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# Fish Cultivation Counseling Through Digital Fisheries Applications to Coastal Communities in Indonesia

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**Abstract**---Efforts to equalize opportunities through digital application technology benefit not only the creators of the technology but also other parties. We have virtually searched data from several sources to prove and align this discussion. We analyzed it in the phenomenological approach chapter, which involves, among other things, a data coding system, a thorough evaluation of in-depth interpretation, and concluding so that this study can obtain valid and reliable findings. Based on the findings and discussions validated by scientific evidence, fisheries extension consultation through the assistance of digital fisheries applications in coastal communities in Indonesia is a breakthrough carried out by the government supported by the private sector and the participation of fishing communities. These findings will provide new insight into increasing the scientific repertoire of fisheries and technology studies. Therefore, it will be helpful for academics, industry, and the wider community.

**Keywords**---coastal communities, digital fisheries applications, fish cultivation counseling.

## Introduction

Indonesia has much marine potential because it is one of the largest archipelagic countries in the world (Arismiyanti, 2017). Having 17,504 islands and a coastline of around 81,000 kilometers, Indonesia has great potential with a variety of fish and other marine products ready to support the lives of coastal communities. According to Huda et al. (2018), coastal areas can contain living and non-living natural resources, artificial resources, and environmental services that are very important for people's lives. To take advantage of this potential sustainably, integrated management is needed (Ariyanto et al., 2020). However, the potential of the sea to improve the welfare of the nation and coastal communities in Indonesia has not been optimally utilized by the natural conveniences of the coast and its marine products. According to Kularatne (2020), foreign fishermen with modern equipment who operate illegally in Indonesian waters can use most of the high seas. Likewise, Mahabror & Hidayat (2018), said that Indonesian fishermen live in a harsh natural atmosphere full of uncertainty in running their business. Many fishermen have yet to be touched by modern technology, so their productivity levels can be much higher. So if asked why that is the answer is because, in general, fishermen in Indonesia still use simple fishing gear not equipped with modern tools such as GPS, and digital applications, including consulting equipment for the world of marine and fisheries, and this is still exacerbated by the lack of knowledge of fishermen in Indonesia who only they know they learn through experience, so they do not understand the state of the waters and strategies to manage them for profit and sustainability (Suciati et al., 2022).

So that Indonesia's marine potential can be properly enjoyed, the industrial revolution 4.0 is the solution. Indeed, this method is a big challenge for the Indonesian marine industry (Aprilia, 2020). This transformation forces maritime actors and the marine industry to continue innovating to expand capacity and develop commercial items. This includes using automated technological instruments controlled by software developed by startups in the fisheries and marine industries. Welcoming the 4.0 industrial revolution, the parties need to strengthen the self-capacity of all fish cultivators by forming digital villages based on regional mainstay commodities throughout Indonesia (Pahlevi et al., 2021). Digital village pilots are conducted in villages and coasts in Indonesia. For example, the development of the catfish commodity has inspired many fish and crab cultivators. To make this successful, use digital technology, namely fisheries applications through automatic feeders. Digital adoption in aquaculture can

increase the selling value of aquaculture commodities, market certainty, the efficiency of business facilities and infrastructure, and ease of access to production technology. Since starting in 2013, hundreds of farmers have successfully harvested up to four times a year using fisheries programs to regulate feed utilization (Carras et al., 2020).

The Government of Indonesia's efforts to embrace the Fourth Industrial Revolution aims to increase the self-sufficiency of all fish and other marine product farmers. This initiative's inevitable outcome is forming digital villages across Indonesia. Many villages in Indonesia will be motivated to adopt digital technology in their communities. By integrating information technology systems through feeding control devices managed by intelligent apps, villages can conduct aquaculture (Van Oostenbrugge et al., 2004; Ermayanti et al., 2016; Lein & Setiawina, 2018). The government thinks that through implementing information technology, fish and crab farmers would be better equipped to compete, particularly in the face of the Indonesian industrial revolution 4.0. Cultivators can employ digital applications to improve their company efficiency and boost their income. The digital adoption of grown crabs will have a good influence since it will raise the selling value of cultivated items. Furthermore, cultivators gain market certainty, business facilities, and infrastructure to become more efficient and easy access to production technologies with digital ideas. It will boost the efficiency of the cultivation business and, as a result, the cultivator's income. Through the digital revolution, investments may also be made online, making the process more efficient (Tumiwa et al., 2022).

