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Personal Groundnut Separation Machine for Local Farmers (GS Machine)

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ABSTRACT
Applying improper crop cutting techniques can result in loss and damage to crop harvesting. The process of pruning crops from roots like peanuts can be done manually or mechanically. The mechanical cutting process is performed using a threshing machine. Studies have shown that the machine is rarely detected in the area. Purpose of this study is to create or develop ideas of cropping machines for separating crops from root. With this idea, the farmers can easily segregate their crops from roots easily. This research used the knowledge of farmers about existing machine and the results is recorded as data to develop ideation to design a proper cropping machine. The responses analysis shows that ideation of designing the cropping machine is acceptable and recommended by most farmers besides studying important elements in designing the machine.

Key Words: Crops, groundnut harvesting, manual harvesting, mechanical harvesting.

1 INTRODUCTION

Agricultural machinery is a machine used in livestock or other agriculture. There are many types of such tools, from hand tools and machine tools to tractors and the endless kinds of farm implements that they tow or run. In both organic and non-organic farming, diverse arrays of machinery are used. Agricultural machinery is an invaluable part of how the earth is nurtured, particularly after the advent of mechanised agriculture. Motorized threshing is normally performed in the field or near the field. Many stationary paddy threshers have peg-toothed threshed drums, but they are often used with wire-loop or rasp bars. Additional cleaning instruments, such as an oscillating panel, a centrifugal blower and a windboard, are equipped with broad stationary reservoirs. In several countries, computer threshes are operated by individuals who sell personalised operations to farmers. This allows farmers to arrange harvesting dates.

The method of pruning root crops, such as peanuts, can be easily carried out by using the same threshing machine. Unfortunately, the machine is rarely seen or used in a local farm and thus the process is carried out manually by most farmers, particularly smallholders. The installation of effective cereal harvesting machinery will reduce the time of harvesting and the loss of grain due to slow work in the manual harvesting process (Ojha and Nath, 1980). The aim of this study is therefore to create a structure, to create a concept and to define the role of a crop machine to distinguish crops from roots.

In addition to allowing local farmers to prune their groundnut quickly without compromising the quality of crops, one of the essential for the research is to provide an alternative simple and reliable way to build a cropping machine. Besides, the root separating machine intended to provide an effective technique for pruning groundnut particularly from their roots. These efficient methods of pruning will not only help to increase farm production but will also minimise the time required for the operation to be carried out. It is also intended to help local farmers, particularly smallholders, to have a modern machine for better output from their farms.

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2. MATERIALS & METHODS

Data Collection Techniques

1. Quantitative Approaches

This quantitative methodology would concentrate on online questionnaires through the researcher's online delivery of google form. The questionnaire consisted of 10 closed-ended questions, 5 of which were answered by respondents on the basis of their experience in agricultural practices in the context of likert scale. This questionnaire was circulated to 10 respondents with expertise in agriculture and crop processing to collect reliable results. The respondents selected were worked in the agriculture field, owned their own farms and carried out sales activities as a means of income.

2. Qualitative Approaches

This qualitative approach would concentrate on questions distributed via interviews along with questionnaires from the online Google form. The questions in the interviews are three open-ended questions that refer to the perspectives, feedback and ideas of the respondent in creating the best cropping machines. Therefore, an online interview was conducted with the 10 preferred respondents answering the main questions. In Section C, the interview questions are contained in the questionnaire.

The purpose of these questions is for the respondents to obtain the following information:

I. Knowledge of machine / product handling
II. Experience using existing machines / products.
III. Suggestions or opinions from respondents as additional information for improvement.

Observational

Observation is a data collection tool used by researchers in a particular area of study. It is often referred to as a non-intrusive process. In this research, observation is done through video of existing machine that can be found widely online. In term to obtain a reliable results through this method, an existing harvesting machine, mechanical inside the machine, how the machine is operated is observe for data analysis.

3. RESULTS

The results of the data analysis based on the feedback of the respondents to the survey conducted on experience in agricultural activities and knowledge of the machine or crop separating products from its roots are described through the findings of the study. All the results obtained are summarized in the form of tables, pie charts and graphs. In addition, questionnaire analysis and interviews were also conducted in support of the findings.

1. Quantitative Research Method

In this part of questionnaires, the respondents were asked about their experiences (problem faced) in planting groundnut and the results recorded as data for researcher’s references before designing the machine.

