

Adding Value to Fish A Potential Livelihood Option for Rural Women of Odisha

Success Story of Women SHGs

Tanuja S.

Charles Jeeva J.

Ellojita Rout



भा.कृ.अनु.प - केन्द्रीय कृषिरत महिला संस्थान, भुवनेश्वर

ICAR - CENTRAL INSTITUTE FOR WOMEN IN AGRICULTURE

Bhubaneswar - 751003, Odisha



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भारतीय कृषि अनुसंधान परिषद्

Indian Council of Agricultural Research

Plot No. 50-51, Mouza - Jokalandi, Post - Baramunda

Bhubaneswar - 751003, Odisha



Adding Value to Fish : a Potential Livelihood Option for Rural Women of Odisha

Success Story of Women SHGs

(Technical Bulletin prepared based on the work done under the DSIR A2K+TPUPW funded project on 'Adding Value to Fish: a Potential Livelihood Option for Rural Women of Odisha')

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Compiled and Edited by

Dr. Tanuja S.

Dr. J. Charles Jeeva

Mrs. Ellojita Rout

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ICAR- Central Institute for Women in Agriculture

Plot No.50-51, Mouza-Jokalandi

Post-Baramunda, Bhubaneswar – 751 003, Odisha, India

Phone : 0674-2387220; Fax : 0674-2387242

E-mail : director.ciwa@icar.gov.in

Web : <http://www.icar-ciwa.org.in>

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Foreword

A project on “Adding Value to Fish: a Potential Livelihood option for Rural Women of Odisha” was implemented in ICAR-CIWA with the funding support of Department of Scientific and Industrial Research, New Delhi during the period 2018-2020. In an Indian fisher’s family, the responsibility of household management of food, childcare, education, health, sanitation and financial management generally rests on the women’s shoulders. They share their family’s financial burden by indulging in shore based activities. Throughout the world, women’s most prominent role in small-scale and industrial fisheries is in post-harvest processing and marketing. But, fisherwomen remain unaware of the changing consumer needs and advanced technologies for post harvest processing and value addition. Value addition of food could also play a major role in employment generation, entrepreneur ventures and boosting exports from a country.

In this context, the project started off with the objectives; to build the capacity of fisherwomen of Puri district of Odisha in the preparation of value added products and by products from fish and fish wastes; to enhance entrepreneurial skills of the fisherwomen in managing their business and to assess the consumer preference of value added fish products and byproducts and development of innovative products based on consumer preference.

Since its inception, ICAR-CIWA has been undertaking research on issues concerning women in agriculture. It has focused on participatory action research in different technology based thematic areas to test suitability of homestead and farm technologies, including fisheries technologies for women, and suggest measures to make these women friendly. The study conducted by ICAR-CIWA shows that 90-95 percent of coastal fisherwomen of Odisha are active dry fish producers and vendors and this contributes around Rs. 20,000/- to their family’s annual income. Women also form about 90 percent of the labour force in seafood processing industry, but the wages paid to them is almost 30 percent less than that paid to men. Moreover, they have to stay away from their homes for longer periods, which makes it more difficult for them to fulfill their domestic roles and they experience poorer working conditions. Hence, it is important to provide alternate as well as additional livelihood options for the fisherwomen which will make a positive impact on their earnings and quality of life.

The project, apart from skill upgradation through capacity building programmes, also facilitated market linkage for the interested women SHG groups for setting up the enterprises. The overall empowerment of the women through development of skill, knowledge and attitude will motivate them to sustain their activities. I appreciate the efforts of the Project Team for the successful implementation and compilation of the project findings to bring out Technical Bulletin, which will be an useful reference material to various stakeholders in bringing forth rural women entrepreneurship.

S.K. Srivastava
Director

Preface

A gender perspective on post harvest fisheries is important because women are often the primary work force in off-shore activities. Women's participation and capacity building is to be facilitated with the understanding of the community. Understanding gender roles can be valuable in planning interventions and policy advocacies. The importance of fish in the diet of Indian population is on the rise and there has been a shift in consumer's demand towards convenience foods like ready-to-eat products. To tap this opportunity, it is necessary to build the capacity of fisherwomen by updating them with the latest technologies in value addition. This will help to boost their confidence to widen their arena of fish processing activities thereby improving their chances of earning a much better income.

In this background, the project funded by Department of Scientific and Industrial Research (DSIR) viz., "Adding Value to Fish: a Potential Livelihood option for Rural Women of Odisha" was implemented at ICAR-Central Institute for Women in Agriculture, Bhubaneswar during the period 2018-20, with the objectives to build the capacity of fisherwomen of Puri district of Odisha in the preparation of value added products and by products from fish and fish wastes; to enhance entrepreneurial skills of the fisherwomen in managing their business, and to assess the consumer preference of value added fish products and byproducts and development of innovative products based on consumer preference.

The fisherwomen were imparted training on the preparation of these value added fish products in ICAR-Central Institute for Women in Agriculture. Beneficiaries were also trained on the importance of attractive packaging and labeling of their produce, entrepreneurship development, management, branding & marketing, group dynamics and book keeping. They have ventured into online marketing taking into consideration the pandemic situation. The next step will be opening a website and trademark registration of the products under the trade name "Fishlikes". Through the skill and knowledge upgradation, the project motivated fisherwomen enough to initiate small scale enterprises to further enhance their quality of living through increased income.

This technical bulletin is the output of the Project. We are highly indebted to DSIR for sponsoring this project. Further, we express our sincere gratitude to the Director, ICAR-CIWA for necessary guidance and support in implementing the programme and for bringing out this Bulletin. Thanks are also due to the project beneficiaries for extending necessary cooperation in implementing the project activities. Our thanks are also due to the administrative and accounts staff of ICAR-CIWA, without whose cooperation, this endeavour would not have been a success.

Project Team

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The authors place on record their gratitude to Department of Scientific and Industrial Research (DSIR), New Delhi for the financial support granted for conducting this study and Director, ICAR-CIWA for providing all necessary facilities.

Thanks are also due to all the rural women SHG members of this project locale, for their participation and extending necessary cooperation in implementing the project activities.

Our thanks are also due to the administrative and accounts staff of ICAR-CIWA, without whose cooperation, this endeavour would not have been a success.

Summary

Throughout the world, the main work sphere of women in fisheries is in processing and marketing. The major processing activity undertaken by women is fish drying/curing. The traditional methods of fish drying is undertaken in an unhygienic way, exposed to the sun, pests, microbes, animals and other impurities. In recent years, the popularity of fish products in the diet has increased due to the international recommendation to lower the total level of dietary fat. Also with the economic growth, changes in tastes and preferences and urbanization has resulted in changing consumption pattern away from traditional food commodities to processed and high value commodities.

Fisherwomen remain unaware of the changing consumer needs and advanced technologies. Value addition of food also plays a major role in employment generation, entrepreneur ventures and boosting exports from a country. Hence it is important to provide alternate as well as additional livelihood options for the fisherwomen which will make a positive impact on their earnings and quality of life. In this context, the DSIR funded project on “Adding Value to Fish: a Potential Livelihood Option for Rural Women of Odisha” started off with the objectives; to build the capacity of fisherwomen of Puri district of Odisha in the preparation of value added products and by products from fish and fish wastes; to enhance entrepreneurial skills of the fisherwomen in managing their business and to assess the consumer preference of value added fish products and byproducts and development of innovative products based on consumer preference.

Skill upgradation trainings were given to the beneficiaries of the project on the aspects of hygienic handling of fish, solar drying of fish, and value added products preparation. The fisherwomen were imparted training on the preparation of these value added fish products in ICAR-Central Institute for Women in Agriculture. Beneficiaries were also trained on the importance of attractive packaging and labeling of their produce, entrepreneurship development, management, branding & marketing, group dynamics and book keeping. Forty master trainers were selected from the 17 SHGs who further carried on the training activities in the respective villages. Facilitation of marketing of the products was done through



experimental display of the products in fish melas or exhibitions. This could help to popularize the products and also in assessing the viability of the value added fish products enterprise. Women SHGs were exposed to bankable project proposal preparation and were sensitized about the different schemes facilitating enterprise development by women. Consumer preference for the value added fish products like hygienic dry fish, fish cutlet, fish momos, fish pickle, fish papad and prawn chutney powder was studied by conducting a survey of 150 consumers in the peri-urban areas of Bhubaneswar. Innovative value added products from fish/shell fish were prepared, taking into account the consumer preferences. Quality analysis of the prepared products was done to estimate the shelf life and nutritional quality of the products.

The popularization of the attractively packed value added fish products prepared by the SHGs has been done through participation and display of the products in fairs and exhibitions. Linkage with Odisha Fisheries Cooperative Corporation (FISHFED) and Falcon Fresh for marketing of value added fish products was initiated. A group of 12 women have started the enterprise after obtaining the FSSAI license and selection of site of manufacture. Taking cue from the modern marketing methods, they have ventured into online marketing after applying for a trade license. Through the skill and knowledge upgradation, the project motivated fisherwomen enough to initiate small scale enterprises to further enhance their quality of living through increased income.

Current Scenario, Challenges and Scope for Women in Post Harvest Fisheries



1. Current Scenario, Challenges and Scope for Women in Post Harvest Fisheries

Fisheries has been playing a pivotal role in the economic development of India on account of its potential contribution to employment generation, income enhancement, food and nutritional security and foreign exchange earnings. In an Indian fisher's family, the responsibility of household management of food, childcare, education, health, sanitation and financial management generally rests on the women's shoulders. They share their family's financial burden by indulging in shore based activities. Throughout the world, women's most prominent role in small-scale and industrial fisheries is in post-harvest, processing and marketing. The women of coastal States of India, except West Bengal are involved in net mending, prawn peeling, fish curing, drying and trading, value addition etc. A study conducted by ICAR-CIWA shows that 90-95% of coastal fisherwomen of Odisha are active dry fish producers and vendors and this contributes around Rs. 20,000/- to their family's annual income. Women also form about 90% of the labour force in seafood processing industry but the wages paid to them is almost 30% less than that paid to men. Moreover, they have to stay away from their homes for longer periods, which makes it more difficult for them to fulfill their domestic roles and they experience poorer working conditions. Hence, it is important to provide alternate as well as additional livelihood options for the fisherwomen which will make a positive impact on their earnings and quality of life.

