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Factors Responsible For Discriminating Between High and Low Adopter Categories of Shrimp Farmers

[1]Swathi Lekshmi P.S.*, [1]Balasubramani. N,
[2]Deboral Vimala. D and [1]Chandrakandan. K

[1]*Agricultural Extension Division,Tamil Nadu Agricultural University, Coimbatore-641003, India*
[2]*Agricultural Extension Division, Central Institute of Brackish Water Aquaculture, Chennai.*

Shrimp farming on a commercial scale has come to be the main stay, of the coastal economy of the country. Scientific Shrimp farming is characterised by the adoption of improved technologies for getting a better yield both in terms of quantity and quality. Adoption of improved technologies is dependent upon a host of factors such as the perceived attributes of the technology, the cost of the technologies and the policy environment in which the technologies are adopted. Among these factors, certain factors help to discriminate between high and low adoption categories. These are vital from the point of view of technology development and refinement. In this study 60 shrimp farmers of Nellore district of Andhra Pradesh were studied for identifying the factors responsible for discriminating the high and low adoption categories of shrimp farmers. The findings revealed that, the variables such as attributes of shrimp culture technologies such as efficiency and feasibility of technologies had substantial importance in the classification of shrimp farmers into high adopter category and low adopter category. Further, it was observed that of the 60 shrimp farmers studied, 31 belonged to high adopter category and 29 belonged to the low adopter category.

Key Words : Perception, Attributes, Shrimp Farmers, Adopter Categories

Perception is the process whereby an individual receives stimuli through the various senses and interprets them (Kollat *et. al.*, 1970). Perception of the same situation may differ from individual to individual due to differences in their experiences and ways of looking at it. It is not the intrinsic quality or attribute of an object, individual or message, but how people individually and collectively perceive them, which is important for extension.

However it is possible to discriminate individuals, with differential perception of a set of characters. (Patil & Swamy, 1999). Better peception of attributes of innovations influenced the adoption as reported by Ray (1968) in respect of High yielding varieties. Venkatachalam (1999) reported that the cost of cultivation as perceived by farmers was comparatively low due to the use of biological control agents. Similiarly perception of policy issues pertaining to an enterprise have a profound influence on its extent of adoption. This paper attempts to delineate the factors responsible for categorising the shrimp farmers into high and low adopter categories based on their perceived attributes of technologies, perceived cost and perceived policy.

Materials and Methods

Multistage random sampling was used to study the perceived attributes, cost and policy with respect to shrimp farming of 60 respondents drawn from 6 villages of 3 blocks in Nellore district of Andhra Pradesh. Data was collected with respect to the perceived attributes of technologies, cost and policy. The perception of attributes of shrimp culture technologies and

* Corresponding author:

policies affecting shrimp culture were measured with the help of scales specifically developed for the purpose.

The selection of attributes and policies affecting shrimp farming was done based on Judges ranking, and the selected attributes and policy statements were administered to the shrimp farmers on a five point continum, ranging from strongly Agree, Agree, undecided, disagree and strongly disagree. The scores of 5,4,3,2,1 and 1,2,3,4,5 were assigned for positive and negative criteria respectively. The perception of the cost of shrimp culture technologies were studied based on the scoring procedure developed for the study. For every Rs.50,000 incurred as expenditure out of the total cost of culture, a score of 1 was allotted.

Adoption behaviour of shrimp farmers was studied by selecting 12 critical technologies in shrimp farming based on judges ranking. The extent of adoption of each of the 12 technologies was compared with the recommendation and the scores of 1,2,3 were assigned to non-adoption of a recommended practice and full adoption of a recommended practice respectively.

