DEVELOPMENT OF SHALLOW TUBE WELL DIGGING MACHINE FOR IRRIGATION IN AGRICULTURE IN PERAK, MALAYSIA

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ABSTRACT

The development for groundwater in Peninsular Malaysia is on the increase following the boom in economy and progress in groundwater drilling. The agricultural sector has seen a rapid growth since 2002. This has increased the pressure on the available water sources in which various methods have been utilized to get water.
Surface water resources are easily contaminated by surface activities, wastewater, domestic or industrial waste. Therefore, alternative water sources such as ground water is one of the water sources that can be developed, if there is a decrease in the above mentioned resources. The tube well machine is one development to source for groundwater resources. This method is cost-effective and helps save agricultural crops. The depth of tube wells depends on the vegetable crop water requirements and the depth of the strata (rock in the earth's crust) containing groundwater storage. For a limited water source, tube wells must be dug up to a saturation zone, 0-30 meters. A particular method / technique or a special machine will be required for this operation.At the beginning of 1995, the centre used manual methods to develop tube wells. This method required a long time and was labour intensive. This was found to be inappropriate method as the cost spent was quite high in its implementation. To overcome these problems, the Centre developed a suitable machine called the "machine" percussionist “for the construction of tube wells. The capacity of this machine is within the range of 0-30 meters depth from the ground surface and unencumbered hard rock or hard object under the ground. This machine is designed to make it easy to be carried to the project area, shorten the implementation time in digging tube wells. This machine also reduces the use of labour and cost of drilling for underground water resources for irrigation purposes.

INTRODUCTION

Groundwater resources is a major source of water used as an alternative for daily needs, agricultural irrigation, domestic and others. Water resources can be found more or less level or 30 feet in the ground. It can even reach 100 feet in the ground. Peat soil areas requires water source that is more than 30 feet deep. However, the quantity of water is limited and will change, especially during the dry season. The "Water Table" between layers of peat is peat and clay (alluvium clay) which does not describe the true "equifer" density layer of sand. Sometimes, there is a need to dig up to 80 feet deep depending on the machine used. Rain water, rivers and ponds are major sources of water for irrigation in Malaysia. The geographical locations of agricultural farmers are scattered. Besides this, the distance from the location to the nearest city presents a difficulty for farmers to get water. Also, construction of ponds requiring large areas has its drawbacks. During the dry season, the water dries up, making it another difficulty to get water for the crops

As a result, construction of tube wells is one of the new alternative water sources for a clean and safe use of farm irrigation and other needs.

MATERIALS AND METHODS

Drilling/ Compaction:

This method is done by making holes and breaking the consolidated formation of soil using higher pressure from the load of the weight on the machine. However, the unconsolidated soil can cause it to collapse. Thus, the materials of pipe is important for prevent it. Moreover, stomping the pipe should be above the water table and not rushing. This is because it will cause the pipe to not be in the right path and in turn, may cause water to leak..

Steps and Procedures:

1. The point/ place to build the tube well is identified and the equipment needed will include gi socket, 'head pipe called rocket Gi pipe class C 11/2, pipe GI connecter, two water portable pump diesels/ petrol, hose HDPE pipe and white tape.
2. Put the head pipe (rocket) into the soil and break it using the tube well machine. This is done usng the compact method.
3. The head pipe and pipe are connected with the socket.
4. After that, do the flushing (water) process to clear the inside of the pipe.
5. Repeat the process until water table if found.
6. Draw the water out from the gi pipe.

Cost estimation:

Table 1: Total Cost Estimation

No.	Materials	Quantity	Price (RM)	Amount (RM)
1	Head pipe (rocket)	1	142.00	142.00
2	GI pipe	55	62.00	3410.00
3	Elbow GI Pipe	1	7.00	7.00
4	Socket GI Pipe	55	7.00	385.00
5	White Tape	5	1.00	5.00
Total cost estimation				3949.00

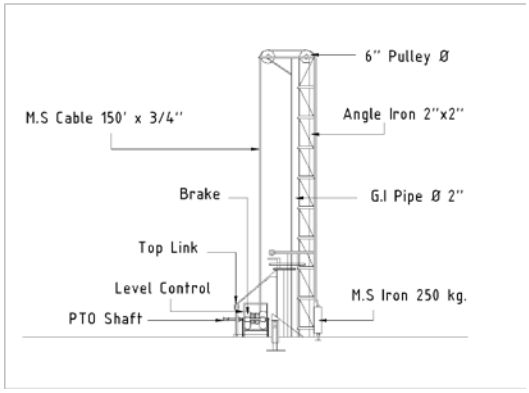

Fig. 1: Tube Well Design Drawing

Fig. 2: Picture of Old Method

Fig.3: Picture of New Method

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RESULTS AND DISCUSSIONS

Figure shallow tubes well have been built in Perak State. It can shown that the increase of the demands every year. Mostly they used of this tiub well for agricultural purposed like for irrigations for farming, water for animals and other like home used.

Table 2: Data of Tube Well in State of Perak, Malaysia

Year	Total Built	Average Deep (Feet)
2005	20 unit	35-90
2006	26 unit	22-78
2007	28 unit	35-98
2008	24 unit	40-99
2009	40 unit	22-100
2010	13unit	35-105
2011	18unit	33-89
2012	23unit	22-90

Table 3: Table of Total Cost Estimation (Private sector and Department of Agricultural)

No.	**Company**	**Type of Tube Well**	**Estimation of Cost Built (RM)**
1	Department of Agricultural, Perak	Shallow (100 feet)	3000.00-3900.00
2	Private sector	Shallow (100 feet)	4000.00-5000.00
3	Farmer/ Private Sector	Deep (>100 feet)	35,000.00- 200,000.00

Table 3 show that the comparison the shallow tube well and the deep tube well. In Malaysia, the private company doing this underground water drilling only five. In Perak state, there a lot of company or private sector has been doing the shallow tube well included our department.

CONCLUSIONS

The development of groundwater resources should be considered for agricultural areas in the state silver that face difficulty in looking for a natural water source or have limited resources. However, continuous monitoring should be done to support the work of development of groundwater resources, including water quality monitoring, assessment of volume, conservation of resources and the relationship between ground water and surface water bodies. If these activities are to be developed, the water can definitely help and support the agricultural sector, particularly in enhancing the country's food production in Perak.

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