Article Id AL04149

USE OF MOBILE APPS IN AQUACULTURE SECTOR: ITS ADVANTAGES

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The primary vital purpose of smartphone victimization is for its applications, which can be downloaded from the Play store. These mobile applications help both aquaculture and fisheries. Fishermen will be ready to build a more pleasant fishing duty by using a mobile application, and a lot of profit may be taken from cultivation by diagnosing fish health diseases in time. The victimisation of trendy technologies in fisheries and agriculture would be beneficial in supporting higher cognitive processes for developing and managing land use and alternative natural resources. There were 124 mobile apps in the fields of Angling, Aquaculture, Aquarium Management, Marine Fisheries and Fisheries Governance, Marketing, and Biology, out of which 22.58 percent of the apps were of Indian origin.The software market for precision agricultural tools is expected to grow, and there is a need for fisheries organizations to collaborate with information technology providers to come out with solutions that are visionary for both sustainability and profitability.

Fisheries and aquaculture are one of agriculture's fastest-growing subsectors. It plays an important role in meeting out the food and nutritional security of the growing population. The sector plays a major role to contribution in global food production and prosperity (Dhenuvakonda and Sharma, 2020). Nowadays, mobile phones are a necessity for everyone in their day today life. The usage of mobile applications has become essential in several fields. Smartphone apps were initially designed for productivity assistance such as email, calendar, and phone databases; however, the general public demand for apps caused speedy enlargement into alternative areas such as mobile games, works automation, GPS and location-based services, order-tracking, and price ticket purchases. The public's demand leads to the invention of numerous apps in various fields. Applications are usually downloaded from application conveyance stages that are worked by the proprietor of the mobile OS, for example, the App Store (iOS) or Google Play Store (Zhang and Adipat, 2005; Sarwar and

Soomro, 2013). This article discusses the use and importance of smartphone mobile applications in fisheries and aquaculture. Mobile phones have significantly reduced the cost of communication and information. More than just hardware, the smartphone has inaugurated in a new era for software developers all over the world (US. App Economy,2017).Fisheries sector has not been left untouched by this digital revolution. Aquaculture is one of the leading revenues generating industry. Current fisheries production of India (2020-22) is 14.14 million metric tonnes (HoFs, 2020). Now the government is launched a scheme PMMSY (Pradhan Mantri Matsya Sampada Yojana) for improving the fisheries and aquaculture sector for future. For this scheme, government has allotted Rs. 20,050crores. For achieving this, better awareness is needed among the farmers and fishermen's. This digital platform will help in achieving the production of sustainable and profitable aquaculture and fisheries. As per Amrita and Karthic (2016) usage of mobile applications is becoming popular in the fisheries sector in developing countries.

Use of Mobile Apps in Aquaculture and Fisheries Sector

The fishing community is one of the most vulnerable groups, facing a number of challenges that threaten their lives and livelihoods, such as unpredictable weather and ocean states, danger zones at sea, a lack of GPS information on the fish shoal, quality fish processing, value addition and storage, market trends, and government schemes. Mobile phones reached great heights in markets because it provides information in real time. By using Mobile Application, ocean Fishermen can do their work easily and safely as they get timely updates (Abbibrinda *et al*., 2020). The mobile apps which were providing information to fishers/users on topics related to fisheries/aquaculture were studied. A total of 124 mobile apps could be found in the fisheries sector. Out of these highest percentage i.e., 49.19% were from marine fisheries followed by aquaculture and angling. Aquarium management had 8.06% of apps (Sharma and Dhenuvakonda, 2019)**Table 1**.

Sl. No.	Field	Number of mobile apps	Percentage (%)
1.	Aquaculture	20	16.12
2.	Aquarium Management	10	08.06
3.	Angling	18	14.51
4.	Marine Fisheries	61	49.19
5.	Fisheries Governance, Marketing and Biology	15	12.09
	Total	**124**	

Table 1: Mobile apps in fisheries sector

Mobile Apps for Aquaculture

In the field of aquaculture, mobile apps provide information about inputs, new advancements, market prices etc. The table 2 show that there are 20 apps in the field of aquaculture. Out of these there are 10 apps which are of Indian origin. These are Aqua app, Aquadeals, AquaBrahma, m-KRISHI Aqua Service, Pescare, Vanamei Shrimp app, Aquall app, Fish Disease Advisory, Fish Names and IndAqua.