Odisha is one among the nine maritime States of India with a total fish production of around 6.1 lakh tonnes. The fisher community is engulfed in the vicious circle of poverty and gender biasness. They are refrained from moving a step towards their economic and social empowerment by their lack of access to up-to-date technologies. This situation is even more conspicuous among the fisherwomen of Odisha, among whom the concept of value addition is limited to the traditional beach drying of fishes. In Odisha, around 35,000 tonnes of fish is marketed in dried form annually. The Twenty-sixth Session of the FAO Committee on Fisheries (COFI), held in Rome from 7 to 11 March 2005, noted a range of issues that should be addressed so that small-scale fisheries can make a greater contribution to rural development, sustainable livelihoods, poverty alleviation and food security. The issues noted and that need to be addressed were the lack of rural infrastructure and services, access to credit and microfinance services as well as the reduction of post-harvest losses, better access to markets and adding value to fish and fish products through improved practices in the field of fish handling, preservation, processing and marketing. According to the U.N.'s Food and Agriculture



Organization (FAO), women make up one in two seafood workers worldwide. As a general rule, women dominate post-harvest activities such as processing and marketing fish. All through the world, several initiatives have been taken up to empower fisherwomen economically and socially by improving their skill and knowledge for taking up alternate livelihood options. In West African fishing villages, a modern drying technology pioneered by FAO is helping to reduce health hazards among women, improve food safety and quality, improve working conditions and cut down food losses. In Africa, women groups in Tana River County was reported to be reaping enormous benefits from improved fish drying technology provided by Kenya Marine and Fisheries Research Institute (KMFRI), funded by the European Union (EU) through SECUREFISH project. The project aimed at achieving the UN Millennium Development Goals by eradicating hunger and poverty through reduction of post-harvest losses in the fisheries sector. Although significant, these kind of interventions are very limited in number across the world. Even though there is no dearth of technologies in the post harvest fisheries sector, the proportion of it reaching the fisherwomen around the world is very meager.

In recent years, the popularity of fish products in the diet has increased due to the international recommendation to lower the total level of dietary fat (Akter *et al.*, 2013). Also with the economic growth, changes in tastes and preferences and urbanization has resulted in changing consumption pattern away from traditional food commodities to processed and high value commodities (Murthy, 2000). Nowadays “hygiene” and “value addition” are two terms which are increasingly becoming popular with the rising urbanization and globalization which are deciding the market price and acceptability of the product. These are two important components of ‘quality control’. Value addition of food also plays a major role in employment generation, entrepreneur ventures and boosting exports from a country. Value addition in fish could range from a simple display of hygienically dressed and iced fish which lures the customers to preparation of dry fish, mince based ready-to-cook or ready-to-eat products or byproducts like fish silage. The annual per capita consumption of fish in Odisha is 13.49 kg which is much higher than the national average of 5.1 kg. A report by Sabat *et al.* (2008) suggests that around 41% respondents in a consumer preference survey in northern Indian States suggested that they are willing to pay upto 20% extra for value added products from fish. But fisherwomen remain unaware of these changing consumer needs and advanced technologies. One of the effective means to bring the fisherwomen to the mainstream is to equip them with formal training in advanced processing techniques, marketing and development of entrepreneurial skills.



Challenges and the Opportunities that the Project has aimed to Address

- Throughout the world, women's most prominent role in small-scale and industrial fisheries is in post-harvest, processing and marketing.
- About 90% of coastal fisherwomen of Odisha are active dry fish producers and vendors and this contributes sizeably to their family's annual income.
- Women also form about 90% of the labour force in seafood processing industry but the wages paid to them is almost 30% less than that paid to men. Moreover they have to stay away from their homes for longer periods, which makes it more difficult for them to fulfill their domestic roles and they experience poorer working conditions.
- Nowadays, the consumer demand is shifting towards ready to cook or ready to eat products. Fisherwomen should be equipped to tap these opportunities.
- Fisherwomen remain unaware of the changing consumer needs and advanced technologies.
- Value addition of food also plays a major role in employment generation, entrepreneur ventures and boosting exports from a country.
- Hence it is important to provide alternate as well as additional livelihood options for the fisherwomen which will make a positive impact on their earnings and quality of life.

**Gender I nclusive
I nnovative Approaches
for Entrepreneurship
Development**

2. Gender Inclusive Innovative Approaches for Entrepreneurship Development

Value added products meet changing consumer life-style requirements. It offers better utilization of different low value fishes as well as by-catches. In general, returns out of value added products are always greater than fresh fish/ shell fishes. There is an increasing trend in the utilization of value-added fish products as evidenced by their availability in modern super markets as well as malls which are becoming popular. It is a production and marketing strategy driven by consumer needs and perceptions. Empowerment of fisherwomen and formation of self help groups also have led to the increased small scale level production of value added items in recent times. As per the study conducted by MS Swaminathan Research Foundation, production of fish value added items have been helping in livelihood enhancement of fisherwomen of Nagapattinam District in Tamil Nadu, India (Selvaganapathy and Krishnan, 2015). Among fisherwomen of Kerala, value added fish producers were found better empowered (46.78%), followed by retailers (45.09%), vendors (43.92%) and dry fish makers (43.42%) (Salim and Geetha, 2013). The present project, through the skill and knowledge upgradation of fisherwomen envisaged to motivate fisherwomen enough to initiate small scale enterprises to further enhance their quality of living through increased income.

Odisha is a maritime State along the East Coast of India that has the total population of 4.2 crores among which about 0.793% of the total population are fishermen. The total number of marine villages and inland villages in Odisha are 589 and 3289 respectively. The total number of fishermen population of the State is just over 1 million. It has a coastline of 480 kms, of which Puri has the highest stretch of coastline i.e. 150.4 kms. The state of Odisha has favourable condition for inland fishing, brackish water fishing and marine fishing. The district Puri has a physical expansion of nearly 150 kms from Astaranga in the Northeast to Krushnaprasad in Southwest and around 45 kms from Pipili in the North to Puri in the South.

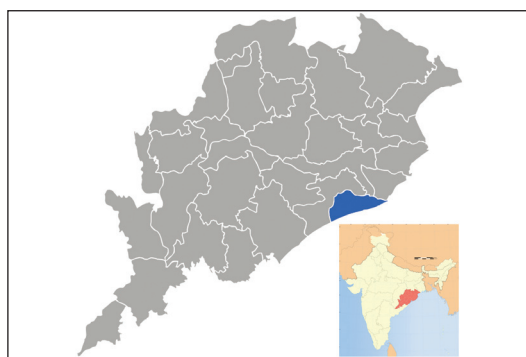


Fig.1. Map of Odisha

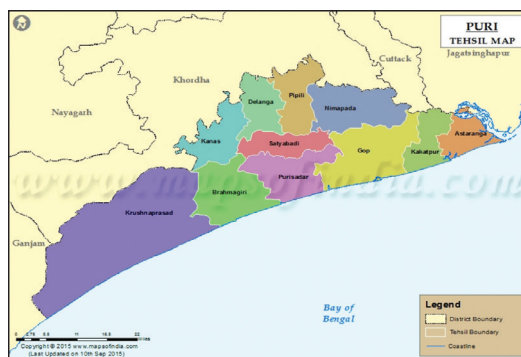


Fig.2. Tehsils of Puri district



The marine fishing villages in Puri are covered by 4 blocks i.e. Astaranga, Krushnaprasad, Puri Sadar and Gop. Astaranga has the maximum number of fishing villages i.e. 6, followed by Krushnaprasad (6), Puri Sadar (3) and Gop (2). In respect of fishermen population, 56% was in Puri (Sadar) block followed by 30% in Astaranga, 11 % in Krushnaprasad and 3% in Gop. The average family size in all the blocks was found to be 6. The number of persons per fishing village was highest in Puri (Sadar) block (3,844) and least in Gop block (351).

In this context, the DSIR funded project on “Adding Value to Fish: a Potential Livelihood Option for Rural Women of Odisha” started off with the objectives;

- To build the capacity of fisherwomen of Puri district of Odisha in the preparation of value added products and by products from fish and fish wastes
- To enhance entrepreneurial skills of the fisherwomen in managing their business
- To assess the consumer preference of value added fish products and byproducts and development of innovative products based on consumer preferences.

Two coastal blocks viz., Puri Sadar and Astaranga were selected for implementation of the project. The primary data were collected through focussed group discussions, stakeholder meetings and in-depth household surveys using semi-structured interview schedules. Twenty Women SHG groups from three villages Kanamana and Balidia from Astaranga and Pentakota village from Puri Sadar were selected as beneficiaries. Among the 17 SHGs, 5 were in Pentakota, Puri, 5 were in Kanamana, Astaranga and 7 were in Balidia, Astaranga. The questionnaire covered the;

- Demographic profile like, age, caste, family size, education.
- Socioeconomic information like annual income, standard of living, ownership of fishing gear and crafts etc.
- Social mobility, daily routine of fisherwomen.
- Role of women in fish processing- experience in fish processing, the activities in fish processing carried out by fisherwomen alone and in combination with their spouses, time spent in fish processing, women’s needs in fish processing, access to resources by women, decision making by women, knowledge on scientific fish curing etc.

The perceived needs were assessed on a three-point continuum viz., less important, important and most important. Simple statistical tools such as frequencies, percentages, mean and class intervals were used to express the results.



Major Activities Undertaken

- Baseline survey of selected villages of Puri District of Odisha was carried out to document the existing practices in fisheries post harvest processing. A total of 200 women from identified villages were selected based on their socio economic status, level of participation in fish processing, motivation and willingness to adopt new processing technologies. For primary data, semi-structured interview schedule, group discussion and meetings were conducted. Information for secondary data was collected from state fisheries departments, block office, village panchayats, etc. Average and percentage analysis were used to examine the different variables pertaining to the respondents of the survey.
- Skill upgradation training were given to the beneficiaries of the project on the aspects of:
 - Hygienic handling of fish: Hygienic handling helped prevent the post harvest losses and also protected the fisherwomen from contracting microbes from contaminated fishes.
 - Solar drying of fish: Demonstrations were done on the methods of hygienic salting and drying in the solar dryer or raised platforms, racks and mechanical solar dryers.
 - Value added products preparation: Several value added products like fish cutlets, fish balls, fish papad, fish silage etc could be prepared from low value fishes. The fisherwomen were imparted training on the preparation of these value added fish products in ICAR-Central Institute for Women in Agriculture (ICAR-CIWA), Bhubaneswar.
 - Beneficiaries were also trained on the importance of attractive packaging and labeling of their produce.
 - Beneficiaries were trained in entrepreneurship development, management, branding & marketing, group dynamics and book keeping by faculties from organizations which provide such capacity building programmes.
- Facilitation of marketing of the products was done through experimental display of the products in fish *melas* or exhibitions. Women SHG's were trained in preparing bankable project proposals and sensitized about various governmental schemes available for women entrepreneurs. They were facilitated for obtaining FSSAI licence to ensure the marketability of the products.