Knapp & Rubino (2016), claims that, as a result of the industrial revolution 4.0, fish farmers will be able to work more quickly and efficiently. This is because cultivators can use their smartphones to download digital applications made by startups. After that, they can use the application to set the time and quantity of fish feed. This automatic feeder will reduce the value of the fish conversion ratio by increasing feed utilization efficiency in freshwater aquaculture systems. Using applications developed by startups like eFishery, which focuses on developing the fisheries sector, has this advantage. He is confident that there will be an increase in demand for catfish products as more and more applications use digital technology. Catfish consumption is increasing and has become a prima donna in society despite the absence of digital technology. Additionally, the export market's demand for catfish will rise due to digital technology (Huboyo et al., 2014; Simmons & Fielding, 2019; Rosyida & Sasaoka, 2018).

The government, on the other hand, expects fish farmers to be able to use sustainable practices in their operations. As a result, the company's commitment to preserving the environment will always continue (Fisher & Anders, 2020). For sustainable cultivation, wastewater treatment installations and water circulation arrangements must be implemented in and out of cultivation areas. The government reminds fish farmers to immediately form cooperatives to strengthen cultivator economic institutions once the application of technology is booming. Fish farmers will then have access to various facilities and government and financial institution support for their businesses thanks to cooperatives. According to Føre et al. (2018), fish farmers will also reap many benefits from information technology, which is advancing rapidly. However, this will only be the case if it is utilized appropriately. Among other things, we want to learn about the best available seeds, feed, and aquaculture production facilities and infrastructure. Information technology can streamline the distribution chain, resulting in lower consumer selling prices than in traditional markets.

The transfer of technology provided to the fishing community, one of which is through the fisheries extension program, is one of the keys to the fishing community's ability to compete in this all-digital era. Therefore, the fisheries extension system must follow the millennial trend to adapt to the 4.0 industrial revolution. Key and business actors must also be strengthened through extension efforts (Allison et al., 2012). Therefore, fisheries instructors must also possess knowledge, skills, and an attitude. Because of this, government agencies bring together the fields of research and human resources so that all of the knowledge gained is derived from the results of renewable research. Fisheries extension specialists aid in achieving food sovereignty in significant ways. Because extension officers play a crucial role in the growth of the marine and fisheries industries, their capacity must be continuously enhanced in line with their strategic role. We agree that it is crucial to encourage all fisheries extension officers to become millennial fisheries extension officers and adapt to the times.

Counseling, in general, is a social science that investigates the systems and processes of change in persons and society to satisfy expectations that are compatible with plans or patterns when these changes occur. According to Mazzucato (2018), counseling is changing people's behavior so that they know, want, and can make changes to improve their welfare and increase production, income, or profits. Narrowly is an occasional learning activity to solve the problem at hand; however, creating a spirit of lifelong learning independently and sustainably is more important than that. To be more precise, *fisheries extension* can be defined as a learning process for the main actors, fisheries business actors, and their families that uses a working philosophy to increase the potential and capabilities of the main actors and their families so that they can overcome their own needs and desires without always having to

rely on others. The conclusion that can be drawn from this description is that fisheries extension is an effort to alter the social, economic, and cultural behaviors of coastal communities in a systematic and structured way that takes their environmental conditions into account. This is important because counseling will always be in a vertical approach that can lead to wrong targets or targets if it considers the coastal community's social, cultural, and environmental conditions (Abubakar et al., 2016).

Its duties in fisheries counseling are as follows; 1) aiding principle players and business actors in their learning; 2) ensuring key actors and business actors have simple access to sources of information, technology, and other tools to help them build their enterprises; 3) They improved key and company actors' management, leadership, and entrepreneurial talents; 4) helping key players and business actors transform their firms into highly competitive, productive, and long-term economic entities through solid corporate governance; Contributing to the business's management by analyzing and resolving issues and responding to opportunities and challenges faced by key stakeholders; 5) They are increasingly critical and business actors' understanding of the preservation of environmental functions; and 6) They are putting the cultural values of advanced and modern farming, fisheries, and forestry development in the hands of the leading players in a sustainable fashion (Putra & Eriyanti, 2020).

