



An Investigation of Fish Processing and Preserving for Socio-Economic Development in North "B" District of Unguja - Zanzibar

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ABSTRACT: This study was conducted in order to investigate fish processing and preserving for socio-economic development in North "B" District Unguja-Zanzibar. The specific objectives were to assess the contribution of fish processing and preserving activities for socio-economic development in North "B" District of Unguja-Zanzibar and to examine the strategies set by the government in promoting fish processing. The target population of the study comprised of District Officers, Fisheries Officers, Shehia Leaders, community members and stockholders. Data was gathered using questionnaires. The study population was 81,675 which and a sample size of 145. The study revealed that, fish processing and preserving contributed to socio-economic development especially in as far as improving the standard of living of the communities. This was at the level of 93 equal to (64.1%), income increased to 48 equal to (33.1%), usage of modern technology was found to be 82 (56.5%), improvement of training and education to the local community and fish folks 62 equal to (42.8%). In general, the benefits contributed to the socio-economic development in Zanzibar. The study revealed that, some of the strategies set by the government were to strengthen the monitoring and evaluation processes, provision of modern technology to the local communities, provision of training and education to the local communities. The study recommended the government to increase more fish processing and preservation in order to increase social economic development. Also the study recommended that, modern technology, monitoring and evaluation; training local communities should be enhanced.

KEYWORDS: Fish Processing, Preservation, Socio-Economic Development

1.0 INTRODUCTION

The fisheries sector has proved crucial among small island economies and coastal communities around the world (Ahmed, *et.al.*, 2022). The fisheries sector provides both food and employment for millions of people and improving the livelihood and economic status. Fish harvesting, handling, processing and distribution provide livelihood for millions of people, as well as providing foreign exchange to many countries all over the world (IUCN, 2020). This means that, a country that will be fully committed to fish conservation and processing leads to significant social economic development for her people.

In American, most communities use fish processing and preserving by salting, drying, smoking, fermentation and canning. In response to consumer demand for texture, appearance and taste, new methods were developed including cooling, freezing and chemical preservation. (Ghaly, *et.al.*, 2010). A comprehensive review of the literature on the subject of fish spoilage and modern preservation techniques was carried out. Fish spoilage results from three basic mechanisms: Enzymatic autolysis, oxidation, microbial growth. Low temperature storage and chemical techniques for controlling water activity, enzymatic, oxidative and microbial spoilage are the most common in the industry today. (Ghaly, *et.al.*, 2010). A process involving the addition of an EDTA (1 mM)-TBHQ (0.02%) combination and ascorbic acid and storage at refrigerated temperatures (5°C) in darkness can be the most positive for controlling the spoilage of fish and fish product (Ghaly, *et.al.*, 2010).

Canada is a major exporter of seafood and marine products whereby 75% of her fish products are exported to more than 80 countries around the world. In the year 2012, exports from Canada amounted to 595,615.738 metric tons of fish worth \$4.15 billion. Canada has the world's longest coastline (244,000 km) which makes 25% of the entire world's coastline. Atlantic Canada represents 40,000 km of coastline which comprises four major provinces. She exports high quality harvested ground fish, shellfish and pelagic fish accounting for 85% of the total Canadian fish landings. The Pacific fishery accounts for 14% of the total fish landings and includes cod, redfish, flatfish, hake, herring, tuna, salmon and calms (Ghaly *et.al.*, 2010).



In Africa, some 5% of the population, about 35 million people, depend wholly or partly on the fisheries sector, mostly artisanal fisheries, for their livelihood (Feidi, 2005). There are many methods of fish processing and preserving, the modern method including chilling or freezing are employed to facilitate transportation in insulated containers and are suitable for refrigeration on transit. Also traditional processing methods which include air drying, hot smoking and salting method are used. The 100% of women who engage in fishing and use methods that are outdated and unproductive for competitive economic development in the world, the smoking kilns used by processors were barrel kiln (67.7%), traditional kiln in clay (31.5%) and Chorkor (5.6%) (Assogba, 2019).