- Consumer preference for the value added fish products like hygienic dry fish, fish cutlet, fish momos, fish pickle, fish papad and prawn chutney powder was studied by conducting a survey of 150 consumers in the peri-urban areas of Bhubaneswar. The questionnaire covered the species preference for fresh and dried fish, frequency of consumption of fish and value added products, form in which consumed, ability of consumer to assess the quality of fish, perception towards health benefits of fish, important attributes of value added products, willingness to pay for value added products etc.
- Preparation of innovative value added fish products from fish/shell fish taking into account the consumers suggestions: Since the taste preference of consumers vary with regions, innovative products were prepared based on the consumers' suggestions. Quality analysis of the prepared products was done to estimate the shelf life and nutritional quality of the products. Shelf life was estimated using the quality indices like pH, Total Volatile Base Nitrogen, Trimethylamine, Peroxide Value, Thiobarbituric Acid Reactive substances microbial sensory analysis.
- Forty trainers were selected from the identified SHGs to act as resource persons to impart the trainings in rural areas.
- A commodity interest group involving 15 women has been formed in the Karamana village, Astaranga for taking forward the rural entrepreneurship development activities and to act as focal point for future discussions and training.

**Producer to Consumer :
Needs, Perceptions,
Attitudes and Interventions**

3. Producer to Consumer : Needs, Perceptions, Attitudes and Interventions

Kanamana is a medium size village located in Astaranga Block of Puri district, Odisha with total 102 families residing. The village has a population of 446 of which 232 are males while 214 are females as per Population Census 2011. The population of children with age 0-6 is 36 which makes up 8.07% of total population of the village. Sex Ratio is 922 which is lower than Odisha State average of 979. Kanamana village has higher literacy rate compared to Odisha. In 2011, literacy rate of this village was 86.10% compared to 72.87% of Odisha. The male literacy stands at 93.43% while female literacy rate was 78.17%. Most of the villagers are from Scheduled Caste (SC), which constitutes 44.39% while Schedule Tribes (ST) were 0.22% of total population.

Balidia village comes under Nagar Panchayat of Astaranga block, Puri district. Nagar is a large village located in Astaranga Block of Puri district, Odisha with total 993 families residing. The Nagar village has population of 4510 of which 2378 are males while 2132 are females as per Population Census 2011. Average Sex Ratio is 897 which is lower than the state average of 979. The village has higher literacy rate compared to State. In 2011, literacy rate was 82.03% compared to 72.87% of Odisha. Male literacy stands at 90.10% while female literacy rate was 73.06%. Most of the villagers are from Scheduled Caste (SC), which constitutes 90.13% of total population and the village currently doesn't have any Scheduled Tribe (ST) population.

All the marine fishermen of Puri Sadar are mainly composed of migrant population of Telugu people. In the southern coastal districts of Puri, the fishermen migrated from 50 coastal villages of Ganjam district of Odisha and Srikakulam district of Andhra Pradesh and are mainly settled in Pentakota, Bali Nolia Sahi of Puri municipality, Chandrabhaga Nolia Sahi of Konark municipality and Arkhakur of Chilka lake area.

All the women involved in dry fish production from the village Pentakota, Puri belonged to the OBC category. All the women involved in fish processing from Balidia village, Astaranga belonged to the SC category. About 57% of women beneficiaries selected from Kanamana Village, Astaranga belonged to the SC category and the rest 43% belonged to the OBC category. Majority of the fisherwomen involved in the dry fish production and trade were middle-aged (78%) and the rest belonged to the age group of 60 and above. They had more than 10 years (10-25 years) of experience in dry fish production and handling, with high social participation through self help groups (SHGs) and moderate decision making power in family and their trade.



Majority of the fisherwomen (90%) of Pentakota spent 225-250 days in dry fish production process, based on the seasonal availability of fishes. The women of Kanamana and Astaranga villages are involved in drying for a period of 4-5 months from November-March. Mainly low to medium valued fishes were used for fish drying, targeting the consumers' preference in the local areas and nearby urban peripheries. Anchovies, sciaenids, mackerel, catfish, ribbonfish, hilsa and seabass were the major species used for dry fish production in Pentakota, Puri as it is close to the marine landing centre. In Balidia village, the women undertake the drying of *Hilsa ilisha* (ilishi) as it fetches a higher price. The other fishes cured are sardine, anchovy, mullet etc.

In Kanamana and Balidia, they are into drying of brackishwater shrimp which cannot be seen in Pentakota. The primary occupation of 65% women in Pentakota is fish drying (100%) and the rest is involved in fish vending. During the glut period, a maximum of 500kg of fish is being dried in a season. Women in Balidia and Kanamana village help their counterparts in shrimp farming as the area is abundant in brackishwater resources suitable for fish farming. The annual income of majority (82%) of the fisherwomen of Pentakota was more than Rs. 30,000/-. But the dry fish producers of Astaranga responded (72%) that they get an average of Rs.1,000-2,000/- per month which goes upto Rs. 5,000-10,000 in peak season depending on species availability.

More than 50% of the women in Puri were involved in fish collection/procurement of fish. But 100% of the beneficiaries of Astaranga are dependent on their counterparts for procurement of fish. In all the villages selected, only women are involved in the grading, salting and drying of fish. None of the beneficiaries use hygienic drying practices. They dry the fish in the open on coir mats or tarpaulin sheets. The salting is not done scientifically. Excess salt, that too of inferior quality is used for salting.

Knowledge Level

The standard protocol for salting is ratio of fish:salt of 1:3 for large fish, 1:6 for medium fish and 1:8 for small fish. But the amount of salt used is around 250gm per kg of fish, irrespective of the size of the fish. The fish is salted for 2 days and dried upto 50% moisture content. The recommended level of moisture in dried fish is 25-30% to preserve it for a longer time from bacterial spoilage. Since the moisture level maintained is about 50% in traditionally dried fishes, the shelf life of the salted and dried fish is limited to 15 days. The dried fish are packed in jute bags or in bamboo baskets till marketed. A knowledge, attitude and skill test was conducted to assess the extent of awareness of dryfish producers on the scientific dry curing of fish (Table 1)

Table 1: Knowledge level of fisherwomen on scientific curing of fish, before and after the project interventions

Steps in scientific dry curing of fish	Knowledge level of producers before the commencement of project (%) (n=200)	Knowledge level of producers after capacity building on scientific curing of fish (%) (n=200)
Washing and grading of fish	75	100
Gutting and cleaning	60	75
Amount of salt	20	60
Quality of salt	20	55
Method of salting	25	80
Duration of salting	50	70
Knowledge on improved drying methods	30	40
Knowhow on quality parameters of dry fish	10	40
Packaging	12	50
Maintenance of hygiene	20	70

Constraints in Fish Curing Processes

The constraints identified were; low shelf life of dried fish (10-15 days); lack of knowledge on scientific curing and hygienic drying practices; lack of knowledge on improved packaging; lack of market linkage for value added fish products and hygienically dried fishes and lack of knowledge on government programmes and schemes for women empowerment in fisheries.

Perceived Needs

All the women responded that credit is their most important need (Fig 3). More than 90% women responded that safeguard against unfair trading practices is most important for them to remain in the profession. Training in fish processing and value addition and access to extension services were considered to be most important need by 90% women. All the women responded that site management is the least important need for them and 90% of them felt property right is less important for them to carry out the drying activities. More than half of the women said that in order to take up hygienic drying practices, assurance on marketing is the most important thing.

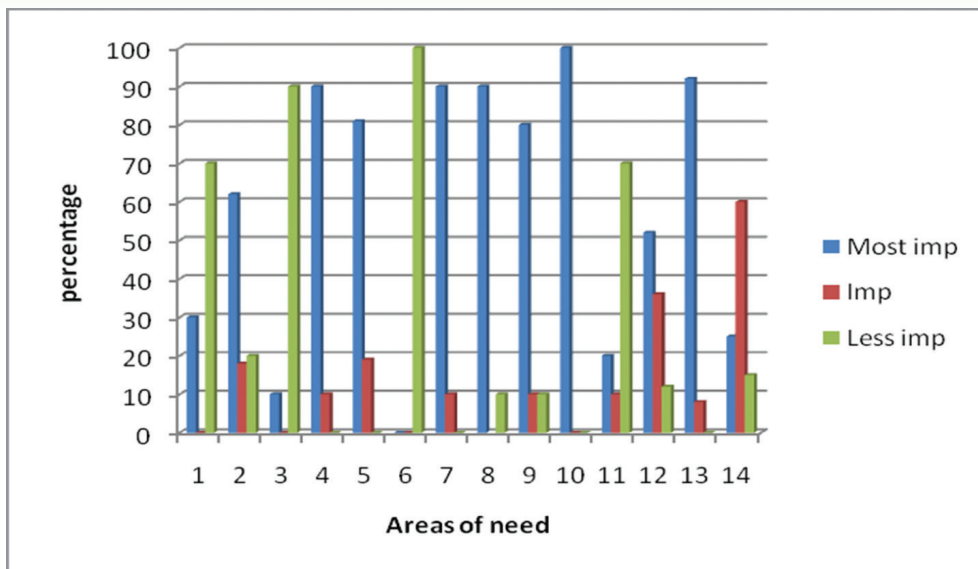


Fig.3: Perceived occupational needs of fisherwomen

1. Social support, 2. Support from counterpart, 3. Property right, 4. Timely availability of fish, 5. Quality of fish, 6. Site management, 7. Training in fish processing and value addition, 8. Access to extension services, 9. Exposure visits, 10. Credit, 11. Marketing, 12. marketing of hygienic produce, 13. Safeguard against unfair transactions, 14. Packaging and transport

Access to Resources by Women

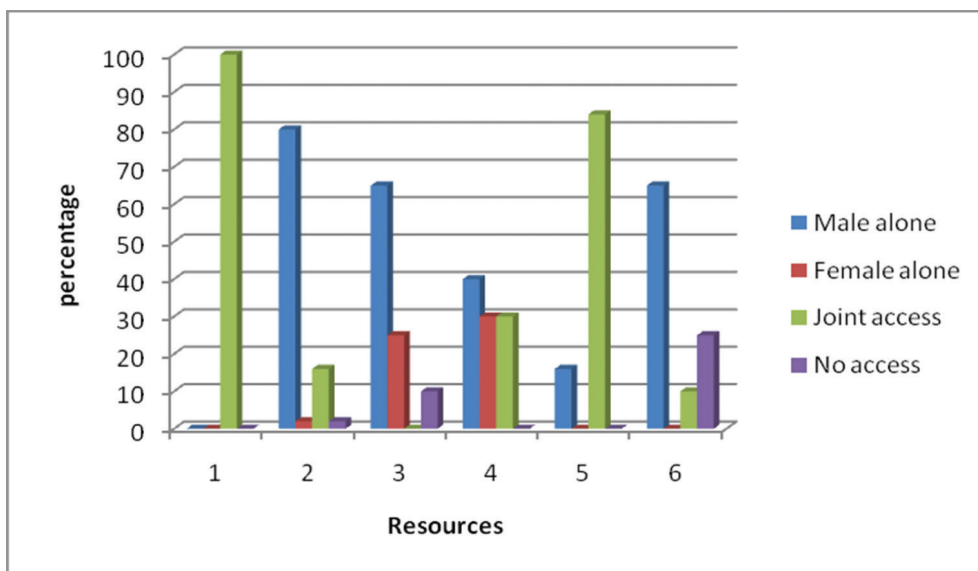


Fig 4 : Access to resources by women

1. Water, 2. Raw materials 3. Institutional credit, 4. Non institutional credit, 5. Market, 6. Extension services

Fig. 4 depicts the access to resources by women. Access to water was 100% for both men and women. Sixty five percent of women responded that men only have access to institutional credit and 10% were of the opinion that they don't have any access to institutional credit. Access to non institutional credit was better for women (30%) mainly because they were organised into Self Help Groups. As per their response, women have been kept at distance from the reach of extension services. Sixty five percent of women responded that only men have access to extension services and 25% responded that both men and women were deprived of the extension services.

