Triple helix as an empowerment strategy for labor fishermen: a proposed model through action research study

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Abstract. Labor Fishermen poverty has been an issue for a long time. Several factors cause fishermen poverty, environmental conditions of resources, culture, and structural. The purpose of this paper is to propose a community empowerment model, especially labor that the government can carry out in collaboration with universities and industry. The model formulated in this paper is compiled by conducting a study of the fishermen’s life in the village of Menganti Cilacap. In-depth interviews with fishermen and the village government are done to collect the data. An analysis was conducted to identify fishermen’s needs through government cooperation with universities and industries related to fishermen. The Triple Helix strategy, in this case, is carried out by researchers from Jenderal Soedirman University (university), the Menganti regional government, and the Department of Industry, Trade and Cooperatives (government), and the Mina Sidat Bersatu Cooperative (Industry). Implementing the triple helix strategy is expected to produce real breakthroughs that can be applied directly to improve labor fishermen’s welfare.

1. Introduction
Fishermen are a group of people whose lives depend directly on marine products, either by catching or cultivating them. They generally live on the beach, a residential area close to the location of their activities. In terms of fishing gear ownership, fishermen can be divided into three groups, namely labor fishermen, skipper fishermen, and individual fishermen. Labor fishermen are fishermen who work with other people's fishing gear. In contrast, skipper fishermen are fishermen who have fishing gear operated by other people. Individual fishermen are fishermen who have their fishing gear and do not involve other people in their operations. Labor Fishermen are synonymous with limited assets, weak capital capacity, bargaining power, and market access [1].

The arguments for poverty among labor fishermen are based on the data we collect in the field during the study, as follows: one boat usually consists of 4 people (1 ship owner, 3 labor fishermen). On average, in 2020, one ship can get 700 thousand in a trip. The rule of profit sharing in a ship can be 50% (ship owner) : 50% (labor fishermen) or 4 + 1 (4 people + 1). In the usual use of profit-sharing methods, they use 4+1 which 700 thousand that they got is deducted for fuel 200 that is 500 thousand (the net income). The number is divided by 5 (2 parts for ship owner and 3 parts for labor fishermen). This means that the maximum income of labor fishermen in a day is 100 thousand for each person. The reality of fish caught for 12 months in a year, they can only work a maximum of 6 months due to the weather and fish seasons. If 100 thousand is used up for one day's living expenses, the remaining 6 months they will owe to the moneylender or cooperative who on average charge them an interest of 10% to 25% per month. This is what causes them to be trapped in a circle of poverty.
Based on our interview with the labor fishermen in Menganti Village conducted throughout 2020, many factors cause fishermen poverty. First, many fishermen are now doing fishing business in the sea where the fish resource stock is overfishing. Second, marine pollution, destruction of coastal ecosystems such as mangroves, coral reefs, seagrass beds, and estuaries, which are increasingly devastating, and global climate change suspected to reduce fish availability.

The third factor is that most fishermen handle the fish they have caught without following proper handling methods. As a result, the quality of the fish when they arrive at the landing site has decreased or even rotten, so the selling price is low. This is because most fishing vessels are not equipped with refrigerated hatches or ice containers to keep fish fresh.

In addition, many traditional fishermen think that carrying ice means increasing the cost of going to sea, especially if you can't get the fish or you catch a little, or the ice melts before you get the fish, then you will lose a lot. Fourth, almost all traditional fishermen land their catch in fishing settlements, fish landing sites, or coastal fishing ports that are not equipped with ice factories or cold storage and do not meet sanitary and hygienic standard requirements. Thus, it worsens the quality of the fish, which has implications for the selling price of fish.

In times of famine and sea conditions, the fifth factor is having big waves or strong winds (storms), between 2 to 4 months a year, fishermen cannot go to sea to catch fish. For fishermen and their family members who do not have other businesses is practically no income during times of famine, so they are forced to borrow money from moneylenders, who usually charge unusually high-interest rates, averaging 5 to 10 percent per month. This is where fishermen start to get trapped in a ‘vicious cycle of poverty’, because the income they earn during the fishing season is abundant, apart from meeting their family’s daily needs, they are also spent to pay their debts as well as interest.

