

PAPER • OPEN ACCESS

Evaluation of the Success of Programs and Strategy for Sustainable Coastal Community Development in Tanggamus Regency

To cite this article: H Yanfika *et al* 2020 *J. Phys.: Conf. Ser.* **1467** 012026

View the [article online](#) for updates and enhancements.



IOP | ebooks™

Bringing together innovative digital publishing with leading authors from the global scientific community.

Start exploring the collection—download the first chapter of every title for free.

Evaluation of the Success of Programs and Strategy for Sustainable Coastal Community Development in Tanggamus Regency

H Yanfika^{1*}, K K Ranga¹, B Viantimala¹, I Listiana¹, A Mutolib¹, A Rahmat²

¹Study Program of Agricultural Extension, Faculty of Agriculture, University of Lampung, 35145 Bandar Lampung, Indonesia

²Department of Soil Science, Faculty of Agriculture, University of Lampung, 35145 Bandar Lampung, Indonesia

[*helviyanfika@yahoo.co.id](mailto:helviyanfika@yahoo.co.id)

Abstract. This study aims to analyze the success of the KUB program and the coastal community development strategy in Tanggamus Regency. The research was conducted in Kota Agung Sub-district, Tanggamus Regency, Lampung Province, which is a fishery center in Tanggamus Regency. The study was conducted in July and August 2019. The research method uses a quantitative approach to the survey method. Qualitative data was collected to support research studies through in-depth interviews, focus group discussions (FGD), and field observations. The data collected will be analyzed using qualitative descriptive approaches. The results showed that the capture fisheries program was generally good and following the needs of fishermen to increase catches. Nevertheless, in the implementation of activities in the joint business groups still need to be improved access, because program assistance is still felt by some individuals. Besides, increased communication between group members strengthens joint business groups is needed. The strategy of developing coastal communities in increase independence is through training in processing fishery products, fostering entrepreneurship, policies to limiting fishery products from outside the region, increasing public awareness about of maintaining the cleanliness of the sea and the environment and promote cooperation with stakeholders to support the sustainability of fisheries businesses.

1. Introduction

Community economic empowerment is very important to create a balanced, developed and equitable economic structure; grow and develop the ability of community businesses to become strong and independent businesses; enhance the role of the community in regional development, job creation, income distribution, economic growth, and poverty alleviation [1]. Community development is a community-oriented development activity with the condition that it touches on aspects of justice, the balance of natural resources, community participation, and if possible based on community initiatives [2]. Furthermore, Adiwibowo revealed that community development is a change that is planned and relevant to local problems faced by members of the community that are carried out typically in ways that are appropriate to the capacities, norms, values, perceptions, and beliefs of local community members [3,4], where the principles of resident participation are held in high esteem. Research [5] that says that people with Malay Sambas also have rules or norms that are unique in society. The new development paradigm today provides more adequate space for the community to participate in the



development process. Community participation is needed because participation is a prerequisite for successful development. One strategy for generating active participation by individual members of the community is through a group approach [6,7]. Development aimed at community development will be easily understood if it involves local agents through a container called a group. According to Chaudhri, because in carrying out a variety of livelihood activities, everyone tends to group [8].

Marine development and fishing activities are base activities to utilize and manage natural resources in the form of water, land, climate, and other factors of production in a sustainable manner to increase the prosperity of the community, especially fishermen and fish cultivation [9,10]. Semangka Bay was included in the administrative area of Tanggamus Regency, Lampung Province. Semangka Bay is directly in contact with the three sub-district such as Cukuh Balak, Kota Agung, and Wonosobo, which have a wide and varied marine and fisheries potential. The potential is catching fish in the sea, catching fish in the river, fish/shrimp cultivation in ponds, and fish farming in ponds and floating cages. Coastal-based area development activities are needed to improve the welfare of fishermen.