Decision Making

Decision on drying, packing, accounting and book keeping are taken entirely by women (100%). Seventy five percent of the women responded that joint decision making is done in the aspects of marketing and fish procurement. But in the case of availing institutional credit, decision making was said to be taken mainly by the male counterparts (65%).

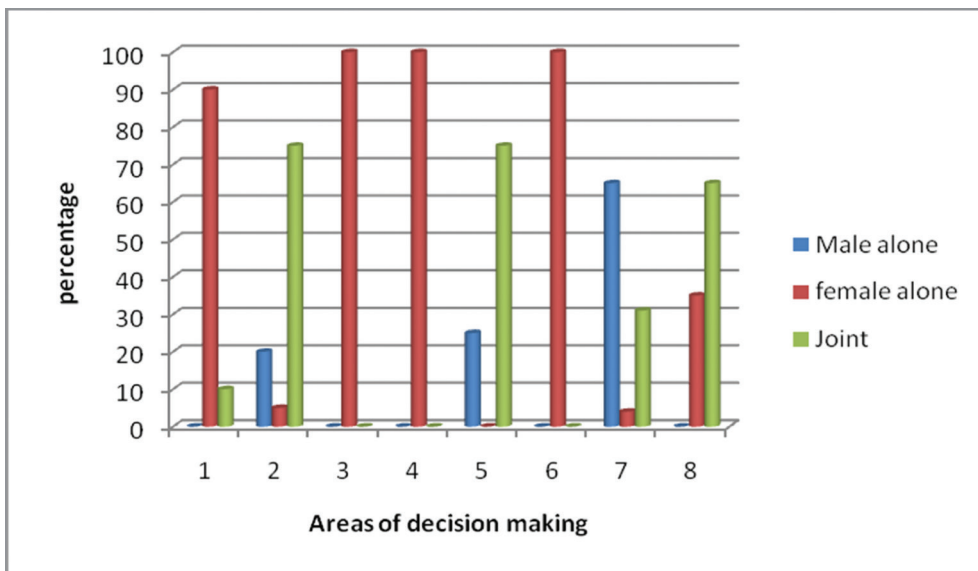


Fig 5: Decision making by women

1.Site selection, 2. Fish procurement 3. Drying, 4.Packaging, 5. Marketing, 6. Accounting and record keeping, 7. Institutional credit, 8.. Non institutional credit

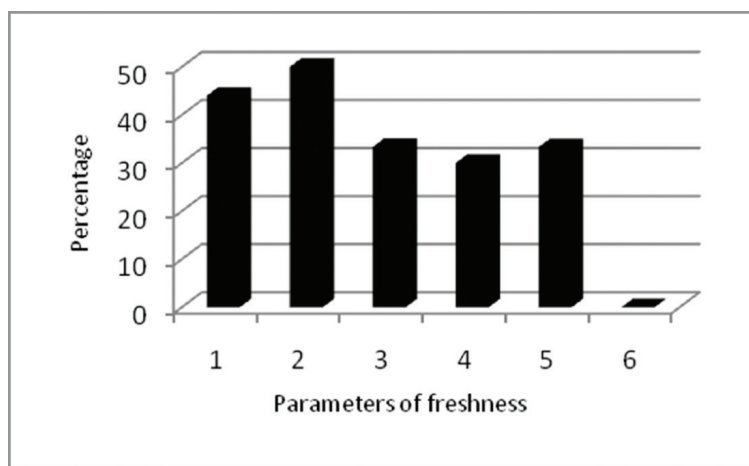
Marketing

The marketing of the dryfish is done through traders who collect the dryfish from the doorsteps of the dryfish producers. The price of the produce is dictated by the traders. The price of the dryfish varies as follows, Dry Hilsa- Rs 500-700/-, Dry prawns-Rs 80-400/-, small fish (eg anchovies) Rs 25-50/-, Dry Mackerel- Rs 30-40/-.

Consumer preference of fish and fishery products

Consumer preference for the value added fish products like hygienic dry fish, fish cutlet, fish momos, fish pickle, fish papad and prawn chutney powder was studied by conducting a survey of 150 consumers in the peri-urban areas of Bhubaneswar during the year 2018-19. Data were collected through structured and pre-tested questionnaire. The questionnaire covered the species preference for fresh and dried fish, frequency of consumption of fish and value added products, form in which consumed, ability of consumer to assess the quality of fish, perception towards health benefits of fish, important attributes of value added products, willingness to pay for value added products etc.

Consumers' perception about freshness of fish: Perceptions of seafood quality are based on intrinsic attributes (sensory cues) including appearance, colour, smell, texture, tenderness and taste (Neilson *et al*, 2002 ; Trondsen *et al*, 2003). All the consumers were aware about one or other parameters to assess the freshness of fish. Half of the consumers were of the opinion that they should look for gill colour to assess the freshness of fish (Fig 6).

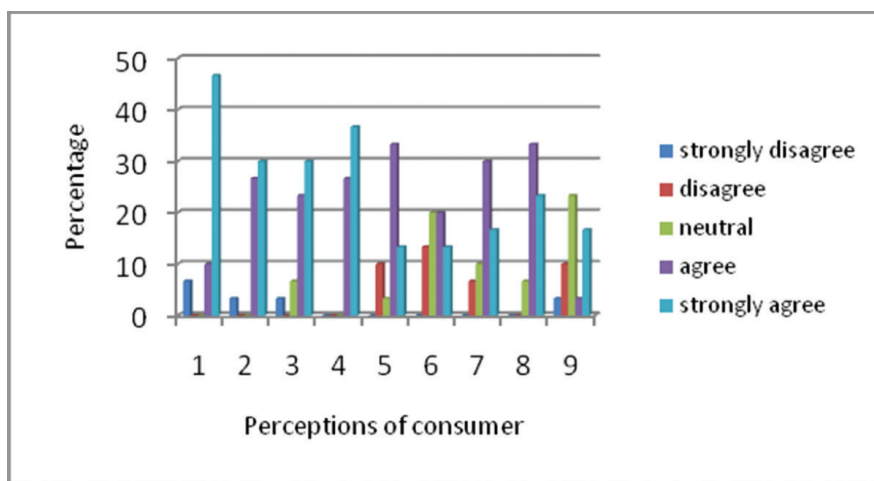


1. Colour of skin 2. Gill colour 3. Smell 4. Eyes 5. Firmness of flesh 6. Don't know

Fig 6. Consumers' perception about freshness of fish

Consumers' perceptions and attitude towards benefits of fish consumption: Almost half of the consumers (46.67%) were aware that fish is a good source of quality protein (Fig. 7). Fish is rich in all the essential amino acids. Amino acids are reported to have not only high nutritive value, but also provide several health benefits, such as reduction of blood cholesterol, antimutagenicity, reduction of coronary heart disease, and anti-obesity potential (Sarma *et al*, 2013). About 30% of the consumers were of the opinion that fish is rich in omega 3 fatty acids and is good for neonatal brain development. Several observational studies have demonstrated independent beneficial associations of DHA levels in mother's blood

during pregnancy or in cord blood during delivery or of maternal fish consumption during pregnancy with more optimal neurodevelopmental outcomes in offspring. These neurodevelopmental outcomes include better behavioural attention scores, visual recognition memory and language comprehension in infancy and childhood (Oken *et al.*, 2005; Hibbeln *et al.*, 2007). Nearly 33% consumers were of the opinion that they should consume more fish than any other animal protein as it is easily digestible too. About 23% of the consumers were not able to decide to agree or disagree on the statement that people with chronic diseases like diabetes and hypertension should refrain from eating fish. Hence awareness of consumers on the positive effects of eating fish in preventing chronic and inflammatory diseases should be done to improve the consumption of fish by patients with chronic illness.



1. Fish is a good source of protein 2. Fish is a good source of omega 3 fatty acids 3. Eating fish is good for child's brain development 4. Eating fish is good for overall health 5. Fish spoils easily than chicken or meat 6. Fish is cheaper than any other animal meat 7. Fish should be iced properly to maintain the quality 8. We should consume more of fish than other animal protein 9. People with chronic diseases like diabetes and hypertension should refrain from eating fish

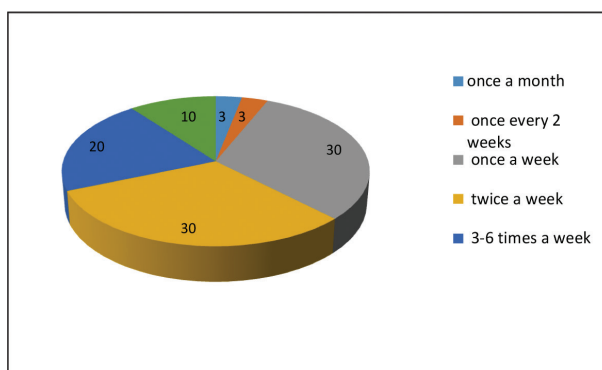
Fig 7. Consumers' perception about benefits of fish consumption

Consumers' opinion about value added fish products (VAP's): Consumers (33.33%) were of the opinion that the variety of value added fish products available in the market is limited when compared to chicken and vegetable products (Table 2). This is true in the case of State like Odisha, where the only form of VAP of fish available is dry fish. Consumers were aware (26.67%) that the VAP are convenience products which are easy to cook. Nearly 30% of the consumers opined that they will be willing to buy VAP of fish if they are available in prices comparable to that of chicken/ vegetable products. Consumers were also keen on the safety aspects. Majority of them (36.67%) were of the opinion that the VAP from fish should be available locally for them to consume. This confirms that Odisha has a potential market for different value added fish products.

