

Application of Information Communication Technology in Coastal Resilience through Income Improvement

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Climate Change and Livelihood Insecurities of Fishermen Communities

Climate change and associated events such as cyclones, heavy rainfall and floods affects the fishers as well as fish farmers. Most significant impact of climate change is obviously on society, which deserves the utmost priority and attention. Societal impacts of climate change includes loss of fishing days, low value catch, damages to fishing equipment, damages to aquafarms and income loss cumulatively leading to livelihood insecurities among fishermen communities. The scenario adversely affects the national fisheries economy and many fishermen youth are forced to seek exit path from fisheries sector.

Climate change induced stock fluctuations and distribution results in catch composition variation and accordingly, catch of high value fishes may be replaced with low valued species, which in turn affects the profitability and income. At landing centres or harbours, they have to settle for low prices as they do not have any roles in further supply chain. Extreme weather events such as cyclones, depressions and associated phenomena negatively affects the fishermen community as they could not venture into sea, which results in loss of fishing days followed by a drastic reduction in income. The frequency and occurrence of extreme events are increasing, which exacerbates the aggrieved scenario of fishermen communities. Extreme events also damage coastal infrastructure, fishing equipments and even result in loss of life, thereby escalating the livelihood insecurities of fishermen folks. The impact of recent extreme event Ockhi on fishermen community is as tabulated.

Though many of the reported missing human lives returns, high risk prevails on the coastal livelihoods towards the occurrence of climate change related extreme events.

| S.No. | Items | Tamilnadu | Kerala | Lakshadweep |
|-------|--|---|---|---|
| i. | Human lives lost (district wise) | 30 | 75 | Nil |
| ii. | Livestock | 7654 | Nil | 1691 |
| iii. | No. of missing fishermen | 203 | 141 | Nil |
| iv. | Houses damaged | Hut damaged- 6262 Pucca/kutchu houses partly damaged-101 | Fully-221 Severely-3253 | Fully -87 Partially -935 |
| v. | Infrastructure Damage | <ul style="list-style-type: none"> • Mechanized boats partially-640 • Mechanized boats fully -60 • Fiber Reinforced Plastic (FRP)Vallams partially-3407 • (FRP)Vallams fully-3407 • Electricity Board Poles - 15,858 • Transformers-95 • Fallen Trees -25,526 • 38 Breaches in tanks and 31 Breaches in channels/canals • 103 Government buildings damaged • Damage to 75.046 km State Highways, 98.93 km National Highways, 417.18 km Rural/Urban Roads. | <ul style="list-style-type: none"> • Boats fully damaged/lost- 384 • Loss of road- 41 km • Damage to Pumps - 180 • Damage to Supply Tanks - 430 | <ul style="list-style-type: none"> • Boats fully damaged/lost-12 • Boats partially damaged-25 • Houses - fully damaged-87 • Houses partially damaged-935 • Government building-340 • Coconut trees - 32747 • Other trees - 5514 NIOT drinking water plant was also damaged to some extent |
| vi. | Coconut trees | - | - | 32747 |
| vii. | Total crop area affected (in hectares) | 6625 hectares | 7817.43 hectares | - |
| viii. | Damage caused to the environment | The subject environment pertains to the Ministry of Environment & Forest, and their response is pending. | | |

Source: Report No.211., *The Cyclone Ockhi - Its Impact on Fishermen and Damaged Caused by it*, Presented to Rajya Sabha on 4th April 2018 and Laid on the Table of Lok Sabha on 4th April 2018.

The marine farms of the nation are also in stressed condition due to changes in physico-chemical and microbial composition of the eco system, which in turn has detrimental effects on farm outcome. Irregular rainfall patterns and extreme events results in influx of flood and storm water into marine farms and consequently the species growth and maturity shall be reduced along with

increased susceptibilities to diseases and mortalities. The recent floods in Kerala are an example of the impacts of climate change on aquaculture farms. The composition of the aquaculture farms has been drastically changed due to the flood water intrusion. The cage farmers suffered extensive damages and wash away of their cages along with stock loss, thereby economic loss. The Chinese fishing nets, traditional fishing equipments were also damaged due to the flood.

