

Attitude towards Mariculture Enterprises and its Influence on the Implementation of Poverty Alleviation Mariculture Projects

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Abstract: Mariculture projects are implemented along the coast of Kenya to provide an additional livelihood source and address the problem of poverty among the coastal communities. Development of mariculture has however lagged behind due to negative beliefs and attitudes. This study was carried out in Kwale, Mombasa and Kilifi Counties of the coast of Kenya to examine the influence of attitudes towards mariculture enterprises on the implementation of mariculture projects. The specific objectives were to examine the influence of attitudes towards benefits of mariculture enterprises on the implementation of mariculture projects, and to establish the influence of attitudes towards costs of mariculture enterprises on the implementation of mariculture projects. A quantitative research approach was used with the application of survey method. The study revealed that mariculture has been adopted as a source of livelihood and income by more women than men in the coast of Kenya. Most of the respondents had attained different levels of primary education. The degree of success in the implementation of mariculture projects was moderate and the products generated by mariculture made beneficiaries happy. Correlation analysis showed that there is a significant and strong positive relationship between attitudes towards benefits of mariculture and project implementation, implying that higher levels of benefits from mariculture projects would be associated with better implementation of mariculture projects. On the other hand, attitudes towards costs of mariculture was statistically insignificant and therefore considered less important compared to attitudes towards the benefits of mariculture.

Keywords: Attitudes, implementation, mariculture, project, benefits, costs, communities.

I. INTRODUCTION

Introduction of mariculture in the coast of Kenya has provided economic opportunities that enhance the freedom of rural poor coastal communities to access an additional source of livelihood and income thus bringing about development (Mirera & Ngugi, 2009). Mariculture refers to the production of aquatic organisms, including fish, molluscs, crustaceans and aquatic plants in marine and brackish waters. Mariculture development in Kenya began four decades ago (Troell, et al, 2011), having been introduced through different development, research and conservation programs (Mirera, 2011; Mwaluma, 2002). The mariculture projects are mainly operated by self-help groups. These projects are concentrated in Kwale, Mombasa and Kilifi Counties of the coast while Lamu and Tana River Counties have lagged behind.

The main aim of mariculture projects has been to provide an additional livelihood opportunity and address the problem of poverty among the Kenyan coastal communities (Mirera, Ochiewo & Munyi, 2014). While some progress has been made towards realizing the objectives of mariculture projects, it has been observed that mariculture has lagged behind in the

coast of Kenya due to negative beliefs and attitudes (Brummett & Williams, 2000; Mirera & Ngugi, 2009; Mirera, 2011). Since attitude was identified to be one of the factors that made mariculture to lag behind, this study sought to examine the effect of attitudes towards mariculture on implementation of mariculture projects in the coast of Kenya. Attitudes of local communities towards mariculture projects are determined by the expected benefits from mariculture projects, anticipated costs of implementing mariculture enterprises and the local cultural setting.

From a technical perspective, feasibility studies have revealed that the coast of Kenya has many areas that are suitable for mariculture development (Troell et al 2011). However, despite the existence of suitable areas for mariculture development, mariculture has remained under-developed in Kenya and in comparison to freshwater aquaculture it has been considered an insignificant activity (Shimpton & Hecht, 2007).

Objectives:

The main objective of the study was to examine the influence of attitudes towards mariculture enterprises on the implementation of mariculture projects. The specific objectives were:-

1. To examine the influence of attitudes towards benefits of mariculture enterprises on the implementation of mariculture projects.
2. To establish the influence of attitudes towards costs of mariculture enterprises on the implementation of mariculture projects.

Research questions:

The study sought to address the following research questions:-

1. How do attitudes towards benefits of mariculture enterprises affect implementation of mariculture projects?
2. To what extent do attitudes towards costs of mariculture enterprises influence implementation of mariculture projects?

II. METHODOLOGY

Research Design:

The study used a quantitative research approach as it sought to examine the relationship between attitudes towards mariculture enterprises and implementation of mariculture projects. Quantitative research approach relies on the principle of verifiability/measurement to establish the cause-effect relationship. This approach was adopted because the data collected through is easily analyzed using the standard statistical procedures. It involved the application of a survey method which is one of the most important data collection methods in the social sciences and is suitable because it makes it possible to obtain a sample which is representative of the population (Kothari, 2009, Mugenda and Mugenda, 2003). The survey was in the form of cross section research design.

