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Shrimp industry gender gap in India: Case of Maharashtra state

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Abstract
In India, Maharashtra state, offers vast scope for development of brackish water aquaculture. A study was done in order to analyse if there is a gender gap in this industry. Study has revealed that in shrimp farming during 1990's, participation of women was seen in pond construction, seed collection, feed making and many post-harvest activities. However, with modernization, all jobs in which women were involved have been eliminated. There are 165 registered shrimp farms in Maharashtra and 6% are registered on women's name but at ground level these are run by the men. Study has shown that in shrimp farming, which is a sunrise industry, participation of women, is minuscule and gender gap exists. Reasons for gender gap in shrimp farming are lack of skill, high investments, high risk, remote location of farms and lack of favourable policies. Masculinity of capital seems to have inclined towards investing resources among men. However, the effort to bring women aquafarmers into the mainstream is under progress in India and one such change is that every year 15th October is celebrated as National Women Farmer's Day by the Government of India. It is expected that this inclusive approach, from formation of policy to implementation will bring women into the mainstream of brackish water shrimp farming.

Keywords: Shrimp, job replacement, gender gap, women, Maharashtra, India

1. Introduction
Fisheries and aquaculture sector occupies a very prominent place in the socio-economic development of India. Among aquaculture, brackish water shrimp farming is one of the fastest growing forms of aquaculture. Global fish production (fisheries and aquaculture) continued to grow and reached 170.9 million tonnes in 2016 (FAO, 2018) [2]. The world total aquaculture production is 80.0 million tonnes representing 47 percent of total fish production (FAO, 2018) [2]. The world total cultured shrimp production is 3.3 million tonnes. In cultured shrimp production, China rank first while India stands at fifth position with production of 4,87,470 lakh tonnes. The India's total aquaculture production was 4.21 million tonnes in 2015-16. India's total shrimp production during 2015-16 was 4,97,622 tonnes (MPEDA, 2019) [4]. There is a robust demand for frozen shrimp and fish in international markets. India is exporting 13,77,244 MT of seafood which is all time high with a worth of Rs. 45,106 crores in 2017-18. MPEDA (2019) [4] reported that frozen shrimp was the major export value item accounting for 5,65,980 tonnes and amounting to Rs. 30868.17 crores. The total area utilized for Shrimp aquaculture production was 1,40,666 ha which produced 4,97,622 tonnes during the year 2015-16 in India. As far as global aquaculture production is concerned, India is at the second position. Indian aquaculture has high potentials in the sector for nutritional security, livelihood support, employment generation as well as export earnings. The country has diverse fisheries resources in the form of rivers and canals (1.96 lakh km); ponds and tanks (24.40 lakh hectare); reservoirs (29.07 lakh hectare) and brackish water (12.40 lakh hectare), which contributes significantly to nutritional security, export earnings, provide gainful employment and livelihood support as well as women empowerment. Foreseeing the high potential in the sector, the Hon'ble Prime Minister has called for a revolution in the fisheries sector and has named it as Blue Revolution. The mission of Blue Revolution scheme is to ensure doubling the income of the fishers and fish farmers with inclusive participation of the socio-economically weaker sections and ensure sustainability with environment and biosecurity.
In India, commercial shrimp farming started in the early 1980s and attained industrial proposition in the late 1980s. The growing demand for shrimp in the international market coupled with lucrative price prompted more and more farmers to venture into shrimp farming.

Among all the coastal states, Andhra Pradesh ranks first with a total production of 3,00,278 tonnes followed by West Bengal with total production of 72,554 tonnes. Maharashtra occupies sixth position in cultured shrimp production with production of 8,126 tonnes in the year 2015-16 (MPEDA, 2019) [4]. Emergence of shrimp farming in the state of Maharashtra has its own history. It started with a pilot brackish water shrimp farm which was established by Department of Fisheries (DoF) in 1981. Later in 1989-90, Shakti, Pancham and Ruia Aquaculture were first farms established at Saphale village, Palghar, Thane, Maharashtra.

During 1990's, *Penaeus monodon* was the favoured species because of the availability of hatchery-produced post larvae which were procured from other states like Andhra Pradesh, Tamil Nadu and Karnataka as well as *P. monodon's* ability to grow fast under semi-intensive conditions. Shrimp farming industry was at its peak around 1994 throughout India, but saw its decline mainly due to the White Spot Syndrome Virus (WSSV) disease, However, in 2008, Government of India permitted use of Specific Pathogen Free (SPF) stock of *Litopenaeus vannamei* for culture. This resulted in revival of shrimp farming along the coast of Maharashtra, and Andhra Pradesh as well as other states in India. Most of the farm owners and entrepreneurs were men.

