Fabrication of Portable Wheel Hoe

(Fabrikasi Cangkul Roda Mudah Alih)

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Abstract

Most of the agricultural machinery that available in the market now is typically massive, heavy, and costly. Some farmers are hardly buying agricultural machinery for example Rotary Tiller for walking Tractors for their work because of the weight, cost, and size of the technology. The farmer will find it difficult while working with hot weather and working too long causes them to suffer from back pain and illness. . In addition, farmers have to a long time to complete their work. The ultimate objective of this study is to find a solution for the construction of a smaller, more compact, cheaper, easier-to-use wheel hoe for a vegetable farmer, comfort for farmers while working, reduce the working time, and reduce the manpower for crop boundaries. The materials used are black pipe, steel plate, construction steel, wheelbarrow type, bolt nut, washer, anchor spray, umbrella, basket, and shaft. Fabrication processes are used in the cutting process, welding process, grinding process, drilling process, and finishing process. Wheel Hoe Garden Tool results are showed that the farmer can produce two boundaries at once in that time. We were finished our project with designed and lubricated according to our inventor drawing, flow chart, and t chart that we already prepared in our proposal. Overall, the Hoe Garden Wheel tool can be used by small-scale farmer and the results show how a farmer's working time can be reduced, including energy reduction and can provide comfort while using the Hoe Garden Wheel Tool.

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INTRODUCTION

The Wheel Hoe Garden Tool was fabricated for the use of farmers. Wheel Hoe was needed in vegetable gardens in making crop boundaries. Wheel Hoe also could be used manually by pushing it on the soil. The purpose of Wheel Hoe was to provide comfort for farmers while working, to reduce the working time and manpower during cropping boundaries on the farm (Hildayani et al., 2019)

The wheel hoe began invented as a horse-drawn implement first manufactured by a company based in Philadelphia, known as Planet Jr. (Tool, 2020). The first mass produced design was released in 1890 as a product that could be powered by a horse which most of the Planet Jr. Customers had at least one utility animal that could be used for the product (Hildayani et al., 2019); (Priya et al., 2018). Figure 1 shows a Modern Wheel Hoe. It was designed stems directly from that of the famed Planet Jr. wheel hoe, a popular tool with home and market gardeners a century ago. The wheel hoe was supplied with a removable set of three times (Aparna and Babu, 2018).

Figure 1. Modern Wheel Hoe(Aparna & Babu, 2018)

Meanwhile, Figure 2 shows a traditional wheel hoe that has a bunch of different blades and is essentially a hoe attached to a big wheel. Using more of the weight of your arms to push the hoe around, so it tends to be slightly faster and slightly easier (though your shoulders get tired). The products available in the market are mostly for international countries. As we know international products are expensive from our national products.

Figure 2. Traditional Wheel Hoe

Based on the issues that need to be tackled are those farmers difficult to work during hot weather and working too long cause them to suffer from back pain and illness. In addition, the farmers need to take a long time to complete their work with a very high

level of work and a high level of commitment in vegetable planting. Therefore, fabrication of wheel hoe that can fulfil the requirement of those farmer. The height and width of the wheel hoe was approximately 16 cm and 55 cm. This wheel hoe was able to make a gap between the soil beds around 36 cm and depth of the hole for planting was 3 cm.

METHODOLOGY

Several stages had been planned and archived in the wheel hoe fabrication process. Major phases of the design process involved in this project outlined as the flow chart in Figure 3 below. The process of fabrication started with material selection. Materials such as hollow pipe (steel), steel plat, construction steel, wheelbarrow tire, umbrella, basket and plow set. Then, two steel (length 0.82 m) were welded using arc welding for laying the plow set. Two other steels (length 0.6 m) were welded using arc welding and attached in the construction steel middle and black steel with steel to be used as a place to attach the tiers. Later, four plow set were mounted on the body frame of the wheel hoe. Two tiers were also mounted on the body frame of the wheel hoe too. After the structure of the frame was built. The complete wheel hoe body frame is shown in Figure 4.