In the present study, the adoption behaviour of shrimp farmers was measured by using the adoption quotient given below:

$$\text{Adoption quotient} = \frac{\sum_{j=1}^{M}\left\{\frac{ej}{Ej} \times wj\right\}}{\sum_{i=1}^{M} W_i} \times 100$$

ej = Extent of adoption of jth practice in terms of magnitude

Sj = Potentiality for adoption of jth prac tice in terms of magnitude

Wj = Weightage assigned to jth practice

M = No. of applicable practices

S = Summation

Use of appropriate statistical techniques such as the Discriminant function analysis was done in order to test the significance of the variables in discriminating the shrimp farmers into two categories namely high adopter category and low adopter category, and also to find out the relative importance of the variables in discriminating between the high and low adopter categories. A linear combination of predictor variables, weighed in such a way that it will best discriminate among groups with the least error is called a linear discriminant function and is given by :

$D=L_1.X_1+L_2.X_2+.............+L_K.X_K$, where Xi's are predictor variables, Li's represents the discriminant co-efficients, and D is the value of the discriminant function of a particular individual/element such that if this value is greater than a certain critical value D* (Mean of the Discriminant scores of high adopter category and low adopter category) , the individual is classified in group I ie high adoption category ,otherwise the individual would be classified in Group II ie low adoption category.

The respondents were classified into 2 groups namely high adoption group and low adoption group, based on the mean adoption score. The predictor variables used for the study were the attributes of shrimp culture technologies (X_1 to x_{12}), perception of cost of technologies(X_{13}), and perception of policies affecting shrimp culture (X_{14}).

The relative importance of the variables in discriminating between the high and low adopter categories was found out by using the formula,

Relative importance = $(L(i)*D(i)/D^2 *100$, wherein L (i) represents the discriminant coefficients, D(i) represents the group mean difference and D^2 is the Mahalonobis Discrimination index.

Results and Discussion

A perusal of Table 1 revealed that adoption behaviour of shrimp farmers was highest with respect to technologies such as harvesting (98.90%), pond bottom conditioning (98.30%), Acclimatisation and stocking of fry (92.30%) and feed management (86.10%). In harvesting the total harvesting was followed using drain capture method. The adoption of technologies like pond bottom conditioning was adopted to ensure health and hygiene of the pond. Pond bottom sterilization on the other hand involves the application of burnt lime mainly to make the pond free from pathogenic organisms, such as bacteria, fungus and virus. Killing of pathogenic organisms plays an important role in ensuring a healthy ,disease free crop which in turn fetches a good crop. Besides easy availability of pond sterilization input materials such as lime influences the adoption of the technology namely pond bottom sterilization. Acclimatisation and stocking of fry accorded 92.30% of extent of adoption. This practice involves counting of shrimp seeds, stocking, acclimatising the procured shrimp seed to the pond water conditions to ensure that salinity, temperature and PH of transported water containing the shrimp seeds is same as that of pond water and also ensuring the correct stocking density. A scientific procedure of acclimatisation and a good stocking density, is a prerequisite for getting a healthy crop of shrimp.

With respect to other critical technologies, it could be observed from the table that the extent of adoption of feed management was 86.10%. For feed management, it could be observed that majority of the shrimp farmers adopted scientific feeding based on feeding schedules, feed broad casting distance, biomass estimation and use of feed supplements.

As far as the adoption of health management practices was concerned , while PCR (Polymerase chain reaction) test was adopted by all the shrimp farmers , majority of the shrimp farmers adopted the use of probiotics. None of the shrimp farmers adopted the use of immunostimulants due to their high cost. It could be further seen from the table that the extent of adoption of water management was 61.30%. The water management practices adopted by most of the shrimp farmers included application of Zeolite, and use of paddle wheels and aerators for ensuring sufficient oxygen supply in the pond. Most of the shrimp farmers did not follow the recommended frequency of water exchange since they were of the opinion that water exchange once in 10 days (as per recommendations) from the third month of culture onwards increased the spread of disease, through water pumped from the creek. (water source).

Table 1. Adoption of shrimp farming technologies by shrimp farmers of Nellore

Technologies	Extent of Adoption (%)
Pond bottom conditioning	98.30
Pond bottom sterilization	98.30
Measurement of Soil pH	49.60
Liming the pond	90.00
Use of Predator Eradication	87.20
Manure and fertilizer application	73.60
Acclimatisation and stocking of fry	92.30
Water management	61.30
Soil management	74.80
Feed management	86.10
Health management	65.30
Harvesting	98.90

The measurement of soil pH was adopted only when taking up of new sites for shrimp culture. The extent of adoption of this technology was 49.60%.

