

The preliminary design of cocoa juice manufacturing setup

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Introduction

More than 10% of world's population is living in extreme poverty, where poor nations such as Southern Asia and Sub Africans struggling to cover the basic human survival needs on an Introduction daily basis (Nations, 2022). Low income is one of the main issues which results in not enough money for food and shelter. In most under developed countries people have no access to electricity and a running water system. One of the biggest sectors which is harmed by poverty is agriculture, where lack of equipment, facilities and low wages impacts the food production. Farmers are most of the time relying on multinationals which take advantages of the political and socio-economic context by underpaying local cocoa farms.

In collaboration with "Kumasi drinks" this research attempts to design a solution which helps the cocoa farmers in improving their current working situation.

Kumasi drinks is a small company that started in 2020 as an initiative deal with the lack of justice and extreme poverty within cocoa industry The founder was inspired after making a documentary ("Mede mogelijk gemaakt...")(Kumasi, 2022) depicting the cocoa industry in West Africa. Main takeaways from the documentary which Kumasi is attempting to solve are that The farmers get way too less money for their cocoa. And that The residual waste (pulp) of the cocoa beans production is a wasted opportunity for making cocoa juice. Thus, Kumasi started to make their own soft drink from the juice of pulp of the cocoa fruit (which is the residual waste of the cocoa bean).

Value

In this thesis it is researched if the farmers can produce the juice completely by their selves. The goal of this thesis is to design a manufacturing setup which is self-explainable, modular, universal and easy to use. The manufacturing setup will become a tool which farmers assist the farmer in producing the juice in the correct way, and selling the juice locally. In this way an opportunity for farmers to increase their income is created which is a small but outstanding step in fighting a systematic issue such as poverty.

Process

In the beginning of the thesis the current situation is analysed. The current mass production chain and local manufacturing chain of the cocoa juice are researched upon using desk research, and questionnaires. The main takeaways from this research is that the production of cocoa juice mainly consists of three steps, the pressing of the pulp, the pasteurizing of the juice and the bottling of the juice. The second step in the research phase was to investigate different options for the pressing, pasteurizing and bottling. In the second phase, the Ideation phase, requirements were formulated. The most important requirements being: The manufacturing setup must guide the farmers correctly through the juice production process, The manufacturing setup should be a universal solution and should not use the electricity and should not use the water grid.

Design

The concept of product affordances and product semantics become important concepts in designing a self-explainable (understandable), modular and universal design. With the product affordances the physical interaction with products is meant. The concept of product semantics is according to Krippendorff and Butler (Riley, 2001) "the study of symbolic qualities of man-made shapes, in the cognitive and social context of their use". With product semantics the function and symbolic qualities of a product are explained.

Keeping in mind the concept of product affordances and semantics a Central Manufacturing Hub is designed. The central Manufacturing Hub is consisting of three segments (figure 1), the first segment being the pressing step, in which pulp is pressed with the usage of an hydraulic press. The second segment being the pasteurizing step in which water with juice and potassium sorbate (preservative) are mixed together and heated for 10 minutes at 80 degrees Celsius. The last segment is the bottling in which bottles are filled with juice and a cap is put on the bottles.

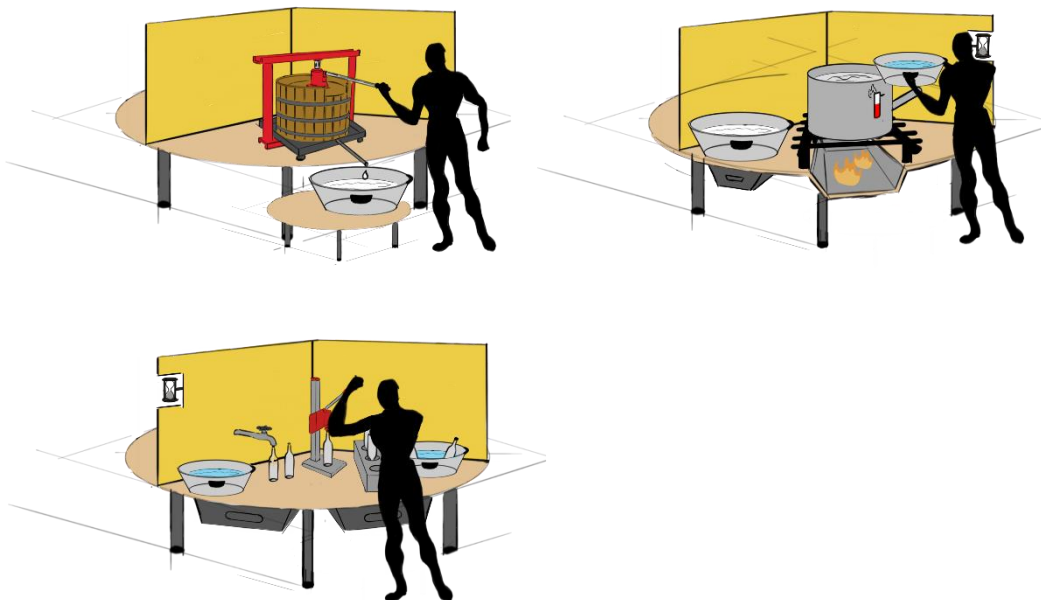


Figure 1, visualisation of the three steps in the CMH

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