Optimization Of Fish Catching Resulting Using Appropriate Technology

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Abstract

This research was conducted to optimize the fishing results of fishermen using Appropriate Technology by building a smart village that is not limited to Information Communication and Technology. Mapping of traditional fishermen in Depok, Kretek, Bantul Regency, DIY. The benefits of this research are to improve the welfare of traditional fishermen, and to increase the contribution of the fisheries sector to the regional and national economy, and to empower traditional fishermen to improve food security. The result of this research is by applying Appropriate Technology to the servant's navigation system, the fishermen can see changes in the weather, the location of the fish, the sending of danger signals if the ship is damaged at sea.

Keywords: Ship Navigation, Appropriate Technology, Fishermen, Yogyakarta

I. INTRODUCTION

To optimize fish catches and improve fishermen's welfare, a research stage is needed to inventory data on the potential for human resources (traditional fishermen) and SDI in the coast of Depok, Kretek, Bantul, Yogyakarta Special Region. Design and manufacture of appropriate communication technology (TTG) and carry out trials and implementations of TTG in the field. The expected benefits from these activities are increasing the catch of traditional fishermen, the welfare of traditional fishermen, and increasing the contribution of the fisheries sector to the regional and national economies, as well as empowering traditional fishermen to improve food security.

The problems that have been faced so far include: 1) There are still many fishermen who do not want to accept new technological innovations, both related to fishing technology, environmental management, and family financial management: 2) The low number of fish catches is because fishermen still use traditional boats that are not equipped with a navigation and information system: and 3) The low level of education and knowledge of the traditional fishermen community causes access to information to be limited.

This research can be achieved by 1) Engineering and developing appropriate technology based on information technology that meets the standards for economical reactivation in the empowerment of the coastal community of Depok, Kretek, Bantul Regency, DIY. 2) Building a smart village or smart village is not only limited to the sophistication of ICT (Information Communication and Technology) but what is more important and needs to be emphasized is how the concept of a smart village can change the capacity of the community and the way they interact.

Thus the target of this research is to improve the community economy based on empowerment and state defense of the coastal fishermen of Depok, to improve community welfare and create jobs for the surrounding community. The location of this research activity includes fishing villages in Depok, Kretek, Bantul Regency, Yogyakarta Province. With this research activity, it is hoped that there will be a change in the mindset of traditional fishermen in Depok from "Among Tani to Dagang Layar and Steering Wheel to Maritime Vision" through developing the potential of SDI, empowering human resources and technology.

The benefits of this research are to improve the welfare of traditional fishermen, and to increase the contribution of the fisheries sector to the regional and national economy, and to empower traditional fishermen to improve food security. The results of this study can be used as a database for the management of traditional fishing communities in the coastal areas of Bantul Regency, DIY.

II. LITERATURE REVIEW

In terms of building a strategy for economic empowerment Sabihaini and Januar (2014, 2015) through the Fundamental research grant scheme stated that the synergy of all stakeholders will form an acceleration in economic empowerment in an area. Besides, the implementation of the empowerment program mentioned above needs to be supported by increasing the capacity of the community in various aspects, namely through the pattern of community empowerment as part of complete human development. The success of the empowerment program requires an active role from the local government, community leaders, academics, maritime affairs, and NGOs (Sabihaini, 2013). Related to the economic empowerment of traditional fishermen based on integrated information technology. Some of these community development programs, including Community Empowerment Patterns:

a. Increased awareness about the importance of protecting the environment for their well-being.
b. Increasing active community involvement in maintaining environmental safety.
c. Education in a thrifty lifestyle, saving regularly, and living in harmony through mutual cooperation.
d. Increased awareness of the importance of education for children and young people to improve their standard of living.

Sabihaini and Januar (2016) through the Grant scheme compete for factors that shape the personal characteristics of entrepreneurs, namely: independence, enthusiasm at work (energetic), self-confidence, competitive, and goal-oriented, experience in managing businesses, work background of parents, and level of involvement. family in making company decisions has a positive and significant impact on the performance of small-scale businesses. The determinants of the success and barriers of MSEs lie in the individual background and the influence of individual characteristics such as age and gender, and individual backgrounds, such as education and work experience.

Sabihaini (2006) states that there is a positive relationship between social factors and the use of technology. Long-run consequences are measured from the output produced, related to future benefits, such as increased flexibility in changing jobs or increased opportunities for better jobs. However, tasks can be measured by knowing whether individuals believe that the use of information technology will improve individual performance. The use of information technology can be demonstrated in the context of acceptance of innovation. Meanwhile, conditions that facilitate the use of information technology include objective factors outside the environment that make it easier for users to do a job.

