Development of Multi - Function Mixer (Manual/Motorized) for Small Scale Entrepreneur and Producer

Redentor A. Janaban

Abstract

The University through Extension Service provides training for the community to enhance their skills and knowledge on how to put-up their small livelihood program in their area. With some training especially in food, non-food and other related livelihood program university has the capability to extend their service using traditional way on how to prepare different training strategy. With the observation it’s time to develop improve a new approached using new technology that can give more easy, fast and profitable to trainer and partner agency.

The development of multi-function mixer (manual/motorized) used high quality food grade materials so that it could be used for food and non-food products to become more variable in terms of functionality and usability of the technology. With this project they can produce more or double the production compare to the regular production using the traditional way of making their product.

New approach of technology can develop the economy and also fast improvement of the community with regards to their production to cater the demand of the community. Through this, we can sustain the production marketing and distribution of high quality and affordable for the marginalized farmers, students, out-of-school youth (OSY), people with disabilities (PWDs), entrepreneur and producer.

Keyword: multi-function mixer, techno development, & manual & motorized mixer
Introduction

Extension service provides training for the community to enhance their skills and knowledge on how to put-up their small livelihood program in their area. With this several training especially in soap, candle making and other related livelihood program university has the capability to extend their service using a traditional way on how to prepare different training strategy. With this observation it’s time to develop improve a new approach using new technology that can give them more easy, fast and profitable to trainer and partner community/agency.

The development of multi-function mixer (manual/motorized) for small scale meat processing producer, soap granules producer, polvoron (shortbreads) producer, hog growers producer, charcoal briquette producer and organic fertilizer producer with this we can assure the quality and efficient outcome for the project.

Background of the Project

Multi-function Mixer aims to help the small scale producers on soap granules, meat processing, polvoron (shortbreads) maker, hog growers, charcoal briquette and organic fertilizer. With this project they can produce more or double the production compare to the regular production using the traditional way of making their products. Through this project, we can sustain the production, marketing and distribution of high quality and affordable for the marginalized farmers, students, out-of-school youth (OSY), people with disabilities (PWDs), entrepreneur.

Justification of the Project

The project development well result to a very productive and help to improve or double the production of their products. New approach of technology will help to develop the economy and also fast developments of the community with regard to must production and cater the demand of the community.

It will contribute for the employment of locale individual to operate the machine.

Objective of the Project:

Researcher what to developed another approach using new technology;
1. To develop new technology for the production of soap granules, meat processing, polvoron (shortbreads) maker, hog growers, charcoal briquette producer and organic fertilizer producer;

2. To evaluate the effectiveness of the project for more comprehensive approach;

3. To enhance and increase the production of the producer to meet the need of the community;

4. To get the main average of production of the producer per capital to fade up capital share;

5. To develop new technology approach that being related to the micro business entrepreneurial for the benefits of the producer.

**Conceptual Framework**

This project aimed to developed new techniques approaches in producing meat processing producer, hog growers producer, polvoron (shortbreads) maker, charcoal briquette producer, organic fertilizer producer and soap producer technology by using a conventional technology using manual and motorized technology approach in processing products.

**Related Literature**

**Food Mixer**, has become an essential item for the kitchen, and provides an efficient, reliable alternative to mixing and beating by hand. They are easy to set up, clean and maintain, and usually work by plugging into the mains power. Utilised for a variety of different tasks such as beating eggs, preparing bread dough, mixing cake or cookie batter, along with mashing carrots and turnips, food mixers are a convenient, time saving tool for most homemakers. ([http://www.ebay.co.uk/bhp/food-mixer retrieved 4/9/14](http://www.ebay.co.uk/bhp/food-mixer retrieved 4/9/14)).