It could be observed from Table 2 that out of the 60 shrimp farmers of Nellore, 31 farmers belonged to the high adopter category and 29 farmers belonged to the low adopter category. Thus 31 farmers were correctly classified. Hence the percentage of correct classification was 51.66%.

It was also evident that the D^2 value was 0.3505 and that the f value was highly significant at one percent level of significance. This implied that the fourteen variables were significantly discriminating between the high and low adopter categories of shrimp farmers. Further, out of the fourteen variables, eight variables had shown significant positive influence in differentiating the high from the low adopter categories of shrimp farmers. The 8 variables in the descending order of their importance were Efficiency (1.0584), perceived risk (0.5651), Feasibility (0.4455), Policies (0.3330), Cost (0.2485), Complexity (0.04313), Immediacy of returns (0.0194), and multiple advantage (0.0055).

The analysis also revealed that the remaining 6 variables viz., input availability (-0.4461), profitability (-0.4232), Trialability (-0.3247), Observability (-0.1857), physical compatibility (-0.0433) and cost of technologies

Table 2. Discriminant function analysis in relation to the relative importance of variables in discriminating between the groups (n=60)

Variables	Discriminant function Coefficient L(i)	Relative importance = (L(i)*D(i)/D²*100 (%)
Efficiency (x_1)	1.0584	100.78
Feasibility (x_2)	0.4455	-0.788
Immediacy of returns (x_3)	0.0194	0
Physical Compatability (x_4)	-0.0433	0
Observability (x_5)	-0.1857	0
Profitability (x_6)	-0.4232	0
Perceived risk (x_7)	0.5651	0
Input Availability (x_8)	-0.4461	0
Cost (x_9)	0.2485	0
Complexity (x_{10})	0.04313	0
Trialability (x_{11})	-0.3247	0
Multiple Advantage (x_{12})	0.0055	0
Cost of Technologies (x_{13})	-0.0163	0
Policies (x_{14})	0.3330	0
Total		100.00

$D^2 = 0.3505$ High group (n_1) = 31 Low group (n_2) = 29 F = 20.56**

D = $1.0584x_1 + 0.4455x_2 + 0.0194x_3 - 0.0433x_4 - 0.1857x_5 - 0.4232x_6 + 0.5651x_7 - 0.4461x_8 + 0.2485x_9 + 0.04313x_{10} - 0.3247x_{11} + 0.0055x_{12} - 0.0163x_{13} + 0.3330x_{14}$

D = Value of the discriminant function of an individual shrimp farmer.

$x_1, x_2 \ldots\ldots x_{14}$ = Predictor variables.

(-0.0163) had shown significant negative discriminant function coefficients in the descending order of their importance. The analysis also revealed that these variables had shown significant negative influence in differentiating the high adoption category and low adoption categories.

Table 2 also shows the relative importance of the variables in discriminating between the high and low adopter categories. It could be seen that the variables having substantial importance in the classification of shrimp farmers into high adopter category (first group) and low adopter category (second group) were efficiency and feasibility with a relative importance of 100.78 and -0.788%respectively.

The study revealed that the perceived attributes of technologies namely efficiency and feasibility were found to discriminate between high and low adopter categories of shrimp farmers. In the recent years, shrimp farming has become a money spinner and farmers invest lakhs of rupees in a single crop of shrimp. Besides, the farmers are highly receptive to new technologies, provided the research system generates technologies which are more efficient and feasible and the farmers at the receiving end would be able to deliver the goods more effectively by increasing the production of shrimp thus contributing more effectively to the foreign exchange reserves of the country. Efficiency of the technology implies that sufficient time, money and labour should be saved with decrease in discomfort to the farmer. Hence efficiency of technology is warranted in the first place followed by feasibility of the technology. Feasibility of the technology on the other hand implies the possibility of getting suitable conditions in terms of water sources, inputs such as seed, feed and power. The findings of the study implies that Scientists and researchers should concentrate their efforts on developing and standardizing technologies in shrimp farming which are more efficient and feasible. Hence scientists and researches should give more relative importance to these attributes in technology generation and technology refinement.

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