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Publication Trends in Aquaculture Research

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Abstract

The main theme of this piece of document is to review the literature related to aquaculture. Content analysis approach was adopted. The available literature was divided into two main groups: Local and foreign literature in the filed under study. It was pinpointed that a reasonable bulk of literature is available on this important financial entity of the world.

Key words: *Fisheries- Literature review, Aquaculture- Literature analysis, Aquaculture- Bibliometric, Statistical analysis- Fisheries*

Introduction & Objective of the study

Efforts were made to extract literature from leading data bases and search engines. The collected literature was categorized into two portions:

- Literature available at national level
- Literature available at international level

The prime aim of this study is the analyze the literature on aquaculture at national and international level.

Research Methodology

Bibliometric method was used to scrutinize the existing literature on fisheries. Google scholar, Research Gate, Higher Education Commission (HEC) digital library and other prominent leading databases were searched and reviewed. Literature was broadly divided into local and foreign.

Previous published literature at National Level

Fisheries are considered as the precious assets for supporting the economy of the country. According to the World Bank 2019 the world fishing industry employs 200 million people and generating US 80 million dollars per year (Nouman *et al.*, 2019). In Pakistan, the fishery sector provide employment to about 400,000 fishermen and 600,000 people in secondary industries (Lagahari *et al.*, 2018). Pakistan is an important agriculture and

maritime country with 8563820 km² areas in the form of river, lakes, ponds and water lodging. Amazing is to know that the country also have a coast of 1100 km running from India to Iran. Pakistan is gifted by nature with varieties of fish fauna which contain 531 species out of which 233 species are freshwater fish and the rest 298 are marine fish which include both exotic and endemic species (Nazr *et al.*, 2015). The marine fisheries contribute majorly to the total fish production of Pakistan according to the survey 2017-18 the fish production was 482000 metric tons out of which 338000 metric tons was from marine. Aquaculture gain attention due to the increase protein need of the growing population of Pakistan. And about 13000 fish farms have been developed across the country.

Khan *et al.* (2018) carried out research on Economic analysis of Carp Fish Farming in the selected Districts of KP. The important objective was to find out average cost and revenue per unit fish farm and to observe the sensitivity of output to the key factors of production. By using lottery method the fish farmer were interviewed by taking the sample of 60 fish farms in four district of KP i.e. Kohat, Swabi, Mardan and Dera Ismail Khan. The samples are further grouped according to the area i.e. small, medium and large farms. The study uncovered that for carp fish farm investment per acre arm and operating cost is 1,24,000/- and 38,000/- respectively. Whereas the annual return was 1,10,3790/-The study done that this activity is financially advantageous business which gives per year profit of Rs72,370/- and plays a central role in earning a respectable livelihood , fulfilling the basic needs at low cost and eradicating poverty by providing jobs. Hassan *et al.* (2007) worked on economics of trout fish farming in northern areas of Pakistan. The study was carried out at the Trout Fish Research and Multiplication Centre (TRMC), Jaglote and the personal farmer's ponds to estimate the expenditure on trout fish farming and its productivity. The outcome of the investigation show that total expenditure of Rs.234 was spend to produce one kilogram of trout fish, which in turn generate Rs.310. The net income came to Rs.76 per kg of fish. It show that the trout fish farming is an excellent opportunity for the resident of northern area of Pakistan to exploit the abundant resource of cool water , which will play major role in the income of the people of that area.

Sharma, (1999) conduct a research work on Technical efficiency of carp production in Pakistan. The main objective of this study is to examine technical efficiency and its determinants in carp pond culture in Pakistan. A stochastic production frontier involving the model for technical inefficiency effects is applied separately extensive and semi-intensive fish farms. The results revealed that extensive farms and semi-intensive/intensive

shows the means technical efficiency of 0.561 and 0.673 respectively. The extensive and semi intensive farm show the increase in production from 3.0-4.5 Mt/ha and 2.6-4.6 Mt/ha respectively by working at complete technical efficiency. Much of these efficiency gains would come from. The perfection in feed monitoring and management, fish form and water would result in showing much gain in technical efficiency. Besides improving technical efficiency, potential also exists for raising carp productivity through increased intensification and technological progress. The constant government back up for adequate provision of inputs, technology transfer, market and infrastructure, development and extension and recognition services to carp farmers will assist in realization of the potential.

