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THE APPLICATION OF HIDRAM PUMPS AS APPROPRIATE TECHNOLOGY FOR THE KADUBEREUM VILLAGE FARMERS GROUP – PADARINCANG

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ABSTRACT

Kadubeureum Village is one of the villages located in Padarincang, Serang Regency, Banten Province. Kadubeureum village has 976,235 ha with a rice field area of 362,432 ha or about 37.16% of the existing area. So, this area is one of the agricultural sector areas in Padarincang Subdistrict. Irrigation in the rice fields in Kadubeurem Village is divided into 2 types of irrigation: rice fields that use irrigation from irrigation sourced from springs and rivers, and rice fields that still rely on rain (rice fields that have rain). This rain-fed rice field area is caused by rice fields above the river stream and are not watered from irrigation. So that the level of harvest productivity in the rain-affected rice fields is relatively lower than the area of rice fields that are irrigated. This becomes a problem for farmers whose rice fields include rice fields that have rain due to the location of the rice fields that are above the river flow. Seeing the above, it is necessary to apply appropriate technology for innovative in overcoming problems in farmers groups with the application of appropriate technology, namely with the application of hydrant pumps that are economical, efficient and effective so that the problem of water shortage in rice fields can be resolved.

Keywords: *Hidram Pumps;Appropriate Technology; Farmers Group;*

INTRODUCTION

Kadubeureum Village is one of the villages located in Padarincang, Serang Regency, Banten Province. Viewed in terms of administration Kadubeureum Village has the shape of the land area that is elongated, namely from east to west by surrounded by the following boundaries: The north is bounded by Bugel Village, thesouthis bounded by Pari Village, sThe west isbounded by Cibojong Village,theeast is borderedby Padarincang Village. While in terms of the size of the long distance, between Kadubeureum Village and the regional government center is as follows: The distance from Kadubeureum to Kecamatan Padarincang is about 2.5 Km and the distance from Kadubeureum to the Serang Regency Government Office is about 46 Km.

In monographic Kadubereum Village has an area of 976,235 Ha with a rice field area of 362,432 Ha or about 37.16% of the existing area. Viewed demographically based on the type of work, most Kadubereum Village people have jobs as farmers and farm workers. A total of 1,100 people work as farmers (47%) and 751 people work as farm workers (32%). So that this areais an eruption of one of the agricultural sector areas in Padarincang Subdistrict.

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This rain-fed rice field area is caused by rice fields above the river stream and are not watered from irrigation. So that the level of harvest productivity in the rain-affected rice fields is relatively lower than the area of rice fields that are irrigated. So this becomes a problem for farmers whose rice fields, including the rice field area, are rained due to the rice fields above the river flow.

Seeing the above, it is necessary to apply appropriate technology for innovative in overcoming problems in farmers groups whose rice field area position includes rain-dah ricefields.

One of the appropriate technologies that can be used to drain water from the bottom to the rice fields above it is a hydrant pump. A hydrant pump is a device used to pump by raising water from a lower place to a higher place with high-use results that can drain water continuously (Hanafie, 1979). Hydrant pumps have a working principle by utilizing falling water pressure. This pump works without the need for fuel or electric current to lift water from the bottom up. In addition, the manufacture and maintenance of this pump is simple and the spare parts are also easy to obtain so that it is suitable for areas with a limited level of community technical ability.

METHOD

The method of community service (PKM) carried out through increasing community productivity through appropriate technology for the improvement of the community economy in Kadubeurem Village, is carried out in several stages, namely:

1. Preparation Stage
   a. Determination of Place and Time of Implementation
      This Community Service is carried out in Kadubeureum Village of Padarincang District of Serang Regency and the time of PKM will be held in August 2021.
   b. *Assessment* /Preliminary Review / Situation Analysis
      The method in this initial study uses the PRA method (Participatory Rural Appraisal), which is a method used in conducting assessment /assessment/observation to understand the circumstances or conditions ofa particular village or region by involving community participation. This PRA method is very suitable to be used. It is flexible because it has a nature that is open to accepting new ways that are considered suitable.
      In this initial study activity is divided into several activities, namely: (1) consultation and consultation with officials of Kadubereum Village, (2) to the target location by the recommendations of the village, (3) discussions with BPD and farmers groups and local communities, at this stage also at the same time applied for permission for the implementation of PKM activities by the schedule that has been determined.
2. Implementation Stage of Activities
   a. Socialization
      This stage is the stage of appropriate technology that is a hydrant pump to the community so that the public can know the benefits and workings of the

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hydrant pump. In case we will explain everything related to this hydrant pump. This socialist activity also conducted training in the assembly of this tool aims so that the community can be independent if later there are problems faced if this hydrant pump has been used. Moreover, the public can get knowledge of how to assemble tools to assemble and reconstruct these hindram pumps. This plate aims so that the community can operate and maintain this hydrant pump.

