**Chapter I**

**INTRODUCTION**

Rice, also known for its scientific name as *Oryza Sativa*, is one of the most famous crops consumed widely in every corner of the world. According to Rost, T L. (1997), its origin dated back as far as 2500 B.C which began in China and its surrounding areas, its cultivation spread to Sri Lanka and India. Which was then passed on to Greece and some areas in the Mediterranean. It spread to some of North Africa and throughout Southern Europe. Which was the key to introducing rice into the new world. From then on, the growth of rice increased drastically, and more and more people depend on it for daily calorie intake and health benefits. According to an article published by Shahbandeh, M., the global consumption of rice crop in the 2020/2021 crop year was estimated at about 504.3 million metric tons, which has significantly increased compared to the previous record during the 2008/2009 crop year of around 437.18 million metric tons. In terms of its production, with approximately 158 million hectares harvested area more than 700 million tons or 470 million tons of milled rice are produced. Out of these figures, nearly 640 million tons of rice are grown in Asia, which has an equivalent of 90% of the global production rate. The next major producers are Sub-Saharan Africa with 19 million tons and Latin America with 25 million tons. With over 3.5 billion people out of which 29% of global consumption is from China, 21% from India, 7% in Bangladesh, 4% in Vietnam, and 3% in the Philippines, depending on rice for the 20% of their daily calorie intake, no wonder rice is the staple food for Asian countries who consume more than half of its production rate.

The increase in the production rate and consumption rate of rice was sustained and developed even more during the revolution period of agriculture. Where the introduction to new mechanisms and farming methods was established. Mechanisms that paved the way for decreasing the total labor the farmers and producers of rice have to commit by combining the traditional method of farming with mechanization. One of which is the process of *palay* threshing, or the separation of *palay* grains from stalks or leafy materials. *Palay* is Tagalog word for rice that has not been husked. From the traditional method of manual threshing by “*hampasan*”, modernity paved the way for a better and more efficient method of threshing through mechanical-powered threshers.

However, improvement has always been a significant factor in the growth of an industry, with the aforementioned information, the researchers decided to construct and design a machine that can aid in the production of rice crops.

**BACKGROUND OF THE STUDY**

Rice crop production involves several steps in order to produce the rice meal served at our dining tables. It follows the steps of seed selection, seedbed, and land preparation, transplanting, weeding, fertilizing, pest management, harvesting, threshing, drying, and marketing. For this study, threshing is the central topic out of the mentioned steps. Threshing involves the removal or separation of grains from the straws of the crop, it is traditionally done through manual labor. Where the crop is beat against a slatted bamboo through the process called threshing rack or trampling, wherein bare feet or animals are involved to thresh the crop.

In relation to this, the threshing of a crop consumes a huge number of times in order to produce the desired output. The concept of Solar Powered Rice Crop Thresher is related to the individual performance of the solar panel and a designed thresher, but the difference is that they are formed together to create a singular machine capable of threshing rice crop while at the same time limiting the carbon footprint emitted. The researchers desire to develop a renewable source of energy for the threshing machine and create an efficient and cost-effective process of producing rice crops through an individual machine.

And with the increasing threat of global warming generating a new and renewable energy source for rice production can be very helpful. Thus, the researchers come up with the Solar Powered Rice Crop Thresher with the aim to lessen the carbon footprint emitted and generate a cost-effective method for the production of rice crops.

**OBJECTIVES OF THE STUDY**

The primary objective of this study is to design and construct a solar-powered rice crop thresher. Individually, it aims to accomplish the following objectives:

1. Determine the performance of the Solar Powered Rice Crop Thresher compared to traditional Generator powered thresher in terms of:

* Capacity
* Overall production output

2. To determine the quality of the threshed crop by Solar Powered Rice Crop Thresher compared to existing Rice Crop Thresher, in relation to:

* Size of grain
* Color of rice
* Texture

3. To determine the efficiency of the threshed crop by the designed Solar Powered Rice Crop Thresher in terms of:

* Overall production time
* Overall production output

**SIGNIFICANCE OF THE STUDY**

This study focuses to design and construct a Solar Powered Rice Crop Thresher, which will lead to great benefits to the following significant people: local rice crop farmers, the researcher, future researchers.

To **local rice crop farmers**, this study can help improve the production rate of rice which can cater to an increasing demand from people, which will then translate to the economic growth of the farmers. And at the same time, battling the increasing price of gasoline through the utilization of natural energy.

To **the researcher**, this study will be an opportunity to enhance and practice his knowledge, capabilities, and gain strength that can be used in his field of profession.

To **future researchers**, this research study can be a source of information, the basis of ideas, or as comparative material for future researchers whose study has similarities with this paper.

**SCOPE AND LIMITATIONS**

This study is focused on the production of rice in a cost-effective, environmental-friendly manner through the utilization of the natural energy emitted from the sun. The researchers designed a machine that can take advantage of the type of environment where farmers often conduct their work.

The research study is focused on the construction and designing of the solar-powered rice crop thresher concentrated in the production of rice while eliminating carbon emission through solar energy. This paper includes computation and assumptions that were taken into consideration for the design of the machine. Tables of tests and evaluation of properties of materials to be used are included in this paper.

**DEFINITION OF TERMS**

The following terminologies are used in the study, statement of the problem, and variables found in the study.

**Rice Crop** is a raw material in the production of paddy rice and is going to be the medium used in the testing process.

**Paddy Rice** is the output product derived from the rice crop material through the process of threshing.

**Solar Panel** source of energy that utilizes the heat emitted by the sun in order to produce electric power ready for consumption

**Shaft** is a rotating machine element, usually circular in cross-section, which is used to transmit power from one part to another, or from a machine that produces power to a machine that absorbs power.

**Crankshaft** integral part of the machine that is in-charge in the transmission of motion from the motor to the shaft \*

**V-belt pulleys** are devices that transmit power between axles by the use of a v-belt, a mechanical linkage with a trapezoidal cross-section. Together these devices offer a high-speed power transmission solution that is resistant to slipping and misalignment.

**Spike and spike line** is the rotating part of the machine that interacts with the raw material in order to separate the straw from the crop.

**Battery** storage and distributor of the electric power generated by the solar panel which runs the machine.

**Motor** is a machine that converts electrical energy to mechanical energy. Usually by employing

electromagnetic phenomena.

**Prototype** is an early sample, model, or release of a product built to test a concept or process. It

is a term used in a variety of contexts, including semantics, design, electronics, and software programming to provide specifications for a real, working system rather than a theoretical one.

**Welding** is a fabrication process whereby two or more parts are fused together by means of heat,

pressure or both forming a joint as the parts cool.