Joint Business Group Program (KUB) is an idea that can provide empowerment for small communities, especially fishing families, by improving the quality of life to members. The KUB program is implemented directly in the community with guidelines from the government and following Non-Formal Education activities in improving the welfare of the community through a business skills program. The coastal community empowerment model through KUB is directed through group-based empowerment which is can improve the quality of human resources through mentoring and training using the Rural Rapid Appraisal approach [11]. The KUB program in Tanggamus Regency has been running since 2002 but the impact is still not seen significantly. This study aims to analyze the success of the KUB program and formulate strategies for empowering coastal communities in Tanggamus Regency.

2. Method

The research was conducted at Kota Agung Subdistrict, Tanggamus Regency, Lampung Province. The study was conducted in July and August 2019. The study used a qualitative descriptive approach [12-14]. Data collection using survey methods [15-18]. Qualitative data was also collected through in-depth interviews [19], Focus Group Discussion (FGD) and observations of field conditions [19-21].

The population in this study is the coastal community which is incorporated in KUB is 327 fishermen. Research respondents numbered 30 fishermen. The type of data collected in this study are primary data and secondary data. Primary data were obtained through direct observation and interviews using a list of questions (questionnaires) that have been compiled of fishermen, fish farmers, fishery/agricultural product processors who are members of joint business groups, and agencies or related parties. Secondary data was obtained from reports or archives from institutions or agencies related to research which included the condition of the research location, fisheries development and other data and information related to the research. The data collected will then be analyzed using a qualitative descriptive approach [22-24].

The concept of community empowerment and poverty reduction in fishing communities, in general, will be influenced by the internal and external environment, which can determine the level of success in improving people's welfare. The coastal community's development strategy uses the SWOT analysis approach that integrates internal and external environmental factors. The acronym SWOT stands for 'strengths', 'weaknesses', 'opportunities' and 'threats' [25]. For the internal environments, synergistically will determine strengths and weaknesses, then the external environment will synergistically determine opportunities and threats [25,26]. SWOT Analysis is a simple but powerful tool for sizing up an organization's resource capabilities and deficiencies, its market opportunities, and the external threats to its future [1]. The SWOT analysis will get the characteristics of the main strengths, additional strengths, neutral factors, major weaknesses and additional weaknesses based on internal and external environmental analysis conducted [25,26].

3. Results and Discussion

3.1. Characteristics of Fishing Communities.

The average age of fishermen is at the age of 44 years. This condition shows that most fishermen are in the productive age. At the productive age, the level of productivity, adoption of innovative technology is still high [27–29], while the older age is slower. A research by Mardikanto revealed that a person's learning capacity could develop rapidly until the age of 20 years and decreases until its peak is 55 years old [30]. Research results in Nigeria state that young age and higher education tend to have the ability to apply innovations that are introduced [31]. The elementary school dominates fishermen education with a percentage of 66.66%. The number of dependents ranged from 3 to 9 family members, with an average number of family members is 5 people. The length of being a fisherman ranges from 5 to 44 years with an average experience as a fisherman is 23.46 years. The overall sex of the respondent is male. In the fishing community, men still dominate in domestic life, so it is generally men who are the source of information in research and decision making in the family.

3.2. Suitability and Success of the Capture Fisheries Program in Tanggamus Regency.

The capture fisheries development program aims to increase capture fisheries productivity and fishermen welfare based on sustainable management of fish resources. The impact is increasing capture fisheries production (volume and value), increasing fishermen's income, increasing the exchange rate of fishermen. The main activities that will be carried out are: (a) management of fish resources; (b) development of fishing vessels, fishing equipment, and supervision of fishing vessels; (c) development of infrastructure/facilities for fishing ports; (d) fisheries port management and operations; (e) an efficient, orderly and sustainable capture fisheries business port; and (f) developing fishing business and empowering women/fishermen small-scale fishermen. The catch fisheries program in the Department of Fisheries and Maritime Affairs of Tanggamus Regency are: (a) socialization of the Fisherman Insurance Card, the purpose is providing knowledge and understanding to fishermen on the benefits of insurance, and the target in this activity is fishermen surrounding the coast; (b) visiting fisheries fishermen households, this activity aims to all fisherman households can be recorded completely; (c) providing assistance for five units of ships and 10 sets of fishing gear nets, this assistance is given to fishing groups; (e) the beach clean movement, the targets are coastal communities and students; and (f) distribution of 5,000 fisherman insurance cards.

