

Utilization of Hand- Powered Corn Sheller: A Boon to Farmers/Corn Growers

ULYSSES S. SILLERO

ELENA J. SILLERO

Jose Rizal Memorial State College
Dapitan City, Philippines

Abstract - This technical study deals with the design, construction and test the usefulness and effectiveness of the improvised hand-powered corn sheller. The output of this study is purposely designed to help solve the predicament of the farmers most particularly the corn growers during power interruptions. The significant findings of the study revealed that the device is very useful and effective in shelling any size of corn minus electricity or gas. Aside from being economical, this device can be made using only scrap or junk materials that are locally available and can be found anywhere. It is also handy and can be operated anytime and anywhere the user wants it to be. The only limitation of the device is that, the output in shelling corn varies depending upon the speed and strength of the user. In terms of maintenance, the bearings need only to be oiled or greased anytime or the need arises to prevent rust. Further, the said device can promote a healthy exercise to the users, thus, shedding the users' unwanted cholesterols.

Keywords - hand-powered corn sheller, utilization, farmers, corn growers

INTRODUCTION

In the Philippines, the transfer of mechanization technology has been a very slow process. Before the 1960s, the level of agricultural mechanization in the country was mostly dependent on human and animal power. A decade later, a multitude of machinery had already been imported for adoption. However, these machines were designed to favor large contiguous hectares of land and were then utilized solely by big farm enterprises (Paras and Amongo, 2005).

With the continued technology generation and growing capability of our local machinery manufacturers, it then tried designing and adapting small imported machinery, equipment, and other technology run and powered with electricity or gas to suit their own needs and condition (Salokhe, 2003). But sad to say, there are still places in the Philippines that experienced total darkness due to the absence of electricity. This becomes a problem to the people particularly the farmers who are cultivating and engaging in selling corn. And, if a place has already tapped with electricity, they cannot also avoid experiencing constant power interruptions. These alone, could hinder them to work specially in shelling corn because mostly, their equipment are powered with electricity, if not, with gas.

To them, having a set of equipment for shelling corn is really a big help on their part in alleviating their time and effort especially, if is an electric or motor-driven corn sheller. Unfortunately, such equipment may become useless if there are always power interruptions. The only recourse then for the farmers is to come up with an alternative device that can be used in case there is power interruption. But sad to say, that there are some farmers/corn growers who are unaware of the availability of a suitable machine, tool, or implement that could aid them in their usually tedious work. They might be secluded from the technology probably by natural barriers or socio-political boundaries. Further, some farmers/corn growers are even lackadaisical and seemingly uninterested in mechanization especially, if they don't have enough money for use in making such equipment (AMDP, 2002).

With the farmers/corn growers' problem in mind, the idea of designing and eventually constructing a prototype of a simple, cheaper or no cost and can be locally serviced and manufactured corn sheller was conceived by the researchers in order to solve the said problem. Thus, an improvised portable hand-powered corn sheller was made.

The importance of this study is on the practical and economical side of the project. It is practical because it can be made using only scrap or junk materials and it can be used anywhere and anytime the user wants it. It is also economical because it does not use electricity or gas to run the device, thus, saving the farmers or any users from unwanted expenses. Further, it can also promote a healthy exercise to the users during shelling activity, hence, shedding the user's unwanted cholesterols.

FRAMEWORK

The conceptual paradigm showing the variables for the development of the project which guided this study is depicted in the succeeding page. The input includes the ideas and construction of the project based from related literature and studies gathered and read. These also include the supplies and materials, tools, and production cost. The throughput of this study consists of the processes involved in the development of the project. These are: planning and designing that includes the problems that may be encountered, the design process, constructing, testing and revising the model of the device that will lead to the solution of the problem. The output is the completed project which is the improvised portable hand-powered corn sheller. Figure, 1 shows the conceptual paradigm of the study.

OBJECTIVES OF THE STUDY

The purpose of this technical study was to help the farmers/corn growers to come up with a simple, inexpensive, portable and locally made hand-powered device in order to continue their corn shelling activity even if they experience power interruptions. Specifically, it aimed to:

1. Design a manually operated device for shelling corn through the application of some concepts and principles.
2. Construct a device out of locally available materials.
3. Demonstrate and test its functionality.

