Chapter 20

ICT Application in Fisheries

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Introduction:

Information played an important role in all societies since the dawn of civilization. In the initial years use of ICT was limited to academic and research institutes along with costly to access. However, with the passage of time its reach has touched every strata of the society as it has become the most popular and cost effective way of sharing knowledge and information.As we thought that what do fish and fishing have to do with computers, internet and communications? On the outset, nothing... however, information technology is playing a significant role in the modernisation and growth of the fishing industry. This traditional industry is facing economic and environmental pressures, as well as ever changing regulations. Such pressures have led the fishing industry to invest in information technology to maintain sustainability and streamline its operations and be more effective and efficient. The world is undergoing an Information Communication Technology (ICT) revolution, a revolution that has enormous socio-economic implications for the developed and developing countries.ICTs play a vital role for the development of the status of fisheriessector both in marine and inland fisheries in our country. The latest ICT application will transform the fishermen lifestyle as well as their livelihood activities mainly profit motive by reduce their cost of operation and also reduce the vulnerability by timely getting of information which paving the way for social equity and ultimately uplifting fishermen to the mainstream. Nowadays clearly seen that there is fast expansion and development in the fisheries sector through ICTs such as GPS, Navigation, satellite communication and wireless connectivity etcwere significantly contribute in the field of fisheries sector globallycompare to the older technologies such as radio and television.Different initiatives in ICTs have been taken up which would also help in expanding and developing the fisheries technologies to the fisher communities.However, the rural people still have difficulties in accessing crucial information in forms they can understand in order to make timely decisions. New information and communication technologies are generating possibilities to solve problems of rural people and also to promote the aquaculture production by providing scientific information to the fishermen communities.

It is vividly believed that ICT as a basic resource for development, a number of ICT tools used in fishing such as mobile phone, television, radio, GPS, fish finder, can bring significant changes in the development and reduction in the level of poverty of different communities including the fishermen (Kularatne, 1997). ICT play an important role to linking the knowledge among all stakeholders such as researcher, fisheries officials, etc by improving the linkages between the researcher and clients. This will mainly save the cost, time and energy of the fishermen especially through mobile used by the fishermen will provide best price for their catch before brought into

the landing centre. With the help these technology fishermen were moving farther into the deep sea getting better catch high value fishes. This will highly helpful for the fishermen to take decision from the various constraints such as higher operational cost, more investment, decline in the fish catch rate, less infrastructure facilities, and low profitability. All these factors are affecting the overall performance or fishing efficiency. Using ICT application in fisheries will be advantage for the fishermen to reduce their operational cost as well as increase their quantity of catch. But the rural communities in the developing countries like India still lack basic communication infrastructure were seen.

I. **Basic of ICT:**
   a. **Information technology (IT)** is the use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data. Eg letter, Photograph, Digital sensor, GPS, satellite.
   b. **Communication:** it act as a medium to transport information from one to another eg: internet, mobile network, local and wide area network.

   Thereare four basic types of computers are as under:

   - Supercomputer:Eg. China having world fastest super computer namely "Tianhe – 2" Super computer
   - Mainframe Computer: Eg. Fujitsu's ICL VME, Hitachi's Z800
   - Minicomputer: production department can use Mini-computers
   - Microcomputer: Desktop computers, laptops, personal digital assistant (PDA), tablets & smartphones

   c. Hardware refers to the physical parts of the computer such as monitor, keyboard, mouse, and system unit or periphereal device. Whereas the software is all programmes that the user interact with them to carry out the specific task such as Microsoft windows-MS word, internet explorer - Google chrome (search engine), E-mail, cloud storage is back up of data and syncs data that accessible on multiple devices with anytime and anywhere.

In the era of information technology we are spending more time in online using computer, smartphone and tablets and access the facilities such as speaking with people in real time, video chatting, using Google maps for directions, E-learning, e-banking, e-commerce, e government and social networking. Thefishermen's are nowadays using mobile phone for various facilities and also to access the information related to the fishing aspects.There are different tools of information and communication technologies were used in the various fields of fisheries sector such

ICT Technologies applied in fisheries sector
Various Information Communication Technologies (ICT) application tools by fishermen
There are various tools were used by the fishermen to communicate and increase the fish catch such as Whats up, Television, Radio, Mobile, Global Positioning System (GPS), GPRS, Echo sounder, Sound Navigation and Ranging (SONAR), Search and Rescue Transponder (SART), Automatic Identification system (AIS), Distress Alert Transponder (DAT), Internet enabled PC,

Radio Deduction and Ranging (RADAR) , Community Radio, portal, Very High frequency wireless sets (VHF).

Radio and television

Radio and television also play important role in the development of the fishermen. Several studies have been conducted and revealed that more than half of the fishermen have their own radio set. Some of the fishermen have listened radio programmes on fishing related issues

Internet technologies: Internet refers to network of networks. In this network each computer is recognized by a globally unique address known as IP address. A special computer DNS (Domain Name Server) is used to give name to the IP Address so that user can locate a computer by a name.It is the largest network in existence on this planet.The internet hugely connects all WANs and it can have connection to LANs and Home networks. Internet uses TCP/IP protocol suite and uses IP as its addressing protocol. Present day, Internet is widely implemented using IPv4.

