



Association of Socio-economic Attributes with Adoption of Better Management Practices in Shrimp Farming in Karnataka, India

A. R. Leo Cyril^{1*}, Sheela Immanuel¹, P. S. Ananthan¹, B. Thongam¹ and B. S. Viswanatha²

¹ Central Institute of Fisheries Education, Versova, Mumbai - 400 061, India

² College of Fisheries, KVAFSU, Mangalore - 575 002, India

Abstract

The study was conducted to determine personal, socio-economic and psychological characteristics of shrimp farmers and to explore the relationship between selected characteristics of the farmers with the extent of adoption of Better Management Practices (BMPs) in shrimp farming. Data were collected through interview from 120 respondents, who were involved in shrimp farming. Results indicated that more than half of the respondents were in middle age group with medium level of social participation, extension agency contact, extension participation, information seeking ability and scientific orientation. The results of correlation coefficient indicated that the independent variables *viz.*, education, experience, income, extension participation, scientific orientation and risk orientation had positive relationship with the adoption level of BMPs. The multiple regression analysis indicated that the independent variables *viz.*, social participation, innovativeness and economic motivation are the important variables contributing towards adoption.

Keywords: BMPs, scientific orientation, economic motivation, risk orientation, extension participation, innovativeness

Received 10 August 2012; Revised 12 December 2012; Accepted 13 December 2012

* E-mail: leo_cyril@gmail.com

Introduction

Shrimp farming is an important economic activity in India. Over the last decades, shrimp farming has

become one of the most rapidly growing sectors of aquaculture. The total production of cultured shrimp was 3.3 million t with a value of 13.4 billion US\$, and captured shrimp was 3.12 million t, in the year 2010 (FAO, 2010). Out of the total culture production of 3.3 million t, India stands at fifth position with a contribution of only 3%. Currently, cultured shrimp constitute the single most valuable internationally traded aquaculture commodity worldwide. There is a lot of scope to improve the production of shrimp by culture in India.

India's cultured shrimp production was about 1.36 lakh t in the year 2010-11 and Andhra Pradesh ranks first with a total production of 49 030 t, followed by West Bengal (40 725 t). Karnataka occupies seventh position in cultured shrimp production with 2 090 t in the year 2010-11 (MPEDA, 2011). With rapidly increasing production, several issues and challenges over the sustainability of the sector began to emerge, and specific outbreaks of various shrimp diseases have caused devastating economic losses to the sector (Corsin et al, 2008). In response to these concerns, efforts were initiated to develop a more sustainable approach to shrimp farming and to the fisheries sector in general. Considering the importance of shrimp in foreign exchange earnings, an attempt has been made to study the personal, socio-economic and psychological characteristics of shrimp farmers and to explore the relationship between adoption of Better Management Practices (BMPs) and characteristics of shrimp farmers in Karnataka.

Materials and Methods

The study was conducted in North Canara and Udupi districts of Karnataka. A total of four blocks, *viz.*, three from North Canara, and one from Udupi district were selected for the study considering the preponderance of shrimp farmers. A total of eight

villages were selected (two villages from each block) in consultation with the local shrimp feed technicians and Brackishwater Fish Farmers Development Agency (BFDA) officials. Thus a total sample of 120 respondents (15 from each village) were selected for the study.

The adoption of Better Management Practice was measured for six parameters. Under each major practice, sub component of practices was given and to find out the final score under the major practice, the scores of the sub - components were added. For adoption, a score of 1 was given and for non adoption, the score given was 0. The selected farmers were interviewed with structured interview schedules. Statistical tools like, percentage, box plot, mean, standard deviation, correlation coefficient and multiple regression analysis were used to analyze the data.

Results and Discussion

It could be seen from Table 1 that more than half (56.66%) of the respondents belonged to middle age category. More number of respondents had high school (VIII- X std) education (32.50%) followed by higher secondary education (22.5%). Majority (68.33%) of the farmers had nuclear families and 88.33% of the farmers were Hindus, and 41.66% of the shrimp farmers had small land holdings (2.5 to 5 acres) followed by 26.66% under marginal land holdings (up to 2.5 acres). This shows that majority of them were small and marginal farmers, of which 62.55% of the respondents had own ponds. About 31.6% of the farmers had 5-10 years of experience and 37.5% of the farmers had experience of more than 15 years in shrimp farming. This may be due to the fact that during 1990s, majority of the farmers started shrimp culture, but in 1995, due to White Spot Syndrome Virus (WSSV) disease outbreak, most of the farmers left shrimp farming. After controlling WSSV to some extent, farmers had taken up shrimp culture with BMPs and by forming co-operative societies. Majority (42.5%) of the respondents had an income (per crop) of Rs. 50 000 to 1.5 lakh, 35.83% had income of Rs. 1.5 to 2.5 lakh and only 5% of the respondents had income of more than Rs. 3.5 lakh.