George, *et.al.*, (2014) argue that, in Nigeria, a total of five traditional fish processing equipment was observed and included galvanized iron sheet supported by planks 51 (46.4%), drum oven 8 (7.2%), black clay oven 24 (21.8%), red clay oven 9 (8.1%), brick kiln 5 (4.2%) and government model kiln 4 (3.5%). Most developing countries use traditional methods to preserve and process fish for consumption and storage. However, Oluwatoyin, *et.al.*, (2010) reported that, salting, sun drying, smoke drying and frying were the most popular processing and preservation techniques utilized by women. In order to improve the quality of fish processing and preserving that can meet international standards, many countries in Africa and particularly those in COMESA, SADAC and the EAC have standards and regulations to protect consumers and encourage better handling and processing of fish (Kalumanga, 2018). These standards are based on those promoted by Codex, an international organization that develops worldwide standards (Kalumanga, 2018). Some of the most pressing issues facing regional fisheries trade relate to trade barriers in both regional and domestic markets. Average import tariffs for example between countries in the region are generally much higher than in developed countries and are thought to have weakened intra-regional trade significantly, (Kalumanga, 2018).

Most importantly, the Revolutionary Government of Zanzibar (RGoZ) has decided to utilize its ocean resources to drive the development agenda outlined in the Zanzibar Development Vision 2050 (RGoZ, 2020). The RGoZ planned to coordinate and manage development of the ocean and its endowments for significant contribution to economic prosperity.

Government effort aimed at commercialization of fisheries in relaying much more on provision of education to the stakeholders, facilitating financial grants and guaranteeing market infrastructure. The decision based on Zanzibar's long-term strategic direction on the Blue Economy and provision of opportunities for tapping ocean-based wealth. The development plan places great attention to high quality and sustainable human development of Zanzibar's citizenry through sustainable development of her oceanic resources. For quite some time now, Zanzibar has relied mainly on coastal and maritime services since the country's economy has been dominated by tourism, small-scale fishing and maritime trade. Recognizing this potential, the RGoZ has embraced the Blue Economy as the framework for achieving Zanzibar's sustainable development. Zanzibar like other islands in the world, 25% of its population is employed in the marine sector, although the traditional methods are common employed in Zanzibar, fish processing and preserving activities take place in different areas in both Unguja and Pemba such as Mangapwani in Unguja.

The quantity of fish caught in 2019 was estimated to be 36,728 tons worth Tanzanian Shillings 196.65 billion or US\$ 83.7 million. This contributed 4.8% to GDP, representing a 0.4% decrease from 2018 (OCGS, 2019). Despite the amount of fish caught in Zanzibar, fisheries activities applied are unsatisfactory because they are facing multiple challenges including but not limited to climate change, local tools and equipment, overfishing and illegal fishing practices that threaten the sustainability of Zanzibar's fish resources to meet international standards. In this perspective, fish is often handled and processed in unhygienic conditions causing spoilage, contamination with disease causing germs and loss of income as fish attracts low prices. This explains why this study investigated fish processing and preserving for socio-economic development of Zanzibar.

Zanzibar, through her policies and strategies relating with investment Blue Economy, she directly encourages fish processing and preserving as a source of government revenue. She has a robust Zanzibar Blue Economy Policy 2020 and Zanzibar Development Vision 2050 through which she is promoting socio-economic development through better stewardship of the sea and related resources especially in fish processing and preserving activities. The Revolutionary Government of Zanzibar recognizes the role of the Blue Economy by providing an opportunity to enhance local community to invest in deep-sea fishing businesses as well as fish processing and preserving that provide a chance to promote a welfare society (RGoZ, 2020).

Zanzibar has liberalized her strategies to ensure that, fish processing and preserving are used as an opportunity to improve the economic footing of her people. This is effected through promotion of training on fishing activities, improvement of fishing



equipment as well as improving of fishing infrastructure. Hence, ensuring effective fish processing as to register socio-economic development of her citizens, (RGoZ 2020). Despite this effort taken by the Zanzibar Government to improve fish processing and preserving, nearly all fish caught in Zanzibar is consumed domestically due to unsatisfactory quality on the international fish market resulting from poor fishing methods, improper handling and poor storage and processing facilities (OCGS, 2019). These were some of the factors behind the choice for this area of study.