Data communication: Data communications refers to the transmission of this digital data between two or more computers and a computer network or data network is a telecommunications network that allows computers to exchange data. The physical connection between networked computing devices is established using either cable media or wireless media. The best-known computer network is the Internet.

Network Basic Understanding

A system of interconnected computers and computerized peripherals such as printers is called computer network. This interconnection among computers facilitates information sharing among them. Computers may connect to each other by either wired or wireless media.

Identity technologies:

> **Barcoding** A barcode or bar code is a method of representing data in a visual, machine-readable form. Initially, barcodes represented data by varying the widths and spacings of parallel lines. These barcodes, now commonly referred to as linear or one-dimensional (1D), can be scanned by special optical scanners, called barcode readers. 2D barcodes, although they do not use bars as such. 2D barcodes can be read or deconstructed using application software on mobile devices with inbuilt cameras, such as smartphones.

> **Vessel tracking devices** - Vessel tracking devices such as the Pelagic Data Systems (PDS) tracker can be used to establish locations in which fish are caught and landed. These data can serve as part of a digital record of seafood provenance.

> **Supply chain tracking software** - A number of software systems are now available for tracking fish through the supply chain in order to reduce fish fraud and reliably transmit information about the seafood to buyers. First, the fish must be labeled with a unique identifier. For high value products, a QR code, barcode or NFC-enabled labels (small passive electronic disks that encode information and are activated by the magnetic fields produced by smartphones) might be required to ensure sufficient security. For other products, text messages or app input fields that include information on where the fish was caught, how it was caught, how it was handled, where it was landed and other

information can be validated by trusted entities, such as local NGOs with no financial stake in the fishery

Sensors:

Environmental monitoring of aquaculture for the current means of monitoring equipment and a weak infrastructure, relatively backward status quo, using wireless sensor technology, embedded computing technology, MEMS technology (Micro-Electro-Mechanical Systems), distributing information processing technology and wireless communication technology to build the wireless network sensor network system. This system is a digital, networked, intelligent real-time dynamic for monitoring the aquaculture water quality. The system not only can deal the normal detection of the aquaculture environment indicators (temperature, PH, dissolved oxygen, turbidity, ammonia, etc.) in real-time monitoring,

Image processing:

The FishAPP mobile application software enables smartphones and tablets to capture the photo of a fish, or to select one from the local device photo library, and to connect with the FishAPP remote server. FishAPP mobile software has been developed with PhoneGap, a free and open source framework that allows to create mobile apps using a set of standardized web APIs for the desired platforms. The photo must include the full fish and it needs to respect the following guidelines: The fish must be photographed sideway; The caudal fin must be arranged in the relaxed anatomical way; Other fins should be set in a close-fitting manner. Since lifeless fishes cannot keep the fins completely visible we opted to consider only the caudal fin as an anatomical discriminative feature.

Data management:

Web-based Seafood export management software system that simplifies and helps you in a smarter way to increase your business productivity and profitability.

The inventory could operate multiple warehouse locations. It calculates the true yield and margin on everything you cut and meeting the unique challenges of weight, products where yields, collection hub, product accounting, settlement processing, catch weight, multiple freezer/warehouse and Shipment.

Server Side: Web server, Search Engines
Clients side: Browsers, Apps
Cloud : Google drive, icloud, drop box, Skydrive
**Access Devices:** Desktop, Laptop, tablet, smart phone..

II. Application of ICT solutions in fisheries sector:

1. **Advisories:**
   Indian Marine Fishery Advisory System: Dissemination of PFZ Advisories:

SMS, IVRS, Help lines, Voice Messages, Information Kiosks, etc. through Location Based, New Generation E.D. Boards, , Doordarshan, E.D. Boards, News Papers, E – mails, Website with Web GIS Facility, Phones & Faxes