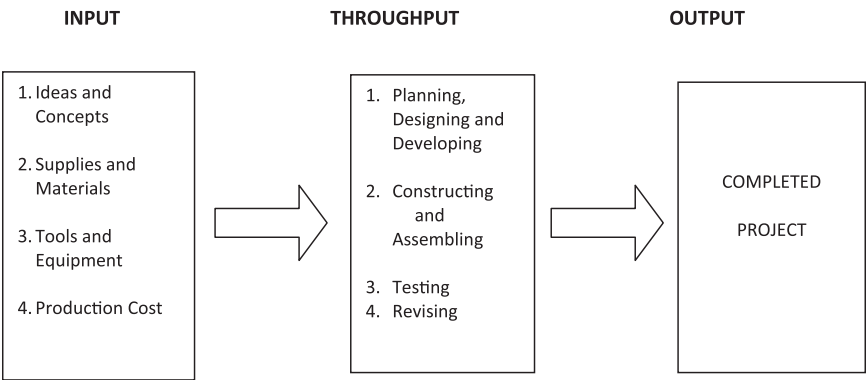


Figure 1. The conceptual paradigm of the study

SCOPE AND DELIMITATION OF THE STUDY

This technical study focused on the designing, constructing, testing, and revising the device for farm use. It was intended to help farmers/ corn growers to continue their work of shelling corn even if there is power interruption or not. The process of assembling the project and testing its effectiveness, efficiency, and operation were done through try-out and revisions. Only those experiments specified in this study were conducted.

FRAMEWORK

Perhaps the largest category of corn related inventions were for shelling or stripping the kernels from the cob. Picker wheel or disk type sheller appeared as early as 1815. The spiked disk was turned by a hand crank while the ear of the corn was pressed directly to the spike. Shelled kernels dropped into a container and the empty cob was tossed

aside. Later, the picker wheel was enclosed in a permanent housing which channeled the ear through the machine, greatly speeding up the process. Cobs and kernels fell to the bottom together in these early machines requiring extra work to separate the two after shelling. This problem was remedied in the 1840's by a design which expelled the cob out the side of the machine while the kernels dropped out the bottom.

Both box mounted and floor model disk sheller are commonly encountered at farm auctions and antique shops in corn country. However, frequently overlooked is the great variety of hand shellers that were manufactured in the 19th and early 20th century (Van Vleck, 1999).

Airy (1985) pointed out, that the shelling, cleaning, and sizing of corn seed are necessary to prepare a uniform, high quality product, satisfactory in appearance, and can easily be planted by farmer-customer in a much existing equipment. He stated that only about 65 to 75 percent of the crop delivered from the field is saleable seed sizes. About 15 percent of the original crop is lost in sorting, handling, shattering, and drying. The ratio of bushels of sized seed to bushels of shelled grain ranges from 78 to 88 percent. He estimated that normal cleaning and sizing losses are: air cleaning 1%, tips 4%, short kernels removed 9%, and gravity machine rejection 3%. These losses vary according to hybrids, growing areas, and seasons.

Corn shellers vary in size from small hand-powered sheller or less than one-half quintal per hour capacity to large motor-driven sheller with capacities up to 100 kg or more per hour (one quintal = 100 kg. or 221 lbs.). Hand-powered shellers are most useful for small lots or for inbred lines (Gregg, et.al., 1980).

DEVELOPMENT OF THE PROJECT

Supplies and materials. The supplies and materials used in the construction of the device are listed in the tabular form according to quantity, unit, and description of articles.