Furthermore, there are two main things contained in poverty, namely vulnerability and powerlessness [1]. With the vulnerability they experience, poor people will find it difficult to deal with emergency situations. This can be seen in individual fishermen, for example, having difficulty buying fuel for fishing. This is because previously, no catch could be sold, and no reserve fund could be used for urgent needs. Labor fishermen experience the same, and they feel helpless in front of the bosses who have employed them, even though the profit-sharing they receive is felt to be unfair.

The phenomenon of fishermen poverty is more experienced by labor fishermen. Labor fishermen generally get their income from the sharing of the fish caught on that day with the skipper as fisherman who owns the boat. The share for the results is based on an agreement divided equally by 50 percent each, but the share for labor fishermen is still distributed to the number of labor fishermen who participated in fishing activities. In reality, labor fishermen often get profit-sharing after the boat owner’s debt is deducted from the merchant, so that the labor fishermen indirectly share the debt of the boat owner.

This poverty phenomenon occurs in Menganti Village, Kesugihan sub-district, Cilacap Regency, Central Java. The poverty experienced by labor fishermen in the village is more due to cultural factors. The practice of mutual relations between labor fishermen, ship owner and traders has resulted in many problems that labor fishermen ultimately bear. Starting from the price of the fisherman's catch which is determined unilaterally by the traders (far below the market price) which the fishermen have to accept because the fishermen have debts to the traders. One of them is for fishing capital. This loan is a tool for traders to tie the ship owner to always sell their catch only to him. What traders do to ship owner is also practiced by them in relation to labor fishermen. The saddest thing is that the new catch will be shared between the ship owner and labor fishermen after deducting the installments to pay the ship owner's debt to the traders. It means that the labor fishermen will pay off their boss's debt. This condition makes labor fishermen suffer the most. Real action is needed to release labor fishermen from the shackles of this kind of suffering.

This article aims to to propose a community empowerment model, especially labor that the government can carry out in collaboration with universities and industry to reduce fisherman poverty and alleviate the suffering of labor fishermen, especially in times of famine when fishermen do not go to sea. This strategy includes cooperation between government, industry and universities. Each plays its role and cooperates with each other to create fishermen's welfare to increase fishermen's income. This strategy is known as the Triple Helix [2].
2. Triple Helix Model

The Triple Helix concept of the university-industry-government relationship was initiated by Etzkowitz and Leydesdorff in the 1990s [2]. This concept interprets a shift from the industry-government relationship that dominates industrial society to the triadic relationship between universities, industry, and government in a knowledge society. Triple Helix assumes that the potential for innovation and economic development through science in society lies in the collaboration between elements from universities, industry, and government to produce new institutional and social formats for the production, transfer, and application of knowledge. This concept relates to efforts to increase productivity by incorporating science and technology. Trying to explore new sources for the growth of existing companies or to create new businesses. The essence of the triple helix is to develop public and university knowledge in advancing the economy [3].

The assumption of Triple Helix is that industry, universities, and government are increasingly interdependent [4, 5, 6]. The Triple Helix system is defined as a set of the component, relationship of the component and the function [7]. The components consist of university, industry and government institutional fields, each with a variety of actors, such as individual and institutional innovators, R&D (Research and Development), and non-R&D innovators, and “one-ball” and “multi-ball” (hybrid) institutions. The relationship among the components can be a technological transfer, collaboration and conflict moderation, collaborative leadership, substitution, and networking. Each component competence will determine the system performance. The main function of the Triple Helix system is seen in a broader sense, consisting of the generation, diffusion and utilization of knowledge and innovation. This function is manifested not only by techno-economic competencies described in the innovation system theory but also by entrepreneurial, social, cultural, and policy competencies embedded in what we call the “Triple Helix space”, which consists of the knowledge, innovation, and consensus spaces.