Figure:1**Indian Marine Fishery Advisory System**
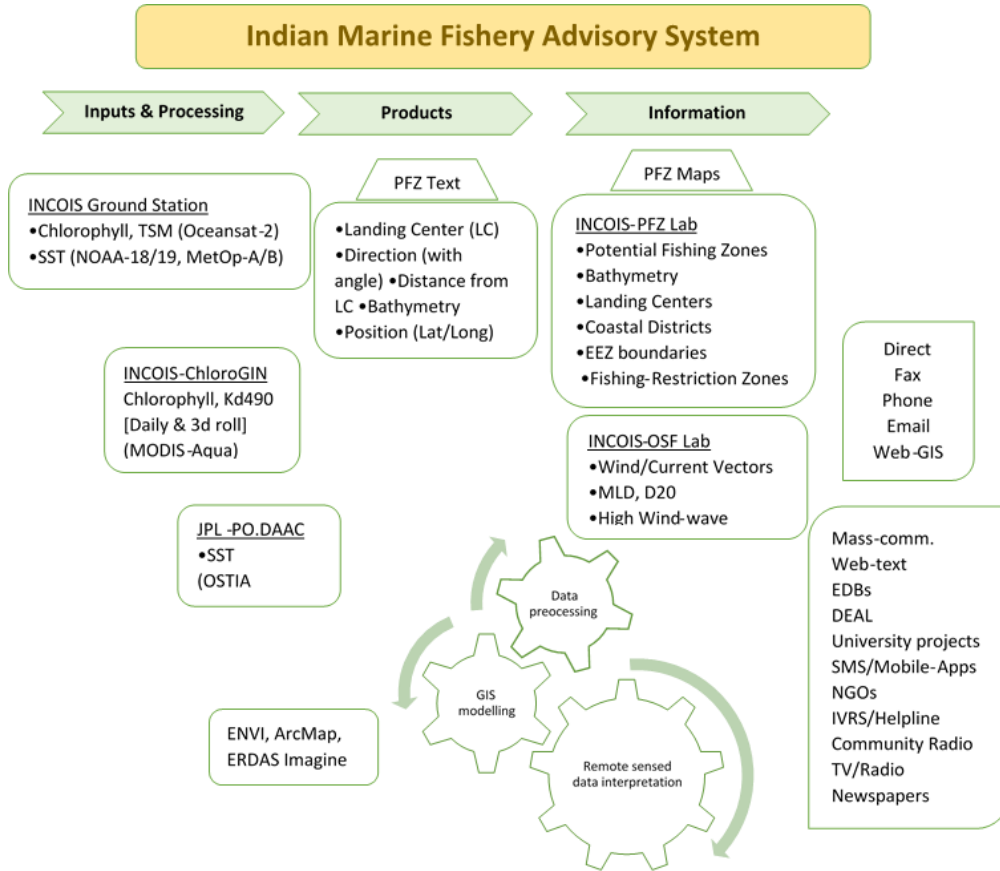
Web-based Dissemination

Unique website for multi-lingual advisories. Provides information in eight local languages (Gujarati, Marathi, Kannada, Malayalam, Tamil, Telugu, Oriya, Bengali) as well as in Hindi and English. Web GIS Facility without any commercial package installation. Retrieve PFZ information pertaining to any area in the Indian EEZ of their interest by doing simple GIS operations.

Mobile phone

Using mobile phones, fishermen are able keep themselves up to date with regard to prices and quality of fish in surrounding markets which ultimately enhance their income (Jensen, 2007). In addition, mobile phones have provided easy access to the fishermen to search the best prices for their catches in different markets (Evoh, 2009). Mobile phone penetration in rural India has revolutionized information access as also connectivity between people, the mobile phones not only have provided information with regard to market information to the fishermen but also have facilitated about weather. Mobile phones allow fishermen to avoid potential losses to boats and nets as well as risks to personal safety. Emergency and safety benefits were consistently described as the most important impacts on their life (Mittal, &Tripathi, 2009). It has been also observed that the coastal fishermen use SMS as a cheap way to get information about weather before go to sea. Fishermen also obtain information about emergencies and acting on weather forecast to return safely at sea for fishing

The use of mobile phones in the small-scale fisheries sector shows promise. In India, mobile phones are being used by fishing communities, and fisheries inspectors, respectively, to report cases of illegal, unregulated or unreported (IUU) fishing. However, the use of mobile apps for fisheries catch landings is scarce, and freely available, modifiable, fisheries apps were not available at the start of this trial. Instead only consultancies offering their services apps,Liaising with the following service providers for disseminating the PFZ, OSF and Tsunami warnings through their Mobile Networks.

