The design for this drying rack is a vertical system with a roof to keep the cassava pieces protected from the elements other than heat. It was found that the drying time for a piece of cassava does not change based on whether sunlight is hitting it directly or not, so the roof would not leave the top most pieces moist. There are support posts surrounded by mesh, upon which the cassava will be dried. This system needs to be coupled with grinding system in order to fully complete the flour-making process.
This design incorporates both drying and grinding into one process. The cassava is laid atop the reflective hopper, which is a system that aims to shorten drying time by increasing the concentration of heat upon the cassava. After drying is complete, the bottom panel would open up and allow the cassava to fall into the grinding system. This grinder has a piston controlled by a cam. The piston comes down upon the cassava and pulverizes it into a powder form.

Figure 3. Dual-Stone Grinding System

This design focuses on the grinding portion of the project. There are two grinding stones, one of which is stationary. The cassava is poured into the top and a corkscrew system pushes it out towards the two grinding stones, where it is ground and poured out. The system is hand-crank driven.

Figure 4. Hand-Driven Cutting/Crushing System
In this concept, the arrow denotes a hand pushing down the top of the device. Blades exist at the top of the chamber, and when a person pushes the device from the top, the blades will come down with the rest of the top of the chamber and crush and cut the cassava.

Figure 5. Roller Crushing System

This design utilizes rollers to crush and grind the cassava. Cassava is poured into the top, ground, and collected in the bottom chamber. The rollers would have pegs on them in order to grind the cassava easily.

Figure 6. Horizontal Dual-Stone System

This design is similar to the vertical dual-stone grinding system in that it utilizes one moving stone and one stationary stone in order to grind the cassava. The top stone has a hole cut in the middle that tapers out in order to guide the cassava to the crushing area. There is a handle on top that will allow for human-powered movement on the device. It will be placed in a collection bin so cassava may fall freely into the proper container.
Figure 7. Piston-Tube-Grinding Stone system

This design utilizes a piston to push the cassava through a tube within which a grinding stone exists. The piston will weight a considerable amount so that it will push the cassava down freely, and no action will be required by the user besides turning the crank.

Figure 8. Grating System
In this system, the cassava is poured into the device from the top. The system utilizes textured surfaces to chip away at cassava pieces. The design grates the cassava repeatedly until it turns to a powder form. The cassava is then collected in the bottom bin.

![Side View](image1.png) ![Top View](image2.png)

Figure 9. Cassava Hopper-Grinding Stone System

This design utilizes grinding stones pressed against each other. Cassava is poured into the hopper, and then gravity brings it to the grinding stones. The system is hand-crank driven, and cassava falls out at the bottom of the hopper.

**Final Recommendation: Concept 7**

The concept that was determined to be best based on the decision matrix is Concept 7: the cylindrical grating system. This system can be easily produced using very basic, cheap materials and processes. This is crucial for production in Kenya. The operating and maintenance cost is minimal due to its simplicity of manufacturing – it can be disassembled and cleaned easily. In relation to end-user parameters, the concept proves to be a strong choice. Safety of operation is good, as the blades are kept away from the user. This distance minimizes health issues as well. Operation is simple and straightforward, so only basic instructions will be necessary in order for the general public to use the device. Environmental conditions will not affect the system much due to its operational simplicity and lack of small intricacies. The size and weight are based on manufacturing specifications, and can be manipulated to acceptable
values based on some further research. The system is to be coupled with the drying rack to speed up the entire process of drying and grinding the cassava pieces into flour.