Table 1 reveals that half (50%) of the respondents had medium level of social participation and medium level of cosmopoliteness (49.16%). The possible reason for such behavior might be that

now-a-days, private agencies and other extension functionaries contact individual farmers at their own house or on field and provide the required information on the spot. As a result, farmers might not visit the city frequently. It was also found that, majority (56.66%) of the respondents had medium level of extension agency contact and about 50.83% of the respondents had medium level of information seeking behavior. This was supported by the findings of Swathilekshmi et al. (2005). It was found that majority (60.83%) had medium level of mass media utilization (Table 1), and about 50% of the respondents had medium level of participation followed by low (25.83%) and high (24.16%) level of extension participation respectively. The findings were in contradiction to the findings of Charles et al. (2009) where 83.33% of the fishermen belonged to low level of extension participation.

Scientific orientation was categorized as low, medium and high, based on class intervals namely 0-4, 5-8 and 9-12. It was also indicated using box plot. From Fig 1, it was observed that the score lies between the minimum value of 5 and maximum of 12 with median at 8. More than half (57.5%) of the respondents fall under the medium level of scientific orientation followed by 42.50% of the respondents under high level of scientific orientation. Probable reason may be that, they would have realized the importance of scientific technologies and importance of adoption of new technologies.

From Fig 2, it was observed that the score for innovativeness lies between minimum value of 4 and maximum of 10 with median at 6. Majority (95.83%) of the respondents fall under the medium level of innovativeness category (5-8). This may be due to their experience, better educational qualification, or participation in training programmes which might have influenced to accept the innovations quite earlier than the other members. Further, shrimp farming involves higher investment and majority of the farmers prefer to know new and important technologies, to earn more profit.

The score for economic motivation lies between minimum value of 4 and maximum of 12 with median at 7 (Fig. 3). Majority (56.66%) of the respondents fall under high level of economic motivation followed by medium (42.50%) level of economic motivation. It may be due to the reason that shrimp culture is more economically profitable. These findings are in line with the findings of

Table 1. Distribution of respondents according to their socio-economic characteristics (n = 120)

Characteristics	Category	Percentage
Age	Up to 30	27.50
	31-50	56.66
	Above 51	15.83
Education	Illiterate	2.50
	Primary	10.00
	Middle	19.16
	High school	32.50
	Higher secondary	22.50
	Collegiate	11.66
	Post graduate	1.66
Family type	Nuclear	68.33
	Joint	31.66
Family size	< 5 family members	40.00
	>5 family members	60.00
Religion	Hindu	88.33
	Muslim	2.50
	Christian	9.16
Land holdings (in acres)	Up to 2.5	26.66
	2.6-5	41.66
	5.1-10	18.33
	>10	13.33
Pond ownership	Owned	62.55
	Leased	20.00
	Owned+leased	17.50
Farming experience (in years)	Up to 5 years	9.16
	5-10	31.66
	10-15	21.66
	>15	37.50
Income/crop (in Rupees)	50 000-1.5 lakh	42.50
	1.5-2.5 lakh	35.83
	2.5-3.5 lakh	16.66
	>3.5 lakh	5.00
Farming activity	Primary	73.33
	Secondary	26.66
Source of income	Shrimp culture	32.50
	Shrimp culture + agriculture	28.33
	Shrimp culture + other business	39.16
Communication variables		
Social participation (Mean - 2.1; SD-1.08)	Low	45.83
	Medium	50.00
	High	4.16
Cosmopolitaness (Mean - 2.43; SD-1.11)	Low	28.33
	Medium	49.16
	High	22.50
Extension agency contact (Mean - 3.64; SD-1.76)	Low	26.66
	Medium	56.66
	High	16.66
Extension participation (Mean - 4.59; SD-1.48)	Low	25.83
	Medium	50.00
	High	24.16
Information seeking ability (Mean - 6.60; SD-1.73)	Low	24.16
	Medium	50.83
	High	25.00
Mass media exposure (Mean - 4.20; SD-1.18)	Low	20.83
	Medium	60.83
	High	18.33

checking the water quality parameters like ammonia, pH, and alkalinity. Cent percent of the farmers adopted the practices such as use of check trays and adjustment of feed during lunar cycle and moulting period. This may be due to the fact that since shrimp feed costs high when compared to other fish feed, farmers were cautious not to waste feed. About 57.5% of the respondents was using bird fencing, crab fencing and regular checking of pond bottom, but none was using antibiotics, which is totally banned in shrimp aquaculture. About 45% of the respondents was using pre and post harvest practices like cleaning of shrimp before packing and bleaching of water before releasing into creek.