Architecture of Help Line Services (INCOIS-MSSRF)
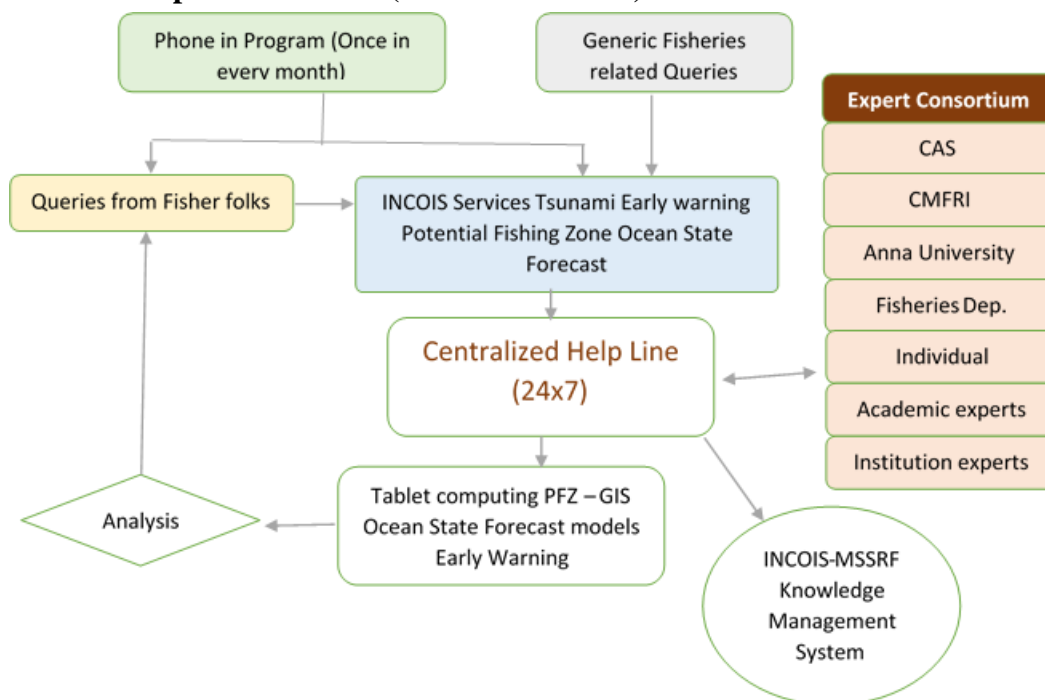
PFZ Advisory:

This app can be used for disseminating Potential Fishing Zone (PFZ) advisories to fishermen living in coastal areas of India in English language. It also provides daily advisories to fisher folk about presence of chlorophyll, sea temperature, water clarity and help them easily locate areas of abundant fish in the ocean while saving on both fuel and time used to search for the same.

mKRISHI:

mKRISHI® Fisheries is a mobile app developed by Tata Consultancy Services (TCS) Innovation Lab – Mumbai, in collaboration with ICAR- Central Marine Fisheries Research Institute and Indian National Centre for Ocean Information Services (INCOIS) Hyderabad. This app is a result of multi-dimensional research and field work involving the best of the expertise of all the partner organisations. INCOIS generates Potential Fishing Zone (PFZ), a fish shoals prediction information based on the remote sensing data received from NOAA satellites, sea surface temperature and the presence of phytoplankton which form the food of several fish species. mKRISHI® Fisheries app consolidates these information and presents advisories in local language,

CIFT Lab Test

ICAR- Central Institute of Fisheries Technology, Cochin, an ISO 9001: 2008 certified organization has been recognized as a National Referral Laboratory for Fish and Fishery Products by Food Safety and Standards Authority of India (FSSAI) under Ministry of Health and Family Welfare, Government of India. ICAR-CIFT has developed an innovative Mobile Application christened as "CIFT Lab Test"

intended for providing information related to different types of sample testing and analysis of various fish and fish based products, fishing gear materials, packaging materials, microbiological parameters, quality parameters of ice and water samples etc.This Mobile App may be useful for the aquaculture farmers, processing industries and other stakeholders in the sector to access the contents of different lab tests as per their interest through online and get the desired information on quantity of sample required, time required for test report and cost particulars etc. available at 24X7 times.