Table 2. Consumers' opinion about value added products from fish

Statements	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
Value added fish products are good alternative for similar meat and chicken products.	0.00	6.67	13.33	20.00	20.00
The types of fish used to produce value added fish products are of low quality.	13.33	16.67	20.00	3.33	6.67
The types of value added fish products are limited compared to similar meat and chicken products.	0.00	0.00	13.33	33.33	6.67
The value added fish products are easy to cook.	3.33	6.67	6.67	26.67	13.33
I prefer to consume only imported/branded value added fish products.	6.67	23.33	3.33	16.67	0.00
I never knew or even consumed those products.	10.00	26.67	3.33	13.33	0.00
I am willing to buy value added fish products if prices are comparable to similar products of meat and chicken.	3.33	6.67	0.00	30.00	10.00
I am willing to buy value added fish products if assurance is made that they are safe.	3.33	0.00	0.00	30.00	16.67
I am willing to buy value added fish products if available locally	3.33	0.00	0.00	36.67	10.00

Frequency of fish and fish products consumption: About 10% of the consumers ate fresh fish everyday (Fig 8). But nearly one-third (30%) of the consumers responded that they preferred to have fresh fish only once or twice in a week mainly because of the religious beliefs prevalent in Odisha. Almost 90% of the consumers preferred buying fresh fish from the market. The reason attributed was the ease of access, availability of fresh fish and the availability of dressed fish.


Fig 8. Frequency of consumption of fresh fish

Only 10% of the consumers were willing to buy from retail outlets. About 40% of the consumers responded that they consume value added fish products once in a month (Fig. 9). The only value added fish product consumed by them is dry fish. About 7% of the consumers responded that they never consume dry fish as hygienic ones are not available in the market.

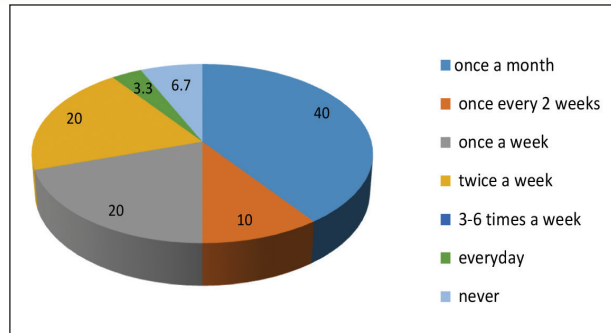


Fig 9. Frequency of consumption of value added fish products by consumers

Consumers’ preference on the different VAP from fish: All the consumers were interested in consuming one or other forms of VAP from fish (Fig.10). Half of the consumers (50%) were interested to consume fish cutlet. The next highest demand was for solar dried fish (43%). The sensory analysis of sun dried and solar dried fishes has been done and reported that the quality of solar dried fish was preferred by consumers (Ojitiku *et al.*, 2009, Rahman *et al.*, 2002). Household income is an important determinant of demand for fish. Higher the income, higher will be the percentage of the component of fish in the daily diet chart. Clearly, fish product development should aim at capturing the fancy of high income groups if more monetary return per quantity of raw fish is to be realized (Nikita & Annamalai, 2001). Also with the economic growth, changes in tastes and preferences and urbanization has resulted in changing consumption pattern away from traditional food commodities to processed and high value commodities (Murthy, 2000).

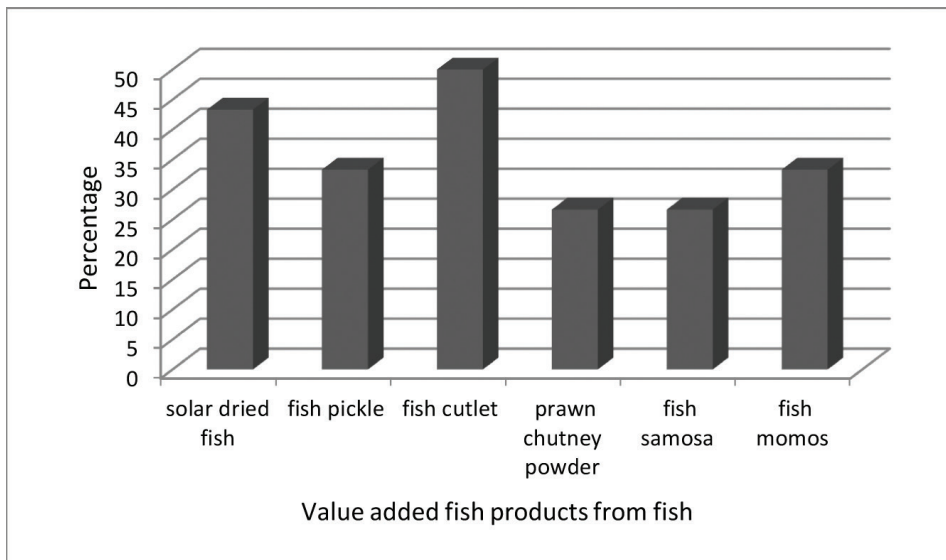


Fig 10. Consumers’ preference on the different value added products from fish

Varieties of dry fish preferred by consumers: In Odisha, around 35,000 tonnes of fish is marketed in dried form annually. About one-third (33.30%) of consumers preferred prawn and marine fish for dry fish (Fig 11). The consumption of fresh marine fish is low compared to that of freshwater fish in the state. The reasons attributed are the unique flavour of the marine fish species and misconceptions about the disadvantages of eating marine fish. But marine fish species like anchovies, ribbon fish etc are the most used ones for dry fish production mainly because of the bulk production of these species. The traditional methods of fish drying is undertaken in an unhygienic way, exposed to the sun, pests, microbes, animals and other impurities. Only 6.67% of consumers preferred the dried catla, rohu or mrigal as these are the most favoured fishes for fresh consumption in the state.

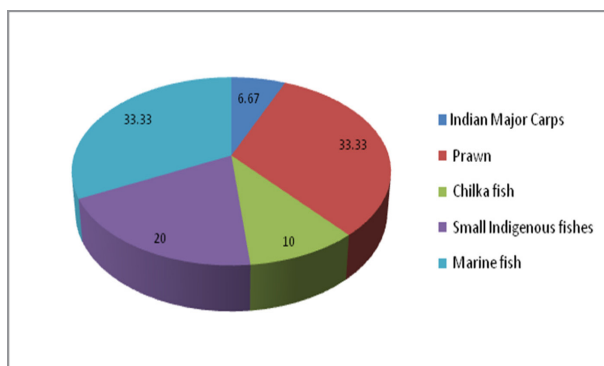
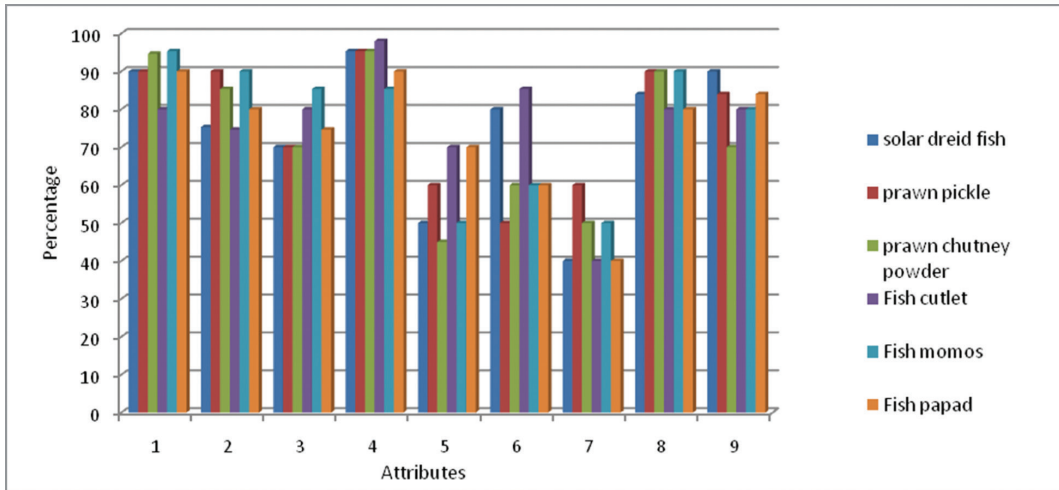


Fig 11. Varieties of dry fish preferred by consumers

Consumers' preferences on the attributes of value added fish products: Taste, price and nutritional information on the pack were considered as most important attributes of solar dried fish (Fig 12). Variety of fish was least important for the consumers (40%). Price, taste, health factor and appearance are the most important attributes as perceived by consumers in prawn pickle. Price, taste and health factor are the most important attributes in prawn chutney powder as per the consumers' perception. Taste was the most important attribute perceived by the consumer in fish cutlet. Variety scored the least. Price, appearance and health factor are the most important attributes of fish momos. Price and taste are the most important attributes in fish papad. As per the survey report, price, taste, health factor were perceived as the most important attributes of overall value added fish products. On the contrary, in a study conducted on consumer preference for value added fish products in Oman, the price of the product was the least important attribute perceived by the consumers of Oman (Boughanmi *et al*, 2017). Geethalekshmi *et al* (2013) in their study reported that certified quality as an important criteria to improve market opportunities for value added fish products in Palakkad, Kerala as the young and earning age group were ready to pay 10-15% more for a quality ensured fish product. Similarly, Mugaonkar *et al*. (2011) reported nutritional value to be the most important factor in purchasing of fish and fish products among consumers of Mumbai city.



1. Price 2. Appearance 3. Attractive packing 4. Taste 5. Availability 6. Ease of availability of ingredients and ease of preparation 7. Variety 8. Health factor 9. Nutrition information on the pack

Fig 12. Overall perception of consumers towards the different attributes of value added fish products

Willingness of consumers to pay for different value added fish products: Almost, 80% of the consumers were not willing to pay a higher price for hygienically dried fish (Table 3). This points to the unawareness of consumers about the advantages of hygienic drying of fish. The consumers though willing to purchase value added fish products were not ready to accept the prevailing market rates of these products in States outside Odisha. The main reason that could be attributed is the non existence of these kinds of products in the Odisha markets which makes it impossible for the consumers to assess the price. A report by Sabat *et al.* (2008) says that around 41% respondents in a consumer preference survey in northern Indian states suggested that they are willing to pay upto 20% extra for value added products from fish.