2.0 LITERATURE REVIEW

2.1 Fish Processing and Preservation

Fish processing is the process associated with fish and fish products between the time during which fish is caught or harvested and the time in which the final product is delivered to the customer (George, *et.al.*, 2014). Fish is one of the protein foods that need careful handling (Eyo, 2004). This is because fish gets spoiled easily after being captured due to the high tropical temperature that accelerates the activities of bacteria, enzymes and chemical oxidation of fat in the fish. The purpose of processing and preserving fish is to get fish to an ultimate consumer in good and usable condition.

The steps necessary to accomplish this begins before the fishing expedition starts and does not end until the fish is eaten or processed into oil, meal, or a feed (Karube *et.al.*, 2001). According to Murali (2017), drying has evolved as a traditional method of preserving fish, the action of the sun and wind is used to effect evaporative drying. In recent times, the controlled artificial dehydration of fish has been developed in some industrialized countries so that fish drying can be carried out regardless of weather conditions. In any process of drying, the removal of water requires an input of thermal energy.

Usman, *et.al.*, (2017), conducted a study on traditional fish processing methods among women in Lau Local Government Area of Taraba State, Nigeria. The study revealed that, traditional fish processing in the study area was mainly adopted by women whose family size and educational status had positive impact on the business. Smoke pollution, poor transportation network and seasonality of fish were the major problems confronting the respondents. The investigator recommended that, the Fisheries Unit of Agricultural Extension Agency and Research Institutes should device appropriate or improved methods of processing fish locally that will be less hazardous to health and environmentally suitable.

Sifuna *et.al.*, (2017), conducted a study on evaluation of Fish Processing and Preservation Systems along the Shores of Lake Victoria towards Enhancement of Sun Drying Technology in Kenya. The aim of the study was to identify and document existing fish processing and preservation technologies practised along Lake Victoria and their adaptability in order to improve food security and improve the socio economic of the Kenyans. The study observed easy technology to be utilized, the effectiveness of technology and the cost of producing and maintaining of the new technology.

2.2 Economic Development

The concept of economic development is complex and difficult to define in an inclusive manner. Initially, development has been defined in terms of Western style modernization achieved through economic growth (Redclift, 1987). From a Western perspective, economic development means modernization of economic systems through economic growth. Economic growth increases national productivity and per capital income and thus the standard of living of the population. Kularatne *et.al.*, (2022), conducted a study on Women contribution in small scale fisheries at Kalahagala fishing village District in Sri Lanka. The study revealed that, Fish selling, Dry fish production, repairing and maintaining the fishing gears are the main fishing activities that women performed. About 59% of women engaged in fish selling.

Furthermore, 50% of women produced dry fish in the village. The main contribution of women in fisheries is collective harvesting, selling, drying and fish processing which contributed about 35% share of households' income. In addition, about one to two Kilo grams of fish they used for subsistence purposes from the daily catch which was ensuring nutritional level of the family members. The main drawback for the fishing activities of women was monsoon rain which disturbed fishing in the reservoir.

Allou, (2012) conducted a study on technology Adoption and Economics of small-scale Fish processing in the Nzema East District of Ghana. The study revealed that, the smoked fish and salted sun-dried fish processing were profitable ventures in Nzema. The two products were also very efficient in the market operations, with smoked fish far more profitable than the salted sun-dried fish.



This study was conducted in North "B" District of Unguja- Zanzibar. It employed the quantitative research design. The study population was 81,675, equal to the total population of the District mentioned in the census of 2022. The population was 145 individuals who were purposively selected. This is a non-probability sampling process in which an individual in the sample is chosen without giving all members of the population an equal chance of being chosen (Kothari, 2004). Data was collected using questionnaires from 145 respondents. Quantitative analysis which included frequency distribution and percentages were used. Statistical Package for the Social Sciences (SPSS) version 21 was employed in the analysis.

3.0 FINDINGS AND DISCUSSION

3.1 Profile of the Respondents

The informants from who data for this study was gathered are presented in Table 1.