The adverse impact of climate change associated events on fishermen and fish farmers are profoundly visible through multiple instances. In this context, coastal resilience strategies towards fishers and fish farmers income improvement needs to be highly prioritized and focused. Several alternative livelihood practices and avocations has been in practice across the nation among the coastal communities to cope up with the climatic adversities induced income loss. However, alternative livelihood practices and occupational changes away from the fisheries sectors shall not be sustainable options, as such scenarios eventually points out towards the exit path from fisheries sector. The challenge is to attain income enhancement and livelihood security by retaining the fisher folks in the fisheries sector itself and to make fisheries sector profitable for the prioritized stakeholders.

The harvest through Capture fisheries, Mariculture or other means after overcoming the climatic adversities deserves better profit, but in reality the fishermen and farmers are not yet earning the deserved profit tag. In spite of high price for fishes in market, the profit is being reduced within the supply chain and the farmers as well as fishers are gaining only low margin. Conventional strategies are focused mainly on availing high price for the produce. However, soaring fish prices is not an appreciable sustainable approach as fish is the common man's nutritional source. To attain village level nutritional security to millions, the fish price should be affordable. Again the challenge is to formulate a win-win approach with fishers and farmers earning higher profit along with moderate fish price for consumers.

Resilient Strategy through ICT application

Fishermen or fish farmer community centric resilient strategy is the need of hour to attain income improvement and to negate the coastal livelihood insecurities. The fisheries supply chain operates through producers, marketers and consumers. Fishermen or farmers upon catch or harvest normally depends mainly on the auctioneers or wholesalers, who fix the price for the produce. However the fishermen and farmers does not have any significant role in further marketing and the price of their catch is determined within a shorter time frame,

which shall not be the deserving considering their efforts, uncertainties and adversities. Fishermen and fish farmers are provided with no other opportunity than to depend on wholesalers and physical market. To enhance the profit and income for fishermen and farmers, a feasible strategy is to empower them (Producers) to advance through the supply chain and accordingly they could have greater role in marketing as well as sales also, which in turn shall fetch them better profit margins. To attain the same and to reduce the sole dependency on middlemen, alternative marketing and sales channel needs to be developed to directly connect the fishermen or fish farmer communities with customers.

Technological interventions have the potential to reduce the process costs and the E-Commerce technology had proved across several sectors as an efficient solution to connect between the producers and consumers with beneficial implications on pricing and profits for both. E-Commerce is an online platform where producers have opportunity to effectively market their products towards a successful sale, after which associated distributor shall deliver the product to customer. Though E-Commerce is gaining popularity in fisheries sector, most of them are being operated by private entrepreneurs and the profit is being channelized to them than to producers. Multivendor E-Commerce platform is similar to a virtual market place, through which multiple vendors can make direct online sales to customers through online portal.

Fishermen groups could be trained to familiarize with the e-commerce solutions and empower them to harness the beneficial implications towards advancement in supply chain, direct marketing and sales. Fisheries institutes could play lead role in transforming the roles of fishermen or fish farmers through multivendor E-Commerce solutions. However besides offering e-commerce platform, continuous support needs to be provided to make the venture success. Pilot studies, capacity building programs and promotional activities are of need to make impact of technology in societal transformation.

NICRA Intervention: Multivendor e-commerce website and associated mobile application

In the context of climate change adversities on fishermen communities and in line with the highly prioritized national goal of income improvement for farmers, National Innovations on Climate Resilient Agriculture (NICRA) project of Central Marine Fisheries Research Institute (CMFRI) has developed a multivendor E-commerce website hosted as www.marinefishsales.com and associated android mobile phone application 'marinefishsales' for enabling direct sales between

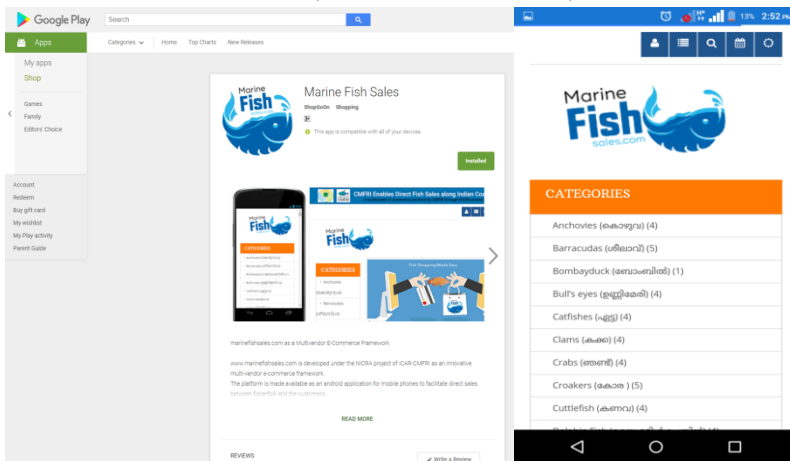
fishermen and customers. Developed multivendor e-commerce platform focuses on income enhancement for coastal fishers and farmers.