Sl. No.	Mobile app Name	Features
1.	Aqua app	✧ Locate manufacturers of feed ✧ Statistics about weather ✧ New advancements in aqua culture ✧ Up-to-date market prices
2.	Aquabrahma	✧ Connect farmers and suppliers ✧ Information on suppliers, hatcheries
3.	Aqua deals	✧ Information on feed, health care, machine and equipment like aeration tubes, aerators, blower, paddle wheels, pipes, pumps, testing kits, hatchery machinery, and fish cages ✧ Deals for seed, feed, health care, machinery and farm equipment
4.	Aquaimate	✧ Has a collection of freshwater and saltwater fish, corals, invertebrates and plant species Record parameters test results. ✧ Customize parameters and calculate the required dosing ✧ Create husbandry tasks and set up reminders for them with an advanced scheduling system ✧ Monitor activities integrated with tasks and reminders
5.	Aqua Plant	✧ Identification and management of pond vegetation ✧ Treatment options which includes biological, mechanical and herbicide controls
6.	Aqua Reef	✧ Includes pond filling time ✧ Pumping rate equivalents ✧ Discharge rates from standpipes ✧ Net mesh sizes for grading fish ✧ Length/weight relationships for fish
7.	Aquatic Log	✧ Ability to log water parameters ✧ Record dosing additives and supplements
8.	Fish Advice	✧ Education app contains various picture of fish disease, symptoms, preventive measures, fish culture methods ✧ Information on fish feed sellers, fish medicine sellers, fish farm owners, local extension agents
9.	m Fish	✧ Set of mobile applications for fishing and aquaculture that educates and connects fishers to market prices ✧ Gathers information directly from the fishermen ✧ Access to information such as weather data, fish prices at port, fish handling and best practices for safety

10.	m-KRISHI Aqua Service	✧ Alert remote farmers to cloud formation, rainfall and temperature ✧ Scientific information on water parameters in tanks, feed supply, growth of shrimp and atmospheric condition ✧ Tool for book-keeping, advisory and weather information services
11.	Pescare	✧ Insight into diseases that commonly occur in fish and shrimp aquaculture ✧ Brief description of their symptoms, aetiological agent, diagnosis, and treatment ✧ Tool to diagnose and prevent the occurrence of diseases in cultured fishes and shrimps
12.	Pondcalc	✧ Determine accurate area and volume of the pond for application of chemical treatments and herbicides
13.	Source Trace ESE™ Aqua solution	✧ Aquaculture operations and supply chain ✧ Real-time business intelligence ✧ Better resource management and pond health monitoring systems ✧ Geo-referenced farm data
14.	Texas Farm Pond Management Calendar	✧ Digital pocket calendar to keep private pond managers up-todate with the activities required to manage their pond for the best possible fishing
15.	Vanamei shrimpapp	✧ Information on the Better Management Practices of shrimp farming in the form of Frequently Asked Questions
16.	Aquall App	✧ Aquall is a one-stop place for seeds, feeds, chemicals, aerators as well as hardware products.
17.	Fish Disease advisory	✧ The app gives information about diseases, causative agents and remedial measures
18.	Fish Names	✧ Gives information about fish varieties and names in different Indian Languages
19.	Ind Aqua	✧ The app has technology modules for different fishes, the database of stakeholders, FAQs, updates, discussion forum.
20.	Aquatic Disease Field Guide app	✧ Helps to know about diseases that affect finfish, crustaceans, molluscs, and amphibians in Australia

Table 2: Mobile apps related to aquaculture

Provide the information about the mobile apps related to aquarium management.

With wholesale value of the global ornamental fish trade estimated to be in billion dollars there is a huge potential of mobile apps in this field. The table 3 show that there are 10 mobile apps which provide information on aquarium management. The Indian ornamental fish sector is a small but vibrant segment, but there are no apps developed which are of Indian origin.

Sl. No.	Mobile app Name	Features
1.	Ammonia Calc	✧ Calculate ammonia concentration ✧ Un-ionized ammonia calculator ✧ Resource for on-the-go aquaculture producers and

		manager as well as home aquarium hobbyists. ✧ Allows users to instantly calculate the un ionized ammonia concentration by providing water chemistry measurements such as pH and temperature
2.	Apex Fusion	✧ Monitor the health of aquarium based on current and past water parameters ✧ Control aquarium equipment (e.g., turn on or turn off light and pumps, adjust lightning spectrum, and change pump modes) ✧ See how fish and plants are doing via IP web cams ✧ Can remotely feed, enter crucial water testing parameters
3.	aquaPlanner	✧ Maintenance and scheduling with notifications, water test logging, calculators and equipment log ✧ Allows to adjust parameters and time for aquarium ✧ Let know when it is time to change the water, filter, carbon, fluorescent bulbs, add medication, and other.
4.	Aqua Planner Pro	✧ Task alert system ✧ Attend to all fish tank maintenance duties such as changing the water, checking water chemistry, adding medication and various supplements on time. ✧ Can log key water parameters, and monitor parameter changes on graphs
5.	Aquaria Pro	✧ Aquarium management ✧ Manage multiple aquariums, ✧ create to-do lists for various tasks and testing ✧ Monitor water parameters
6.	Aquarimate	✧ Manages both saltwater and freshwater aquariums ✧ Library contains information on saltwater fish and freshwater, invertebrate, plant and coral species ✧ Variety of tools such as tank parameters tracking and livestock tracking ✧ Task reminders, tank parameters and activity analyze. ✧ Advanced unit converters and dosing calculators.
7.	Coral Tank Pro	✧ Saltwater fish tank management ✧ Track 7 chemical levels with graphs ✧ Notifications and a countdown timer displayed on the home screen ✧ Store records of fish and coral
8.	Reef Tank	✧ Built-in tests: Calcium, Ammonia, Carbonate Hardness, Phosphate, Magnesium, Nitrate, Nitrite, Total Dissolved Solids Specific Gravity (Salinity), Temperature, and pH ✧ Chronological view of the data, track water parameters
9.	The Fish Room	✧ Information about reef tank ✧ Set and log custom chemistry goals for PH, Calcium, dKH, Nitrites, Nitrates, and more ✧ Keep track of fish and when to change lights and water
10.	Aquarium Note	✧ Record information of aquarium and count days from setup date, calculate expenses, log 24 water parameters and view trend with graphs.