b. Tool Preparation

Inthisstage, the tools and materials used to assemble the hydrant pump are prepared and collected to be below to the place of implementation of the program,it aims to run the program smoothly and by the targets that have been set.

c. Tool Assembly/Construction

In this stage, there will be a process of assembling a hydrant pump from materials that have been prepared in the previous stage. The assembly stage of this tool takes much time because the manufacture of some components of the hydrant pump must be made and prejuddedwiththoroughness so that the performance of the hydrant pump produces the expected output. In addition to this, the public understands the process of making and assembling the hydrant pump tool. so that after this program is implemented it will be able to practice itself in the manufacture of the hydrant pump tool

RESULTS

A. Concept Analysis

By the law of gravity, water flow always flows from a high place to a lower place. It is impossible to raise water from a source or flow to a higher place, without the help of electrical energy or fueloil. The working principle of a hydrant pump follows the process of changing kinetic energy (waterflow) into dynamic pressure and consequently giving rise to a water *hammer.* Water flows from a source through an intake pipe and exits through a exhaust valve. The flow of water through the exhaust valve is quite fast, so the dynamic pressure, which is the upward force, pushes the waste valve to close suddenly while stopping the flow of water in the intake pipe. The stalled flow of water resulting in a sudden high pressure in the ram, if the pressure is large enough it will overcome the pressure in the air chamber on the delivery valve thus allowing water to flow through the air space and so on to the holding tank.

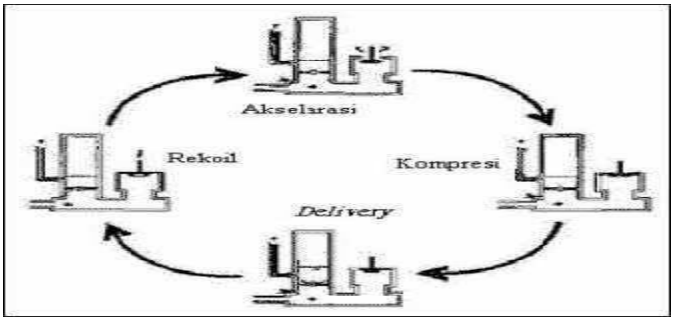

Figure 1. Working Principles of Hidram Pumps *(Source: Suroso,2012)*

B. Preparation and Assembly

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To design a hydrant pump it is necessary to conduct a field survey to get the data - data that becomes the parameters of the pump design. Some of the data that needs to be obtained are:

a. Flow of water source
   This data is in the form of water source discharge in normal conditions and measurements must be done in the dry season because that is when there is a decrease in water discharge.
b. *Water* supply head
   Seethe extent of the water source's height to the location of the placement of the hydrant pump and the slope of the location below the water source.
c. *Placeholder* head
   The height of the water source to the planned location for the supply output water so that the placement of the hydrant pump is appropriate.

Once the datais known, the most importantstages are PVC 2" and 3" manufacturing materials for the manufacture of air tank units or airchambers, checkvalves,and exhaustvalves. The tusen valve serves to drain water from below then hold it in the tank to not flow back down. If there is a water transfer to the tank, the air in the tank will experience pressure. This depressed air withindoors water up to the delivery pipe andthen press the water down, resulting in the tusen valve closed, so that the water from below cannot rise again because the pressure from the air tank is equal to or greater than the water pressure from below.

To design a pump that actively moves itself, it is necessary to open-close the flow of water automatically work, namely by relying on the exhaust valve mechanism. When the exhaust valve is closed due to pressure or water thrust, the water will return and there will be a pounding of water / water hammer. As the water flows in the valve flowing back, the pressure on the lid is reduced and because of the force of the spring push, the valve moves down.

and open. After the impact of water / hammer of water and the exhaust valve is open, the water will again flow into the exhaust. When closing movement occurs, kelp tusen plays a role in the additional pressure of water flowing towards the exhaustvalve.