Table 3. Willingness of consumers to pay for value added fish products

Price Range (Rs) / Product	Rs 100-150 (%)	Rs150-200 (%)	Rs 200-250 (%)	Rs 250-300 (%)	Below 100 (%)
Solar dried fish (250gm)	3.33	3.33	0	0	93.33
Price Range (Rs) / Product	Rs 100-120 (%)	Rs 120-140 (%)	Rs 140-160 (%)	Rs 160-180 (%)	Below 100 (%)
Prawn pickle (200 gm)	20	10	10	0	60
Price Range (Rs) / Product	Rs 20-30 (%)	Rs 30-40 (%)	Rs 40-50 (%)	Rs 50-60 (%)	Below 20 (%)



Prawn chutney powder (100 gm)	70	10	10	--	10
Price Range (Rs) / Product	Rs 5-8 (%)	Rs 8-12 (%)	Rs 12-15 (%)	Rs 15-18 (%)	Below 5 (%)
Fish cutlet (per piece)	80	10	3.33	--	6.67
Price Range (Rs) / Product	Rs 3-5 (%)	Rs 5-8 (%)	Rs 8-10 (%)	Rs 10-12 (%)	Below 3 (%)
Fish momo (per piece)	70	10	3.33	3.33	3.33
Price Range (Rs) / Product	Rs 40-60 (%)	Rs 60-80 (%)	Rs 80-100 (%)	Rs 100-120 (%)	Below 40 (%)
Fish papad (50 gm)	80	5	--	--	20

Consumers responded that in order to improve the consumption of fish and fishery products, the following points should be considered;

- Awareness creation on the health benefits of eating fish to children and adults should be done through government programmes or mass media programmes
- The products should be available locally and in an affordable price
- Special focus should be given on the hygienic preparation of the same
- Capacity building of interested beneficiaries should be done for hygienic production of these VAPs and hand holding should be done for market linkage and credit linkage

Capacity Building of Beneficiaries

Capacity building of the beneficiaries were conducted through the following methods:

- On campus and off campus trainings
- Method demonstration
- Hands on training on preparation of VAPs and fish silage manure
- Establishing backward and forward linkages
- Management training on entrepreneurship development

In order to equip the selected beneficiaries with adequate knowledge and skill on scientific and hygienic preparation of value added fish products and by products as potential livelihood option, several capacity building programmes were conducted, as summarized in the table below. A commodity Interest group of 15 women from Kanamana Village was formed for sharing of information on technologies, market and credit linkage and also as a focal point for conduct

of trainings. Hands on training on hygienic preparation of dry fish, fish papad, fish cutlet, fish momos, prawn pickle and prawn chutney powder was imparted to the beneficiaries. Forty master trainers were selected within the beneficiaries depending upon their interest and enthusiasm in taking up the production of these products. The hands on training were imparted to these master trainers. The master trainers eventually gave training to the remaining members in the village at their household level. The details of the trainings conducted are given in the table below. Several management trainings were also conducted. During the management training, the groups were sensitized about the different schemes available for entrepreneurship development among women SHG groups, exposed to various success stories of different SHG women groups around the country, the pre requisites for success of an enterprise etc.

Table 4: Skill training and management trainings imparted to build the capacity of beneficiaries

Sl. No.	Capacity building programme	No of beneficiaries	Skills imparted
1.	Organic waste management for production of farm made manures and fertilisers	25 from Balidia Village, Astaranga	Preparation of fish silage from fish dressing waste Preparation of organic manure using fish silage
2.	Preparation of value added products and by products to master trainers	60 from Balidia Village, Astaranga	Preparation of hygienic dry fish using ICAR-CIWA rack dryer
3.	Preparation of value added products and by products	60 from Balidia Village, Astaranga	Preparation of hygienic dry fish using ICAR-CIWA rack dryer Preparation of fish cutlet
4.	Preparation of value added products and by products	55 from Pentakota Village, Puri	Preparation of hygienic dry fish using ICAR-CIWA rack dryer
5.	Preparation of value added products and by products to master trainers	21 from Balidia village, Astaranga	Preparation of fish pickle and fish chutney powder
6.	Preparation of value added products and by products to master trainers	21 from Pentakota Village, Puri	Preparation of fish papad and prawn chutney powder
7	Focus Group Discussion with fisherwomen SHG women members	43 from Kanamana Village, Astaranga	Discussion on the present practices of fish curing and value addition and the need for adopting scientific methods of handling and processing
8	Skill training to master trainers on value added fish products preparation	15 from Kanamana Village Astaranga	Preparation of hygienic dry fish and prawn pickle



9	Skill training to master trainers on value added fish products preparation	15 from Kanamana Village Astaranga	Preparation of fish silage, silage based manure, prawn chutney powder
10	Skill training to master trainers on value added fish products preparation	15 from Kanamana Village, Astaranga	Preparation of cutlet to master trainers
11	Skill training to master trainers on value added fish products preparation	10 from Pentakota village, Puri	Preparation of dry fish and pickle by master trainers
12	Skill training to master trainers on value added fish products preparation	10 from Pentakota village, Puri	Maintenance of hygiene while preparing VAP and good hygiene practices
13	Skill training to master trainers on value added fish products preparation	17 from Balidia Village, Astaranga	Preparation of dry fish and pickle by master trainers
14	Skill training to master trainers on value added fish products preparation	16 from Balidia Village, Astaranga	Maintenance of hygiene while preparing VAP and Good Hygiene practices
15	Skill training to master trainers on value added fish products preparation	12 from Kanamana Village, Astaranga	Preparation of fish papad by master trainers
16	Skill training to master trainers on value added fish products preparation	16 from Balidia Village, Astaranga	Preparation of fish papad by master trainers
17	Skill training to master trainers on value added fish products preparation	12 from Pentakota Village, Puri	Preparation of fish papad by master trainers
18	Skill training to master trainers on value added fish products preparation	13 from Pentakota Village, Puri	Preparation of fish silage and organic manure from fish silage by master trainers
19	Skill training to master trainers on value added fish products preparation	17 from Balidia Village, Astaranga	Preparation of fish silage and organic manure from fish silage by master trainers
20	Skill training to master trainers on value added fish products preparation	16 from Kanamana Village, Astaranga	Preparation of fish silage and organic manure from fish silage by master trainers
21	Skill training to master trainers on value added fish products preparation	18 from Kanamana Village, Astaranga	Maintenance of hygiene while preparing VAP and good hygiene practices
22.	Hands on training on the operation of manual and motor operated fish descaling device.	17 from Kanamana Village, Astaranga	Operation of the fish scaling device developed by ICAR-CIFT for facilitating injury free de scaling of fish

23.	Skill training on hygienic fish drying using ICAR-CIWA modified solar dryer and ICAR-CIFT hybrid solar dryer	10 from Balidia Village, Astaranga	Preparation hygienic dry fish using solar -LPG-Electrical Dryer developed by ICAR-CIFT
24.	Management training on the schemes for entrepreneurship development among women	14 from Kanamana Village, Astaranga	Different schemes available for entrepreneurship development, success stories of women SHGs, Marketing strategies for their products etc
25.	Management training to master trainers for successful enterprise development	10 from Kanamana Village, Astaranga	Different schemes available for entrepreneurship development, success stories of women SHGs, marketing strategies for their products etc
26.	Management training to master trainers for successful enterprise development	21 from Pentakota Village, Puri	Different schemes available for entrepreneurship development, success stories of women SHGs, marketing strategies for their products etc
27.	Management training to master trainers for successful enterprise development	14 from Kanamana Village, Astaranga	Different schemes available for entrepreneurship development, success stories of women SHGs, marketing strategies for their products etc
28.	Management training to master trainers for successful enterprise development	21 from Pentakota Village, Puri	Different schemes available for entrepreneurship development, success stories of women SHGs, marketing strategies for their products etc
29.	Skill training on hygienic preparation and vacuum packaging of prawn pickle and prawn chutney powder	6 from Kanamana Village, Astranga	Skill development on vacuum packaging of value added products
30.	Scientist farmer interface on entrepreneurship development	10 from Kanamana Village, Astranga	Discussion on marketing strategies and avenues for women SHG's
31.	Skill training on hygienic preparation and vacuum packaging of prawn pickle and prawn chutney powder	15 from Kanamana Village, Astranga	Skill development on vacuum packaging of VAPs
32.	Distribution of utensils awareness on labelling and pricing	3 from Kanamana Village, Astranga	Distribution of utensils for preparation of VAPs and labelling and pricing

Glimpses of Skill Trainings and Management Trainings



Training on fish silage preparation



Training on VAP preparation



Training on quality analysis of dry fish at Pentakota, puri



Training on hygienic dry curing of fish at Balidia, Astaranga



Training on fish pickle preparation to beneficiaries from Astaranga, puri



Training on maintenance of hygiene in production of VAP



Training on hygienic drying to beneficiaries from Pentakota, Puri



SHG master trainers preparing prawn pickle



Master trainers preparing prawn chutney powder



SHG members preparing fish cutlet in Balidia Village, Astaranga



Master trainers preparing dry fish using racks



Fisherwomen interacting in the Scientist Fisherwomen interface



Hands on training on preparation of fish silage



Master trainer preparing prawn pickle



Management training to beneficiaries from Kanamana village



Management training to beneficiaries from Pentakota village

The value added products about which the skills were imparted to fisherwomen, were finalized based on the assessment of consumer preferences. Organoleptic evaluation of the VAP from fish were conducted using a 9 point hedonic scale.

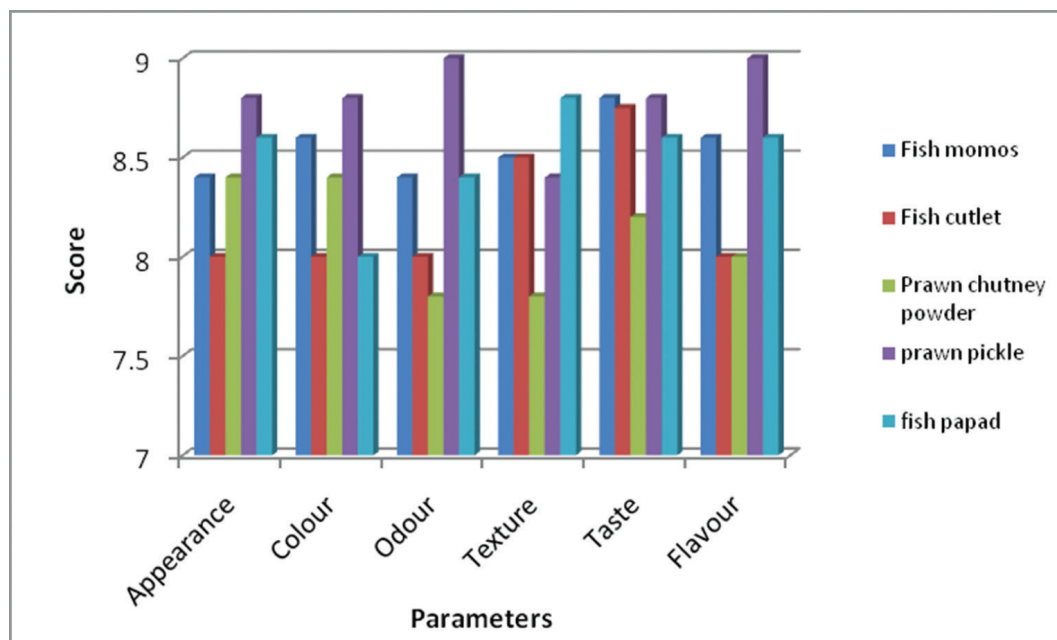


Fig 13. Organoleptic evaluation of VAP's

Like extremely : 9, Like very much : 8, Like moderately : 7, Like slightly : 6, Neither like nor dislike : 5, Dislike slightly : 4, Dislike moderately : 3, Dislike very much : 2, Dislike extremely : 1

The score of the different products showed that the products were liked by the consumers with respect to appearance, colour, odour, texture, taste and flavour. The recipes of the different products given below were standardized based on the local preferences (Fig 13).