CIFT Lab Test
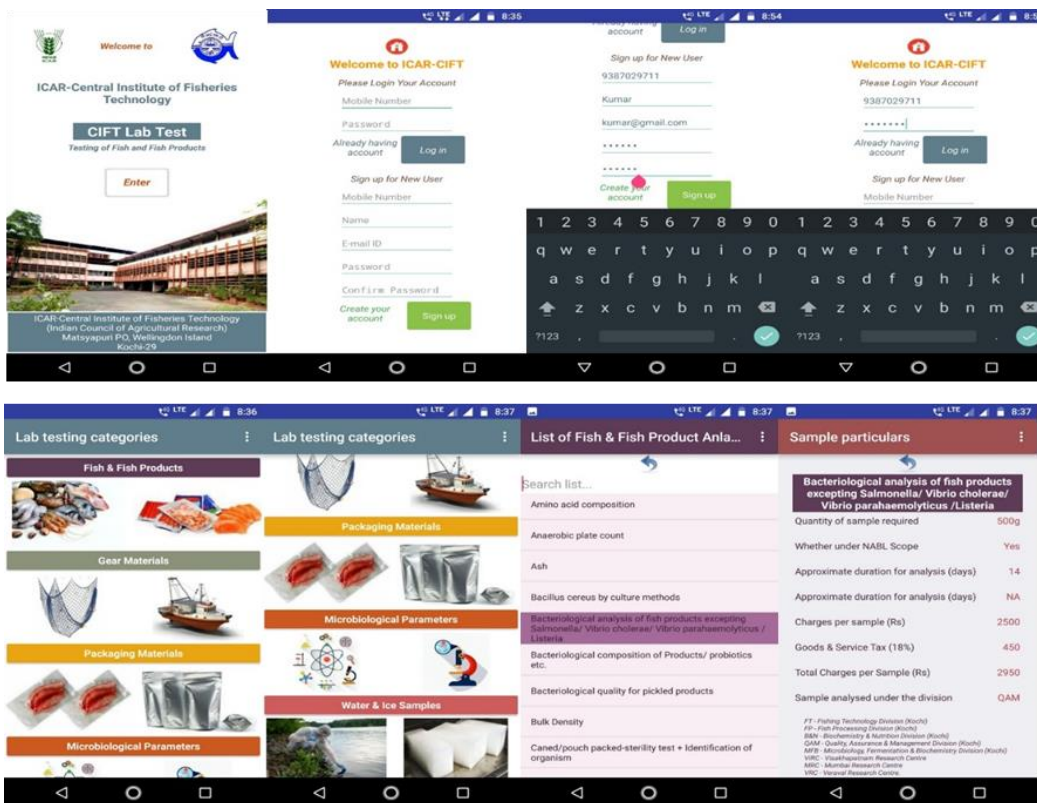
CIFTraining

ICAR-Central Institute of Fisheries Technology, Cochin has developed an innovative Mobile Application christened as "CIFTraining" that provides a complete package of information on ICAR-CIFT Training programmes. This App is highly useful for the fisheries students, researchers, industry personnel, state extension personnel, fisheries based entrepreneurs, fishers and other stakeholders in the sector to access the online information at 24X7 times regarding different types of training programmes in the field of Fishing Technology, Fish Processing, Biochemistry & Nutrition, Microbiology, Quality control, Engineering and Extension & Economics.

The "CIFTraining" Mobile App has embedded with a total list of 68 types of clientele based trainings programmes available in ICAR-CIFT, which contain 60 regular training courses along

with 2 comprehensives, 3 specialized and 3 certified courses covering the themes of seven divisions. The "CIFTraining" mobile app will help the stakeholders to search the training of their interest and see the training programme details like course contents, course fee, duration, eligibility and other facilities at fingertips, so that the right stakeholder can opt for right training programme for improving the technical knowledge and skill in the concerned field. Finally applying the training programme through online registration mode.
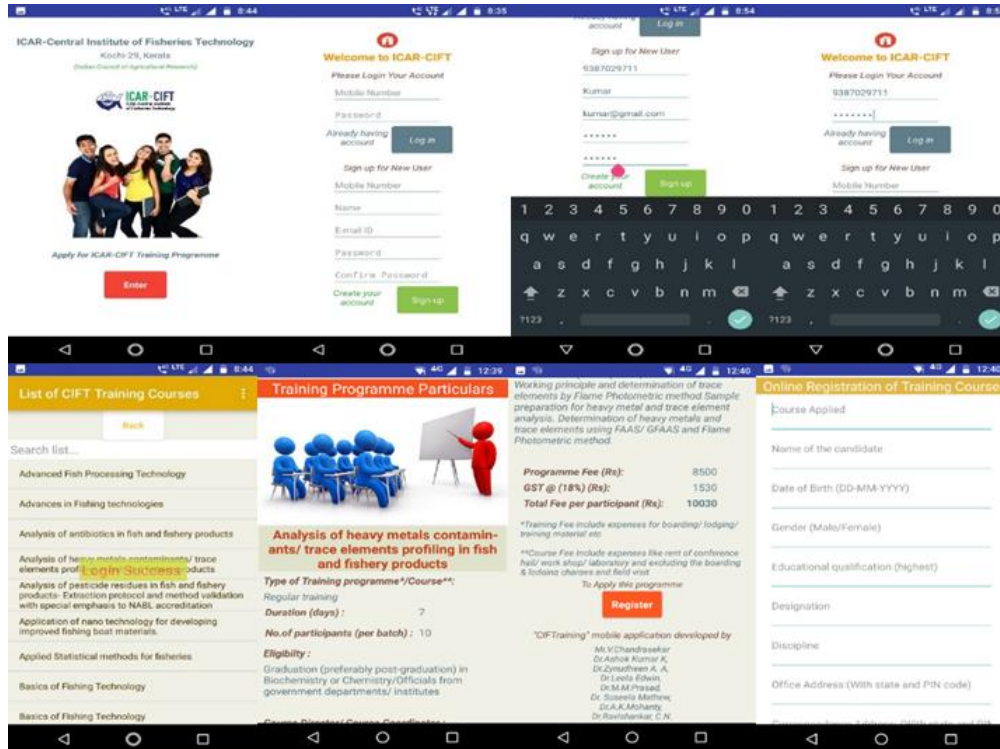
Fisher Friend Mobile Application

Developed on Android mobile platform which supports English, Tamil , Telugu, odiya and Malayalam languages

FFMA provides following facilities to fisher folks:

- Potential Fishing Zone
- GPS facility
- International Border Line Alert
- Ocean State Forecast
- Disaster Alert

- Weather Forecast
- Government Schemes
- Market Information
- News
- Important Contacts

E-Commerce in fishery

www.marinefishsales.com is developed under the NICRA project of ICAR-CMFRI as an innovative multi-vendor e-commerce. The platform is made available as an android application

for mobile phones to facilitate direct sales between fisherfolk and the customers. The app envisions reasonable prices as direct sale between fishermen / farmer to consumer is facilitated.