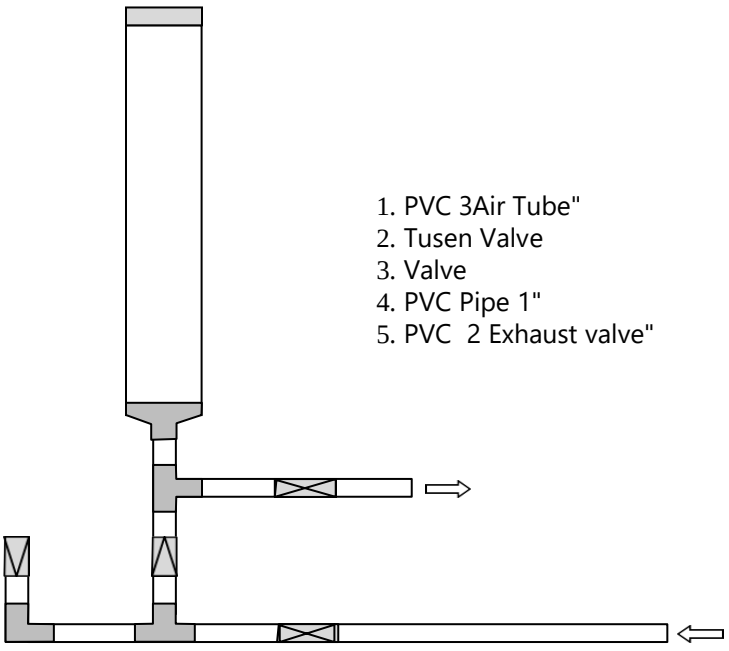

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Figure 1. 2D Pvc 2" Hidram Pump Design

Figure 3. Hidram Pump Assembly 2 katup buang PVC 2"

C. Hidram Pump Trial

Thehydraulicpump tool before being demonstrated to the public, first conducted a trial by the team to test whether the components of the hydrant pump run well from the exhaust valve to the output water flow from the delivery pipe.

Figure 5. Exhaust Valve Performance Trial

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(a) (b)

Figure 6. Test Performance of Exhaust Valves and Out Put Delivery Pipes

Being in the community is done through a test of knowledge and understanding in making, dismantling and reassembled hydrant pumps. From this process, the community does not experience obstacles either in making the hydrant pump components, dismantling or reassembling. Sehingga this can be concluded there is a transfer ofuan and experience in the community about the manufacture of hydrant pumps whose manufacturing materials are easily found in the community.

High response to the activities of making hydrant pumps due to the transfer of new knowledge, such as the introduction of basic applied physics prisips, utilization of used materials and ease in the application of manufacture both in terms of materials and supporting equipment needed.

D. Implementation of Hidram Pump

The application of hydrant pumps that have been made, installed in Kp, Cibodas RT 04 RW 02 by the recommendations of BPD Kadubeureum Village and Kadubeureum Village Farmers Group and the results of surveys conducted by the team group that the recommended place is by the criteria that have been established (water level with soil / rice field and water pressure) to measure the maximum discharge capability and the distance of distribution.

Figure 7. Delivery of Hidram Pumps to the Chairman of the Farmer Group Kp. Cibodas Kadubeureum Village

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Figure 8. Installation of Hidram Pumps in selected Areas

CONCLUSION

The conclusion of the implementation of the Community Service (PKM) program is the result of the assembly of appropriate technology for hydrant pumps to have been qualified to be installed permanently because the resulting water hammer can reach a height of 15 meters by the rice fields that are not irrigated irrigation water (rice fields with rain). Thus, the ability of this hidram pump is by the purpose of its application to help farmers whose rice fields are not irrigated or rain-dreded rice fields. In addition, hasil assembly also shows satisfactory quality with an extensive and powerful thrust capability seen from output water from a large delivery pipe.

As a transformation of science, it is necessary to make several models of water pump design with varying tubes (4', 6', and 8') as a medium of learning kadubeureum villagers based on various factors both from the contour of the soil, elevation of water to ground level,altitude of exit put location and others. Thus, residents can estimate the needs and size of the pipes to be used. The right technology for this iis also not much developed by the local government, especially the Regional Government of Serang Regency in this case Padarincang Subdistrict,so there needs to bedeminasi and joint work as a solution to overcome the problems experienced by farmers whose rice fields are not irrigated or rely only on rainwater (rainwater rice fields).

REFERENCES

Cahyanta, Y. A. dan Indrawan.1996. “Studi Terhadap Prestasi Pompa Hydraulic Ram Dengan Variasi Beban Katup Limbah.” Jurnal Ilmiah Teknik Mesin Cakram.

Hanafie, J. .1979. Teknologi Pompa Hidraulik Ram. Bandung: Pusat Teknologi Pembangunan Institut Teknologi Bandung.

Munir, Abdul dan Mahmudin .2017. Pompa Hidram Sebagai Pompa Air Harapan Masyarakat di Dsa Samoling Kecamatan Lilirilau Kabupaten Soppeng. Berkemajuan : Jurnal Pengandian Kepada Masyarakat Vol. 1 hal 45-51.

Panjaitan, D.O., dan Sitepu, T., .2012. Rancang Bangun Pompa Hidram dan Pengujian Pengaruh Variasi Tinggi Tabung Udara Dan Panjang Pipa Pemasukan Terhadap Unjuk Kerja Pompa Hidram, Jurnal E-Dinamis, Vol. II, No.2

Suroso, 2012. Membuat Pompa Hidram. Kanisius, Yogyakarta

e-ISSN: 2963-8771
DOI: 10.57254/eka.v3i3.129

Zulfiar, Muhammad Heri. 2020. Penerapan Teknologi Pompa Hidram Bagi Masyarakat Pedesaan. Jurnal Berdikari Vol. 8 No