**Silicone Rubber**, are often one- or two-part polymers, and may contain fillers to improve properties or reduce cost. Silicone rubber is generally non-reactive, stable, and resistant to extreme environments and temperatures from -55 °C to +300 °C while still maintaining its useful properties. Due to these properties and its ease of manufacturing and shaping, silicone rubber can be found in a wide variety of products, including: automotive applications; cooking, baking, and food storage products; apparel such as undergarments, sportswear, and footwear; electronics; medical devices and implants; and in home repair and hardware with products such as silicone sealants. ([http://us.wow.com/wiki/Silicone_rubber, retrieved 4/8/14](http://us.wow.com/wiki/Silicone_rubber, retrieved 4/8/14))

**FDA Silicone Rubber**, products can be produced in a variety of configurations in order to suit your particular application. All of our food-grade silicone products are FDA complaint and can provide reliable service
at temperatures ranging from -67°F to 450°F. FDA Silicone is typically red, white, gray and translucent in color. (http://us.wow.com/wiki/Silicone_rubber, retrieved 4/8/14)

**Stainless Steel - Grade 316 (UNS S31600),** Grade 316 is the standard molybdenum-bearing grade, second in importance to 304 amongst the austenitic stainless steels. The molybdenum gives 316 better overall corrosion resistant properties than Grade 304, particularly higher resistance to pitting and crevice corrosion in chloride environments.

**Corrosion Resistance,** excellent in a range of atmospheric environments and many corrosive media - generally more resistant than 304. Subject to pitting and crevice corrosion in warm chloride environments, and to stress corrosion cracking about 60°C. Considered resistant to potable water with up to about 1000mg/L chlorides at ambient temperatures, reducing to about 500mg/L at 60°C.

**Heat Resistance,** good oxidation resistance in intermittent service to 870°C and in continuous service to 925°C. Continuous use of 316 in the 425-860°C range is not recommended if subsequent aqueous corrosion resistance is important. Grade 316L is more resistant to carbide precipitation and can be used in the above temperature range. Grade 316H has higher strength at elevated temperatures and is sometimes used for structural and pressure-containing applications at temperatures above about 500°C.

**Heat Treatment,** Solution Treatment (Annealing) - Heat to 1010-1120°C and cool rapidly. These grades cannot be hardened by thermal treatment.

**Welding,** excellent weldability by all standard fusion methods, both with and without filler metals. AS 1554.6 pre-qualifies welding of 316 with Grade 316 and 316L with Grade 316L rods or electrodes (or their high silicon equivalents). Heavy welded sections in Grade 316 require post-weld annealing for maximum corrosion resistance. This is not required for 316L. Grade 316Ti may also be used as an alternative to 316 for heavy section welding.

**Machining,** a “Ugima” improved machinability version of grade 316 is available in round and hollow bar products. This machines significantly better than standard 316 or 316L, giving higher machining rates and lower tool wear in many operations.

**Stainless steels used in food processing,** most containers, pipe work and food contact equipment in stainless steels is manufactured from either 304
or 316 type austenitic stainless steels. The 17% chromium ferritic stainless steel (430 type) is also used widely for such applications as splash backs, housings and equipment enclosures, where corrosion resistance requirements are not so demanding.  

(http://www.bssa.org.uk/topics.php?article, retrieved 4/8/14)

**Maintenance of food process equipment**, stainless steel equipment often contains gaskets or other components that can absorb or retain fluids. These liquids may be become concentrated by evaporation and corrosion may ensue. Equipment should be disassembled occasionally for thorough cleaning. If the disassembled equipment exhibits corrosion (crevice corrosion usually), then the corroded surfaces should be cleaned.  

(http://www.bssa.org.uk/topics.php?article=45 retrieved 4/8/14)

**Stainless Steel - Grade 304 (UNS S30400)**, grade 304 is the standard "18/8" stainless; it is the most versatile and most widely used stainless steel, available in a wider range of products, forms and finishes than any other. It has excellent forming and welding characteristics. The balanced austenitic structure of Grade 304 enables it to be severely deep drawn without intermediate annealing, which has made this grade dominant in the manufacture of drawn stainless parts such as sinks, hollow-ware and saucepans. For these applications it is common to use special "304DDQ" (Deep Drawing Quality) variants.

**Dual Certification**, It is common for 304 and 304L to be stocked in "Dual Certified" form, particularly in plate and pipe. These items have chemical and mechanical properties complying with both 304 and 304L specifications. Such dual certified product does not meet 304H specifications and may be unacceptable for high temperature applications.  