Table 3: Mobile apps related to aquarium management

Provide the information about the mobile apps related to fisheries governance, biology and marketing

The mobile apps which provide information on fisheries governance, biology and marketing. A total of 15 mobile apps were found which provided information on governance, information and resource networks from fishery monitoring and maritime safety, resilience building, biodiversity information, listing of seafood exporters, track seafood volumes, prices and online marketing. 9 are of Indian origin and are Aqua Pulse, Daily Fish India, Healthy Fish, Marine fish sales, Matha Fresh Fish, Nallameen, Smart fish, Fresh Fish Cart and Fish Stop (Table 4).

Sl. No.	Mobile app Name	Features
1.	Abalobi	✧ Working towards good governance and adopting a fisheries approach based on human rights ✧ Enabling small-scale fishing communities to be integrated into information and resource networks from fisheries monitoring and maritime safety, local development and market opportunities ✧ Enabling social justice and poverty alleviation in the small-scale fisheries chain Resilience building in the face of climate change
2.	Fish Base	✧ Information on biodiversity for all world fish covering more than 34,000 species ✧ Includes biology, ecology, taxonomy, life history, trophic features and population dynamics
3.	Xiaoliu Online Fish Market	✧ Foreign seafood exporters can list their products on app ✧ Allows buyers to track seafood volumes and prices for product nationally, while also bidding for lots
4.	Aqua Pulse	✧ Shrimp purchase mobile app and acts as a bridge between companies and sellers
5.	Daily fish India	✧ It is an online seafood store, available in Ernakulam and Trivandrum.
6.	Healthy Fish	✧ Online marine fish, farm freshwater fish, Dry fish, Crabs, Shrimps, Lobsters delivery app
7.	Marine fish sales	✧ The app facilitates direct sales between fisherfolk and customers.
8.	Matha Fresh Fish	✧ Online seafood store
9.	Nallameen	✧ The app delivers fresh fish from the daily catch in and around Kochi
10.	Smart fish	✧ Online fish delivery app
11.	Fish.qa	✧ Qatar online fish purchase app
12.	Sydney Fish Market Supplier	✧ This app allows the registered suppliers access to daily auction prices
13.	Fish.me	✧ The app allows to shop directly from fishermen.
14.	Fresh Fish Cart	✧ Delivers all type of fish and sea foods with freshness
15.	Fish Stop	✧ Online fish market

Table 4: Mobile apps in fisheries governance, biology and marketing

Advantages of Mobile App in Aquaculture

The advent of mobile application development has allowed the farmers to work in a more efficient manner. Also, they play a major role in lowering down the costs involved. For achieving the Blue Revolution (Neel Kranti Mission) and making fisheries a modern world-class industry, the need is to embrace new technologies like blockchain, AI and IoT and mobile apps. These technologies can play an important role in ushering the blue revolution. The number of mobile apps in the market is increasing and is a big source of revenue generation. Mobile apps can help in the dissemination of the required information in the right form and at the right time. One of the benefits that modern technologies provide is that it promotes efficient resource utilization, minimizes human efforts in many life aspects.

Conclusion

In conclusion this modern world, usage of mobile application becomes mandatory in everyone's life. In developing countries, smart phone usage has become very popular. For prevention and precaution, the mobile applications are highly useful for the fisherman. Mobile application helps the fishermen to know the seller and buyer. More research is needed to know how many apps are successful by way of their downloads as well as user engagement and feedback. The software market for precision farming tools is expected to grow by 14% in the United States alone by 2022 in agriculture. In this background, it has to be realized by the policy makers that big data is moving into every field and fisheries cannot be left behind. In Indian scenario, there are more mobile applications have been developed but they have not reached the stakeholders, fishing community and fish farmers, due to language issues. However, there are some apps provide multilingual choice which is very useful to them. Thus, in future, the smartphone apps with user-friendly mode and provide much information in their local languages need to be developed for the welfare of fisherman and aqua culturist.

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