Table 1: Profile of the Respondents

Variable	Categories	Percentage (%)
Gender	Female	63%
	Male	27%
Age	18-29	26.6%
	30-49	51.3%
	50-69	21.3%
	Above 70	0.7%
Education	Informal education	14.6%
	Primary education	40%
	Secondary education	35.3%
	Higher education	10%
Experience	Below 5	28%
	6-10	22%
	16-20	20.6%
	More than 20	14.6%
	More than 30	14.6%

Source: Field Data, (2022)

The findings as indicated in Table 1 show that, females were (63%) compared to males who were (27%) respondents. This higher proportion is because of the fact that, currently, females are dominant in fishing and aquatic related activities compared to males who are practically seen involving themselves in other income generating activities. This implies that, gender balance was not given priority in preservation and processing of marine products including fish. Men were in most cases denied rights of representation and their needs are poorly addressed in this area. This in turn leads to poor men’s participation in preservation and processing of fishing resources. This implies that, they tend to be disadvantaged when decisions are made against their interest. The findings of this study tally with those of Rutasitara et.al., (2012) who argued that, gender dimensions reflect clear division of labor observed at the household level, as most parts of Africa females do most of the fishing activities such as selling fish, preserving and processing them, while males go out to search for other opportunities to improve household welfare.

The respondents in Table 1 were of different age groups, the study revealed that, (51.3%) respondents were from the age group between 30 and 49 years old, while those who were aged between 50 to 69 were (21.3%) those who were aged between 18 and 29 were (26.6%) and a respondent aged above 70 years old was (0.7%). It is clear here that, most of the most respondents were active and energetic since they were younger compared to the old respondents. To this effect, Rutasitara et.al., (2012) argue that, young age group is very active, aggressive and motivated by needs of their family and careering of their aged parents and grandparents. This implies that, an increase in Age increases people’s awareness and acceptance, mature people are assumed to have accumulated enough wealth and thus do not encroach the reserve for different motives. They also respect rules and regulation guiding preservation and processing of fish resources in improving socio-economic development. Similar finding



done by Kajembe et.al, (2012) in Handeni District reported that, elders are usually committed to preservation and they do insist on preservation rather than overexploitation of the resources.

The findings in Table 1 also indicated that, (40%) respondents had primary education, another (35.3%) respondents completed secondary education, (14.6 %) respondents had attained informal education and only (10%) of the respondents had higher education. Therefore, from this data, majority (40%) of respondents in this study were found to have primary education. These proportions reflect the general situation in the country where the majority of the rural populations have achieved primary education. This is because of the fact that, primary education in Tanzania is compulsory compared to other levels of education which are optional. This implies that, these respondents had wealth of knowledge on fish processing and preservation. Hence, they were able to provide views and information required on investigation of fish processing and preserving for socio-economic development.

The results in Table 1 present the responses on working experience of the respondents in this study, (28%) respondents had working experience in fish processing and preservation in a period below 5 years compared to those who had working experience for more than 30 years who were (14.6%). Another group was of (14.6%) respondents who had working experience of more than 20 years. While (22%) of the respondents had working experience between 6 to 10 years. Another group was of (20.6%) respondents whose working experience was between 16 to 20 years. This implies that, majority of the respondents (28%) had less than 5 years of working experiences in processing and preserving fish for socio-economic development. This was because of presence of limited knowledge and skills and inadequate modern facilities for quality storage and preservation. The fact that, most of the respondents have less working experience in the village for many years implies that, they had limited knowledge on fishing processing activities and related problems, as well as information on the benefits, weakness and challenges of FPP and strategies to be taken to reduce poor storage and facilities. On other hand, people who have working experience for a longer period of time accumulate experience on various problems associated with processing and preservation, as well as the need for restoration of the marine resources. Similar observations were reported by Nduwamungu, *et.al.*, (2011) who argued that, people who have extended working experience in an area are likely to provide relatively reliable historical data.

3.2 Contribution of fish processing and preserving activities for socio-economic development

With this objective, views on how fish processing and preservation activities contributed to socio-economic development of the people were sought and results are indicated in Table 2.