Economic Analysis at International Level

Saikia and Dasin. (1970) carry out research on Rice-based fish farming, which was the mean of dual production practiced by Apatani farmer. This type of fish farming help farmer to get maximum yield without providing any supplementary feed. The new technique helps the farmer to get 500 kg fish production with minimum expenditure of labor. In this type of rice-fish integrated fields, the farmers get economic benefit which was about 65.8% per annum. Rice-based fish farming system of the Apatani farmers due to sustainability and low cost and immense potentiality to be recognized as low cost and sustainable farming practice and could be a significant breakthrough for poor and marginal farmers of the rest of the World. Kareem *et al.* (2008) worked on economic efficiency in fish farming; hope for agro- allied industry in Nigeria. The study used descriptive statistics was in order to determine the socio-economic condition of the respondents. The extensive study uncovered that majority of the fish farmer were married having average age of 44 years. The farmer was with fish farming for last 10 years. *Tilapia guineensis* were produce by 56.5% of the farmers and 70% employed were hired labor. The result of hypothesis of inefficiency sources models showed that years of experience of fish farmers is significant at 1% probability level indicating the factor contributing to the fish farming experience in the state The result revealed that the level of economic efficiency was is 55% to 84% which signifying hope for the development agro-allied industry in the state.

Goswami *et al.* (2013) worked on the Small scale pond fish farming in a tribal district of India: an economic perspective. The total number of fifty six fish farmer was selected in a random fashion from the farmers occupying area of 58.79 ha. The farmers were interviewed using questionnaire regarding different aspects of fish farming. The result point out that pond fish farming is an economically viable enterprise with the benefit-cost ratio ranging

from 2.22 to 4.44. The producer's portion in consumer's rupee ranges from 52 to 93%. The study also highlight major issue faced by the farmer i.e. ownership plurality, inadequate knowledge, lack of inspiration. The analysis highlighted inevitability of developing infrastructure to comprehend potential of fish farming and marketing as a leading venture in the district. Kaliba *et al.* (2006) carried out research study on Economic Analysis of Nile Tilapia Production in Tanzani. Simulations such as TFST software was used to find out the economic profitability of small-scale Nile tilapia production that shows the individual growth and bring about information about population dynamics of fish in the pond. The study revealed that that the mixed-sex tilapia culture devoid of predation is not economically efficient. Furthermore the Nile tilapia production system should be developed as a conservatory effort that is based on hand-sex all-male tilapia. In the superseding time the overpopulation is controlled by introducing catfish in tilapia culture. In Tanzania the sustainable Nile tilapia production system can be developed by the determination of availability of feed, optimal pond sizes, and a quality fingerling supply chain. The improved culture system will results in defend the investment barrowed from the formal institution.

Arikan. (2019) conduct research work on the Economic analysis of aquaculture enterprises and the determination of factors affecting sustainability of the sector in Turkey. The data acquisition was done by simple face-to-face interview carried out from 65 enterprises from 2014-15. The evaluation of the production data was carried out from economic and technical point of view and multiple regression models was used to check the factors effecting per unit profit. The rate of shrinkage and mortality (%), the FCR (kg feed/kg fish) and average fattening period the FCR (kg feed/kg fish) for Seabream and Seabass were found to be 1.84-1.98, 14.43-19.05 and 10.70-14.33 respectively. The unit cost and unit profit for the fish species in query were estimated to be 4.18 US\$/kg and 4.57 US\$/kg, and 1.29 US\$/kg and 1.07 US\$/kg, respectively. The study revealed that the aquaculture could achieve stability if the farm area is increased, other feed sources are used and foreign markets are accessed. Abash *et al.* (2013) carried out research work on Economic Analysis of Fish Marketing in Labia Local Government Area of Nasiriya State, Nigeria. The fish marketers were selected as respondent by random sampling. Respondents were drawn from a cross-section of fish marketers in Lafia markets. Data collected were on socio-economic characteristics, costs and returns and problems associated with fish marketing in the study area. Structured questionnaire was the instruments used for data

collection. Gross margin, percentages and marketing performance models were used as analytical tools. The study concluded that mainly young women of their age ranging between 20-40 years were involve in fish marketing with retailers and wholesalers in ratio of 62 and 60 and majority of them same stage of literacy. The wholesalers and retailer obtained the gross revenue of 323.61 and 373.78 respectively while 41.83 and 35.75 of gross margin for retailers and wholesalers were obtained with a marketing margin of 11.5 and 14.2 percent respectively. Transportation, inadequate fund and storage were the main problems faced by fish marketers.