This study will evaluate the suitability of the program in capture fisheries through the context, input, process, and product aspects. The suitability and success of the program are seen from the perception and assessment of research respondents. An evaluation of the capture fisheries program is shown in Table 1.

Context aspect has a good percentage of above 60 percent, this is because the program carried out in the field is appropriate, such as coaching activities on fishing groups, especially in providing solutions to the problems of fishermen, including providing environmentally friendly fishing aids, assistance of 5 GT vessels to fishermen groups with assistance will establish better group cooperation, providing insurance to fishermen so that fishermen get a guarantee of safety when fishing. The input aspect is good but there are still a few things that need to be improved. The availability of funds already exists from both the APBD (Local government budget) and the APBN (State government budget), besides that the program delivered is in accordance with the plan, there are already available places for fishermen to gather, such as the TPI office (TPI: Fish auction market). Resource advisors are provided with the provision of a minimum provision of graduate education, training is held by the government to improve the quality of human resources KUB managers and advisors, but not all KUB managers participate in training.

The process aspect shows that it is already good; this can be seen from the socialization activities of each program to be carried out. The mentoring activities carried out by the instructor are good; this is seen from the facts in the field of fisheries instructors becoming facilitators between extension workers and other agencies/institutions. The distribution of fishing net assistance and assistance of 5

GT vessels is given to the village to be used by the KUB of fishermen, while the fishermen insurance card is given to individual fishermen. In the schedule of meetings with fishermen, it is usually arranged to follow the time of the fishermen so that they can meet on time, at the time of the meeting the fishermen usually reveal all their problems and needs. The extension agent and the agency will realize it in the form of a program.

Table 1. Evaluation of fisheries programs in the Tanggamus Regency

| Assessment component | Percentage/ Score | Value |
|--|----------------------|-------|
| I. Context | | |
| a. Suitability of the program with the problem | 73.1 | High |
| b. Program according to need | | |
| c. Problem solving | | |
| II. Input | | |
| a. Number of extension workers / assistants | 71.7 | High |
| b. Ability of counselors / assistants | | |
| c. Facilities and infrastructure | | |
| d. Funding | | |
| III. Process | | |
| a. Social activities | 70.9 | High |
| b. Accompaniment | | |
| c. Implementation of activities in accordance with established plans | | |
| IV. Product | | |
| a. Achieving goals | 70.0 | High |
| b. Fulfill the need | | |
| c. Increased the income | | |

Source: Primary data processed (2019)

In the product aspect, coaching activities in the group have a good impact on increasing catches. Fishing nets help, the ship will lead to greater productivity of fishermen, because fishermen already have the facilities needed to be able to expand the catchment area. Increased fisherman productivity will result in increased fishermen's income. This finding is in line with the research by Hikmah in 2016 and Hiariy and Romeon in 2017 that group coaching and providing fishing gear assistance can increase fisheries catch productivity [11,32].

3.3. Programs and Assistance to Joint Business Groups.

KUB program has been running in Kota Agung sub-district since 2002. Assistance from KUB programs that have been provided includes assistance for large vessels, small vessels, fiber, and fishing gear (whacky nets, nylon nets, ramp, and fishing nets). The assistance provided by fishermen, in general, is in accordance with the needs, but when the assistance has been handed over to groups there are many problems such as the leader/group leader who wants to master the assistance provided. The KUB is not solid because it is generally formed in an unorderly and actionable manner whose members are dominated by family members and close relatives so that the distribution of aid is often not precise and equitable. The community hopes that assistance will be given to individuals because often the assistance obtained through KUB causes differences in understanding between group members. Disputes between KUB members are difficult to avoid because they are supported by the low intensity of officers from the relevant agencies conducting surveys related to the use of equipment, whether appropriately used and used for groups or for the benefit of individuals. The age of assistance provided through KUB generally does not last long. Generally, boat and ship assistance from KUB is only used for one year and then sold, and the proceeds are distributed to individual KUB

members. The types of assistance that have been provided through the KUB program are shown in Table 2.