Daily fish: The voyage of your 'Daily Fish' from 'catch' to 'kitchen' has never been so world class. Daily Fish, the online seafood store serves you ready to cook seafood which is 'As good as Live' with all the goodness of nutrients stored in it. This is in step with the vision of Baby Marine; promoters of Daily Fish and one of the leading exporters of marine products from India to Europe, US, South America, Japan, South East Asia, Gulf, South Africa and Australia for over four decades.

Decision support system:

A decision support system (DSS) is a computer-based application that collects, organizes and analyzes business data to facilitate quality business decision-making for management, operations and planning. A well-designed DSS aids decision makers in compiling a variety of data from many sources: raw data, documents, personal knowledge from employees, management, executives and business models. DSS analysis helps companies to identify and solve problems, and make decisions.

Types of Decision Support Systems (DSS)
These can be categorized into five types: Communication-driven, data-driven DSS, document-driven DSS,knowledge-driven DSS and model-driven DSS

Example: Aqua manageris a comprehensive, integrated software solution for improved efficiency in aquaculture industries. It is a complete fish farming software that supports all stages of fish production, from hatchery to harvest.

Supply chain:
Integrating technology into a supply chain can be a challenge, and the seafood industry is no exception with the advent of traceability technology that monitors the catch from water to plate.
As more consumers demand to know where the fish they eat comes from, companies have started developing high-tech solutions to capture, receive and transmit data across every component of the seafood supply chain, from fishermen to processors, transporters, distributors, and retailers.

Traceability:
Traceability is linked to the validity of seafood labels that boast about a product's sustainability, authenticity, location and other factors important to consumers. Providing a socially responsible product can translate to higher profit margins, enhanced customer loyalty, and improved brand reputation.Suppliers are under increased pressure from consumers and retailers to provide traceability for their products.Traceability is seen as a way to soothe such worries.Traceability technology can mitigate risks and limit the impact of public health incidents.
A unique ID code for fisheries and its application in traceability and data-sharing The unique codes for fisheries maintained as part of the Global Record for Stocks and Fisheries (GRSF) will save time and money for the seafood supply chain, traceability/technology companies, governments, and non-governmental organizations (NGOs).

The GRSF, the Global Record of Stocks and Fisheries, integrates data from three authoritative sources: FIRMS (Fisheries and Resources Monitoring System), RAM (RAM Legacy Stock Assessment Database) and FishSource (Program of the Sustainable Fisheries Partnership).

Microfinance: Still it is not developed specifically for fisheries so microfinance application in fisheries sector will may try to reduce accounting work of self help groups. The app contains centre, region, unit, SHG and member logins. Each members and their heads can use this app with their account. Network connection is needed for this app. Simple UI and easy to use.

Aquaculture farm management:

Fisheries plays an important role for livelihood and food security of millions. Diseases form a major setback/hindrance to the fish production including both wild capture and culture system. As in natural open waters diseases spread very quickly than the culture system, therefore documentation of disease outbreaks, timely diagnosis and cataloguing of pathogens combinely could help in developing remedial measures or chemotherapy to combat against the disease outbreaks.

Various ICT tools used for fisheries sector:

 1. **Fisheries repository management:**

     a. **Fish Base**

Fish Base is a global biodiversity information system on finfishes. Its initial goal to provide key facts on population dynamics for 200 major commercial species has now grown to having a wide range of information on all species currently known in the world: taxonomy, biology, trophic ecology, life history, and uses, as well as historical data reaching back to 250 years.

At present, FishBase covers >33,000 fish species compiled from >52,000 references in partnership with >2,000 collaborators: >300,000 common names and >55,000 pictures. https://www.fishbase.de/home.htm

 2. **Identity management:**

AIS (Automatic Identification System)

The Ship borne Automatic Identification System (AIS) is a vessel tracking system capable of communicating navigation information automatically between AIS equipped vessels and coastal authorities. It is a collision avoidance system that gives information all the ships in your area, their speed and courses and how to contact them (name, callsign, MMSI). This information is publically broadcast on VHF radio which can be picked up either by other ships or by shore-based receivers. Main purpose to improve the safety of navigation by assisting in the efficient navigation of ship, protection of the environment, and operation of Vessel Traffic Services (VTS), by satisfying the following functional requirements In a ship-to-ship mode for collision avoidance, As a means for littoral States to obtain information about a ship and its cargo and As a VTS tool, i.e. ship-to-shore (traffic management).