**304 Stainless Steel Round**, Is ideal for all applications where greater strength and superior corrosion resistance is required. 304 Stainless Round has a durable dull, mill finish that is widely used for all types of fabrication projects that are exposed to the elements - chemical, acidic, fresh water, and salt water environments.  


**Stainless Steel Angle**, Stainless steel angle bars are widely used for engineering structures, industrial tools, machinery parts, building construction etc. There are two methods of angle bars processing which is cold-worked and hot drawn. The difference is the angle of bend: cold-
worked bar is smoother, hot drawn bar is right angle (sharp edge). (http://www.chainchon.com/stainless-steel-angle.htm, retrieved 4/8/14)

**Stainless Steel 304**, American iron and steel institute (AISI) use three numbers to clarify different types of steel which are 200, 300, 400 and 600 series. According to the components which could be discriminate into "nickel-chromium-manganese, chromium-nickel and chromium series." The main elements of austenitic stainless steel are nickel, chromium, manganese which divided to 200 and 300 series; the materials are non-magnetic normally but after cold processing will become slightly magnetic. 304 could be general use and have great corrosion resistance, processing and welding properties. (http://www.chainchon.com/stainless-steel-316.htm, retrieved 4/8/14)

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**Gear Reduction**, Gear reduction has many applications. When rotational forces need to change in a machine, engineers will employ a gear reduction technique to either increase or decrease torque or speed. Gear reduction works because gears rotate differently according to their circumference. The larger the circumference, the longer it will take that gear to perform a revolution. (http://www.ehow.com/facts_7502179_gearreducer.html#ixzz2yHYQSusi, retrieved 4/8/14)

**Gear Reducer**, A gear reducer is a pair of interlocking gears. One of the gears is driven by an input, usually a motor which has a given speed, in revolutions per minute, and torque. Torque is rotational force. The gear reducer translates the input force and speed into a different force and speed at the output. The total amount of power, however, remains the same. (www.rushgears.com retrieved 4/8/14)

**Lovejoy jaw type coupling w/ hytrel elastomer 1.250"**, Lovejoy Jaw Type Industrial Coupling w/ Hytrel Elastomer. This coupling offers standard shaft-to-shaft connection for general industrial duty applications. Standard L type coupling hub materials are either sintered iron (L035 - L150) or cast iron (L190 - L276). (http://www.bakersfieldads.net/Bakersfield-/Food-
Induction Motor, An induction motor is a motor that provides power. It owes its name to the way it operates. Alternating current (AC) voltages are induced by the magnetic and rotating field of the stator in the rotor circuit. An induction motor is constructed with elements of copper, steel, and aluminum. (http://www.wisegeek.com/what-is-an-induction-motor.htm, retrieved 4/8/14)

General-purpose Horizontal, These compact Horizontal Limit Switches are used applications in which Basic Switches would not provide enough strength. Models with molded terminals are available. (http://www.ia.omron.com/products/category/switches/limit-switches/general-purpose-horizontal/index.html, retrieved 4/8/14)

Limit Switch, In electrical engineering a limit switch is a switch operated by the motion of a machine part or presence of an object. They are used for control of a machine, as safety interlocks, or to count objects passing a point. A limit switch is an electromechanical device that consists of an actuator mechanically linked to a set of contacts. (http://en.wikipedia.org/wiki/Limit_switch, retrieved 4/8/14)

Pillow Block Bearing Units, Pillow blocks are the most commonly used type of mounted units, to provide support for a rotating shaft with the mounting surface on a parallel line with the axis of the shaft. The bolt holes are usually slotted for adjustment during mounting. (http://bearingson.com/Category/pillow_blocks Bearings/default.asp, retrieved 4/8/14)

Pillow Block, A pillow block is a mounted bearing that is used to give support for a rotating shaft. This type of bearing is usually placed on a parallel line within the axis of the shaft. Pillow blocks are found in various conveyor systems and are often self-lubricating. (http://www.ehow.com/about_5782074_pillow-block_.html#ixzz2yHjbfb5S, retrieved 4/8/14)