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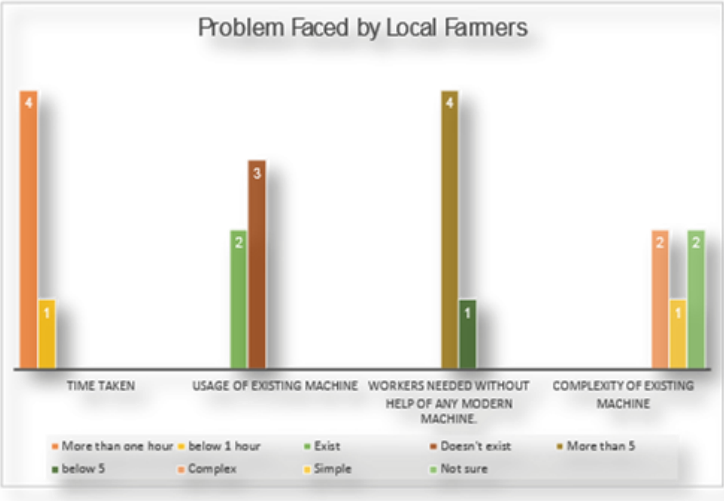

Diagram 1: Experience as in problem faced by farmers while planting groundnut inside their farm.

2. Virtual Interview

The interview session are done by spreading 7 interview questions to the 5 experiences farmers along with the questionnaires questions. This method taken to reduce time taken, and avoid face to face or physical contacts between researcher and the respondents during the COVID-19 Pandemic. This questions spread to receive a better suggestion from the farmers before designing the groundnut separation machine. It is to be acknowledge that the questions were asked in Malay language, this is to make it easier for the respondent to answer the questions. From the interview, researcher received positive responds from local farmers as they suggest that the design of the machine should be average in size, affordable, safe to use and simple

4. DISCUSSION

Groundnut separation machine design is based on research data and analysis, with an emphasis on the aesthetic element of the exterior body and the functionality of the inside elements. The ergonomics and simplicity of design will also be important aspects of the design. Based on user-friendly elements, the designer will create the structure, shape, style, decoration, and iconography of machine. The primary market for this product and design is local farmers who cultivate groundnuts and similar plants on their farms. First design stage is to learn about the research background of the existing machine using the observation and quantitative research approach. The data is gathered based on the identification of the visual features of the exterior body and the design of the machine's inner sections in the market. A few concepts are presented based on the data obtained, and the concept development process is carried out to provide a final design for this product. To design a groundnut separation machine, sketches with several concepts are created to demonstrate the growth of the design idea based on the data acquired and the various needs from the research data.

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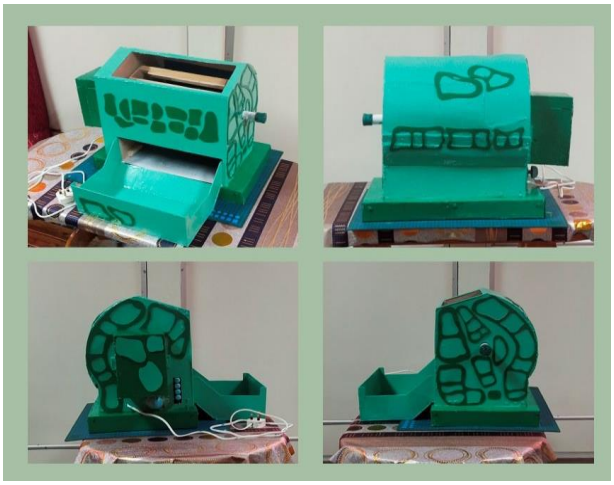

Figure 1. Finished prototype from different or each view.

Product Design Specifications

In the design specification, there are criteria highlighted to produced the personal groundnut separation machine for the local farmers. Table 5.7 below shows the product design specification of the finalize idea, concept, dimension, material, colour, weight, and features.

Table 1. Product Design Specifications

Criteria	Product Design Specifications
Concept	Geometric round-shaped
Dimension	50 cm (length) x 40 cm (Width) x 40 cm (Height) in general
Material	Wood : Plywood and Pinewood / Aluminum
Colour	Green and Brown
Weight	2.85 Kilogram
Features	Works mechanically

5. CONCLUSION

This research is aimed to design personal groundnut separation machine for local farmers especially those who lives in rural areas and allow them to separate their groundnut from roots easily. In addition, the product will not only help in productivity of groundnut but based on the research and data analysis, the design of agricultural machinery can be with artistic value and can be implemented. Groundnut plant and its artistic value of it shells pattern is an inspiration in designing product. It needs to be applied and utilized as part of modern design element. It is very unique and profound. One of the ways to utilized aesthetics value in some agricultural machinery is through design. Designer can try to make use and inherit the aesthetics value through their design as unique and local identity products. The ideas of modern product design and agricultural elements integration should be accepted by the society. The design should be simple and need to be approved by the user. Meanwhile, people should not underestimate the value of artistic elements in the design industry field. Nowadays, with advanced science and technology, broad ideas and open-minded design, the integration of agricultural machinery with artistic elements became popular and commercialized in global markets. A successful local agricultural machinery can embrace both modern and ancient design. Culture exchange between traditional and modesty also a learning process for designer. Hence, developing and promoting local artistic design in creating agricultural tools or machinery to the worldwide.

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