Sabihaini, Gusaptono, Kaswidjanti, and Aribowo (2015) through the Cluster Research Grant scheme succeeded in developing a decision support system for poverty alleviation programs which in phase I research produced a database structure for poor families in Bantul. The second phase of research resulted in a profile of the poor with various skills and educational backgrounds whose potential could be explored for empowerment (Sabihaini, Aribowo Gusaptono, and Kaswidjanti, 2015). Sabihaini, et al (2015) continued the research on decision support systems by developing more and could produce findings that many empowerment programs for poor families were not on target (Sabihaini, Kaswidjanti, Gusaptono, and Aribowo, 2015). The results of follow-up studies also show that they are inaccurate due to the absence of potential and no assistance to poor families who are assisted to be empowered.

Pratomo et al. (2009) autonomous control is the ability of a computer-based device to perform certain tasks in an environment without human intervention. Robot autonomous control can be done by designing a program that is placed in a robot or special equipment to be able to recognize its environment and act following the program design that has been made (Pratomo et al., 2010). To recognize the environment, an intelligent agent requires a sensor system that provides information to the smart agent about changes in its surroundings (Pratomo et al., 2013; Pratomo et al., 2015).

Pratomo et al., (2010) Environmental changes can affect the acquisition of information so that it can cause errors in taking action. The actions taken affect the results obtained. Collaboration in the process will involve several agents who have special algorithms so that they can work together to complete any given work (Pratomo et al., 2011). Agent autonomous Internet of Things systems can have a big impact on process automation. This is because the application of intelligent technology in the data collection and processing process can reduce costs and speed up the process.

Internet of Things technology cannot be separated from cloud computing technology. Cloud Computing technology in Pratomo et al (2016) has produced a system based on RFID technology and Cloud Computing. In this research, it produces Software as a Service (SAS) in cloud computing technology, which is an application as a service that is implemented in lectures in the UPN "Veteran" environment. "Yogyakarta which can be used widely and integrated through the Internet network.

Kusmantini, Rustamaji, (2015) through the IbPE grant scheme assisted UKM Batik to encourage the prospect of written batik as a superior export product in Bantul Regency. Empowerment was carried out using the active participation approach of group members. In addition to recording the achievement of percentage indicators for production and sales growth, it has also produced several tangible outcomes such as websites, product catalogs, sales power packaging, batik craft product pioneers, and home interiors.

Widjanarko, Rustamaji, et al (2012-2014), through the IbK grant scheme is one of the programs to assist in creating new young entrepreneurs in the campus environment. The methods developed include training and outbound, apprenticeship, business plan preparation, capital assistance, technical assistance, and mentoring. Based on the monitoring, the mentored students have successfully developed their businesses and become independent young entrepreneurs who are ready to develop.

Kusmantini, Rustamaji, in the PPM KKN scheme (2012) carried out Empowerment activities for Strengthening the Local Economy based on Village Leading Products and Mainstay in Bayat District, Klaten Regency. The concept of empowerment that is carried is OVOP (One Village One Product). regional potential development approach in a certain area to produce a unique global class product that is unique to the region by utilizing local resources, and for the Bayat sub-district, the product raised is batik.

Sabihaini et al (2018) found that fishermen have special characteristics that distinguish them from other communities, namely characteristics that are formed from life in the sea which is very hard and full of risks, especially risks that come from natural factors. The education level of fishermen tends to be low to medium and some of them still do not go to school, however, Depok beach fishermen are different from other fishermen. From the way of life, the fishing community is a community of mutual cooperation. Traditional fishermen's access to information is also relatively limited, this causes fishing routines in the same area. On the other hand, traditional fishermen have local knowledge (local knowledge) naturally about potential areas of fish that are passed down from generation to generation.

III. RESEARCH METHODOLOGY

This research is descriptive. A descriptive method is a method in research that is used to analyze data by describing or describing the data that has been collected as it is without intending to make general or generalized conclusions (Sugiyono, 2017). Collecting data in this study using direct observation methods. The direct observation method is that the researcher goes directly to the field to observe and analyze the object of research. The object of this research is fishermen residing in Kretek, Depok, Bantul Regency, DIY. The type of data in this study is primary data because the researchers obtained the required data directly from fishermen on the coast of Depok. The analytical tool in this research is SmartPLS.

After knowing the characteristics of the fishermen from the results of the analysis, the fishermen need to collect the tools needed in optimizing fishing results. This stage is important so that the tools developed are in accordance with fishermen's characteristics and needs. It is also known that fishermen on the Depok beach need navigation tools in looking for fish, need information about the weather when fishermen go to sea, need information on the presence of fish in the sea, and need information on the adequacy of fuel oil in the sea. To support the use of these navigation tools, a Ground Control System (GCS) is also needed.

