.1%, respectively. The jackfruit has been processed into flour for baking, pastries, and confections. HACCP, or Hazard Analysis Critical Control Points, is a requirement for food safety and quality. This research sought to develop a HACCP plan for jackfruit flour. The HACCP model was established based on actual facility conditions. A three-person HACCP team initiated the HACCP plan, verification procedures, and record-keeping system. Two critical control points (CCPs) and one operational prerequisite program (OPRP) were identified in the processing facility. Vendor precertification, pre-shipment record-review program, and central product temperature (range 32^o–40^oC) were the essential CCPs identified. This procedure established good personal hygiene practices for employees by the halal certification requirement. Based on their research and findings, the authors recommend implementing the HACCP system in the jackfruit flour processing facility.

Keywords: Jackfruit, Hazard Analysis Critical Control Points, Critical control points, Halal

1 Introduction

The halal industry has emerged as the new market field economy in the current global economy. The halal industry is one of the most rapidly developing in the world today. Thailand, Brunei, Philippines, Singapore, South Korea, China, Japan, and Australia are just a few countries involved in the global halal industry market [1]. By 2030, the halal industry sector is expected to contribute approximately 5.8% of the country's gross domestic product (GDP). To become a world halal hub, it is critical for the Malaysia halal industry stakeholders, including higher learning institutions, government agencies, and halal industry players, to have a preferable and well-developed halal education ecosystem with extensive support and network.



Most people think of "quality" items and services that exceed expectations. However, quality is a product or service's traits and attributes that affect its ability to meet inferred or explicit requirements [2]. ISO standards professionals define quality as "fitness for use" or, for foodstuffs, "fitness for consumption," which ensures customer pleasure. Quality is satisfying consumers' needs [3]. Malaysia's food and beverage industry must follow MATRADE's food processing requirements. Malaysian food manufacturers must follow HACCP, GMP, and SOPs

2 Materials and Methods

The jackfruit's outer skin and fibre layer are peeled and sliced. Jackfruit is cleaned and trimmed. Use a clean kitchen knife to prepare jackfruit pulp to avoid cuts and bleeding. Avoiding foreign body contamination requires thorough cleanliness at these phases. First, to avoid the gums created by the jackfruit's inner skin, rub your fingers and kitchen knife with cooking oil. Blending follows. Jackfruit blending smooths and refines the pulp. It also removes jackfruit flour's stiff fibre. To make blending more manageable, the jackfruit was chopped into pieces, rewashed with clean water, and put in the industrial blender with the proper amount of water. Then purée the jackfruit pulp pieces. The food processor and industrial blender combine jackfruit pulp particles to make it more accessible. The Materials, process, and experimental formulation are shown in Table 1, Table 2, and Figure 1.

Table 1: Raw Materials in Making Jackfruit Flour

Ingredients	Functions
Jackfruit Pulp	The main ingredients, Flavour, Nutritional Value
Wheat Flour	Side ingredients, Texture, Nutritional Value
Rice Flour	Side ingredients, Texture, Nutritional Value
Maltodextrin	Sweetener, Flavour, Additives
Salt	Additives, Flavour
Water	Emulsifiers, Binding Agent

Table 2: Experimental Formulation for Every 1 Kilogram of Jackfruit Pulp

Experiment	Jackfruit Pulp	Wheat Flour	Rice Flour	Maltodextrin	Salt	Water
1	5 (1 kg)	3 (600 g)	3 (600 g)	3 (600 g)	0.1 (20 g)	400 milliliter
2	4 (1 kg)	3 (750 g)	3 (750 g)	3 (750 g)	0.1 (25 g)	300 milliliter
3	3 (1 kg)	3 (1 kg)	3 (1 kg)	3 (1 kg)	0.1 (33 g)	300 milliliter
4	3 (1 kg)	2 (666 g)	2 (666 g)	2 (666 g)	0.1 (33 g)	300 milliliter
5	3 (1 kg)	1 (333 kg)	1 (333 kg)	1 (333 kg)	0.1 (33 g)	300 milliliter
6	3 (1 kg)	0.5 (166 g)	0.5 (166 g)	0.5 (166 g)	0.05 (16 g)	300 milliliter
7	2 (1 kg)	0.5 (250 g)	0.5 (250 g)	0.5 (250 g)	0.05 (16 g)	200 milliliter