The cooperative relationship between the university and the government has been established for a long time. The government funds various activities carried out by the university. Not only educational activities, but also research. The university conducts a lot of research, the results of which are utilized by the government, such as research for food security to weaponry development and health care. The government also recognizes the results of university work in the form of granting Intellectual Property Rights for university research results.

The university also deals with industry. Universities do a lot of transfer of knowledge to be applied in industry. For example, the research results that found vaccines to ward off certain diseases were captured by the pharmaceutical industry to be produced in mass quantities and sold to the public. Economic interest triggers cooperation between universities and industry, as explained by Etzkowitz and Leydesdorff, who describe university and industrial cooperation as a driving factor for economic growth and producing new products and businesses [4].

The government deals with industry as a support for the country’s economy. The government has an interest in industrial progress. In addition to subsidies to encourage industrial growth, the government is also working in other ways, for example, formulating monetary policy so that industries can get low-cost credit assistance. The latest trend, the government is trying to collaborate with universities that are rich with sources of ideas to advance industry [8]. The government disburses large funds for universities through various state institutions as an incentive for university findings or contributions to the advancement of life for the general public. The government strives to make university research results not only useful for academic progress but also have commercial aspects that can be utilized in everyday life. One example is the LPDP RISPRO program organized by the ministry of finance. This program aims to encourage university academics to carry out research whose impact can be directly accepted by the community who are research partners (industry).

The Triple Helix model is an innovation spiral model that captures multiple reciprocal relationships at various knowledge capitalization processes. Triple Helix shows the university-industry-government relationship as a relative, equal, but the interdependent institutional environment that overlaps and takes on other roles. This triadic relationship illustrates how a knowledge-based economy appears in life [9]. The mutual relationship between university-industry-government is shown in Figure 1.
3. The Role of Universities, Government and Industry in Community Empowerment

3.1. University
The university has three obligations which are known as Tri Dharma. Tridharma according to Law no. 12 of 2012 article 1 paragraph 9 is the obligation of the University to organize education, research, and community service [10]. The university's obligations that are in direct contact with the general public are usually carried out through the second and third dharma, education and community service. Both are aimed at community empowerment. This is made possible through action research.

Action research is a research design to address complex, practical problem that occur in the community or target group, and the results can be directly applied to the community concerned with the aim of improving the implementation of an activity carried out systematically [11]. According to Cooper and Schlinder [11] the goal to be achieved in action research is to map a series of alternatives that can be used to overcome the problems that have been identified by researchers [11]. The result of the action is observed and assessed as effective or not. Universities carry out action research to fulfill their social role. The university's social role is achieved by creating social transformation towards a better life [12]. This can be pursued, among others by:

1. Development of community organizations/groups that can play a role in community productive activities
2. Development of strategic networks between groups/community organizations so that they can work together and help each other.
3. Development of community development centers, with utilizing existing local resources.
4. Development of groups within the community to access unreached external resources, which can support their development in finance, information, technology, management, and the ability to negotiate.
5. Developing the technical and managerial capacities of existing community groups so that they can solve their problems independently and improve their welfare in the future.

The university's concrete steps in helping people's lives through researchers who go directly to the community can be started by digging up information about the potential and problems in an area or community group. The information is then sorted and analyzed further. Furthermore, the researcher tries to identify a series of alternatives that can be applied to solve existing problems and offer them to community groups through joint discussion activities. Often solving community group problems will encourage universities to cooperate with other parties such as government and industry.

3.2. Government
The government is the director and administration who has authority over community activities in a country, city, and so on. Government is also defined as an institution or agency that administers/regulates a certain country or region13. According to Law no. 23 of 2014 concerning regional government, there are two government, central, and regional governments. The central...
government is the President of the Republic of Indonesia who holds the power of government of the Republic of Indonesia, assisted by the Vice President and ministers as referred to in the 1945 Constitution. Therefore, all ministries and services under it are a unitary form of the central government. Meanwhile, the regional government is the head of the region as an element of Regional Government administering who leads the implementation of government affairs, which become the authority of the autonomous region. Local government includes the Governor, Regent, or Mayor and regional apparatuses as elements of regional government administration.