Out of the 13 variables studied for their relationship with the extent of adoption of BMPs, only six variables namely education, experience, income, extension participation, scientific orientation, and risk orientation had significant and positive relationship with adoption (Table 3). Significant relationship between education and adoption indicated that, the respondents with higher level of education may have inquisitiveness to update their knowledge in shrimp farming and hence they would have adopted more BMPs. Experience was positively correlated with adoption and this may be due to the fact that with increase in experience, they may adopt more scientific technologies to maximize profit.

Table 2 indicates that in the case of pond preparation majority (60%) of the respondents adopted practices such as liming, spacing, removal of organic matter and bleaching as per the standards suggested by the Coastal Aquaculture Authority (CAA). Since selection of seed is a very critical point in shrimp farming, farmers were very careful while selecting the seed. They purchased the seed based on body length and the stage of the post-larvae. They take the seeds only from certified hatcheries. More than half (65%) of the respondents were frequently

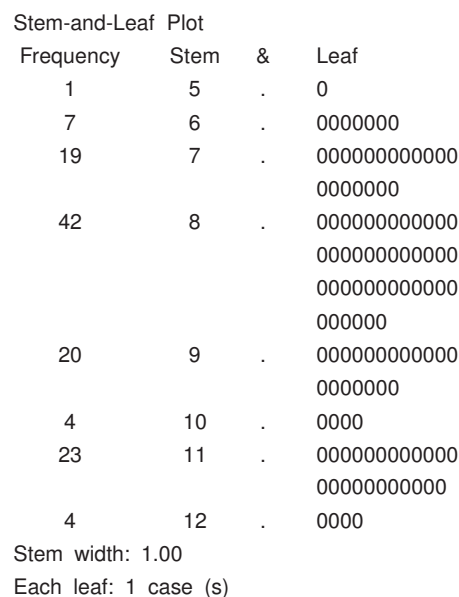
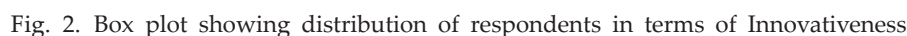


Fig. 1. Box plot showing distribution of respondents in terms of scientific orientation



take risk, may adopt new scientific technology. In the study area, majority of the farmers get the farm related information only from training, extension agency, input dealers, adopted farmers, and in many cases, they don't acquire the information from television and radio, because the information disseminated through mass media is very minimal.

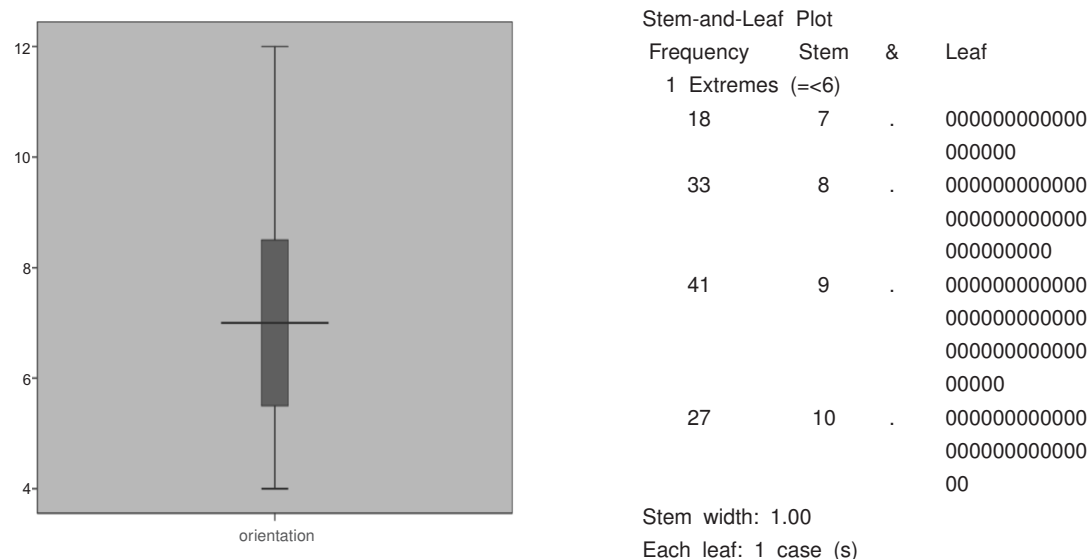


Fig. 4. Box plot showing distribution of respondents in terms of risk orientation

Table 2. Adoption of Better Management Practices (BMPs) (n=120)

Practices	Adopted No. (Percentage)	Not Adopted No. (Percentage)
Pond preparation	72 (60.00)	48 (40.00)
Good quality seed	101 (84.16)	19 (15.83)
Feed management	120 (100.00)	-
Water quality management	78 (65.00)	42 (35.00)
Health monitoring	69 (57.50)	51 (42.50)
Pre and Post harvest practices	54 (45.00)	66 (55.00)

(Note: Better Management Practices (BMPs) were taken from Coastal Aquaculture Authority (CAA) / Food and Agricultural Organization (FAO)).