In India, Maharashtra is one of the major maritime states, offering vast scope for development of brackish water aquaculture. Maharashtra state has about 52,001 hectare of potential brackish water area suitable for shrimp farming. Out of this area, 10,400 ha are suitable for shrimp farming as per the official website of DoF, Maharashtra. However, only 1356 ha is used for shrimp farming as per MPEDA (2019) [4] and 9044 ha area is left which can be utilized for shrimp farming.

Even though studies have reported about the participation of women in aquaculture, not many studies have highlighted that there are gender gaps in farm ownership and how new developments in aquaculture have impacted women. Thus, a study was done in order to analyse if there is a gender gap in shrimp farming and what are the reasons for the gap and how new developments in aquaculture have impacted women.

2. Materials and Methods

This study was carried out in all the coastal districts of Maharashtra state where shrimp farming is practiced. The data was collected from registered shrimp farmers (151) out of the total shrimp farmers (165) in Maharashtra. A pilot study was done on 25 shrimp farmers and based on the pilot study an interview schedule was prepared. Information was collected with reference to farm/pond ownership, gender of the farm owner, age, education, experience, participation, farming area, type of firm, number of crops per year, stocking density and species cultured, participation of women in aquaculture activities when the shrimp farming started in 1990's and now and how new developments in aquaculture have impacted women. Reliability of the interview schedule was checked by computing Cronbach's Alpha. Cronbach's alpha is the most common measure of internal consistency or reliability. It is a test reliability technique that requires only a single test administration to provide a unique estimate of the reliability for a given test. Its coefficient ranges from 0 to 1. Closer the value of Cronbach alpha coefficient is to 1 the greater the internal consistency of the item in the scale. Formula of Cronbach's alpha is;

$$\alpha = r\,k / [1 + (k-1)\,r]$$

Where,

r = mean of the inter-item correlations i.e. the correlation of each item with the sum of all remaining items

k = number of items considered

Cronbach's alpha was calculated using SPSS version 16. The value of alpha was 0.80 suggesting high reliability of the interview schedule.

3. Results and Discussion

3.1 Emergence of shrimp farming in Maharashtra:

It was reported by shrimp farmers that shrimp farming started in Maharashtra during 1990s. Emergence of shrimp farming in Maharashtra started with a pilot brackish water shrimp farm which was established by DoF, Government of Maharashtra in 1981. Later in 1989-90, Shakti, Pancham and Ruia Aquaculture were first farms established at Saphale village, Palghar, Thane, Maharashtra. Shrimp hatchery for *Penaeus monodon* was developed by DoF at Badapokharan village in in Thane district, Maharashtra. However, in the present times, both the hatchery and pilot shrimp farm are not functional. Later in 1989-90, Shakti, Pancham and Ruia Aquaculture were first three farms established at Saphale village, Palghar, Thane district, Maharashtra. During 1990's, *Penaeus monodon* was the favoured species because of the availability of hatchery produced post larvae which were procured from other states like Andhra Pradesh, Tamil Nadu and Karnataka as well as *P. monodon's* ability to grow fast under semi-intensive conditions.

Shrimp farming industry was at its peak around 1994 throughout India, but saw its decline mainly due to the White Spot Syndrome Virus (WSSV) disease. In 2008, Government of India permitted use of Specific Pathogen Free (SPF) stock of *Litopenaeus vannamei* for culture. This resulted in revival of shrimp farming along the coast of Maharashtra, Andhra Pradesh as well as other states in India. Slowly number of farms increased. Now, there are 165 registered shrimp farms in Maharashtra.

3.2 Shrimp famers/farming profile

The study has revealed that, in Maharashtra, 6% of farms are registered in name of women. But at ground level these shrimp farms are run by men which show that farm ownership is dominated by men. Maximum shrimp farmers of Maharashtra were in the middle age group (36-45 years). All were educated, had farming experience up to 5 years. About 45.70 % of the shrimp farmers had their own ponds and 54.30 % had taken ponds on lease basis for shrimp culture. A total of 39.74% 37.09% and 13.25% of shrimp farmers were having farm area in up to 2 ha, between 2-5 ha, between 5-10 ha respectively and 9.93 % farmers had above 10 ha of farm area. Majority (95.36%) of shrimp farmers were taking two crops/year. About 54.97% were maintaining stocking density between 26-50 nos./m^2 followed by 16-25 nos./m^2 (33.11%). Majority of shrimp farmers (85.43%) were practicing shrimp farming individually. Most farmers have also undergone training. Training is an important component for success in shrimp farming as highlighted by Patil and Sharma (2017) [5] in their study and Discrepancy and competency model for designing training programmes for shrimp farmers was used by Patil and Sharma (2018) [5]. Profile of shrimp farmers of Maharashtra is presented in table 1.