Table 1. List of Supplies and Materials for Improvised Portable Hand Powered Corn Sheller

Quantity	Unit	Description of Articles
1	pc.	2" x 3" diameter Water Pipe
1	pc.	½ "x 4" diameter Water Pipe
2	pcs.	1 ¼" or 2" dia. Bearings
1	pc.	2/16" x 1" x 2 ½" Plain bar Metal
1	pc.	12mm. x 20" Plain bar Metal
4	pcs.	3/8" x 3" Bolts and Nuts
4	pcs.	1" Screws
2	pcs.	1" x 6" x 2' Wood
1	pc.	Gauge 24 x 7" x 9" Plain Sheet
1	pc.	Welding Rod
1	pc.	Hacksaw Blade
1	pint	Enamel Paint (any color)

Tools and equipment used. In the construction of the improvised portable hand –powered corn sheller, the following tools and equipment were also used and specified:

1. Hacksaw – A hand tool for cutting metal
2. Crosscut saw – A tool used for cutting wood
3. Wood chisel – A tool used for paring wood
4. Smooth plane (optional) – A tool used to smoothen surface of wood
5. Pull-push rule – A measuring tool used to measure length and Dimension
6. Try-square – A tool used for testing squareness
7. Welding machine (optional) – An equipment used for welding metal
8. Pair of pliers – A tool used for holding and shaping wires
9. Adjustable wrench – a tool used for turning and loosening nuts
10. Screw driver – A tool used for fastening screws
11. Tin shear – A tool used for cutting plain sheets

Construction procedures. This section describes the strategies used in the development of the project that includes planning and designing, constructing and assembling, supplies and materials and tools and equipment used.

Planning and Designing. This includes the preparation of the working drawing complete with all the details and specification together with the bill of materials. It also considers the availability of the tools, equipment, and materials found in the locality.

Constructing and Assembling. The improvised portable hand-powered corn sheller is made by fabricating the various parts of the project such as the structural framework of the body, cutting, welding, screwing, and painting the body. Below are the following steps in developing the project:

1. Layout all the measurement of the different parts as found in the plan and drawing of the project and cut them according to its individual dimension.
2. Remove all burrs found at the edges by using either metal file or smooth plane for woods.
3. Square the stock by using try-square.
4. Drill holes to point where the screws including bolts and nuts are to be placed.
5. Cut the tip of the 2" diameter pipe to form teeth for shelling corn.
6. Attach and weld the pipe to the prepared plain metal bar with the two bearings already fastened and attached in the same bar.
7. Weld and mount the welded plain metal bars to serve as a rotating crank.
8. Cut and form plain sheet into a small catch spout.
9. Fasten, nail and mount or attach all parts including its structural wood base and check.
10. Paint the project.

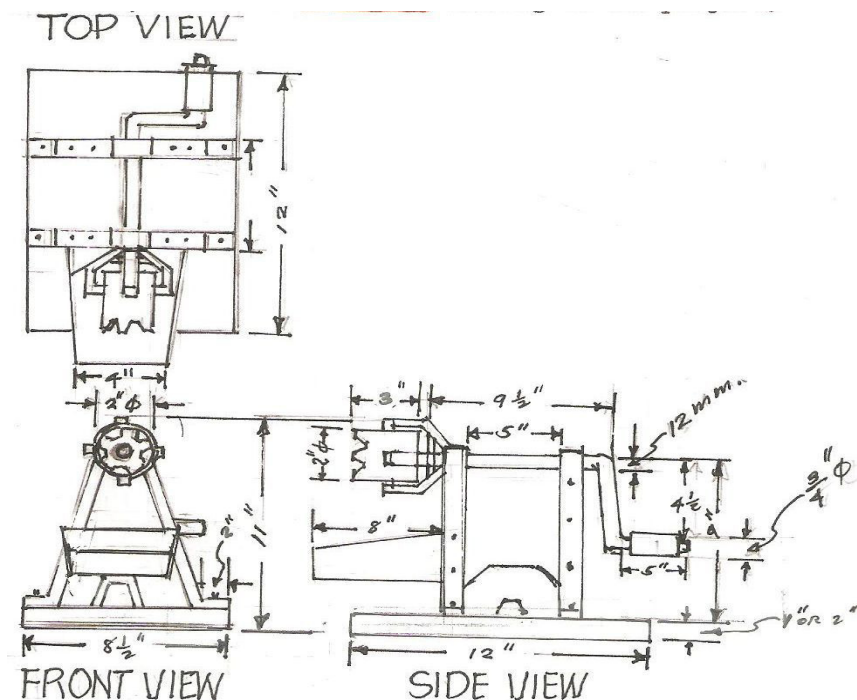


Figure 2. Orthographic drawing of the project.