Table 2. Contribution of fish processing and preserving activities for socio-economic development

Variable	Categories	Percentage (%)
Improvement of employment opportunity	Strong Agreed	64.1%
	Agreed	17.2%
	Neutral	9.0%
	Disagreed	6.2%
	Strong Disagreed	3.4%
Improvement of living standards to local community	Strong Agreed	46.8%
	Agreed	18.6%
	Neutral	10.3%
	Disagreed	11.7%
	Strong Disagreed	12.4%
Increase income to local community	Strong Agreed	33.1%
	Agreed	26.2%
	Neutral	18.6%
	Disagreed	11.7%
	Strong Disagreed	10.3%

Source: Field data, (2022)



Table 2 summarized the results about whether fish processing and preservation improve employment opportunities. Table shows that (64.1%) strongly agreed, (17.2%) agreed, whereas (9.0%) were neutral. However, (6.2%) disagreed and the rest of respondents (3.4%) strongly disagreed. Therefore, these results clearly indicated that, local communities had strongly agreed that fish processing and preservation promote socio-economic development. Hence, leading to improved employment opportunities. This was because more than (64.1%) of the respondents in this study reported that, employment opportunities had increased specifically after the official introduction of Blue Economy policy in Zanzibar in 2020.

The improvement of employment opportunities was mainly associated with Village Blue Economy Resource Management Committee (VBERMC) members who seemed to have access to project resources such as fish processing and preservation in North “B” District of Unguja - Zanzibar. The improvement of employment opportunities could also be attributed to some household’s involvement in profitable Blue Economy -based income generating activities. Furthermore, this also could be attributed to the changes in activities that are necessary for living, perhaps the adoption of Blue Economy petty trading has been one of the most significant changes in livelihood in North “B” District of Unguja. Hence, this has resulted to improvement of employment opportunities to local community and stimulated socio-economic development to local communities including increased household incomes, increased assets, improved education and health status as well as improved standard of life.

Table 2 was intended to get the respondents’ views on whether the fish processing and preservation activities improve living standards to local communities in North “B” District of Unguja. The findings showed that, (46.8%) strongly agreed, (18.6%) agreed, (10.3%) were neutral. However, (11.7%) disagreed and the rest (12.4%) strongly disagreed with this argument. Therefore, these study results are clearly indicative of the fact that, fish processing and preservation activities contribute largely to the improvement of living standards of the local communities.

Table 2 also summarized the findings about whether fish processing and preservation activities contribute to the increased income of the local communities living in North “B” District of Unguja. The results showed that, (33.1%) strongly agreed, (26.2%) agreed, whereby (18.6%) were neutral. However, (11.7%) disagreed and the rest of respondents equal to (10.3%) strongly disagreed with the reason. Therefore, these study results clearly indicated that, fish processing and preservation activities contributed largely to the increased income of the local communities. These results tally with the findings of the study conducted by Musimenta,(2020) who researched on Blue Economy in Africa.

The increased income in the household economic condition was mainly associated with Village Resource Management Committee (VRMC) members who accessed project resources such as fish processing and preservation activities done in the villages from tax collection as well as some households’ involvement in profitable marine-based income generating activities and engagement in many legal marine activities.

3.3 Strategies set by government in promoting fish processing and preserving for socio-economic development

This objective aimed at soliciting views from respondents on the strategies set by government in promoting fish processing and preserving for socio-economic development of the people in the research unit. The findings are born in Table 3.

Table 3. strategies set by government in promoting fish processing and preserving for socio-economic development

Variable	Categories	Percentage
Strengthening of monitoring and evaluation strategies	Strong Agreed	44.8%
	Agreed	28.3%
	Neutral	15.3%
	Disagreed	6.9%
	Strong Disagreed	4.1%
Promoting of modern technology to local community	Strong Agreed	56.5%
	Agreed	35.1%
	Neutral	3.4%
	Disagreed	2,7%
	Strong Disagreed	2.1%



Improvement of training and education to local communities	Strong Agreed	42.8%
	Agreed	23.4%
	Neutral	14.5%
	Disagreed	12.4%
	Strong Disagreed	6.9%