The next stage is designing the appropriate tools/technology needed by these fishermen. The tools designed are tools that are in accordance with the characteristics of traditional fishermen, namely tools that are easy to use, safe and comfortable in use, provide benefits and benefits, and have high innovation power. If this is fulfilled, the level of technology acceptance by fishermen will be even higher. There are 3 designs built in developing the integrated navigation tool, namely, designing the equipment system architecture which includes the Ground Control System and the navigation system equipment section along with the data transmission mechanism between the two via radio frequency.as well as collecting weather data, chlorophyll-a data to predict the presence of fish.

Hardware design is carried out to develop GCS tools and navigation tools, in the form of components/modules used, schematic designs. The design of the software is done using a Data Flow Diagram (DFD). DFD Level 0 (context diagram) provides an overview of the data flow in the process described in general, DFD level 1 is a process derived from DFD level 0 which describes more clearly the process. DFD level 2 to a detailed flowchart of each sub-process. user interface design provides an overview of the layout of the menu, and maps and icons for interaction with the user, as well as database design including the design of the tables to be used.

The next stage is related to implementation and testing. This stage starts from the implementation stage of the system which will integrate the hardware and software of the navigation system and the GCS according to the designed system architecture. The results of the design are tested on the tools. The design of maritime weather prediction test results is carried out at several test points to determine the prediction results regarding water weather, wave height, wind speed, and wind direction. The results of the weather prediction from the system will be compared with the results obtained from the Meteorology, Climatology, and Geophysics Agency (BMKG). This is done to match the data taken with the actual data. This data communication test is carried out based on the test parameters in the form of the distance between the navigation system and GCS to determine the ability to communicate using a radio frequency in an open space. The test of the suitability of the representation of the position coordinate points is carried out at several test coordinate points to determine the suitability of the ship's position on the GCS. This test is carried out so that the information obtained from the GCS by the navigation system is in accordance with the position of the ship. To justify that the prototype of the tool is appropriate for fishermen to use, the next stage is socialization to get a response from fishermen and input for further development of the functions and features of the tool if the tool is used by fishermen for fishing.

IV. FINDING AND DISCUSSION

The successful application of technology is influenced by the acceptance of the technology by its users. On the other hand, the user's readiness to apply technology will affect their acceptance. However, the current condition of fishermen in the coastal area of Depok, Kretek, Bantul Regency shows that (1) there are still many fishermen who do not want to accept new technological innovations, (2) the low number of fish catches is because fishermen still use traditional boats that are not equipped with a navigation system and information, (3) the low level of education and knowledge of the traditional fishermen community which causes access to information to be limited. The navigation system used by traditional fishermen is a navigation system that combines nature, feeling, and instinct. Usually, fishermen use the star function at night and during the day use the land, meaning that as long as the land is still the fishermen see their home range while the sun is used to see time (Sabihaini et al, 2019). Besides, Sabihaini et al (2020) found that climate change (sea temperature, rainfall, and humidity) has affected the distribution of fish production and has implications for the capture of fisheries production in the marine sector. The results also show that there is a significant relationship between climate change and annual fish yield or catch. The study also revealed a decline in production from 4,028 kg in 2016 to 3,600 kg in 2017 of fish caught in just one year. This study provides recommendations for government agencies by providing data and information related to temperature and climate change for fishermen. In short, government agencies need to develop an information system to monitor alarming sea conditions (Sabihaini, 2020).

IV.1.The strategy of Industrialization Institutionalization in the Direction of National Characterization

The characteristics of industrialization that are built to produce and utilize Appropriate Technology:

  a. Original Indonesian human resources
  b. The result of the nation's own engineering and innovation
  c. Designed and made by the conditions of traditional fishermen in Depok Bantul beach
  d. Using local raw materials
  e. Simple and easy to use so you can use local labor (local)

With the aforementioned characteristics, Appropriate Technology that is produced will provide benefits and create new jobs for residents (around the coast) so that local people benefit from the invention of Appropriate Technology because they do not need to use labor from outside the region and the local community. feel ownership and share responsibility for the continuity of fishing production.

IV.2. Research Framework

The research framework is described as following the research development process and each of the stages it carries out. Fishing Vessel Navigation Systems are used to avoid dangers due to weather changes, see the location of fish, send danger signals, send foreign vessel information, and send danger signals if the ship is damaged at sea, so fishermen can get help if they experience problems while at anchor. Fisherman Navigation System, this system is used as an observer tool and to avoid the risk of disaster. When a ship is docked, the movements and identities of the other vessels should be considered by the navigator to decide to avoid collisions with other vessels and the dangers of changing weather.