One of the functions of government is to empower the community, which is to shape behavior towards awareness and care for increasing self-capacity [13]. Besides that, it also imparts insight into knowledge and skills in society to contribute to development. In the end, it is hoped that it can produce innovative abilities to lead to an independent society. The concept of community empowerment includes the notion of community development and human-based development.

Community empowerment is the elements that enable a society to survive and, in a dynamic sense, develop itself and achieve goals. Meanwhile, empowering the community is an effort to increase the dignity of people who are unable to escape from the trap of poverty and underdevelopment. In other words, empowering the community is enabling and empowering the community. In relation to fishermen, community empowerment is defined as all efforts to improve fishermen's ability to meet their life needs and family welfare.

In general, the role of government in community empowerment is as follows:
1. **Government as regulator**
   The role of the government as a regulator is to prepare a direction to balance the implementation of development through the issuance of regulations. As a regulator, the government provides a basic reference for the community as an instrument to regulate all empowerment implementation activities.

2. **The government as a dynamist**
   The role of the government as a dynamist is to mobilize community participation in the event of obstacles in the development process to encourage and maintain the dynamics of regional development. The government plays a role by providing guidance and direction intensively and effectively to the community. Usually, the provision of guidance is realized through a team of extension agents or a specific agency to provide training.

3. **Government as facilitator**
   The role of the government as a facilitator is to create conducive conditions for the implementation of development to bridge the various interests of the community in optimizing regional development. As a facilitator, the government is engaged in assistance through training, education, and skills improvement, as well as in the field of funding or capital by providing capital assistance to empowered communities. In relation to fishermen's life, one of the strategic programs implemented by the government to improve fishermen's welfare is the fishermen's life improvement program. The government through the ministry of maritime affairs and fisheries continues to make efforts to map fishermen's data in detail so that assistance for fishermen and monitoring can be carried out effectively. Apart from providing assistance to individuals and groups, this program also provides assistance to strengthen the facilities and infrastructure needed by fishermen. For example, making ice factories, establishing cold storage and solar packed dealers for fishermen.

This third role of government often leads the government to collaborate with other institutions such as universities, provide training and increase community skills, and with industries that will accommodate the results of community empowerment. In the context of empowering fishing communities, the efforts and strategies used by the government are through education and training activities, counseling and mentoring, business partnerships, easy access to science, technology, and information, as well as fisherman institutional support. This effort to empower fishing communities can be carried out simultaneously by government agencies. Based on their role in the management of the fisheries and marine sectors, government agencies that can contribute to the welfare of fishermen's life include:
1. The Department of Fisheries and Marine Affairs, as one of the regional technical instruments in charge of government affairs in the fisheries and marine sector, both in management, program implementation, and community empowerment, especially the fishing community.

2. The Department of Industry, Trade, and Cooperatives has a role in empowering SMES, especially small industries or fishery home industries in fishing villages.

3. The Food Security Service plays a fisheries mentoring and counseling role in the context of empowering coastal communities, especially fishermen.

4. The Community Empowerment Service and Village Government have a role in empowering the community at the village level, especially the fishing community.

5. Village / Subdistrict Government accommodates aspirations from the community based on their wishes and then submits them to the relevant agencies. In addition, the Village / Subdistrict Government mediates with the relevant institutions if there are fishing communities who wish to request assistance and wish to make a fishing business license (SIUP), vessel documents and other fisherman documents to the Fisheries and Maritime Affairs Office.

3.3. Industry

Marine and fisheries industrialization according to ministerial regulation KP No. 7 / KEPMEN-KP / 2013 is the integration of upstream and downstream production systems to increase the scale and quality of production, productivity, competitiveness, and added value of marine and fisheries resources in a sustainable manner [14]. They are based on several principles of (1) increasing added value; (2) increasing competitiveness; (3) strengthening the marine and fishery industry actors; (4) based on commodity, area, and area management system with a concentration on superior commodities; (5) modernization of the upstream and downstream production systems; (6) balance between the use of natural resources and environmental protection in a sustainable manner; and (7) changing the mindset and behavior of modern society (social transformation).