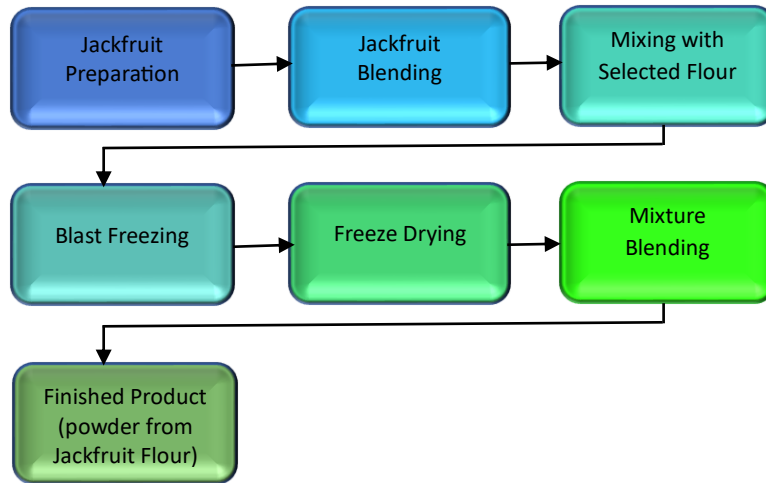


Figure 1: Process Flow Diagram of Jackfruit Flour Production

3 Discussion

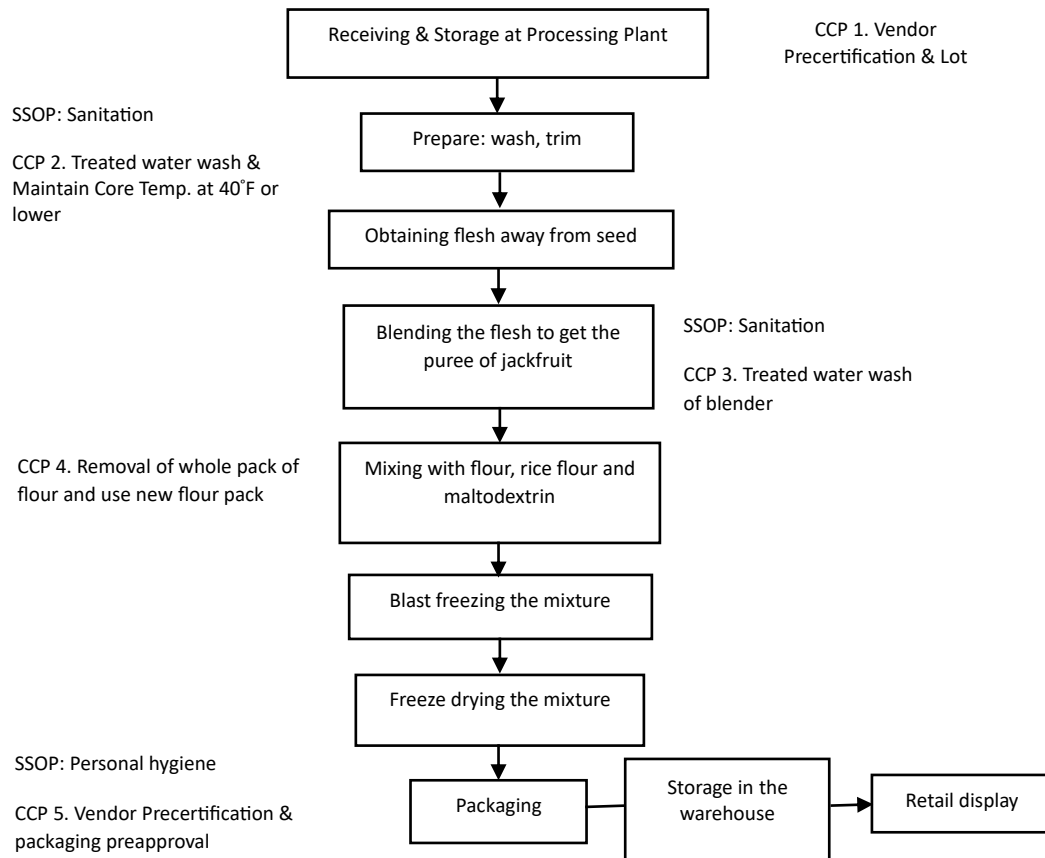


Figure 2: Flow Diagram with CCP for Jackfruit Flour

A brief HACCP plan was designed based on the setting and processing in this plant to improve the quality of jackfruit flour. Based on the principle and several existing generic models of HACCP, the recordkeeping forms of the model in this study were designed in the following manner. They include: a prerequisite program, product description, list of product

ingredients and incoming materials, process flow diagram, hazard identification, critical control points (CCPs) determination, and HACCP control chart.

4 Conclusions

Sustainable Jackfruit flour can delight customers and expand product lines. Jackfruit products are popular globally, making jackfruit flour exportable. Finally, jackfruit flour enables restaurants and hotels make vegan, vegetarian, and meat-free dishes. HACCP enhances food safety, global trade, halal, and healthy food production. HACCP-ed jackfruit flour. New flour was safer, better, and halal. HACCP applied. Halal enterprises must minimise costs and increase earnings. Controlling CCPs helped. Halal HACCP improves jackfruit flour yield, safety, quality, and compliance. Halal shoppers approve.

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