Crank, A crank is an arm attached at right angles to a rotating shaft by which reciprocating motion is imparted to or received from the shaft. It is used to convert circular motion into reciprocating motion, or vice-versa. The arm may be a bent portion of the shaft, or a separate arm or disk attached to it. Attached to the end of the crank by a pivot is a rod, usually called a connecting rod. The end of the rod attached to the crank moves in a
circular motion, while the other end is usually constrained to move in a linear sliding motion.  
(http://en.wikipedia.org/wiki/Crank_(mechanism), retrieved 4/8/14)

**Methodology**

The study was comprised of two major phase: development of the project and the evaluation of its effectiveness. In development phase analyzed for possible equipment needed to utilize for specific function, preparation of design, preparation of materials, cutting of materials and assembling of the project.

The evaluation phase was descriptive study: three groups of respondents were considered: 14 participants from Barangay Dita, Cuenca, Batangas; 9 participants from Barangay Pangil, Laguna and 32 participants from TUP-CIT – students all the activity was in line with granules soap making during the livelihood training program. And one group of respondent was considered: 15 participants from Barangay Dita during the livelihood training in the community in line with meat processing.

The project design was evaluated based on its characteristics in the following dimensions: functionality, aesthetics, safety, durability, availability, economy and saleability.

The evaluation of the project was based in 5-piont Likert Scale as follows: 5=Highly Acceptable, 4=Very Acceptable, 3=Acceptable, 2=Fairly Acceptable and 1=Not Acceptable.

For the interpretation of the response in the evaluation questioners, the following limits were adapted from S. Briones, et.al (2009) as cited from Araneta, et.al (2004).

<table>
<thead>
<tr>
<th>Range</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.30 – 5.00</td>
<td>Highly Acceptable</td>
</tr>
<tr>
<td>3.50 – 4.29</td>
<td>Very Acceptable</td>
</tr>
<tr>
<td>2.50 – 3.49</td>
<td>Acceptable</td>
</tr>
<tr>
<td>1.80 – 2.59</td>
<td>Fairly Acceptable</td>
</tr>
<tr>
<td>1.00 – 1.79</td>
<td>Not Acceptable</td>
</tr>
</tbody>
</table>

**Results and Discussion**

The multi-function mixer were design in such a way that mixing process can be done easy and double the production.
Evaluation Phase

Table 1 shows the overall results of the Evaluation Criteria for the Development of Multi-function Mixer (Manual/Motorized) for Small Scale Entrepreneur and Producer.

Table 1. Overall Results of the Evaluation Criteria for the Development of Multi-function Mixer (Manual/Motorized) for Small Scale Entrepreneur and Producer as perceived by the community respondents, during the livelihood training in granules soap in Barangay Dita, Cuenca, Batangas, Barangay Mabato-Asufre Pangil, Laguna, TUP-CIT students and respondent from Barangay Dita, Cuenca, Batangas during the livelihood training on meat processing.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Mean Rating</th>
<th>BDCB (Sg)</th>
<th>BMAPL (Sg)</th>
<th>CITBsftS (Sg)</th>
<th>BDCB (Mp)</th>
<th>OR</th>
<th>QD</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Functionality</td>
<td></td>
<td>4.83</td>
<td>4.83</td>
<td>4.43</td>
<td>4.43</td>
<td>4.63</td>
<td>HA</td>
</tr>
<tr>
<td>B. Aesthetics</td>
<td></td>
<td>4.73</td>
<td>4.76</td>
<td>4.40</td>
<td>4.40</td>
<td>4.57</td>
<td>HA</td>
</tr>
<tr>
<td>C. Safety</td>
<td></td>
<td>4.86</td>
<td>4.56</td>
<td>4.46</td>
<td>4.50</td>
<td>4.59</td>
<td>HA</td>
</tr>
<tr>
<td>D. Durability</td>
<td></td>
<td>4.96</td>
<td>4.93</td>
<td>4.43</td>
<td>4.30</td>
<td>4.65</td>
<td>HA</td>
</tr>
<tr>
<td>E. Availability</td>
<td></td>
<td>4.90</td>
<td>4.43</td>
<td>4.2</td>
<td>4.30</td>
<td>4.45</td>
<td>HA</td>
</tr>
<tr>
<td>F. Economy</td>
<td></td>
<td>4.90</td>
<td>4.43</td>
<td>4.2</td>
<td>4.20</td>
<td>4.45</td>
<td>HA</td>
</tr>
<tr>
<td>G. Saleability</td>
<td></td>
<td>4.96</td>
<td>4.16</td>
<td>4.13</td>
<td>4.00</td>
<td>4.31</td>
<td>HA</td>
</tr>
<tr>
<td>OVERALL RATING</td>
<td></td>
<td>4.87</td>
<td>4.58</td>
<td>4.33</td>
<td>4.30</td>
<td>4.52</td>
<td>HA</td>
</tr>
<tr>
<td>QUALITATIVE DESCRIPTION</td>
<td></td>
<td>HA</td>
<td>HA</td>
<td>HA</td>
<td>HA</td>
<td>HA</td>
<td></td>
</tr>
</tbody>
</table>