RESULTS AND DISCUSSION

After the completion of the device, this was tested by shelling different sizes of corns. The following findings were noted. To wit:

The device is very useful and effective in shelling any size of corn minus electricity or gas.

The teeth of the device can be adjusted to suit the different sizes of corn using only a pair of pliers.

The device can be made locally, using or utilizing only scrap or junk materials.

The device can be operated anytime and anywhere the user wants it.

In terms of maintenance, the bearings used in the device can be

oiled or greased anytime or as the need arises.

The output in terms of number of corns shelled varies depending upon the speed and strength of the user. Said device is estimated to shell 8 to 15 corns per minute.

The device during shelling activity can also promote a healthy exercise to the users, thus, shedding the users' unwanted cholesterols.

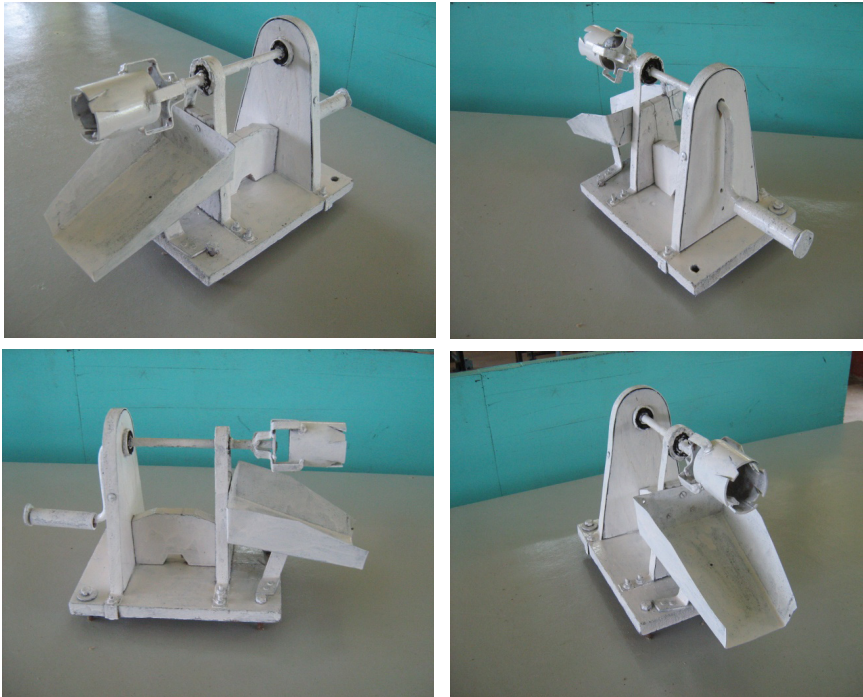


Figure 3. Photos of the finish project – an improved portable hand-powered corn sheller.

CONCLUSIONS

Based upon the findings of the study, the following conclusions were drawn: The hand- powered corn sheller can be made locally with lesser or without cost.

The device is economical in the sense that it does not use electricity or gas. The device can be taken / carry anytime or anywhere because it is portable.

The device is very useful and effective, especially to places without electricity or to places that always experiences power interruptions. The device is very beneficial to farmers who are corn growers because of its practical and economical usefulness.

The procedures involved in the construction of the device are within the capability of the prospective users. The device could shell 8 to 15 corns per minute depending upon the user's speed and strength.

RECOMMENDATIONS

Based on the conclusions of the study, the following are recommended:

1. The farmers/corn growers who are users should be encouraged to construct the said device utilizing materials that are locally available.
2. The Local Government Units (LGU) and technical schools in the locality should be encouraged to mass-produce the hand-powered corn sheller as an alternative during power interruptions or as a way of reaching out the poor farmers living in the locality.
3. Since it is within the capabilities of the prospective users, the device should be duplicated and improved.
4. Further study must also be made to enhance the durability of the device and also to determine the possibility of patenting the device.

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