Innovation

The innovation incorporated is that, in contrary to typical e-commerce ventures where single firm or company as major profit beneficiary, the developed e-platform envisions multiple fishermen self-help groups (SHGs) as beneficiaries. This may be the first instance that a Govt. institution in fisheries sector facilitates the E-Commerce solution, thereby undertaking the greater role to address grass root level climate change adversities through income improvement and livelihood security improvement.



Website (www.marinefishsales.com)



Android Mobile Application 'marinefishsales'

Trainings through NICRA project

Besides multivendor e-commerce solution development, multiple trainings were organized at CMFRI, Kochi through NICRA project to familiarize the developed e-commerce website and mobile app among fish farmers and 28 participants (farmers, fishermens, SHGs and traders) underwent training. On the next level, trial sales were done to familiarize the operational modalities of the e-venture. Farmer meet were arranged on to fix minimum base price, above which only sales shall be performed. Trial sales were further carried out after which sales to public were initiated. Training on 'Fish processing and Packaging for E-Marketing' were also arranged at KVK Njarakkal. Distributers have been engaged to facilitate distribution in case farmers do not have distribution facility. Trial sales have ensured functionality of multivendor e-commerce website. Customization of website and app has been done regarding direct sms to vendors upon each order. Multistore feature has been enabled to replicate the model across other coastal regions of the nation.

Features of the E-platform

The platform is an interface with administrative control panel, vendor panels and user storefront with ICAR-CMFRI in an administrative role, multiple coastal fishermen SHGs as vendors and consumers as users. Various fishermen SHGs can register as vendors (fishers and farmers) based on their fish products and update their stock availability under pre-approved categories and products, which shall be displayed in the website and associated mobile app. Customers visiting the website or app could place the order with payment options of cash on delivery, net banking or with debit/credit cards and subsequently the registered vendor shall be notified through email and SMS, upon which the quality products within the pre-assigned time frame shall be delivered, enabling direct product sale between customers and SHGs. The profit could be shared directly among the fisherfolk SHGs thus ensuring income improvement for fishermen groups.

Each fish vendor group shall be provided with unique login credentials along with vendor panel through which products (raw, cleaned, sliced, bulk, portions, etc) could be added or modified. Unlimited categories and products, auto stock reduction, printable invoice, sales reports, email and sms notifications, special prices and discounts etc are other interesting features of the website. Customers through store front could select or search for products under various categories, proceed to checkout, fill customer details and confirm order. Customers shall

receive sms notifications and call from vendors on the status of order processing. Options are enabled for customers to add review on the products purchased.

Current Status

Around 35 fishers/farmers registered in the website as vendors and trial sales to public are ongoing with total sales amounting to around Rs.89, 000 (Rupees Eighty Nine Thousand). Steps shall be taken to scale up the sales and to extent the beneficiaries. Govt. of Himachal Pradesh expressed interest to implement the same in their state with technical guidelines from NICRA team of CMFRI, which was readily agreed upon. Govt. of Himachal Pradesh has announced in their state budget speech regarding implementation of the same.

Lessons learned and Way ahead

The pilot/ trial sales through the portal and mobile app had gained us several valuable insights, which shall be of high significance in upscaling of the technology.

Multivendor E-Commerce solutions could be an effective solution towards income improvement for coastal communities. Self Help Groups needs to be created towards incorporation as vendors for direct sales through the e-platform. Vulnerable groups related to climate change needs to be prioritized. Initially the sales shall be of low volume and at such instances institutional support in terms of monetary or advertisements could be considered. To ensure uniformity and competence trainings are essential. Vendors need to obtain FSSAI registration and other legal compliances. Each associated vendors need to develop their own brand name, as it shall gain more customer confidence and professionalism in procedures. A dedicated distributor group with order management shall be more feasible. However the price of the stock needs to be fixed by farmer or fishermen and distributor should be eligible only for margin per order or per kilogram sales. Customer pooling or pre orders could channelize more bulk sales. Extensive orientation program needs to be carried out to extend the grass root level beneficiary groups. The program needs to be extended through fisheries institutions of the nation to bring transformation and scalability.