Table 2. Types of assistance obtained from the KUB program in Tanggamus District

| No | Program |
|----|------------------------|
| 1. | Ships and ship engines |
| 2. | Small boat or viber |
| 3. | Big boat |
| 4. | Fishing gear |

3.4. Community Involvement and the Success of the Joint Business Group Program.

Community involvement in development is seen from the aspects of planning, implementation, supervision, and evaluation. From the planning aspect, most of the fishermen have been involved; this can be seen from the suitability of the assistance/program with the fishermen's needs. From the aspect of implementation, supervision and evaluation are far from appropriate. The parties that receive assistance are not the people who are economically in need but those who have a position/power in the community. In contrast, assistance should be prioritized for group members in need and economically limited. This has led to the low satisfaction of community members towards the success of the KUB program.

The low success of the KUB program is due to the assistance received by the group not being felt by all members but is dominated by only a few individuals. Besides, the low success of the KUB program is due to the lack of collaboration between group members due to a lack of communication between members, so disputes often occur. Furthermore, program failure was caused by the practice of collusion in the distribution of aid. Respondents' assessments of the success of the KUB program are shown in Figure 1.

Through Figure 1, information was obtained that most of the people considered that the efficiency and success of the KUB program were at 67 percent. The success category was low at 27 percent, and the people who rated the KUB program had been very successful at 6 percent. A large number of people who consider the KUB program to be less successful is due to the many problems faced by members, especially related to justice and transparency of assistance in the KUB program. Many respondents were dissatisfied with managing aid in the KUB program. This is in line with Hiariey and Romeon's research which stated that the failure of the KUB program is due to weak institutional performance [11], and other research by Hikmayani stated that communication between KUB members is not good and the low human resource capacity of group members [33].

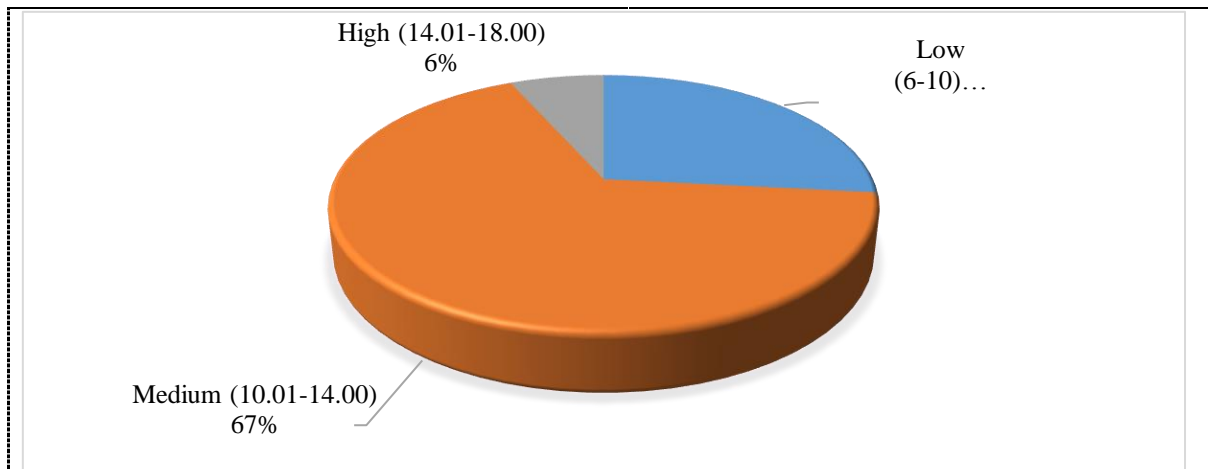


Figure 1. Successful implementation of the KUB program in the Tanggamus Regency
Source: Primary data processed (2019)