The Target Population:

This study targeted community-based mariculture groups that are actively involved in various types of mariculture projects in Kwale, Mombasa and Kilifi Counties of the coast of Kenya. These communities consisted of 12 organized community groups with a total of 331 members (KMFRI-KCDP, 2015). Some groups developed as community conservation groups while others were formed as self-help groups. The self-help groups were formed by the communities themselves to enable them address common challenges such as unemployment and poverty while community conservation groups were formed with the support of local Non- Governmental Organizations to execute donor funded projects (Mirera, Ochiwo & Munyi, 2014).

Sample Size and Sample:

A sample was selected from a sampling frame of 331 individual members of 12 community based mariculture groups in three selected counties (Kilifi, Mombasa and Kwale). A sample size of 182 individuals was obtained from the sampling frame using the formula for determination of sample size for a finite population correction (Daniel, 1999; Naing, Winn, & Rusli, 2006).

Sampling Technique:

Random probability sampling was used to select the number of subjects that represent the target population in the survey. This sampling technique provided an efficient system of capturing the heterogeneity that existed in the target population. Random probability sampling makes it possible to obtain a representative sample and allows generalization to a larger population with a margin of error that is statistically determinable.

Data Collection Instrument:

A questionnaire was the main research instrument used in this study. The questionnaire was prepared with each question being assessed on a 5-point likert scale from strongly disagree to strongly agree. The questionnaire was administered to the respondents through personal face-to-face interviews. The personal face-to-face interviews made it possible to control for non-verbal behaviour (Nachmias & Nachmias, 2004). Before the study was carried out, a pilot study was conducted and a Cronbach's Alpha was used to test the reliability of the questionnaire used in the study.

Data Analysis:

Descriptive statistics were applied to analyze the data using the Statistical Package for Social Sciences (SPSS) Version 22. The generated statistics included frequencies and mean, standard deviation, which described the characteristics of the data, and showed how much observations clustered together. According to Kothari (2009), these statistics described the characteristics of the collected data and revealed which items had a tendency to cluster. The tendency to cluster was particularly assessed by examining the standard deviation; when the standard deviation is small, it shows that most observations clustered around the mean and when it is high it indicates that there were considerable variances in the observations. Pearson correlation analysis was conducted to determine the strength and nature of the relationship between attitudes towards mariculture enterprises and implementation of poverty alleviation mariculture projects.

III. RESEARCH FINDINGS AND DISCUSSION**Respondents' Demographic Characteristics:**

The demographic characteristics of the respondents were studied to shed light on the context within which the implementation of poverty alleviation mariculture projects took place. It captured key demographic attributes such as gender, age, level of education and training in mariculture. The demographic characteristics are summarized in table 1.

Table 1: Descriptive statistics of respondents' demographic characteristics

| Age of respondent | Frequency | Percent |
|--------------------------------|------------------|----------------|
| 18 years and below | 1 | 0.5 |
| 19-30 years | 35 | 19.2 |
| 31-40 years | 57 | 31.3 |
| 41-50 years | 43 | 23.6 |
| 51 years and above | 46 | 25.3 |
| Total | 182 | 100.0 |
| Gender | | |
| Female | 107 | 58.8 |
| Male | 75 | 41.2 |
| Total | 182 | 100.0 |
| Level of education | | |
| Primary or less | 157 | 86.3 |
| Incomplete high school | 7 | 3.85 |
| High school qualification | 11 | 6 |
| Tertiary | 7 | 3.85 |
| Total | 182 | 100.0 |
| Training in mariculture | | |
| Training acquired | 148 | 81.3 |
| No training acquired | 31 | 17.0 |
| Missing | 3 | 1.6 |
| Total | 182 | 100.0 |

The results in table 1 indicate that 58.8 percent of the respondents were female implying that men tended to remain in their traditional occupations such as fishing while women reached out to tap on economic opportunities presented by the

community-based mariculture projects that are geared towards poverty alleviation. This finding shows a major departure from the findings of a previous study by Mirera, Ochiewo and Munyi (2014) which found that mud crab mariculture projects were dominated by men. The situation seemed to have changed with men going back to their traditional occupations and most women taking up seaweed mariculture particularly in the South Coast of Kenya and finfish mariculture in Kwale, Mombasa and Kilifi Counties. The dominance of women in mariculture in Kenya is similar to the situation in Zanzibar where 90 percent of people involved in seaweed mariculture are women and in Madagascar where over 50 percent of the sea cucumber farmers are women (UNEP-Nairobi Convention and WIOMSA (2015).