## Research Method

This study discusses fisheries consultation through digital applications for coastal communities in Indonesia. Through a review of various sources of information and the latest data from 2010 to 2022, we have obtained several field studies that address the issue of technology applications to support Indonesian coastal fisheries activities (Garces et al., 2010). We conducted a virtual data search on several data sources, journals, books, and other scientific content that we examined under a phenomenological approach. To get valid and reliable results, we analyze the data using data coding techniques, in-depth interpretation, and a conclusion to answer the problems of this study. This study entirely relies on secondary data in the form of information and published data from a series of technology and fisheries studies and consultations conducted to obtain information, especially for fishermen. Thus, the method and study of this study, which we started with identifying the problem of electronic data retrieval, was examined under phenomenology, and the final qualitative design report was in the form of literature (Moser & Korstjens, 2018).

## Result and Discussion

### *Fisheries Extension as Agents of Change*

The presence of fisheries extension workers in developing fisheries' human resources in Indonesia is significant. They are not just people assigned to be government agents who convey, socialize, and guide government policies and programs at the lowest level (Ahmed et al., 2018). They also become agents of change for the fishing community itself. Therefore, the presence of fisheries extension officers in the community is expected to create changes that lead to the welfare of the fishing community. Hardjono et al. (2018), said fishery instructors must have three main characteristics: enlightening, enrichment, and empowerment. In the informative character, fisheries extension officers must be able to enlighten the public and change the behavior and attitudes of the main actors from not knowing to knowing. Enrichment means that extension workers are asked to be able to change the behavior and attitudes of the main actors from unwilling to willing.

Meanwhile, empowerment is that fisheries extension workers are asked to be able to empower the community from incapable to capable and initiate to create something in order to change the lives of the main actors and business actors. These three characteristics must also be supported by three main components: knowledge, skills, and attitude. Susiyanti et al. (2022), state that fisheries extension figures must have mastered at least four primary skills. 1) Media literacy, visual literacy, intercultural literacy, global awareness, and technological literacy are examples of information and communication technology abilities; 2) Learning and inventive talents, such as complicated problem solving, creative thinking, a high level of curiosity, and the guts to face and take risks; 3) Leadership and responsibility, moral and ethical principles, productivity and accountability; social and intercultural awareness, as well as initiative and self-direction; and 4) A capability includes practical and interactive communication, national and global orientation, personal and social responsibility, teamwork, and collaboration attitude (Sutton-Grier et al., 2015; Andrews et al., 2021; Oktari et al., 2015).

### *Information Technology-Based Extension Activities*

Based on research results in the field, outreach activities for the target group were carried out using the lecture and demonstration methods. In addition to the fixed agenda for ongoing extension activities, it is usually adjusted to the target group's needs (Trainor et al., 2011). This is in line with research from Komarudin et al. (2022), which states that the availability of information technology in an area will impact the fulfillment of information needs, so that extension agents can convey quality information to the public. Fisheries extension workers have widely used information technology media in Tabanan Regency to support existing extension activities. From interviews with local extension workers, most have tried to utilize supporting information technology media such as the internet, cyber extension, and print media (Rehman et al., 2018).

The motivation of fishery instructors to utilize this media is to get the latest information related to fishery technology which will later be forwarded to the target group during fishery extension activities (Fisheries, 2012). To access information about fisheries, fishery extension workers in Tabanan Regency often use personal cell phones and laptops. Fisheries extension workers use personal laptops more often because this media makes it easier for them to use it optimally because the information display becomes clearer. Extension workers will start using their smartphones or mobile phones in the field because of the demand to find important information quickly and precisely. This is in line with the research of Sunarsi & Dirgahayu (2015), which states that the pattern of cellphone use follows the background and status of the respondents, whether the use of cell phones is carried out at home, work, or school. For more details regarding the utilization of information technology-based extension activities, it will be explained as follows:

#### *Media Internet*

Following the opinion of Voyer et al. (2014), the use of internet media by fisheries extension agents in Tabanan Regency is the intensity of internet access or an illustration of how long and how often the fishery extension officers use or access the internet in the process of searching for information. Based on the results of interviews with fisheries extension officers, their intensity in using internet media is classified as the most frequent compared to other media such as print media and Cyber Extension. However, they use internet media relatively quickly for the length or frequency of use. This is because fisheries extension officers have core duties and responsibilities to visit their target groups almost daily, so they only have a little time to access internet media intensely (Listiana et al., 2019). Frequency measurement in this study was carried out by measuring the intensity of internet access carried out by fisheries extension agents within one week for more details regarding the percentage of internet access frequency by fishery extension workers.