The results of Bappenas survey in 2016 show that fisheries industrialization can support the economic development of a region. This is due to several factors that are the strengths of the fishery industry itself, such as (1) the potential for large marine resources, including capture fisheries, aquaculture and seaweed; (2) large domestic market with per capita consumption of fishery products and derivative products; (3) government and academic support for the development of the marine product processing industry; (4) abundant number of fishery SME industries; and (5) regional policies. Besides that, there are many opportunities that the fishing industry has. Several things identified as opportunities for fisheries industrialization are: (1) the increasing need for world consumption of fishery products (large export opportunities); (2) opportunities for diversification of marine products; (3) opportunities to develop the non-food seafood industry with high added value; and (4) large quantity of human resources scattered in various marine product centers [15].

Micro, small, and medium enterprises related to the fishery industry include fish salting, brining, smoking / roasting, processed fish such as fish crackers, fish nuggets and fish floss. Fish processing products and their derivatives can be seen in Figure 2. Currently, the development of the marine and fisheries sector is directed at industrialization and downstream. Industrialization aims to prevent dependence on Indonesia's consumption needs on other countries. Downstreaming is intended to increase the added value of fishery products [16].
4. Research Methods

The purpose of this paper is to propose a community empowerment model, especially labor fishermen. In this study, we describe an example of applying the triple helix model with the action research method. We do not use rigorous statistical analysis like quantitative research. Nor do you use long exposure like qualitative research.

In order to apply the Triple Helix model, we collected data through individual and group interviews. The interviews took place from January to October 2020. Our informants consist of labor fishermen from Menganti Village, the Head of Menganti Village, the Head of the Cilacap Trade, Industry, Cooperative and Small and Medium Enterprises Office, as well as entrepreneurs in the eel fish breeding and processing industry. The main research subject is labor fishermen.

The design of this study uses the Kemmis research model which includes four stages, such as, (1) seeing what happens to labor fishermen in Menganti Village, Cilacap, (2) formulating problems in the field, (3) finding and formulating solutions to solve problems in the field, and (4) taking actions that have been formulated [17].

The result of the implementation of these four stages is that in stage one, the researcher sees the poverty (low level of welfare) of labor fishermen and the opportunity to increase the income of labor fishermen by utilizing the reservoir owned by Menganti Village. In the second stage, researchers saw enormous support from the Menganti Village government and the Department of Industry and Trade for improving people's welfare. Researchers also saw the potential of the eel industry to increase income. In the third stage, the researcher designed collaboration between the eel industry and labor fishermen in Menganti Village by using facilities owned by the Menganti Village government. In the last stage, researchers realized cooperation with the Eel industry in order to provide additional income for labor fishermen in Menganti Village.

5. Result and Discussion: Implementation of the Triple Helix for Empowerment of Labor Fishermen

The poverty of labor fishermen in the village of Menganti Cilacap has been going on for a long time. One of the causes is the interaction of weather factor which does not allow fishermen to go to sea all
year round, and cultural aspect which is the habit of spending all the money they catch during the harvest so that they have no savings for a famine.

The big waves and extreme weather that was dangerous for fishermen had forced fishermen to stay at home even though at that time it was known that there were much fish they could catch. From the results of interviews with fishermen, in 12 months, they were only able to go to sea for 4 to 5 months. The rest of them are mostly at home. This condition makes fishermen have no income. In order to fulfill their daily needs, they are forced to owe both to middlemen and to the fishermen's skipper. They are forced to accept high interest as long as they are able to fulfill their daily needs.

To overcome the poverty problem of labor fishermen, we are trying to apply the triple helix strategy. Through action research, we were able to identify existing potentials that could be developed in the Menganti Village. One of the potentials possessed by Menganti Village is the cultivation of karamba fish such as catfish and mujahir. However, the cultivation has not been maximized, it is only limited to their needs, and has not been developed optimally. Even though there is a very large reservoir in Menganti Village that can be used for freshwater fish maintenance. This condition is an opportunity that can be used to create productive activities for labor fishermen in times of famine, which is a period when they cannot earn income from the sea.