Regarding age, it is evident from table 1 that most of the respondents (about 74%) were aged between 19 – 50 years, meaning that the mariculture projects are operated by people who are in their active middle age and are therefore able to engage in the hard work in the mariculture farms.

From table 1, it is also evident that most of the respondents (about 86%) had attained different levels of primary of education and only 10 percent had attained high school and tertiary qualifications. This implies that the mariculture projects were operated by people who had low levels of education. This is likely to impact negatively on decision-making during implementation of the poverty alleviation mariculture projects. The low levels of education particularly among women who are involved in mariculture had also been observed in South East Asia, where women have assumed a critical role in aquaculture development (Mirera, Ochiewo & Munyi, 2014; Nash, 1995; Lorica, 2002).

The respondents were asked whether they had obtained any training on mariculture and about 83% stated that they had obtained some training on mariculture. Training is important as it makes people acquire skills which are necessary for handling technical tasks assigned to them. This confirms the findings by Mirera, Ochiewo & Munyi (2014) that groups that had little training in mud crab mariculture experienced higher mortalities in their culture systems due to poor handling, poor construction of culture structures, inadequate feeding and feeding at wrong times. The losses incurred due to high mortalities resulted in loss of hope among group members. People should therefore be adequately trained before they are given technical tasks to perform in mariculture enterprises.

Descriptive Analysis on Attitudes Towards Mariculture:

Attitudes towards mariculture were assessed by two measures namely attitudes towards benefits of mariculture and attitudes towards cost of mariculture. The two measures were studied through 9 opinion statements that were presented to the respondents in a scale of 1 to 5 (where 1 = strongly disagree and 5 = strongly agree). The study first established the reliability of the research variables using a Cronbach's Alpha and the results presented in table 2. The results showed a Cronbach's Alpha coefficient of 0.739.

Table 2: Reliability Statistics for attitudes towards mariculture

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|--|------------|
| .739 | .737 | 9 |

Cronbach's Alpha values range between 0 and 1, with 1.0 showing perfect reliability and 0.70 marking the lower level of acceptability. The computed Cronbach's Alpha coefficient of 0.739 is therefore well above the lower limit of 0.70 hence confirming reliability of the research variables. The study then sought to examine the key features of attitudes towards mariculture projects. Descriptive results are presented in table 3.

Table 3: Descriptive statistics for attitudes towards mariculture

| | N | Min | Max | Mean | Std. Dev. |
|--|-----|-----|-----|-------------|-----------|
| The mariculture enjoys broad support from beneficiaries due to its income generation | 181 | 1 | 5 | 3.55 | 1.310 |
| The mariculture creates support by beneficiaries through income generation | 181 | 1 | 5 | 3.64 | 1.274 |
| The project generates income that enables beneficiaries to support mariculture | 181 | 1 | 5 | 3.52 | 1.348 |
| The cost of implementing mariculture limits its adoption by beneficiaries | 180 | 1 | 5 | 3.09 | 1.326 |

| | | | | | |
|--|-----|---|---|-------------|-------|
| The expected cost of mariculture production influences the number of beneficiaries | 180 | 1 | 5 | 3.24 | 1.257 |
| The project cost limits the support for mariculture by beneficiaries | 180 | 1 | 5 | 3.09 | 1.287 |
| More women have adopted mariculture as source of income than men | 181 | 1 | 5 | 3.94 | 1.242 |
| The local values promote mariculture as a source of income | 181 | 1 | 5 | 3.72 | 1.184 |
| The mariculture provides income to women | 180 | 1 | 5 | 3.84 | 1.250 |
| Valid N (listwise) | 177 | | | | |

Key: N = sample size, scale 1 = strongly disagree and scale 5 = strongly agree, min. = minimum, max. = maximum, std. dev = standard deviation.