The frequency of internet access is seen from several indicators: 1) intensity of access in one week, 2) use of time to access the internet, and 3) internet access media. Table 5 shows that most fisheries extension officers have a moderate frequency of 85 percent and a high category of 15 percent. This illustrates that fisheries extension officers are interested in using the internet and have accessed the internet regularly. The results of frequency measurements in the medium category indicate that the intensity of accessing the internet by fisheries extension officers ranges from 1-4 days within one week. Mobile is the media used by fishery extension workers to access the internet. Most fishery instructors access the internet when they have free time at night. Fisheries extension officers with a high frequency of access are those who access the internet daily; on average, those who frequently access the internet are young fisheries extension officers (Evans et al., 2011).

#### *Cyber Extension*

According to Listiana (2022), a cyber extension can utilize data services related to extension information needed by fisheries extension officers in the field. In order to increase their productivity, several extension workers realized the need to improve their capacity for more efficient work services. They realize the importance of using ICT in supporting extension activities but are constrained by the level of knowledge and limited supporting tools, considering that assistance from the center still needs to be improved due to the broad field. If Cyber Extension is used optimally, it will make the task of the fisheries extension officers easier because it contains much information about fisheries. Extension agents can freely access or upload material on the Cyber Extension site. However, based on the results of interviews with fisheries extension officers, this Cyber Extension is less attractive to fisheries extension officers and the main actors as the target of extension (Klemas, 2013; McGarvey et al., 2010; Venables & Dichmont, 2004).

According to them, Cyber Extension in fisheries has many weaknesses and is less effective when used as an extension medium. This is contrary to the results of research (Panetto et al., 2019), which states that cyber extension has the potential to become an innovative communication network developer by effectively bringing together research, development, and study institutions with innovation disseminators (extensionists), educators, farmers, and other stakeholder groups whom each has different information needs so that they can play a synergistic and complementary role. Cyber Extension cannot be separated from the development of information and communication technology. However, its development is not directly proportional to the development of technology and information itself. Even though as a fishery information and technology dissemination program, it will reach its target if it can meet users' needs, especially from the fishery extension workers themselves, the fishery extension workers think Cyber Extension needs to meet these criteria (Kagermann, 2015).

#### *New fisheries lesson extension efforts from India*

Social and economic progress is directly linked to improved communication and information accessibility. The disparity between those with access to information and those without is causing some concern. Not only must communication technology be made more accessible, but the information must also be made more relevant to local development (Hernando et al., 2010). This article focuses on aquaculture-specific technological advancements. Initiatives from the public sector and a single point of delivery Researchers and technology users can interact more effectively with one another through the establishment of agricultural technology information centers (ASICs). ASICs aim to provide farmers with all the necessary information and technology inputs for testing and application to assist them in solving their location-specific issues (Sun & Chen, 2016).

With initiatives from the public sector and a single point of delivery, researchers and technology users can interact more effectively with one another through the establishment of agricultural technology information centers (ASICs). ASICs aims to provide farmers with all the necessary information and technology inputs for testing and application to assist them in solving their location-specific issues. Entrepreneurs, farmers, and farmers; the agency for research and development; NGOs; and businesses from the private sector. Since 2012, the Indian Council for Agricultural Research (ICAR) has established at least 44 Agricultural Technology Improvement Centres (ASICs) in Indian states as part of the National Agricultural Technology Project (NATP). ASICs give farmers direct access to institutional resources' technology, advice, and products (Shepherd et al., 2020).

Extension services are being provided to the farming community through Kisan Call Centers. A Kisan Call Center is a system of computers, telecommunications infrastructure, and human resources designed to answer questions from farmers in their language (Koshi & Kumar, 2016). Specialists communicate directly with farmers via telephone and computer to comprehend and address their issues. More than 2,000 calls are being handled by the call centers daily, and traffic is expected to come from anywhere in the country. The Central Institute of Freshwater Aquaculture can be reached at 08457 909090-9090 on Tuesdays and Fridays from 3:00 to 5:00 p.m. and at 0674 2111849 on Mondays through Fridays (Viswanath et al., 2018). In developing nations, radio has been used extensively for educational purposes. Farmers are taught the most recent technologies through lessons broadcast over time. In order to encourage audience participation, each broadcast's conclusion features a few questions. 11 lessons on aquaculture were recently broadcast by All India Radio in Cuttack (Sinha, 2019).