In the present times, numbers of shrimp farming practices have changed with modernization. It was found that, average yearly income of shrimp farmers is Rs. 5,52,900/-. The

income levels showed that shrimp farmers were generating higher income than the per capita income of the state (Rs. 1,50,900/-) as well as India's per capita income (Rs. 96,366/-) (Economic survey 2018-19). [1]

Table 1: Shrimp famers/farming profile

S. No.	Profile categories	Details
1	Shrimp farm registered on the name of women's	6%
2	Age	Middle age 36-45 years
3	Education	All educated
4	Gender	Male
5	Experience	5 years or more
6	Pond ownership • Own Ponds • Leased ponds	 45.70% 54.30%
7	Pond area • Up to 2 ha • 2-5 ha • 5-10 ha • 10ha	 39.74% 37.09% 13.25% 9.90%
8	Two crops/year	95.36%
9	Stocking density • 26-50 nos./m^2 • 16-25 nos./m^2	 54.97% 33.11%
10	Average yearly income	Rs. 5,52,900/-
11	Per capita income of Maharashtra	Rs. 1,50,900/-
12	India's per capita income (Economic survey 2018-19)	Rs. 96,366/-

3.3 Involvement of men and women in shrimp farming

It was reported by farmers that during emergence of shrimp farming in Maharashtra, men were owner of shrimp farms. Role of women in shrimp industry was as farm workers and they were involved in pond construction, wild seed collection, feed making, feeding and marketing. During 1990's participation of women was reported to be in pond digging, wild shrimp seed collection, feed material collection, feed making and post-harvest handling. Women entrepreneurs in Tamil Nadu, India were engaged in production, input supply and export and marketing through shrimp farming, shrimp processing, aqua by-products management and exports (Shanthi *et al*., 2012) [6].

At present as per official records available in Department of Fisheries, Maharashtra, 6% of farms are registered in name of women. But at ground level these shrimp farms are run by men which show that farm ownership is dominated by men.

3.4 Impacts of new developments in shrimp farming on women and men

In the present times, numbers of shrimp farming practices have changed with new technologies. Modernization in shrimp farming practices includes use of machines for pond digging, hatcheries, factory feed, automatic feeder, zero water exchange system, biosecurity measures, direct marketing through companies etc. This has been reported by Patil and Sharma (2018) [5] also where they prioritized the training needs of shrimp farmers and reported that it is necessary to provide training on modern practices which are sustainable.

However, these modern changes have impacted women who were involved as workers in the shrimp farm. It was reported by the respondents that now pond construction is done with help of tractors/machines, wild shrimp seed collection has been replaced by procuring shrimp seeds from reputed shrimp hatcheries, feed preparation is now done by feed mill industries, feeding is done by automatic feeders, and marketing is done through seafood companies. All jobs in which women were previously involved in shrimp farming related activities have been eliminated or have become very less. However, shrimp industry has emerged as one of the fastest growing forms of aquaculture and there is a consistent increase in shrimp production resulting in profits to shrimp farmers who are usually men.

Study has revealed that in shrimp farming, which is a sunrise industry, ownership of farms/ponds by women is minuscule and gender gap exists. Enquiry on why farm/ownership is limited to men and why a gender gap exists revealed various reasons. These reasons range from are lack of knowledge/skill, high level of investments, high risk, remote location of farms and new technologies associated with its developments.

4. Conclusions

Shrimp aquaculture is dominated by male farm/pond owners and due to high levels of investment, high skill, high risk, remote location of farms, new technology associated with its development, women seem to have been left out of this.

There is a need to have policies which addresses the reasons for less participation of women in shrimp aquaculture as in a recent study it has been reported that development alone will not cure gender inequality but policies will (Lahoti, 2018) [3].

Masculinity of capital seems to have inclined towards investing resources among men. Having a highly segregated workforce where certain occupational spaces appear to privilege particular gendered dispositions will not be conducive.

However, effort to bring women farmers in India into the mainstream is under progress and one such change is that 15 October has been earmarked as Women Farmers Day (*Mahila Kisan Divas*) by Government of India. It is expected that an inclusive approach, from policy to implementation, will bring women in brackish water shrimp farming into mainstream.

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