3.5. Coastal Resource Management Strategy.

Management of coastal resources is inseparable from various obstacles, to minimize these constraints there needs to be a strategy in managing coastal resources. Management of coastal resources in Tanggamus Regency is generally influenced by the environment both internal and external environment. Environmental factors can determine the level of successful utilization and development. The internal environment synergistically determines strengths and weaknesses. The external environment will determine opportunities (threats) and threats (threats). The SWOT analysis is one of several strategic planning tools that are used by businesses and other organizations to ensure that there is a clear objective defined for the project or venture, and that all factors are related to the effort, both positive and negative, are identified and addressed[34]. After identifying aspects of strengths, weaknesses, opportunities and threats, a strategy is derived from the multiplication of each internal and external factors that produce S-O, S-T, W-O, and W-T strategies. The strategic development plan in Tanggamus Regency is presented in the SWOT Matrix in Table 3.

Table 3. SWOT Matrix for the development of coastal areas in Tanggamus Regency

| | | |
|-----------------|---|--|
| External | Opportunities (O) | Threats (T) |
| | <ol style="list-style-type: none"> 1. A wide sea 2. A large number of fish 3. High fish needs 4. Increased demand for derived products | <ol style="list-style-type: none"> 1. Entry of fishery products from outside the area 2. Exploitation of marine ecosystems 3. The increasingly fierce competition for marine tourism |
| Internal | Strengths (S) | Strategy S-O |
| | <ol style="list-style-type: none"> 1. Fish potential 2. Potential of a good marine ecosystem 3. Have a very interesting marine tourism 4. Beautiful coastal | <ol style="list-style-type: none"> 1. Development of fisheries business. 2. Maintenance of marine ecosystems 3. Training on improving marine processed products 4. Training on improving marine tourism services 5. Maintenance of the environment around the beach / |
| | | Strategy S-T |
| | | <ol style="list-style-type: none"> 1. Increase processed products 2. Enforcement of penalties against the destroyer of marine ecosystems 3. Maintain and preserve the potential of the beach for marine tourism activities |

| sea. | | |
|--|---|--|
| Weakness (W) | Strategy W-O | Strategy W-T |
| 1. Processed products for fishery products are still low | 1. Training of processed fish products | 1. Limiting fishery products from outside the area |
| 2. Low quality of the community in managing marine ecosystems | 2. Training of coastal communities on marine conservation and coastal environment | 2. Increase public awareness about the importance of protecting the sea and the environment |
| 3. Low income of coastal communities, because there are no side businesses | 3. Community development related to entrepreneurship | 3. Collaborating with stakeholders to improve coastal communities' knowledge of the fisheries business |

Table 3 identifies S-O strategies in developing sustainable coastal areas, including 1) Development of fisheries businesses, 2) Maintenance of marine ecosystems, 3) Training in the improvement of processed products. Leading S-W strategies include: 1) Improving processed products, 2) Enforcement of penalties against marine ecosystem destroyers, 3) Maintaining and preserving the potential of the beach for marine tourism activities. W-O's leading strategies include 1) Training of processed fish products, 2) Training of coastal communities on marine conservation and coastal environment, 3) Training of communities related to entrepreneurship. W-T's flagship strategies include 1) Limiting fishery products from outside the region, 2) Increasing public awareness about the importance of protecting the sea and the environment, 3) Establishing cooperation with suspicious stakeholders increasing the knowledge of coastal communities towards the business world.

4. Conclusion

The capture fisheries program is generally good categories; the activities are following the needs of fishermen to increase catches. However, in the implementation of activities and programs in KUB it still needs to be improved because only a few individuals can feel program assistance due to the low level of communication between group members due to understanding of the needs of the group which is still low. An evaluation of the success of the KUB community program assesses that its success is still low. Few people are satisfied with the successful implementation of the KUB program. A large number of people judging the lack of success of the KUB program is due to the many problems faced by members, especially related to justice and transparency of assistance in the KUB program. From this condition, it is necessary to assist groups to improve the success of the KUB program in Tanggamus Regency.