Source: Field data, (2022)

Table 3 summarized the findings about the strategies set by government that had been expected to lead to socio-economic development in the area. These among others were monitoring and evaluation strategies thought of reducing the challenges faced by the local communities in their daily activities of fish processing and preservation in North “B” District of Unguja. The results showed that of all the respondents, (44.8%) strongly agreed, (28.3%) agreed, whereby (15.9%) were neutral. However, (6.9%) disagreed and only (4.1%) strongly disagreed with the reason. Therefore, these results clearly indicated that, in order to reduce the challenges faced by the local communities in fish processing and preservation activities, the government ought to establish and reinforce frequent monitoring and evaluation systems in the areas since more than (44.8%) of the total respondents in this study strongly agreed with those strategies.

These findings showed that, M&E processes provide the essential information needed to see the big picture of the activities adopted. This implies that, after activities wrap up, an organization with good M&E can identify mistakes, successes and things that can be adapted and replicated for future activities. Therefore, in order to have quality marine products, local communities dealing with fish processing and preservation need to be monitored frequently and evaluated regularly in order to improve their storage facilities and processing. Thus, leading to market competitiveness.

Also, Table 3 summarized the findings about whether the use of modern technology in fish processing and preservation activities may improve socio-economic condition and development of the local communities in North “B” District of Unguja. The results showed that, (56.5%) strongly agreed, (35.1%) agreed, whereby (3.4%) were neutral. However, only (2.7%) disagreed and the rest (2.1%) strongly disagreed with those strategies. Therefore, these study results clearly indicated that, in order to reduce the challenges facing local communities in fish processing and preservation activities, the government needs to invest in the use of modern and advanced technology such as modern storage facilities for the quality products that will meet international market standards. The results suggest that, by providing new technology and equipment, the value chain to fish processing and preserving activities may increase.

In the same perspective, Rahma, *et.al.*, (2020), argue that poor quality fishing and aquaculture sector are due to the shortage of suitable infrastructure and modern equipment to local communities. This implies that, most of fish caught was of poor quality, failing to meet international export standards due to inefficient fishing methods, improper handling and poor storage and processing facilities. The finding also match with Heise’s *et.al.*, (2018) assertion that, most of the marine products were held back by infrastructural constraints, including the use of inefficient local technology and an absence of storage facilities to facilitate the process of sun-drying seaweed regardless of the weather. Therefore, the government needs to invest in the use of advanced or modern tools if quality production would be maintained.

The same Table 3 summarized the findings about whether the provision of training and education to local communities may improve their fish processing and preservation activities and hence resulting into improved socio-economic condition and development. The results showed that, of all the respondents, (42.8%) strongly agreed, (23.4%) agreed, whereby (14.5%) were neutral. However, (12.4%) disagreed and only (6.9%) strongly disagreed with these strategies. Therefore, these study results clearly indicated that, in order to reduce the challenges facing local communities particularly in fish processing and preservation activities, government needs to plan, develop and provide sufficient education, training and knowledge on proper fish processing and quality storage of fish to local communities. The results suggest that, by doing that, the value chain to fish processing and preserving activities to local communities will increase and meet international market standards for quality production.



These results tally with the finding of the study by Nuru *et.al.*, (2018), which revealed that, in order to achieve sound fish processing and preservation activities, local communities should be empowered through provision of awareness and knowledge on marine resources.

4.0 CONCLUSION

Basing on the literature reviewed and the foregoing analysis, it is concluded that, fish processing and preservation activities were so beneficial in the life span of the local communities living in North “B” District of Unguja. Fish processing and preservation activities contributed immensely to the employment opportunities, improvement of living standards and increased income and assets in some household. This presupposes that, the strategies set by the government which among others included the strengthening of monitoring and evaluation strategies, promotion of modern technology to local communities, improvement of training and education to local communities in the research unit.

5.0 RECOMMENDATIONS

The study recommended the government to increase more fish processing and preservation activities in order to increase social economic development. Also the study recommended that, modern technology, monitoring and evaluation; training local communities should be enhanced.

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