From the results in table 3, it was evident that the respondents agreed that the mariculture projects had been adopted as a source of livelihood by more women than men as indicated by a mean score of 3.94. The dominance of women in community-based poverty alleviation mariculture projects in the coast of Kenya is similar to the situation in Zanzibar and Madagascar where seaweed mariculture and sea cucumber mariculture have benefitted more women than men as reported by UNEP Nairobi Convention and WIOMSA (2015). The respondents also observed that mariculture provides income to women and is supported by local values as shown by mean scores of 3.84 and 3.72 respectively.

It was further observed that the mariculture projects enjoy broad support from the beneficiaries due to income generation as indicated by mean scores of 3.52 to 3.64. This is consistent with the observation by Brummett and Williams (2000) that small-scale aquaculture including mariculture is globally being seen to be important for the livelihood, welfare and food security of some of the poorest communities in developing countries. It also confirmed the observation that aquaculture including mariculture is increasingly being viewed as a source of food and income for households (Mirera, Ochiewo & Munyi, 2014). In addition, different authors including Ahmed and Lorica (2002), Shelley (2008), Mirera & Ngugi (2009) and Ndanga et al. (2013) have also argued that aquaculture including mariculture makes important contributions to the income and food security of rural households. Studies by Primavera (2006), Primavera (2010), Worm and Branch (2012), and Mirera et al. (2013) established that communities consider mariculture a viable alternative livelihood option to fishing households due to declining income from traditional fishing. Consequently, the expected benefits from mariculture projects has created a positive attitude from communities and provided motivation for more people to get involved in mariculture.

The results in table 3 further show that most respondents were not sure whether the cost of implementing mariculture projects limited its adoption by beneficiaries as shown by mean score of 3.09. This could be attributed to the fact that most poverty alleviation mariculture projects have been implemented using donor funds and therefore the beneficiaries have not been compelled to contribute funds for their implementation. Where such projects are implemented with members' contributions, group members often make minimal contributions with the bulk of their contributions coming in the form of labour provided in the mariculture farms.

Effective implementation of mariculture projects requires positive attitudes from both beneficiaries and other community members that interact with the project. Where negative attitudes exist, mariculture projects are often faced with sabotage. For example, Mirera, Ochiewo & Munyi (2014) found that negative attitudes from other community members were experienced when mud crab farming was first introduced, and this led to conspiracies that resulted in theft of farmed crabs a few days after stocking and a few days before harvest.

Descriptive Results of Project Implementation:

Project implementation was assessed by one measure namely degree of success. Degree of success was studied through analysis of level of happiness created by the poverty alleviation mariculture projects. Three opinion statements about happiness derived from the mariculture projects were used and the results are presented in a scale of 1 to 5 (where 1 = strongly disagree and 5 = strongly agree (table5). The study first determined the reliability of the research variables and a Cronbach's Alpha was used and results presented in table 4. The results showed a Cronbach's Alpha coefficient of 0.961. Cronbach's Alpha coefficient of 0.961 is well above the lower limit of 0.70 hence confirming reliability of the research variables.

Table 4: Reliability Statistics for project implementation

| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | N of Items |
|------------------|--|------------|
| .961 | .961 | 14 |

The study then sought to establish how happy the respondents were with the implementation of mariculture projects along the coast of Kenya. Descriptive statistics were used to explore happiness and the results are presented in table 5.

Table 5: Descriptive statistics for project implementation

| | N | Min | Max | Mean | Std. Dev |
|--|-----|-----|-----|-------------|----------|
| The mariculture increases the level of satisfaction by beneficiaries | 179 | 1 | 5 | 3.54 | 1.391 |
| The mariculture enables beneficiaries to have increased satisfaction | 181 | 1 | 5 | 3.50 | 1.352 |
| The products from mariculture makes the beneficiaries happy | 179 | 1 | 5 | 3.74 | 1.299 |
| Valid N (listwise) | 171 | | | | |

Key: Scale 1 = strongly disagree and scale 5 = strongly agree, min. = minimum, max. = maximum, std. dev = standard deviation, N = sample size

The findings indicate that the poverty alleviation mariculture projects generate products that make beneficiaries happy as demonstrated by the mean score that range between 3.50 and 3.74 (table 5). The finding contradicts the findings by Mirera, Ochiewo & Munyi (2014) that negative attitudes from other community members were experienced when mud crab farming was first introduced. The negative attitudes resulted in conspiracies that led to theft of farmed mud crabs, which in some cases was planned and executed from within the group members, especially when harvesting was near.