Development strategy of coastal communities in increasing independence and sustainability includes: 1) Training of processed fish products, 2) Training of coastal communities on marine conservation and coastal environment, 3) Guidance to communities related to entrepreneurship, 4) Limiting fishery products from outside regional, 5) Increasing public awareness about the importance of protecting the sea and the environment, 6) Establishing cooperation with suspicious stakeholders increasing the knowledge of coastal communities towards the business world.

References

- [1] D. Tampubolon 2012 Strategi Pemberdayaan Masyarakat Pesisir di Kabukpaten Kepulauan Meranti *J. SOROT*, **8** 2 153–161
- [2] Meirinawati, I. Prabawati, and G. W. Pradana 2018 Strategy community development based on local resources *J. Phys. Conf. Ser* **953** 1 1–5
- [3] S. Adiwibowo 2007 *Ekologi Manusia.pdf* (Bogor: Institut Pertanian Bogor)
- [4] A. Mutolib, Yonariza, Mahdi, and H. Ismono 2016 Gender Inequality and the Oppression of Women within Minangkabau Matrilineal Society: A Case Study of the Management of Ulayat Forest Land in Nagari Bonjol, Dharmasraya District, West Sumatra Province, Indonesia *Asian women* **32** 3 23–49

- [5] S. Kurniawan and B. Suratman 2018 Bertani Padi Bagi Orang Melayu Sambas : Kearifan Lokal , Nilai- Nilai Islam, dan Character Building *Anal. J. Stud. Keislam* **18** 2 191
- [6] J. Tampubolon, B. G. Sugihen, M. Samet, D. Susanto, and S. Sumardjo 2006 Pemberdayaan Masyarakat Melalui Pendekatan Kelompok (Kasus Pemberdayaan Masyarakat Miskin melalui Pendekatan Kelompok Usaha Bersama (KUBE)) *J. Penyul.*
- [7] I. Listiana, I. Efendi, A. Mutolib, and A. Rahmat 2019 The behavior of Extension Agents in Utilizing Information and Technology to Improve the Performance of Extension Agents in Lampung Province *J. Phys. Conf. Ser.* **1155** 1 (012004) 1–10
- [8] S. Chaudhuri 2015 Urban poor, economic opportunities and sustainable development through traditional knowledge and practices *Glob. Bioeth.* **26** 2 86–93
- [9] H. Yanfika, I. Listiana, A. Mutolib, and A. Rahmat 2019 Linkages between Extension Institutions and Stakeholders in the Development of Sustainable Fisheries in Lampung Province *J. Phys. Conf. Ser.* **1155** 1 1–6
- [10] A. Rahmat and A. Mutolib 2016 Comparison of air temperature under global climate change issue in Gifu City and Ogaki City, Japan *Indones. J. Sci. Technol.* **1** 1 37–46
- [11] L. S. Hiariy and N. R. Romeon 2017 Penguatan Kelompok Usaha Bersama (KUB) Perikanan Tangkap (Studi Kasus Desa Latahalat, Kota Ambon, Provinsi Maluku) *J. Mat. Saint, dan Teknol.* **18** 2 121–130
- [12] M. T. Bevan 2014 A method of phenomenological interviewing *Qual. Health Res.* **24** 1 136–144
- [13] H. Kim, J. S. Sefcik, and C. Bradway 2017 Characteristics of Qualitative Descriptive Studies: A Systematic Review *Res. Nurs. Heal.* **40** 1 23–42
- [14] A. Huberman and M. Miles 2012 Understanding and Validity in Qualitative Research in *The Qualitative Researcher's Companion*
- [15] S. Roopa and M. Rani 2012 Questionnaire Designing for a Survey *J. Indian Orthod. Soc.* **46** 4 273-277