The shelf life studies of fish and prawn dried in the rack dryer, prawn pickle with and without preservatives (at room temperature and at 4°C) and prawn chutney powder was carried out. Assessment of shelf life was carried out through biochemical tests i.e., pH, TMA (Tri Methyl Amine) (Conway, 1970), Total Volatile Base Nitrogen (TVBN) (Conway, 1970) and Peroxide Value (PV), Proximate composition (AOAC, 2000) and Total Viable Count of Bacteria (BAM, 1995). Total Volatile Base Nitrogen (TVB-N) levels were monitored as the main parameter of fish muscle freshness. Based on the shelf life studies conducted, prawn pickle had a shelf life of 6 months at room temperature and chutney powder 3 months in refrigerated condition.

Popularization and Marketing

The popularization of the attractively packed value added fish products prepared by the master trainers developed under the project was done through ICAR-CIWA's participation and display of the products in fairs and exhibitions. Linkage with Odisha Fisheries Cooperative Corporation (FISHFED) and Falcon Fresh for marketing of value added fish products was also initiated. Discussion on collaboration with WorldFish an international, non-profit research organization with headquarters in Penang, Malaysia, and offices in Asia, Africa, and the Pacific was also held. WorldFish is a member of the Consortium of International Agricultural Research Centers (CGIAR), a global agriculture research partnership for a food secure future. WorldFish's mission is to harness the potential of fisheries and aquaculture to reduce poverty and hunger in developing countries. By collaborating with ICAR-CIWA, State Fisheries Department and Mission Shakti, Worldfish aims to improve the availability and consumption of fish by school children, pregnant and lactating mothers. This is given a boost by the State Government's decision to include small fish in the mid day meal of school children. The hygienic produce (Dry fish) from the fisherwomen is proposed to be linked to the mid day meal scheme in Odisha. The marketing of organic manure from fish silage is proposed to be done through private plant nurseries.

Exhibition folder for Popularization of VAP's

Nutritional information/100g	
Parameters	Concentration
Protein	35.35%
Fat	5.6%
Ash	54.7%
Phosphorus	1.003%
Calcium	3.224%
Magnesium	0.989%
Potassium	0.304%
Iron	161.5ppm
Copper	10.38ppm
Zinc	38.7ppm
Manganese	20ppm

Prepared under DSIR A2 +TDUPW project on "Adding value to fish: a potential livelihood option for rural women of Odisha"

Tanuja S, Charles J. Jeeva, Eliojita Rout

ICAR - CENTRAL INSTITUTE FOR WOMEN IN AGRICULTURE
 Plot No.50-51, Mouza-Jokalandi, Baramunda, Bhubaneswar- 751 003, Odisha
 Website: <http://www.icar-ciwa.org.in>
 E-mail: director.ciwa@icar.gov.in
 Phone No : (0674)2387460, 2387241
 Fax : (0674) 2387242

ICAR - CENTRAL INSTITUTE FOR WOMEN IN AGRICULTURE
 Plot No.50-51, Mouza-Jokalandi, Baramunda, Bhubaneswar- 751 003, Odisha
 Website: <http://www.icar-ciwa.org.in>
 E-mail: director.ciwa@icar.gov.in
 Phone No : (0674)2387460, 2387241, Fax : (0674) 2387242

Popularization of Products



Exhibition of products through ICAR-CIWA's exhibition during National Co-operative Week organised by Fishfed on 20th November 2018



Exhibition of products during ICAR-CIWA's exhibition in the Foundation Day of ICAR-NRRI, Cuttack on 23rd April 2019



Exhibition of products at the State Fisheries Departments exhibition at Zilla Mahotsav, Nabrangpur, Odisha on 8th and 9th Dec 2018



Exhibition of products at ICAR-CIWA's exhibition during Pusa Krishi Vigyan Mela, New Delhi from 5-7th March 2019



Exhibition of products at ICAR-CIFA, Bhubaneswar on 18-19th February, 2019



Exhibition of products during Technology Demonstration Mela at ICAR-CIWA on the Foundation Day on 23rd March 2019



Products displayed at Chilka Fresh for sale



Discussion with Retail Head, Falcon Fresh, Bhubaneswar regarding marketing of VAP from fish

**Impact on Adoption
and Entrepreneurship
Development Among
Rural Women**



4. Impact on Adoption and Entrepreneurship Development among Rural Women

The project envisaged upgrading the skill and knowledge of around 200 fisherwomen of Puri, a coastal district of Odisha through their self help groups on the value added products and by products preparation from fish and shellfish. The State's 12% fisher population resides in Puri district. Through this project, the fisherwomen were made capable to utilize fish waste that remains after processing to be marketed as fish silage which will provide an impetus to the Swacchata Abhiyan in our country.

Market surveys, packaging and advertising are a few of the very important areas, which ultimately determine successful movement of new products all the way to the buyers. Through the project, the consumer preference for the value added products and by products from fish were evaluated so as to assess the marketability potential of the products. The popularization of the products were done through linkages with retailers or through exhibitions/melas. The entrepreneurial skills, management and marketing skills and accounting skills necessary to set up an enterprise and also to make it sustainable were also imparted to the fisherwomen through trainings. Facilitation for obtaining FSSAI licence which is mandatory for any food products production was done. Market linkage for marketing their produce were facilitated to the trained fisherwomen SHG's to promote the value addition and hygienic handling of fish.

Entrepreneurship Development among Women

A group of 12 master trainers was selected from the Kanamana Village, Astaranga. They belong to two SHG groups viz., Biswa Bharati Maa and Maa Mangala of the village. The selected master trainers from Kanamana Village, Astaranga took part in the exhibition arranged in connection with the Foundation Day and Technology Demonstration Mela of ICAR-CIWA on 17th February 2020. They sold the first batch of value added fish products during the exhibition on a pilot basis and earned a revenue of Rs 1,650/-. The building for production of value added fish products has been identified in the village Kanamana, Astaranga. As FSSAI license number is a must for sale of food products in the market, an online application was submitted and FSSAI license number has been obtained in the month of March 2020 (FSSAI no 22020026000056). Discussions have been done with Mission Shakti, Odisha and Hari Telematics Private Limited, Odisha for market linking. Covid-19 changed the entire world with its onset in late 2019. By embracing digital technologies like e-banking, e-commerce and social media, SHGs can tide over the obstacles put before them by the pandemic. The group has been provided with necessary utensils and packaging materials to start the production of value added fish products. They have ventured into online marketing taking into consideration the pandemic situation. Application for trade license for undertaking e marketing has been submitted to Bhubaneswar

Municipal Corporation. The next step will be opening a website and trademark registration of the products under the trade name “Fishlikes”. The women are excited to start the sale of VAP’s through Falcon Chilika Fresh stores located in different parts of Bhubaneswar city.

Enterprise Development



Site for starting enterprise in Kanamana Village



Distribution of utensils and packaging materials



Preparation of products



Sale of their produce during exhibition



Appreciation from Honorable Vice Chancellor, OUAT, Bhubaneswar

The benefit cost analysis of various value added products prepared and marketed by the Fisherwomen SHGs in enterprise mode are presented in the following table.

Table 5: Benefit cost analysis of VAP

Sl. No.	Product	Cost of production	Sale price	B/C ratio
1	Pickle	Rs 460 /kg	Rs 650 /kg	1.41
2	Prawn chutney powder	Rs 390 /kg	Rs 520 /kg	1.33
3	Fish momos	Rs 570 /100 psc	Rs 800 /100	1.4
4	Fish cutlet	Rs 360 /100 psc	Rs 500 /100	1.39
5	Dry fish (Rani)	Rs 360 /kg	Rs 500 /kg	1.39
6	Dry fish (Kokali)	Rs 285 /kg	Rs 400 /kg	1.4
7	Fish papad	Rs 285 /kg	Rs 400 /kg	1.403

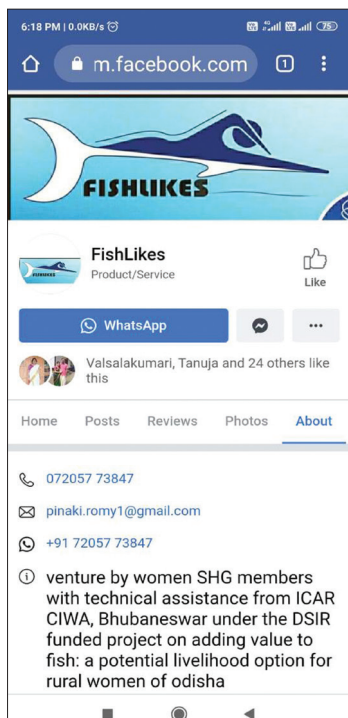


The present project, through the skill and knowledge upgradation of fisherwomen motivated fisherwomen enough to initiate small scale enterprises to further enhance their quality of living through increased income.

In the modern times, with the shift in consumers' demand to ready to eat and hygienic products, value added products preparation from fish holds a key potential. Strategies like promoting fish value added products and by products will provide the much needed alternative livelihood options for fisher women who are being displaced from their occupation because of the mechanization in the sector. The project strengthened and widened the knowledge and skill of fisherwomen to cope up with the changing consumer needs. The promotion of fish by products like fish silage and silage based poultry feed and manure through the project will be a step towards reducing environmental pollution caused by the piling of fishery waste in and around human habitations.