Location recognition:

a. **GPS (Global Positioning System)**

A network of satellites that continuously transmit coded information, which makes it possible to precisely identify locations on earth by measuring the distance from the satellites. As stated in the definition above, The satellites transmit very low power radio signals allowing anyone with a GPS receiver to determine their location on Earth

The advantage is that the global positioning system (GPS) enables the fishermen to plot a course to the potential fishing area. A fisherman can plot his course from any location by using stand-alone GPS, which can work without a mobile network

b. Fish Finder:

It provides valuable information to help you locate rich fishing grounds and boost your catch the Bottom Discrimination Function - Analyze bottom structure Configurable Alarm function (depth, fish echoes, etc.) Post-processing Gain Control applied to all echoes displayed on the screen Share and display information on a chart plotter

Very High frequency wireless sets (VHF)

VHF has been retained for short distance communications but the range is limited under normal circumstances to less than 20 nm. VHF channels at sea especially the distress, safety and calling Channels 16 (156.8 MHz) and 70 (156.525 MHz)

age of social media, especially among the youth is increasing day by day. In this context, a study was conducted to identify the internet and social media usage by students as well as their mode of accessing professional (fisheries) information through social media.social media has been classified into two types, namely social networking sites, and Instant messaging applications based on both form and content of the media

Social Networking Sites	Instant Messaging Applications
Instagram	WhatsApp
Twitter	FB Messenger
Pinterest	Yahoo Messenger
Google plus	Skype

Google groups	Google Hangouts
ResearchGate	IMO
Google Scholar	Snap Chat
Wikipedia	Viber
Facebook	Hike
YouTube	Telegram
LinkedIn	We Chat
BharatStudent	

Server Side: Web server, Search Engines
Clients side: Browsers, Apps
Cloud: Google drive, icloud, drop box etc
Access Devices: Desktop, Laptop, tablet, smart phone..

The Department of Fisheries through the following agencies serves this sector.
Information source exposure: Seminar, workshop, Training programme, scientific books/ Literature, Fisheries related magazine and other publications, radio programme, Television programme, Exhibition, Newsletter, Mobile help line communication, News paper, NGOs and others,
Fisheries related government organisation:
   a. Fisheries Department
   - Kerala State Cooperative Federation for Fisheries development Ltd (Matsyafed), http://www.matsyafed.in/
   - Agency for Development of Aquaculture, Kerala (ADAK),
   - Kerala Fishermen's Welfare Fund (KFWEB),
   - State Fisheries Resource Management Society (FIRMA),
   - Fish Farmers Development Agency (FFDA),
   - Kerala State Coastal Area Development Corporation(KSCADC),
   - National Institute of Fisheries Administration and Management (NIFAM),
   - Society for Assistance to fisherwomen (SAF)
   - Kerala Aquaventures international limited (KAVIL)
   b. MPEDA, Fisheries College, Research institute, CMFRI,
   c. KVK, ATIC, AFCA, CIFNET, CIFT, NGO,
Mass media:
Newspaper, Magazine, Newsletter, Farm Journals, Periodicals, Exhibitions, TV, Radio, Internet, Video lessons.

Social organization:

Village panchayat, Co-operative credit, Co-operative group, Fisheries co-operative society, Fishermen association, Community organization, Harbour mechanised boat association,

Initiatives in Fisheries Sector and aquaculture in India (CIBA 2012)

Aquaculture is technology driven farming enterprise and the aqua farmers are looking for quality information in time at an affordable cost. ICT aided tools like e-learning courses, epublications, compact discs, short films, mobile telephony, Phone in programme, information kiosks, expert systems and decision support systems have developed and implemented in a limited scale as projects or programmes. Some of the initiatives are detailed below.

1. E-learning courses on aquaculture: With the financial support of National Agricultural Innovation Project (NAIP), of Indian Council of Agricultural Research (ICAR), the College of Fisheries, Mangalore and Fisheries College and Research Institute, Thoothookudi have developed the e-learning courses for undergraduate fisheries programme to enable the students throughout the country to acquire more effective learning systems. The e-learning courses would enable the students to interact with the teachers more effectively to enhance their knowledge and skills apart from providing them an anytime and anywhere learning opportunity (ICAR 2012).

2. The 'Phone- in' Programme (PiP): PiP is an e-initiative and service facility where farmers/ fishermen can telephone and record their queries on a given telephone number. They would be called back and provided the required information. At the time of live interaction, they can ask questions to the experts at the station and get replies to their queries immediately.

3. Technology dissemination through mobile phones: Mobile phones are the most important medium through which short messages on farming and related aspects can be communicated to the farming community as well as extension workers. Based on a detailed information need assessment the subject matter is made as short technical messages and were disseminated via SMS for the officials of Department of Fisheries of states and farmers in vernacular languages.