- [16] E. Fossey, C. Harvey, F. McDermott, and L. Davidson 2002 Understanding and evaluating qualitative research *Aust. N. Z. J. Psychiatry* **36** 6 717–732
- [17] Ponto 2015 Understanding and Evaluating Survey Research *J. Adv. Pract. Oncol.* **6** 2 168–171
- [18] A. Yildirim, M. Celikten, T. Desiatov, and Y. Lodatko 2019 The Analysis of Teachers' Cyber Bullying, Cyber Victimization and Cyber Bullying Sensitivity Based On Various Variables *Eur. J. Educ. Res.* **8** 4 1029–1038
- [19] I. Acocella 2012 The focus groups in social research: Advantages and disadvantages *Qual. Quant.* **46** 4 1125–1136
- [20] R. M. Dilshad and M. I. Latif 2013 Focus Group Interview as a Tool for Qualitative Research: An Analysis *Pakistan J. Soc. Sci.* **33** 1 191–198
- [21] H. Yildiz and T. Gokce 2018 The Development Process of a Mathematic Teacher's Technological Pedagogical Content Knowledge *Eur. J. Educ. Res.* **7** 1 11
- [22] M. Matthew B, H. A M, and S. Johnny 2014 *Qualitative data analysis : a methods sourcebook*, Third edit. Thousand Oaks, California: SAGE Publications
- [23] A. Huberman and M. Miles 2012 The Qualitative Researcher's Companion in *The Qualitative Researcher's Companion*, Thousands Oaks, CA: Sage Publications 37–64.
- [24] A. Mutolib, Yonariza, Mahdi, and H. Ismono 2017 Forest ownership conflict between a local community and the state: A case study in Dharmasraya, Indonesia *J. Trop. For. Sci.* **29** 2 163–171
- [25] E. Gurel 2017 SWOT Analysis: A Theoretical Review *J. Int. Soc. Res.* **10** 51 994–1006
- [26] P. Kotler and K. L. Keller 2009 *Marketing management (13th ed.)*, 14 ed. Prentice-Hall, Upper Saddle River, NJ
- [27] J. Chung *et al.* 2015 A study on the relationships between age, work experience, cognition, and work ability in older employees working in heavy industry *J. Phys. Ther. Sci.* **27** 155–157
- [28] M. E. von Bonsdorff, L. Zhou, M. Wang, S. Vanhala, M. B. von Bonsdorff, and T. Rantanen

- 2018 Employee Age and Company Performance: An Integrated Model of Aging and Human Resource Management Practices *J. Manage.* **44** 8 3124–3150
- [29] M. Shehada and W. Abu Dawood 2017 Measuring the Relationship between Age and Productivity: A case Study of Orange West Sales Department *Am. Based Res. J.* **6** 1 35–41
- [30] T. Mardikanto 1993 *Penyuluhan Pembangunan Pertanian*. Surakarta: Sebelas Maret University Press
- [31] C. W. Chesoli 2013 Types of capacity building activities for improved market participation by farmer groups in turbo, Kenya *J. Emerg. Trends Econ. Manag. Sci.* **4** 4 377–380
- [32] N. Hikmah, M. Kurnia, and F. Amir 2016 Pemanfaatan Teknologi Alat Bantu Rumpon Untuk Fads Technology Utilization for Fish Capture in *J. IPTEKS PSP* **3** January 455–468
- [33] Y. Hikmayani 2013 Permasalahan Yang Dihadapi Masyarakat Dan Peran KIMBis Dalam Kehidupan Masyarakat Kota Tegal *Bul. Ilm. Mar. Sos. Ekon. Kelaut. dan Perikan.* **8** 2 67
- [34] I. Osita, I. Onyebuchi, and J. Nzekwe 2014 Organization's stability and productivity: the role of SWOT analysis an acronym for strength, weakness, opportunities and threat *Int. J. Innov. Appl. Res.* **2** 9 23–32