Legend:

OR - Overall Rating
QD - Qualitative Description
HA - Highly Acceptable
BDCB (Sg) - Barangay Dita Cuenca Batangas (Soap Granules)
BMAPL (Sg) - Barangay Mabato-Asufre Pangil Laguna (Soap Granules)
CITBsftS (Sg) - College of Industrial Technology Bachelor of Science in Food Technology Students (Soap Granules)
BDCB (Mp) - Barangay Dita Cuenca Batangas, (Meat Processing)

Summary of Findings

*Functionality*, from the two areas of activity with four groups of evaluators (BDCBSg, BMAPLSg, CITBsftSg and BDCBMp) with an overall mean 4.63 (see table) result, shows that the respondents Highly Acceptable that functionality of the equipment (mixer) are clearly stated and they can use it.
Aesthetics, the overall mean rating of 4.57 suggests that the respondents Highly Acceptable on the aesthetics appearance of the mixer in terms of color design and sizes.

Safety, the respondents Highly Acceptable on the safety of the mixer as reflected by the 4.597 mean overall rating that the materials of the mixer are safe.

Durability, the overall mean rating of 4.655 indicates that the respondents agreed on the quality of the materials used for the mixer. Likewise they agreed that the workmanship of the project is adequately provided (mean 4.45) and the design of the project is highly acceptable to the end-user.

Availability, the overall mean rating of 4.47 shows that the four groups of respondents Highly Acceptable that the materials, technical expertise, tools and machine used can be available in the market.

Economy, the overall rating of 4.48 shows that the respondents Highly Acceptable that the mixer can be used in long term. In terms of time and labor spent using mixer they can double their production compare to the traditional method of mixing.

Saleability, the overall mean rating 4.29 shows that respondent Very Acceptable that the mixer can be utilized in the market.

Conclusions

Based on the finding presented, the following conclusions were drawn:

1. The development of the mixer was useful in terms of mixing activity.
2. The operation, function and application of the mixer were very easy to understand.
3. Lease maintenance required in terms of operation.
4. Using Multi-function mixer could improve the quality of mix products and double the production of their finished products to sustain the demands in the market.

Recommendations

In the light of significant finding and conclusions presented the following recommendations are given, that:

1. Introduce the mixer in the market to help target clients improve their technology used in line with their business.
2. Continuous technology transfer training program on how to use the mixer.
3. The researcher encourages other people to do research in line with technology development.
4. Development and evaluation for every technology should be done according to its functions.

**Actual Project Design Development of Multi-function Mixer**
**(Manual/Motorized)**

**for Small Scale Entrepreneur and Producer**

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**Figure 1.** The picture above is the actual project with motorized function. The load should be minimum of 5 kilos and maximum of 50 kilos. Red indicator is driven power of 220 volts single phase ¼ HP with the speed of 1270 RPM attached with gear reducer with the ratio of 60 RPM.

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**Figure 2.** The picture above is the actual project with manual function. The load should be minimum of 5 kilos and maximum of 30 kilos. Red indicator is the area of the handle to rotate manually to mix.

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**Reference**