News report of exhibition in Krishi Jagran



Using social media platform for the online sale of products



Labelling of products

Market Linkage Strengthened for Fisherwomen SHGs through Falcon Fresh

Market linkage was strengthened for the rural women SHGs by linking them with Falcon Chilka Fresh Retail outlets in Bhubaneswar on 20 August, 2020. Dr. S. K. Srivasatava, Director, ICAR-CIWA launched the first marketing of value added fish products prepared by the SHGs at the Falcon Fresh Fish outlet at NACA gate and near Kesari Cinema Hall at Bhubaneswar.



Marketing of value added fish products through Falcon Fresh Fish outlets at Bhubaneswar



5. Lessons Learned

It can be concluded that demand for value added fish products exists among urban consumers of Odisha. It shows much scope for entrepreneurship development in the area especially by the poor fisherwomen if they are equipped with the necessary skills, financial and market linkages. As per the study conducted by MS Swaminathan Research Foundation, production of fish value added items have been helping in livelihood enhancement of fisherwomen of Nagapattinam District in Tamil Nadu, India (Selvaganapathy and Krishnan, 2015). Among the fisherwomen of Kerala, value added fish producers were found better empowered (46.78%), followed by retailers (45.09%), vendors (43.92%) and dry fish makers (43.42%) (Salim and Geetha, 2013).

However, as per consumers' response, in order to improve the consumption of fish and fishery products in Odisha, the following points should be considered;

- Awareness creation on the health benefits of eating fish to children and adults through government programmes or mass media programmes
- Availability of the products locally at an affordable price
- Special focus on the maintenance of quality of the value added products
- Capacity building of interested beneficiaries for hygienic production of these VAPs and hand holding for market linkage and credit linkage

Impediments Faced

- The initial inertia from the project beneficiaries to start value addition to fish on an enterprise mode and lack of entrepreneurial skills
- Strengthening the market linkages, and meeting the quality standards in the competitive markets with corporate sectors
- The cumbersome procedures in starting an enterprise which involve registration, licensing, getting institutional finance, quality assurance certification (FSSAI certification) etc.
- The poor literacy and socio economic status of fisherwomen self help groups.
- The pandemic situation of Covid 19 was a serious deterrent to the marketing of the products.

Sustainability of the Interventions

Value added products meet changing consumer life-style requirements. It offers better utilization of different low value fishes as well as by-catches. In general, returns out of value added products are always greater than fresh fish/ shell fishes. There is an increasing trend in the utilization of value-added fish products as evidenced by their availability in modern super markets as well as malls which are



becoming popular. It is a production and marketing strategy driven by consumer needs and perceptions. Empowerment of fisherwomen and formation of self help groups also have led to the increased small scale level production of value added items in recent times.

Many studies suggested that consumers are willing to pay upto 20% extra for value added products from fish. But fisherwomen remain unaware of these changing consumer needs and advanced technologies. One of the effective means to bring the fisherwomen to the mainstream is to equip them with formal training in advanced processing techniques, marketing and development of entrepreneurial skills.

The project envisaged to upgrade the skill and knowledge of fisherwomen on the modern processing techniques and the preparation of value added products and by products. The consumer preference study helped to reinforce the marketability potential of the products in Odisha. Display in supermarkets, bakeries, melas or exhibitions were conducted to assess the acceptability of the product and also the viability of the enterprise. The beneficiaries were trained on the aspects of entrepreneurship development, the essentials in starting a fish processing enterprise, group dynamics, management and book keeping by experts from the field. The project also facilitated credit linkage for the interested women SHG groups for setting up the enterprises and also the market linkage of the products. The overall empowerment of the women through development of skill, knowledge and attitude will motivate them to sustain their activities.

Supporting Quotes and Success Stories



6. Supporting Quotes and Success Stories

Success Story of the SHG

The rural women as SHG groups were involved in mushroom farming in the past. But that was not sustainable as they couldn't find a ready market for mushroom because of it being a perishable product. Since theirs is an interior village in Puri, transportation of the fresh produce was difficult. The value added products from fish have



long shelf life ranging from 10 days to 6 months. Hence they were enthusiastic to adopt the technology as they need not have to worry about the immediate transportation of the products. Moreover, being a marine village, they are having regular availability of fish and prawns in their village. They have gained confidence through the series of trainings given by ICAR-CIWA.

**Maa Mangala SHG group
Kanamana, Astaranga, Puri**



“Pickles are generally made with fruits and vegetables. But it is a unique idea of making prawn pickle. Its taste is also very nice. We got training from ICAR-CIWA on the preparation and packaging of these products. We don't use any preservatives and the products are made hygienically”

**Smt. Kausalya Kandi, Secretary
Maa Mangala SHG group
Kanamana, Astaranga, Puri**



“The training given by ICAR-CIWA increased our skill and confidence. We want to progress with this enterprise. Although we couldn’t start large scale marketing due to Covid-19, we have started selling locally and also in online mode. The positive feedback that we are getting are encouraging us to work harder”

**Ms. Pinaki Parimita, Member
Bishwabharti Maa SHG
Kanamana, Astaranga, Puri**

“All the members of ICAR-CIWA were very co-operative and taught us properly. We are very thankful towards them for instilling the confidence in us to take up this as a livelihood option”

**Smt. Labanga Kandi, President
Bishwabharti Maa SHG
Kanamana, Astaranga, Puri**



**Master Trainers : Leaders
for Ushering in Rural
Entrepreneurship on Value
Added Fish Products**

7. Master Trainers : Leaders for Ushering in Rural Entrepreneurship on Value Added Fish Products

Details of beneficiaries from Kanamana Village, Astaranga Block, Puri District

SI No	Name of SHG	Name of beneficiary	Village & Block
1	Biswabharati Maa	Labanga Kandi	Kanamana Village, Astaranga Block, Puri District
2		Santi Kandi	
3		Rajalaxmi Mallick	
4		Pinaki Parimita	
5	Maa Mangala	Kausalya Kandi	
6		Kuni Das	
7		Nirupama Mallick	
8	Maa Sarala	Rina Bhoi	
9		Parbati Mallick	
10		Sukanti Das	
11	Maa Tarini	Jhilli Kandi	
12		Rachana Das	
13		Puspalata Kandi	
14	Om Sainath	Lata Kandi	
15		Urmila Kandi	
16		Lata Kandi	

Details of beneficiaries from Balidia Village, Astaranga Block, Puri District

SI No	Name of SHG	Name of beneficiary	Village & Block
1	Maa Mangala	Laxmi Behera	Balidia Village, Astaranga block, Puri District
2		Shobhagini Behera	
3	Nilachakra	Jema Dalai	
4		Annapurna Behera	
5	Jaya Hanuman	Rosalin Behera	
6		Mamata Behera	
7	Baba Kulamani	Sasmita Behera	
8		Bini Behera	



9	Maa Sarala	Prabhathi Behera	Balidia Village, Astaranga block, Puri District
10		Kamala Behera	
11	Maa Mangala	Jema Behera	
12		Annapurna Behera	
13	Maa Narayanee	Kalpana Behera	
14		Banita Behera	

Details of beneficiaries from Pentakota Village, Puri District

SI No	Name of SHG	Name of beneficiary	Village & Block
1	Nukallamma	Erapili Sitarma	Pentakota Village, Puri Sadar, Puri District
2		Yaripalli Poleru	
3	Spandana	M. Jayalakshmi	
4		Bondi Appalanarasa	
5	Santhi	P. Chitamma	
6		B. Korlayamma	
7	Maa Durga	Vanka Manikyam	
8		Chodipilli Malleswari	
9	Jay Jagannath	Chepala Appalaraju	
10		Bondhi Appalanarsa	

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Details Project Investigator

Name of PI : TANUJA, S.
Designation : Scientist (Fish Harvest and Post Harvest Technology)
Sex & Date of Birth : Female; 21/04/1981
Address : ICAR-Central Institute for Women in Agriculture
Opp. Kalinga Studio, Baramunda Post
Bhubaneswar- 751003
City : Bhubaneswar
Telephone : 0674 2387220
Fax : 0674 2387242
Email : tanujasomarajan@gmail.com
Mobile : 8260374440

Details Co-Project Investigator

Name of Co-PI : J. CHARLES JEEVA
Designation : Principal Scientist(Agriculture Extension)
Sex & Date of Birth : Male; 13/04/1971
Address : ICAR-Central Institute for Women in Agriculture
Opp. Kalinga Studio, Baramunda Post
Bhubaneswar- 751003
City : Bhubaneswar
Telephone : 0674 2387220
Fax : 0674 2387242
Email : jcjeeva@gmail.com
Mobile : 7684835101



ICAR-Central Institute for Women in Agriculture (ICAR-CIWA) Bhubaneswar-751 003, Odisha

Profile of the Institute....

ICAR-CIWA began its journey in 1996 as the National Centre for Research on Women in Agriculture (NRCWA), at Bhubaneswar with her getting upgraded to the Directorate of Research on Women in Agriculture (DRWA) in 2009 and now Central Institute for Women in Agriculture (ICAR-CIWA) as a recognition for her accomplishments on gender research in the country.

Mandate

- ❖ Research on gender issues in agriculture and allied fields.
- ❖ Gender-equitable agricultural policies/programmes and gender-sensitive agricultural-sector responses.
- ❖ Co-ordinate research on Home Science.

Objectives

- Undertake studies to assess agricultural technologies, programmes, institutions and policies to refine these with a gender perspective;
- Create and maintain gender disaggregated databases to understand the dynamics and the effect of gender roles in different agro-ecological and production systems for strategic planning;
- Characterize and understand drudgery and safety related issues of farmwomen and improve their work efficiency;
- Develop gender sensitive, resilient and sustainable agricultural models and institutional innovations for nutrition and livelihood security;
- Documentation and knowledge management of gender studies in agriculture;
- Capacity building of various stakeholders to address gender issues in agriculture.



Vision

Emerge as a leading centre for gender research and serve as a catalyst for gender mainstreaming and women empowerment in agriculture to realize enhanced productivity and sustainability of agriculture.

Mission

Generate and disseminate knowledge to promote gender sensitive decision making for enhancing efficiency and effectiveness of women in agriculture.

Thrust Areas

- Technology Assessment and Refinement
- Livelihood & Socio-economic Policy
- Drudgery and Vulnerability
- Natural Resources Management
- Food and Nutritional Security including Water, Health and Sanitation
- Extension Systems, Grass-root Institution and Capacity Building





ICAR- Central Institute for Women in Agriculture (Indian Council of Agricultural Research)

Plot No. - 50-51, Mouza - Jokalandi, Post - Baramunda
Bhubaneswar - 751 003, Odisha, INDIA

Phone : 0674-2387220; Fax : 0674-2387242

E-mail : director.ciwa@icar.gov.in; Web : <http://www.icar-ciwa.org.in>

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