Thirteen variables explained the extent of 43.18% variation in adoption of BMPs by the farmers (Table 3). The 't' value showed that there was significant difference among the shrimp farmers on the variables such as income, extension participation, scientific orientation and risk taking ability. The variables like extension participation, scientific orientation and risk taking ability were positive and had significant contribution to the adoption behaviour of respondents ($p < 0.05$). Income had a positive and significant contribution to adoption behaviour ($p < 0.01$). The strength of contribution of these variables could be explained as one unit increase in extension participation, scientific orientation, risk taking ability and income would bring

an increase of 1.195, 0.898, 0.687 and 2.063 units in adoption behaviour respectively.

The study indicated that the independent variables *viz.*, social participation, innovativeness and economic motivation are essential in the adoption process. So it could be inferred that the extent of adoption of BMPs by shrimp farmers of Karnataka could be positively influenced by increasing their social participation, innovativeness and economic motivation. Farmers' access to information sources can be enhanced by improving the quality and quantity of government extension services whose efforts may be supplemented and complemented by private extension. By attending regular training

Table 3. Correlation and multiple regression coefficient on extent of adoption of BMPs with independent variables of shrimp farmers

Independent variables	Corealtion coefficient	Regression coefficient	Standard error	t value
Age	-0.024 NS	1.440	1.227	1.174 NS
Education	0.207*	0.894	0.576	1.552 NS
Experience	0.202*	0.816	0.644	1.268 NS
Income	0.229**	2.063	1.297	2.683**
Social participation	0.135 NS	-0.112	0.420	-0.266 NS
Cosmopoliteness	0.187 NS	0.190	0.722	0.263 NS
Mass media exposure	0.026NS	0.063	0.582	0.109 NS
Extension agency contact	0.143 NS	0.273	0.423	0.646 NS
Extension participation	0.393**	1.195	0.536	2.228*
Scientific orientation	0.228*	0.898	0.427	2.105*
Innovativeness	-0.010 NS	0.560	0.499	1.124 NS
Economic motivation	-0.073 NS	0.744	0.381	1.472 NS
Risk taking ability	0.212 *	0.687	0.337	2.046*

$R^2=0.4318$; $F=2.1969$ **Significant at 1% level, *Significant at 5% level, NS-Non significant

programmes, farmers can upgrade their knowledge. Besides, social participation of shrimp farmers can be enhanced by making co-operative societies, because in shrimp farming, cooperation among farmers enhances adoption of BMPs. When farmers become part of cooperative societies, they follow similar crop calendar which leads to success in adoption of BMPs. It also makes availing of credit facilities easier. These measures would serve to further augment the growth of the shrimp industry in the country.

References

- Charles, J., Vasanthakumar, J., Balasubramaniam, S. and Geethalakshmi, V. (2009) Technology development efficiency and socio-personal characteristics of researchers in marine fisheries. *Fish. Technol.* 46(2): 182-192
- Corsin, F., Mohan, C. V., Padiyar, A., Yamamoto, K., Chanratchakool, P., and Phillips, M.J. (2008) Codes of practice and better management: A solution for shrimp health management. *Diseases in Asian Aquaculture*. 6: 419-432
- FAO (2010) www.fao.org/index_en.htm/27-09-2010 pdf Guidelines for sustainable shrimp farming. [fisheris.in/pdf/acts/coastal aquaculture authority.pdf/12-08-2011](http://fisheris.in/pdf/acts/coastal_aquaculture_authority.pdf/12-08-2011) (Accessed 18 June, 2012)
- Meeran, N. (2000) Influence of socio-personal, socio-economic and socio psychological characteristics on the adoption behavior of shrimp farmers. *J. Extn. Edn.* 11(2): 2742-2746
- MPEDA (2011) www.mpeda.com/inner_home.asp?pg=trends and Seafood Exporters Association of India. <http://seai.in/market/shrimp-market-report-eu-october-2012> (Accessed 16 June 2012)
- Swathilekshmi, P. S., Chandrakandan, K., Kumaran, M. and Balasubramani, N. (2005) Socio economic profile of shrimp farmers and its influence on the extent of adoption of shrimp culture technologies. *Fish. Technol.* 42(2): 225-230