IV.3. Search and Rescue

Serves to determine a position in the Marine Search & Rescue operation, this is very useful for knowing the location and navigation status of a ship or person who needs help. The developed navigation system is expected to be able to provide additional information and sources of attention on the operation screen, although it is limited in the distance of the Ferkewensi radio. The standard navigation system also desires proper use of SAR Aircraft and provides a message (AIS Message 9) for the Aircraft in position.

IV.4. Information Message

Information messages are used to provide information about the state of the sea regarding weather information and prediction for a certain period, and information related to locations where there are lots of fish.

IV.5. Communication network

Computer programs in the navigation system are made to be used simultaneously. Some programs use a computer to modulate the communication system using broadcast frequency radio communications into the navigation system. Some programs can re-send communication system information to the network providing authorized users or the public to observe vessel traffic. Multiple program displays are sent from a sending ground station to a computer. The navigation system on the ship uses a receiver to receive information related to the location of the vessel where there are lots of fish, water weather information taken from BMKG data, and the locations of vessels around the location when fishermen are fishing.

IV.6. Web-based data

In December 2004, IMO blamed the irresponsible use of data in the following statements. To announce the availability of AIS information free of charge, ship data developed on the website, publication on the website, or other AIS data transactions can threaten the safety and security of ships and port facilities and hinder the efforts of the organization and its members in efforts to improve the safety of navigation and security of the international maritime sector.

IV,7. Vessel traffic services

Vessel traffic service (VTS) sea traffic is supervised by the authorities in marine traffic. similar to air traffic control for aircraft. Standard VTS uses radar, closed-circuit television (CCTV), VHF radiotelephony, and an automatic identification system to monitor the movement of ships and secure them in a limited geographic area. As a service performed by authorized parties, VTS is designed to improve the safety and efficiency of navigation, the safety of life at sea, and protection of the marine environment. How Vessel Traffic Sevice works is shown in Figure 5. Below.

IV.8. Ship Security Alert System

The Ship Security Alert System (SSAS) is part of the ISP's code and system that contributes to IMO's efforts to strengthen maritime security and resist cracking down on terrorists and hijackers. cooperation project system between Cospas-Sarsat and IMO. If trouble or terrorism, Mercusuar.
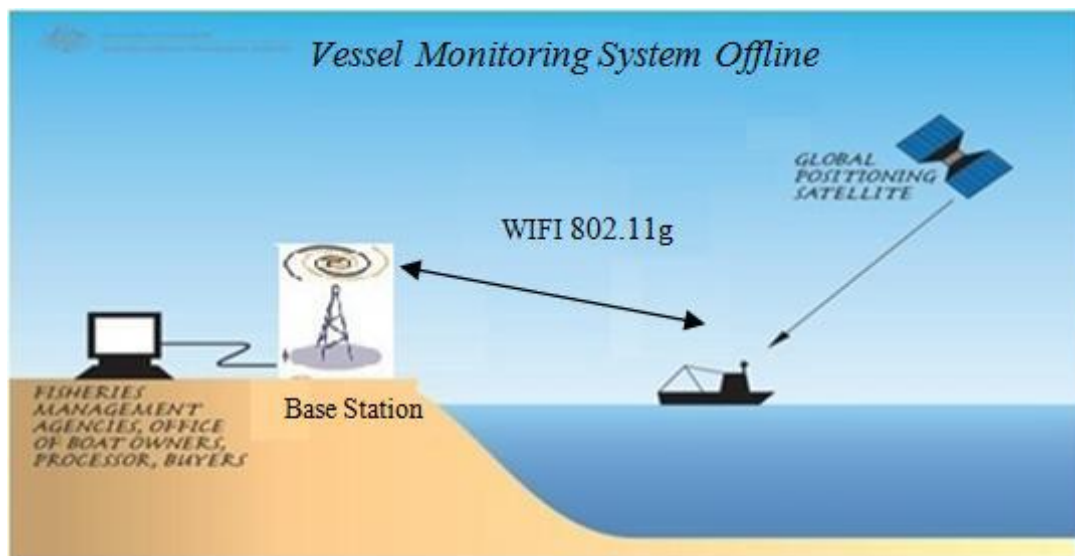

Figure 1. Marine Traffic Monitoring System

V. CONCLUSION AND FURTHER RESEARCH

Based on the above results, it can be concluded that with the application of Appropriate Technology (TTG) fishermen in Depok, Kretek, Bantul Regency, Yogyakarta can provide welfare to them. Because with the Appropriate Technology (TTG) fishermen will find it easier to catch fish because this technology is designed to determine the distribution of fish in the sea. This TTG can also provide warning signs to fishermen to know the natural symptoms that will occur while on the high seas. That way, the welfare and safety of fishermen can increase. For further research, may be possible to increase the number of existing communication ranges.

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