4. Village/ Rural knowledge Centre: The Village/ Rural knowledge Centre is the initiative of M.S. Swaminathan Research Foundation (MSSRF) to help ensure food security. The centre provide the rural communities access to a variety of information in fostering agricultural and allied sectors through a hybrid wireless network comprising computers, telephones, VHF duplex radio devices and facilitating both voice and data transfer. It also provides information regarding fish density in the ocean to the fishers. Its primary aim is to set up multipurpose resource centres at the villages of the country. Each Knowledge centre is run by local self help groups, and cater to knowledge based livelihoods and create income avenues for rural people, farming communities and disadvantaged people

5. **Kisan Call Centre:** The Department of Agriculture & Cooperation, Ministry of Agriculture, Govt. of India launched Kisan Call Centres across the country to deliver extension services to the farming community. A Kisan Call Centre consists of a complex of telecommunication infrastructure, computer support and human resources organized to respond to queries raised by farmers in their local language. The subject matter specialist using telephone and computer, interact with farmers and answers the queries at the call centre.

6. e-Sagu Aqua: e-Sagu Aqua is an ICT based tool for personalized aqua-advisory system. It aims to improve farm productivity by delivering high quality personalized (farm-specific) aqua expert advise in a timely manner to each farm at the farmer's doorstep. The aquaculture extension services are extended through ICT tools like database, internet and digital photographs.

7.Aqua-Choupal: The Aqua-Choupal model in Godavari districts of Andhra Pradesh, a web supported initiative of the Indian Tobacco Company (ITC) was designed to provide market and farming related information to enhance farmers' productivity and their farm-gate price realization. the unique web based initiative of ITC Ltd. offers the farmers of the state of Andhra Pradesh all the information, products and services they need to enhance productivity, improve farm gate prize realization and cut transaction cost. Farmers can access information on weather, scientific farming practices and market prices through a web portal. Aqua choupal also facilitate the supply of high quality farm inputs as well as purchase of shrimps at their doorstep

8.e-TSA: The extension module on Tiger Shrimp Aquaculture (e-TSA), a PC based application was developed for knowledge management and dissemination of Better Management Practices (BMP) of tiger shrimp (Penaeus monodon). Information on BMPs has been covered under ten headings, viz., site selection, pond design and construction, pond preparation, seed selection and stocking, feed management, water quality management, health management, waster water management, harvest and post-harvest management, and shrimp farm bio-security. The e-TSA also assists the user in identifying a shrimp disease and its management through selection of symptom(s) provided in the system, apart from assisting in calculation of lime, fertilizer, chlorine and daily feed requirement for shrimp farming activity.

9.Decision Support Systems: The Decision Support Systems (DSS) like carrying capacity based aquaculture planning in a given creek, multi-criteria based site selection tools for brackishwater aquaculture site selection have been developed by CIBA.

10.Farmer-friendly touch screen information kiosk on BMPs in shrimp culture: A vernacular based information kiosk with touch screen facility on BMPs of shrimp culture was developed and dedicated to the small scale farmers.

11.one stop aqua shop : One of the major recommendations of DFID funded project "Investigating improved policy on aquaculture service provision to poor people" was to establish one stop aqua shop (OAS). It is intended that OAS would provide better access to farmers regarding appropriate aquaculture technology as well as information on government schemes and rural banking and micro finance.

Apart from these, farm advisories, success stories and important information which are to be informed to the end users immediately are being uploaded as e-publications in the websites of the institutions concerned, and short duration video-film on different aspects of aquaculture are being produced especially in local languages.

12. Helpline: Leveraging on the IT revolution in India and the increasing penetration of telephones in villages, many State Agricultural Universities and ICAR institutes have started helpline services. The helplines address queries related at specific hours. The helpline number is advertised through mass media viz., radio and press

APPLICATION OF ICT FOR AQUACULTURE

Globally, ICT has been widely used for the study and improvement in various aspects of fisheries including, research and education. As in any farming enterprises, health management is the key subject in aquaculture too, and aptly, ICT aided tools have been most widely applied in the field of fish disease diagnosis and health management, apart from its application in other areas viz., aquaculture site selection, aquaculture farm management and aquaculture produce marketing.

Expert Systems

The expert systems are the computer applications developed to solve complex problems in a particular domain, at the level of extra-ordinary human intelligence and expertise.Development of Expert System for Shrimp Aquaculture (ESSHA) involved five steps viz., problem selection, knowledge acquisition, knowledge representation, system design and development as well as system validation (Zetian et al., 2005).

Expert Systems in Fisheries Sector:

Expert systems are rapidly becoming an integral part of applications in a number of domains ranging from traditional manufacturing processes to applications in outer space. Expert systems have been shown to improve traditional approaches by as much as an order of magnitude. There are number of areas, including fisheries and aquaculture, in which the return on investment in an expert system can be tremendous.

Categories of Expert Systems developed in Fisheries

1 Fish identification

2 Fisheries management

3 Aquaculture management

4 Fish Disease diagnosis and health management

5 Fisheries information management

6 Fish product marketing

Social media in fisheries science

• Blogs. • YouTube. • Facebook. • Flickr. • LinkedIn. • Ning. • Vimeo. • Twitter • Webinars • Skype • Instagram • Pinterest • Videos • Discussion Forum

https://twitter.com/FisheriesBlog

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