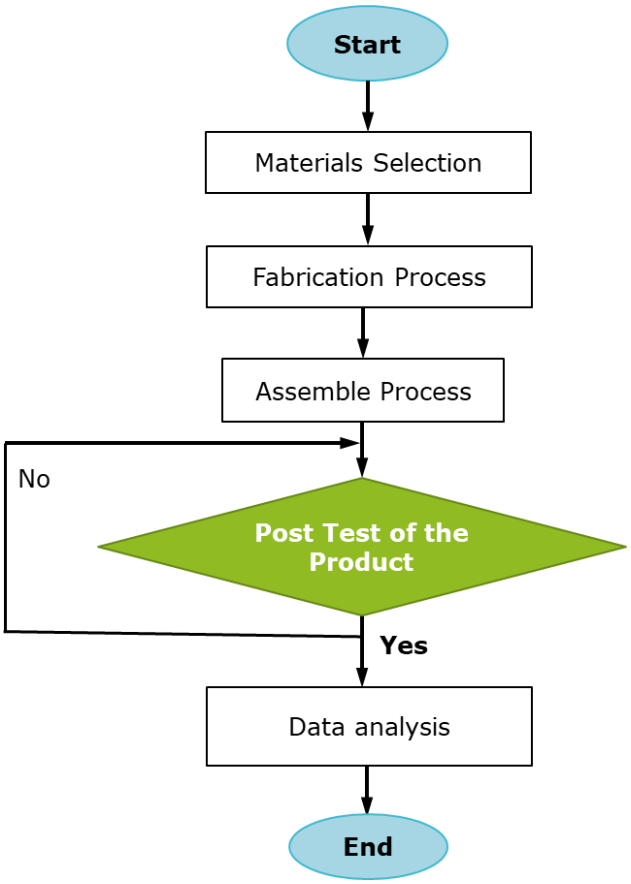

Figure 3. Flow Chart of wheel hoe fabrication process

Figure 4. Body frame of the wheel hoe

Next, plate steel was cut into Y shape with 4mm thickness, 80mm length and 50mm width and then it was welded on the middle of the frame to hold the mould. Then, two handles were welded on steel construction on the full body frame. After all parts were connected, we want to installed umbrella and basket. Lastly, the complete wheel hoe after sprayed and finishing processes as shown in Figure 5. The wheel hoe design was illustrated using Autodesk Inventor software is shown in Figure 6.

Figure 5. Wheel Hoe

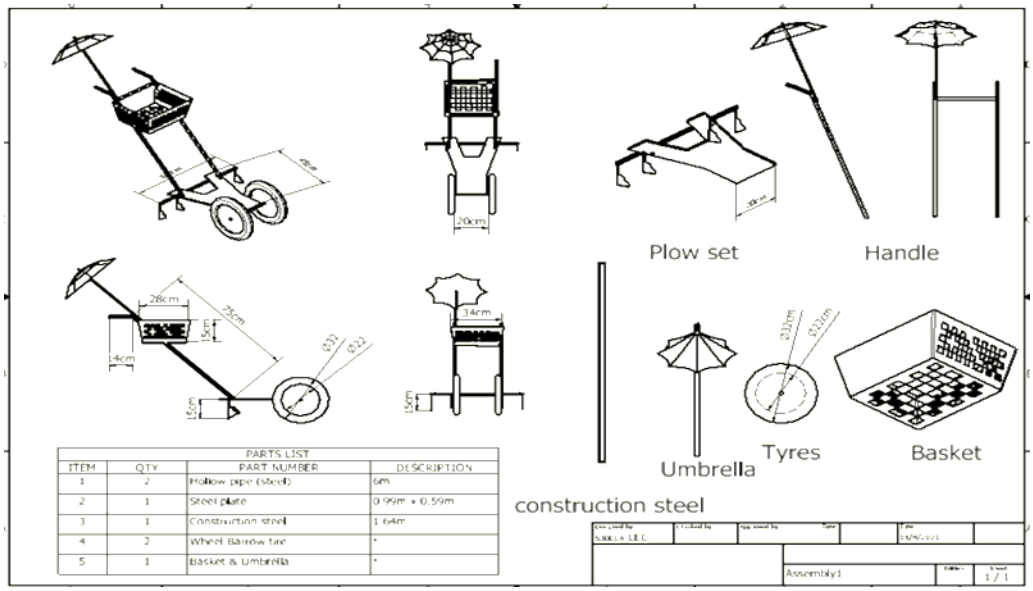

Figure 6. Design of wheel hoe was illustrated using Auto Desk Inventor

RESULTS

A survey was conducted using questionnaires distributed to farmers around several villages, especially those who planted vegetables in the crop boundary. Then, we proposed and tested this Wheel Hoe Garden Tool in their farms. After that, we had interviewed 39 farmers with questions, and we obtained the data as evidence of our data and results.The analysis of the first question showed that 87.2% of the farmers agreed that the Wheel Hoe Garden Tool was comfortable to use them. For the question based on the time consuming during handling this wheel hoe. Analysis showed that 98% of the respondents agreed that this tool had saved their working times at the farm, compared to using hand tools in making crop boundaries. Besides that, 84.6% of the respondents agreed that this tool had them in reducing manpower during made crop boundaries. Therefore, analysis from the survey that being conducted had showed that the objectives of our project were achieved.

CONCLUSION

This project with designed and lubricated according to our inventor drawing, flow chart, and Gantt chart that we already prepared in our proposal. We also had achieved the objectives from what we had shown that we already had designed and fabricated a wheel hoe for small scale's vegetable farmer. Analysis of result showed that the working time and the manpower of a farmer were reduced and can provide comfort during with using our Wheel Hoe Garden Tool in the farm.

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