CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

In many parts of West Africa, yam is a staple food crop and is widely consumed in various forms, one of the most popular being “pounded yam.” Traditionally, this meal is prepared by manually pounding boiled yam with a pestle and mortar — a labor-intensive and time-consuming process. The emergence of mechanized yam pounding machines addressed this problem to a large extent by providing a more efficient method for yam processing. However, many of these machines lack key user-friendly features such as portability and ergonomic adaptability.

To improve usability and enhance performance, this project focuses on modifying an existing yam pounding machine by integrating a wheeled base frame that improves mobility without compromising stability. This seemingly simple addition offers significant improvements in convenience, operational flexibility, and maintenance access.

1.2 Statement of the Problem

Most commercial yam pounding machines are designed as stationary units with rigid frames that are difficult to move. This presents several challenges, particularly in small kitchens, food processing facilities, or environments with space constraints. The difficulty in repositioning the machine hinders cleaning, maintenance, and storage. The lack of mobility also poses ergonomic challenges to operators who must work around the machine’s fixed position.

These limitations necessitate a design modification focused on enhancing mobility and user convenience through the integration of wheels into the frame of the existing yam pounding machine.

1.3 Aim of the Study

The main aim of this project is to improve the functionality and usability of an existing yam pounding machine by incorporating a portable, wheeled frame system.

1.3 Objectives of the Study

1. To evaluate the existing yam pounding machine design and identify areas for ergonomic improvement.
2. To design a modified frame structure capable of supporting added caster wheels.
3. To fabricate and assemble the new frame with mobility enhancement.
4. To test and evaluate the modified machine's performance in terms of stability and user comfort.
5. To ensure that the modification meets ergonomic and safety standards.

1.5 Significance of the study

Integrating wheels into the yam pounder has several advantages. Wheels (or casters) drastically reduce friction and required push-force, enabling easier movement of heavy equipment. This means one person can reposition the machine with minimal effort, which saves labor and prevents injury. Portability also allows the device to be moved out of the way for cleaning, improving hygiene. In fact, ergonomic caster design literature notes that "ergonomic casters reduce the amount of strength needed" to start or stop moving a load. Beyond mobility, a stable wheeled base (with

locks) can still offer safety and vibration isolation if designed correctly. Overall, a mobile yam pounder would combine the mechanical efficiency of existing machines with the flexibility and convenience of portable equipment.

1.4 Justification for the Modification

This modification addresses the practical issue of mobility, particularly in environments that require regular equipment movement. It also improves operator comfort and accessibility to different areas of the work environment, making the machine easier to clean, reposition, and store. Adding caster wheels allows users to relocate the machine effortlessly without applying excessive force.

1.7 Scope of the Work

The project focuses on the mechanical redesign of an existing yam pounding machine frame to add wheels. It does not redesign the beating mechanism or motor, except insofar as weight affects stability. Key tasks include: wheel selection (load rating, size), frame bracket design, center-of-gravity and stability analysis, and fabrication of wheel mounts. Experimental scope includes comparative tests of mobility and user handling; the pounding efficiency itself is assumed unchanged. Evaluation metrics are primarily ease-of-movement, transport time, and operational stability of the modified machine.

1.5 Limitations of the Study

This study does not cover automation of the pounding process or digital control systems. It is limited to physical frame modification aimed at enhancing machine portability and ergonomic design.