#### *Initiatives from the private sector*

High-quality seeds and improved management procedures are the foundations of India's blue revolution that are increasingly looking for high-quality, long-lasting, low-cost feed and other inputs. It has also prompted several players to provide aquaculture consultancy services. Firms involved in fisheries, such as Hindustan Lever, Lipton, Water, CPAqua, Avanti, Higashimaru, and others, have a well-established network of R&D, extension, and marketing technicians who advise farmers who buy their products. For example, IFFCO and KRIBHCO have entered the extension arena by propagating entire crop production messages via demonstration and training programs (Lewis & Boyle, 2017).

#### *Aquatic service centers*

Unemployed educated youth have established aqua service centers; basically, farmer agri-clinics that offer soil and water testing, feed analysis, seed quality, disease diagnosis, and market information. These service facilities may be located in Andhra Pradesh, near the Kolleru lake area of the West Godavari district (Alabaster & Lloyd, 2013).

### *A one-stop store for all things aquatic*

A one-stop aqua store (OAS) has opened in Purulia and Ranchi, Jharkhand, with four more planned for Balangir and Nuapada, Orissa. OAS is a one-stop shop for all inputs a farmer needs to cultivate fish. Seeds, feed, fertilizer, and chemicals are examples of inputs (Sullivan et al., 2018).

### *Initiatives in the field of ICT applications*

According to the United Nations, most of the population's empowerment needs to be improved by a lack of communication infrastructure in rural and isolated areas. According to the United Nations Secretary-General, globalization is being driven by information and communication technology (Lahiri et al., 2019).

### *Choupal aqua and E-choupal*

Aqua Choupal, an innovative web-based project of ITC Ltd., offers farmers in Andhra Pradesh all the information they need to boost productivity while lowering costs. Farmers may utilize a web gateway to get the most recent local and global weather, agricultural practices, and market prices at the village level (Laxmapp et al., 2016). ITCS operates 23 telecentres in Hosangabad and over 600 kiosks in central India. It brings all the required information, commodities, and services for soya growing and purchasing to farmers' doorsteps.

### *Rural Information Center*

The Rural Knowledge Centre (RKCC) plans to establish knowledge centers in each of India's six lakh villages by 2007. The Centre for Information and Communication Technologies (ICT) has set out Rs. One hundred crores for this initiative. This is the first comprehensive research on the interdependence of ICT and human development. It tries to illustrate ties between the two by utilizing the Millennium Development Goals as a benchmark (Kaimal, 2018). Establishing rural knowledge centers will help revitalize traditional knowledge and bridge the digital divide. The internet is developing as a technology with the potential to benefit rural communities; it may assist in reducing rural community isolation and enable bottom-up articulation of needs and perceptions. It is predicted that "Cyber" will be the primary mode of dissemination shortly. It can improve communication between communities and government planners and specialists, increase community participation in decision-making, better coordinate local, regional, and national development initiatives, and assist agricultural researchers, technicians, farmers, and others (Bello et al., 2018).

### *Change as a solution in fisheries*

The aquaculture business in developing countries is under great strain due to global markets, competition, and increased concern about food and the environment. Small-scale farm families are increasingly under pressure to respond to rapidly changing market demands and to adopt cutting-edge technological innovations (Jennings et al., 2016). Regular information given by farming communities and other providing organizations is critical for the agricultural economy's continuous expansion. Public extension systems require top-down to the bottom-up distribution of technological and social knowledge. In order to manage a successful agricultural business, you must have access to information. Farmers require knowledge and insight from public extension services to address local issues.

## **Conclusion**

After a series of studies and data analysis, we can conclude the results and discussion. We found fisheries consulting to be a solution for future changes in the marine industry, which involves many parties from the government, the private sector, and the community. The purpose of this consultation is to obtain up-to-date information, which is very useful for the parties as learning and also leadership and responsibility for how to carry out consulting activities for the betterment of coastal communities who are. Until then, digital application consulting is a solution that several experts have recommended based on their field findings in various countries that have previously applied technology-based consulting methods. These technologies, among others, are in the form of internet desks whose usefulness is undoubted where, like online consultations, many lessons have been learned on how consulting in India

with a variety of beneficial applications helps to farm and fishing communities with highly advanced systems. Fisheries consulting and various solutions are provided not only by the government but also by the private sector, where several digital programs have been launched, such as one-stop store information technology application initiatives. In the final section, we also conclude that through change, there will be solutions for fishing communities, namely differentiating technology to improve the welfare of fishermen on the coast. We can conclude those findings; we realize this friend has weaknesses. Therefore we hope for encouragement and input to improve the quality of these findings.

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