Correlation results of Attitudes Towards Mariculture and project implementation:

Correlation analysis was conducted to determine the strength and direction of the relationship between attitudes towards mariculture enterprises (as measured by attitudes towards benefits of mariculture and attitudes towards cost of mariculture) and mariculture project implementation. Preliminary analyses were carried out to ensure that assumptions of normality, linearity and homoscedasticity were not violated. Correlation results are presented in table 6.

Table 6: Correlation results of Attitudes Towards Mariculture and Project Implementation

| | | Project implementation | Attitudes towards benefits | Attitudes towards costs |
|----------------------------|---------------------|------------------------|----------------------------|-------------------------|
| Project implementation | Pearson Correlation | 1.000 | .869 | -.057 |
| | Sig. (1-tailed) | . | .000 | .231 |
| | N | 174 | 171 | 171 |
| Attitudes towards benefits | Pearson Correlation | .869 | 1.000 | -.034 |
| | Sig. (1-tailed) | .000 | . | .325 |
| | N | 171 | 177 | 177 |
| Attitudes towards costs | Pearson Correlation | -.057 | -.034 | 1.000 |
| | Sig. (1-tailed) | .231 | .325 | . |
| | N | 171 | 177 | 177 |

Attitudes of local communities towards mariculture are determined by the expected benefits from mariculture and the anticipated costs of implementing mariculture enterprises. The correlation coefficients in table 6 revealed that there is a significant and strong positive relationship between attitudes towards benefits of mariculture and project implementation, $r = 0.869$, $n = 171$, $p = 0.000$ (where: r = Pearson correlation coefficient, n = sample size, p = significance). This implies that higher levels of benefits from mariculture projects would be associated with better implementation of mariculture projects. The results further suggest that attitudes towards benefits of mariculture was considered an important factor by the respondents. This is consistent with the conclusion from a study by Mirera, Ochiewo & Munyi (2014) that community

groups that spearhead mariculture interventions have realized initial benefits from mariculture and have a vision of helping their communities out of poverty.

This further confirms the observation by Brummett & Williams (2000), Mirera & Ngugi (2009) and Mirera (2011) that mariculture has lagged behind in the coast of Kenya due to negative beliefs and attitudes.

There is an insignificant negative relationship between attitudes towards costs of mariculture and project implementation, $r = -0.057$, $n = 171$, $p = 0.231$ (where: r = Pearson correlation coefficient, n = sample size, p = significance). This means that increased costs of mariculture would lead to decline in the implementation of mariculture projects. This could be attributed to the fact that if the costs of mariculture increase, most of the respondents would not be willing and able to contribute more resources for the implementation of mariculture projects. Furthermore, the profitability of mariculture enterprises may decline hence negatively affecting implementation.

IV. CONCLUSION AND RECOMMENDATIONS

Conclusion:

The main objective of the study was to examine the influence of attitudes towards mariculture enterprises on the implementation of mariculture projects. The mariculture projects had been adopted as a source of livelihood by more women than men, meaning that strategies to support development of mariculture as a poverty alleviation intervention should focus on the needs of women. These strategies could include developing targeted training modules for women who are already engaged in or contemplating to join mariculture so that they acquire skills that are required in operating mariculture projects.

Attitudes towards mariculture enterprises were measured by attitudes towards benefits of mariculture and attitudes towards cost of mariculture. Most respondents agreed that between the two measures, attitudes towards the benefits of mariculture greatly influence implementation of poverty alleviation mariculture projects. Focus should therefore be put on how to improve benefits from mariculture to enhance commitment by the beneficiaries and other stakeholders. Attitudes towards the cost of implementing mariculture projects was not considered a serious issue hence should be ignored. The cost of mariculture enterprises was not considered important probably because most poverty alleviation mariculture projects have been implemented using donor funds and therefore most of the beneficiaries have not used their own financial resources to support these projects.

Correlation analysis revealed that there is a significant and strong positive relationship between attitudes towards benefits of mariculture and implementation of poverty alleviation mariculture projects in the coast of Kenya. Higher levels of benefits from mariculture projects would be associated with better implementation of mariculture projects.

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