Ele *et al.* (2017) carried out research study on the economic analysis of fish farming in Calabar, Cross River State, Nigeria. The studies determine the estimated gross margin, the cost and return relationship and the hurdles in fish farming in the study area. It was discovered during study that majority of farmer were part time farmers among which 50% were civil engineers, 11% were traditional leaders, 11% were veterinary surgeons, 11% pensioners, and 11% business owners. The main hurdles limiting the increase output level in the Calabar were high cost on managing farm, lacking sufficient investment, farm labor problem, and security of farm. The study revealed that fish farming is money-making activity in Calabar obtaining N400, 000 to N700, 000 gross margins per year. While the expenditure on stocking, water renewal, feeding and labor are 37.37%, 30.21%, 16.51% and 14.84% respectively of the total cost spent on farm. The study revealed that the effectiveness in the output depends on feed, stocking density and years of farming experience. The recommendation of the study was the establishment of fish hatcheries and feed mills for greater output. Tunde *et al.* (2016) conducted research on the Economic Analysis of Costs and Return of Fish Farming in Saki-East Local Government Area of Oyo State, Nigeria. Aquaculture is considered as a profitable and important enterprise in terms of income generation and makes available animal protein to the greater part of population in the country. The data was collected from the randomly chosen respondents by using structured questionnaire from the farmers in the study area. Data collected were analyzed using the analyzing tools such as multiple regression model, cost and budgetary analysis and descriptive statistics were applied on the collected data. The study revealed that the Cost and Return Analysis of aquaculture in Oyo state demonstrated that the total input was N129379.52 k per cycle, whereas the total revenues was N244364.30 k per cycle . Furthermore the BCR obtained was 1.9 which proves that fish farming in Oyo state is profitable activity.

Naggar *et al.* (2018) worked on the economic analysis of fish farming in behera governorate of Egypt. The study period covers one production season i.e. from May 2004 to July 2005. The research work revealed the following characters of fish farmers, i.e. average age of farmers was 43 years, majority of farmers were married (62.5%), land of farmer was rented (93.3%), and major specie reared was tilapia (85%). The major hurdles faced by the farmers were expensive feed, low fish price, and lack of government assistance. The feed cost represents 58.9% of the total cost of production which is LE 3.87. The break-even analysis showed average production costs of LE 6.57 per kilogram of fish while the sales price is LE 7.5 /kg. The investigation of the rate of profits on operational expenses discovered an average of 19 % in the production season. Yuan *et al.* (2017) carried out research work on the Economic profitability of tilapia farming in China. The primary data were collected based on field surveys using structured questionnaire to collect information about the farmer and farming in the main five producing areas, which comprises of 12 regions and 300 farmers. The benefit-cost ratios, gross income, total profit, and profit margin were used to analyze the collected data. The study revealed that large farms has the highest cost and the highest cost-profit margin among the three categories, and the small farms has the lowest cost and profit margin, while the cost and profit margin of medium size are between the large and small sizes. Sensitivity analysis indicates that net revenue of tilapia is extremely flexible to the change of price, feed, rent and fixed cost of which price flexibility was the maximum, followed by the rent, fixed cost and feed. According to the problems existing in the tilapia farming, some policy suggestions were put forward for sustainable tilapia culture.

Ahmad. (2007) carried out research on the Economics of aquaculture feeding practices: Bangladesh. The main intention of the study was to determine the finances of sutchi catfish (*pangasianodon hypopythalmus*) with regard to types of feed used in Mymensingh, Bangladesh. In the study area about 60 farmers were interviewed by using questionnaire and Rapid Rural Appraisal method. The result indicates that annual stocking density of fingerlings were documented as 12 065, 23 575 and 35 900 and per ha, using feed of 5 790 kg, 13 010 kg and 22 370 kg for traditional farms, semi-intensive and, intensive respectively. The whole expenditure on fish farming of sample farmers were averaged as US\$2 964 per ha per year, ranging from US\$5 217 in intensive farming to US\$2 694 in semi-intensive and US\$981 in traditional farming. The average return despite of the high production cost were high and noted as US\$3364, US 2048 and US 1099 for intensive, semi

intensive and traditional farms. Amazing is to know that the benefit-cost ratio was high in traditional farm (2.12) compared with semi intensive (1.76) and intensive (1.64). It is therefore suggested that the semi-intensive system may be preferable with the option of decreasing production costs by using farm-made quality feed in order to increase profits. Thus, development of feed based on low-cost locally produced ingredients would help improve farmer's declining profit margins. In addition, training and extension services would help to improve profitability and reduce risks. Most of the poor framers (traditional farmers) reported that higher production costs as well as lack of money was the most important constraint for fish farming. Thus, adequate bank credits with low tax would provide the basis for a change in practices from traditional to semi-intensive feeding.

Conclusion

From the above discussion, it is concluded that enough previously published literature is available on this important financial entity of the business world. The study also reflected that aquaculture is playing a very dynamic role in the fulfilling the food needs of the human being. It is also a good and appealing business of the world and contributing a good revenue to the financial world.

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