Application of Hec-Ras Technology to Irrigation and Water Building in Agricultural Businesses

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Abstract. This study aims to help irrigate agricultural land using technology. This writing used descriptive method by analyzing the use of an irrigation system, which makes it easier for agricultural landowners in the irrigation process of the land. The results of this paper are building technology irrigation is suitable for irrigation needs of an agricultural land. After getting a survey directly from the location of the study and interviewing several local farmers, with the existence of irrigation channels and water structures, the water needs of a land can be easily fulfilled. The income from the land is increasing little by little, so that land owners have no more trouble getting water to meet their land needs. Therefore, it can be concluded that using this system technology can help design the flow of water on irrigation channels that function to irrigate agricultural land to meet their needs. So that the fulfilment of agricultural land water needs through irrigation can increase the income of the economy in that area.

1. Introduction
In the business environment, technology is one of the factors that influence it. Technology in business processes such as the implementation of company resource planning or ERP (Enterprise Resource Planning) which is the latest business technology to manage and organize corporate processes at the product line, department, and geographical location level [1]. HEC-RAS (River Analysis System) is an integrated software system designed for interactive use in a multi-tasking environment. This system consists of a graphical user interface (GUI), separate hydraulic analysis components, data storage and management capabilities, graphic output and tables, and reporting facilities [2].

The HEC-RAS program will automatically calculate the river cross-sectional capacity to know the shape of the river crossing, water level, and river cross-sectional capacity. In addition to the displaying the results of the calculation, HEC-RAS also displays the shape of a cross section of the channel. Therefore, the shape of the cross section and water level on the River can be seen [3]. The need for water in this cross section greatly influences the irrigation water needs that depend on the way of processing the land. Hence, it is necessary to analyze it to get the maximum and minimum amount of irrigation water demand [4]. The water requirement is from the watershed which is usually restricted to the ridge where rainwater that falls in the area will flow towards the river that is reviewed [5]. The results distributed by the HEC-RAS system for each cross section are interpolated between cross sections and produce water depth as well as the surface water velocity [6]. Moreover, the ability of the HEC-RAS system as a technology that has developed into a community culture becomes important. As an HEC-RAS irrigation system, it is a set of elements that have a reciprocal relationship. The purpose is to produce irrigation water management and services that are influenced by the environment and the human environment plays the most important role towards the results [7]. Later, farmers can determine the desired percentage of moisture at a certain depth they want before the water
is converted from downstream to upstream. On the lower side of the field (the far side of the ditch) the farmer can enter the desired probe depth and set the stop to the desired percentage [8].

In the absence of the HEC-RAS system there is no irrigation system that will apply water without some waste because the cost of preventing all losses is a barrier. Thus, some water losses are expected and accepted in appropriate irrigation systems design, installation, and management [9]. Irrigation optimization systems and methods according to this invention specifically address and meet the needs identified above in agricultural communities and also apply to urban and suburban and urban commercial settings [10]. This paper aims to help irrigate agricultural land using technology application for help farmer to visualization irrigation, with descriptive method.

2. Method

The method used in this scientific work is descriptive method by conducting surveys and interviews to some farmers. Results of surveys and interviews are used for the visualization of irrigation division using the help of technology by analyzing a system program in a computer and adjusting the opinions of several journals. Therefore, this study can show that implementing the HEC-RAS system to regulate irrigation systems in agriculture can be more well controlled.

3. Results and Discussion

HEC-RAS (River Analysis System) is an integrated software system designed for interactive use in a multi-tasking environment. This system consists of a graphical user interface, separate hydraulic analysis components, data storage and management capabilities, graphical output and tables, and reporting facilities. With the existence of this system, it is necessary to be introduced in advance how to use it so that its function can be effective and reliable.

The following figure is the result of making the irrigation. In making the initial project, what must be considered is the initial form when the project will be created. It can be seen in Figure 1 below.

Figure 1. The Initial Form of the HEC-RAS Project that will be Created

Figure 1 explained about the first step to use HEC-RAS application. After making the form at the beginning, then proceed with making a river line scheme, which divided, into the main river and branch. For the main river, it can be seen in Figure 2.
Figure 2 explained the data before putting it into a table. The existing data is entered into the table starting from the main river cross section data. The data is loaded from STA 0 until the river branch meeting. For Manning LOB and ROB, the value is 0.013 because it is concrete. While in the middle part, the value is 0.03. For data and forms in each river, see Figure 3 below.

Figure 3 is data form for every river. The existing data is inputted into the table starting from tributary cross section data. Data is loaded from STA 0 until the river branch meeting. For Manning LOB and ROB, the value is 0.013 because it is concrete, while in the middle part the value is 0.03. For data and forms in each river, see the Figure 4 below.
Figure 4. Main River 2 sta 2

Figure 4 explained for value LOB and ROB. The existing data is inputted into the table starting from tributary cross section 2 data. The data is loaded from STA 0 until the river branch meeting. For Manning LOB and ROB, the value is 0.013 because it is concrete, while in the middle part the value is 0.03. For data and forms in each river can be seen in the Figure 5 below.

Figure 5. Main River 3 sta 3

After getting the results of obtaining the data table filled in as above, then there is the process of entering the distance between 2 rivers, namely the distance from the main river 2 to the main river 1 and vice versa. It can be seen in Figure 6.
Then, enter the amount of flowing water with different amounts in the steady flow option. After that, in the reach boundary section, the upstream of the river is modeled using the condition of critical depth. In the downstream part is modeled using normal conditions with a slope of 0.001. If you have changed flow regime from subcritical to be mixed at steady flow analysis then compute it until the run plan results appear as in Figure 7.

If you want to see the results in 3D, you can see the 3D location select then a form will appear as Figure 8 below.
Figure 8. Select Location 3D

The results of the 3D image produced is as follows. (See Figure 9).

Figure 9. 3D Running

The results of the cross section are as follows. (See Figure 10).
4. Conclusion
With the HEC-RAS system, it can help farmers in the process of irrigating land by designing water flow and estimating the water source that will be used as irrigation for their agricultural land in advance. So that later the farmers will easily control the irrigation of their agricultural land and later the results of these efforts will produce maximum results.

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