I. INTRODUCTION

1.1. Background

As a vital component of the global economy, unfortunately, the food industry generates substantial amounts of waste and loss, accounting for more than one-third of the total food production which as recorded by Food and Agriculture Organization (FAO) in 2013, it is equivalent to 1.3 billion tons lost annually. This wastage begins at the agricultural stage and persists through the entire supply chain, giving rise to growing concerns regarding disposal challenges and the potential for significant environmental pollution (Ünal, Chowdhury, & Şener, 2022). The term of food loss is described as food meant for human consumption that ends up not being consumed by humans (Lipinski *et al*., 2013). Meanwhile, food waste, often found in the same topic discussion as food loss, is used to define the food that is either thrown away or intentionally used for non-food purposes due to food spoilage or expiration (Narisetty *et al*., 2022). Moving beyond these definitions, postharvest loss encompasses all the stages of food loss throughout the food supply chain, from the point of crop harvesting to consumption (Aulakh *et al*., 2013). These losses can be broadly categorized into several types: weight loss due to spoilage, degradation in quality, reduction in nutritional value, loss of seed viability, and commercial losses, which can diminish the economic worth of crops (Kumar & Kalita, 2017). Major factors of postharvest loss are the lack of knowledge, inadequate technology, and poor storage infrastructure. These limitations often result in suboptimal handling practices, leading to significant losses in crop quantity and quality. Delving into crop types, a study conducted by Conrad *et al.* in 2018 sounded an alarming note, revealing that fruits likely contributed to the most significant portion of annual postharvest loss, with over 60% of cultivated land crops going wasted. This phenomenon could occur due to the presence of stringent standards for the visual appeal of fresh fruit, which results in the disposal of "unattractive" fruits even though it remain perfectly edible nutritionally and hygienically. This situation also extends to melon varieties, where the term of substandard melons is employed to describe melons with unappealing characteristics such as cracks, uneven coloring, and irregular shapes.

Economically and socially, the issue of postharvest losses plays a pivotal role in shaping the value of commodities in trade which directly impacts lives of millions of smallholder farmers and food security (Eriksson *et al.*, 2017). Beyond its economic and social implications, postharvest losses also exert an environmental impact where the resources used in agriculture such as land, water, and energy that are invested in producing lost food go to waste alongside the food itself with an addition of CO_2 emissions from unutilized food that ultimately harming the environment (Scholz, Eriksson, & Strid, 2015). Garnering the attention of a diverse spectrum of individuals, including members of the media, researchers, politicians, businesses, and the general public, the challenge of addressing food waste and loss extends beyond the apparent simplicity of “stop throwing it away”. In reality, it is far more intricate than it initially appears. This complexity is intricately tied to the core principles of sustainable development, encompassing economic, social, and environmental dimensions. The aim of enhancing the environmental sustainability of the food supply chain does not solely rely on reducing food waste but should offer the additional advantages of potential cost benefits and be less contentious.

Based on the European Waste Framework Directive (WFD), the management of postharvest loss interventions can be ranked in order of efficacy, starting with prevention as the most favourable followed by re-use, recycling, and recovery, and concluding with disposal as the least preferable option (Van Ewijk & Stegemann, 2016). As one of the best interventions, re-use is one of the strategies to creatively utilize uncommercial ingredients such as damaged food items and by-products that would not typically be intended for human consumption (Moshtaghian, Bolton, & Rousta, 2021). Acknowledging the re-use or repurposing intervention, the study is dedicated to minimize postharvest losses, particularly in the context of fruit crops, with an approach to transform substandard melons into Thai Melon PIe. The close geographic relationship between Thailand and Eastern Asia, especially Taiwan, has not only fostered cultural exchange but also led to the culinary influences which led to Thai populations's familiarity with Taiwanese-style pineapple pies. This preexisting connection has significantly influenced the ideation process to develop Thai melon pie due to the similar concept to existing products while also offering fresh and distinctive food products.

1.2. Objective

This research centered on evaluating the effect of different thickeners and sweeteners on the sensory and physicochemical characteristics of the final product while employing substandard melons as the fundamental element in creating the melon filling for a Thai Melon Pie. In addition to the primary objective, the study sought to disseminate this innovative knowledge to local communities, fostering creative ideas and inspirations that could lead to small business opportunities within the province of Khon Kaen, Thailand.

1.3. Scope

The scope of this project was multifaceted, involving the development of a Thai Melon Pie formulation that explored different ingredient combinations of thickening agents (pectin and modified starch), sweeteners (sucrose, xylitol, and sucralose), and additional 0.1% collagen to achieve the desired taste, texture, and appearance. It encompassed the selection of appropriate techniques and ratios for crust preparation, filling creation, and baking. Additionally, the project included a physicochemical analysis covering proximate factors such as moisture, ash, lipid, protein, dietary fiber, antioxidant levels, water activity and physical attributes like color, texture, and total soluble solids (Brix). To assess consumer preferences, a sensory analysis was conducted using 9-point hedonic scale, JAR (Just About Right) scale, triangle differentiated method, and purchase decision. Furthermore, the research findings and insights were shared with local communities through presentation.

1.4. Hypothesis

The null hypothesis presumed that no significant differences in physicochemical and sensory analysis were exhibited among various formulations, while the alternative hypothesis asserted the presence of a significant difference in different formulations.