To realize the opportunities that exist to provide additional income for labor fishermen, we collaborate with the Cilacap office of industry, trade, and cooperatives (government). The aim is to find the right way to optimize cage fish cultivation. From a series of interviews conducted with a number of employees of the Cilacap industry and cooperative offices, we concluded that the opportunity to optimize karamba fish farming in the Menganti village is to partner with the eel fish farming industry. Eel cultivation in Kaliwungu village, Cilacap, is a very advanced industry. Industries under the Mina Sidat Bersatu Cooperative, which is located in Kaliwungu Village, Kadungeja Cilacap District. This industry has been successful in maintaining and selling eel to Japan. However, this industry still lacks supply to meet market demand, so they need many partnerships. Armed with this information, the researcher then approached the industry, in this case, the Mina Sidat Bersatu cooperative.

The synergy between Jenderal Soedirman University, Menganti Village Government and the Department of Industry, Trade, and Cooperatives, with the Eel Industry as the embodiment of the triple helix is depicted in Figure 3. The benefits obtained from the cooperation of various institutions in the triple helix in figure 3 are, first, the government can increase people's income, increase people's independence and reduce poverty. Second, the eel industry gets good governance and administration knowledge to support production, marketing, and determining the right production costs and prices to increase industrial competitiveness. Third, universities benefit from this cooperation, can carry out Tri Dharma well, help the government, the eel industry, and labor fishermen for a better life.

The model mechanism in Figure 3 is described as follows: researchers as representatives from the university try to find opportunities by action research that could be used to solve the poverty problem of labor fishermen during a famine. After several surveys and interviews with the village Menganti Apparatus, we found the way to solve the problem which is by optimizing the reservoirs in Menganti village. We ask the eel industry to provide training in eel cultivation for labor fishermen in Menganti Village. Before approaching the eel industry, first of all, we collect the data on the current conditions of the eel industry. Furthermore, we also studied the potential of the eel fish industry which can be used to help labor fishermen, and also study the deficiencies that still exist in this industry. Based on the result of our analysis, it was concluded that besides a shortage of supply to sell to their customers, the eel industry still needs good governance assistance. This is then used as a provision for us to approach the eel industry. We try to create synergies between the eel fish industry and labor fishermen facilitated by the government, in this case, the Menganti Village government and the Cilacap Industry and Cooperative Office.
Figure 3. Institutions Synergy Model

The approach with the eel fish industry is carried out with the aim that industry is willing to provide training in eel fish cultivation to fishermen in the village of Menganti as well as to accommodate their production and market them. In addition, we also have a mission to teach the science of good governance to the eel industry in Kaliwungu village so that they can develop even more rapidly. Through the strategy of cooperating with the government and industry or the triple helix strategy, the university, through its researchers, seeks to play an active social role in helping labor fishermen and reducing poverty in Indonesia.

Furthermore, the poverty of labor fishermen can also be reduced by optimizing the potential of the sea. Utilizing the potential of the sea and the seabed, the government can implement the following policies [18]:

1) Developing the fish management industry at the collection center to accommodate catches and fish cultivation in accordance with industrial policies regarding the establishment of industrial zones and industrial agglomerations in areas of economic growth.
2) Utilizing and developing fishing and cultivation of fish, shrimp, seaweed, pearls and exploitation, and environmentally friendly technologies;
3) Increasing the number and quality of human resources to plan, manage and utilize marine resources in a cross-sectoral and multidisciplinary manner at the national and regional levels.
4) Encouraging the use and development of marine science and technology.

With the collaboration of government, universities, and industry, the triple helix can be used to optimize the potential of the sea.

6. Conclusion
The conclusion of this paper is as follows. The poverty of labor fishermen in times of famine is real and ways must be made to overcome it. There needs to be a good synergy between universities, government, and industry in order to realize opportunities for improving people's lives to become a
reality based on information and resources owned by the government, good thinking agility and analytical science from university agents, and practical industrial abilities. The application of the triple helix strategy can be one way to empower coastal fishermen, especially labor fishermen.

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