INSECTICIDE BUYING BEHAVIOR OF PADDY FARMERS

(A study conducted in Anuradhapura District)

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Introduction

Different people have explained marketing in different manner and Kotler (2001) explained marketing as a process of creating and exchanging products that are possible to make profits while satisfying the needs of the customer as well as the functional or psychic utility of the product. Basically marketing is a process to exchange goods and services to satisfy the utility of the customers. Empirical studies have discovered that consumers tend to purchase commodities as a credit bound relationship, due to the influence of marketing information, due to the prevalence of price and services differentials among dealers of commodities (Funk and Downey, 1983, Pathiraja and Jayawardena, 2003, and Rajapaksha, 2005) and due to the impact of the promotional campaigns (Spinks and Bose, 2002, Funk and Downey,1983, Pathiraja and Jayawardena, 2003). In general, consumers tend to purchase commodities in response to changes that are taking place in environment. Consumer behavior in response to changes occurred in the environment could be seen through the purchasing behavior that is completed in few steps. Those steps include problem recognition, information search, evaluation of alternatives , purchase decision and post purchase evaluation (David, 1998). Factors like cultural, social, personal and psychological (Kotler, 2001), demographic factors (Pieters,1989) and lifestyle (Cravens, et al., 2005) could influence consumer behavior.

Pesticide marketing

Use of pesticides in pest control has become popular throughout the world and the world pesticide market is valued approximately at US$ 27 billion and pesticide sales in Asia has boosted by 10% in 2000. The world pesticide industry is lead by relatively small number of manufacturers and world's top ten agro- chemical companies produced 90% of the active ingredients. Companies are generally vertically integrated (Niyarepola, 2008).

Chemicals that use to destroy or control pests of all kinds are pesticides and are named as insecticides weedicides and fungicides based on the intended use of them. Insect/ pest damages are common problems in paddy production and cost of agro-chemicals has accounted for 13%

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of per acre cost of production of paddy under irrigation in Anuradhapura district in Yala, 2006. Per acre cost of agro- chemicals has accounted respectively for three percent and five percent of material inputs used in paddy production including and excluding imputed costs in the same seasons in Anuradhapura district (DOA, 2007).

As the use of agro-chemicals raise the cost of production of paddy alternatives to agro-chemicals should be promoted. Though integrated post management (IPM) is such an alternative it is not popular among paddy farmers due to various reasons such as unawareness and lack of agricultural extension efforts to popularize IPM. Therefore, the appropriate use of agro-chemicals should be promoted. Paddy farmers in rural areas have to depend on the advices of peer farmers and traders when the farmers are not access technical information related to the selection and the use of agro-chemicals. Under these circumstances, the product promotion campaigns launched by the agro-chemical firms through electronic and printed media have confused the farmer up to a certain extent. Hence, it is important to be aware of factors that influence formers' decision process on the use of agro-chemicals.

Material and Methods

Data

Secondary data were extracted from the documentary sources while primary data were gathered through a field survey conducted with a random sample of 55 paddy farmer drawn from the list of paddy farmers available at the Agrarian Services center. This sample was selected from a purposively selected five leading paddy producing villages namely; Nuwarawewa, Nelumkanuiya, Pothanegema, Kalaththawa and Kawarakkulama that are located in five different Grama Niladhari divisions of Nuwaragampalatha-east. Divisional Searetariat area. Data were collected related to the activities completed by paddy farmers during Maha 2006/2007

Theoretical Model of Insecticide use

A logistic model was employed for this purpose. This method was decided to use because of mathematical simplicity and asymptotic characteristics, which constrained the predicted probabilities to a range from zero to one. This model transforms the problem of predicting probabilities within an (0,1) interval to a problem of predicting the odds of an event's occurring within the range of the entire real line (Pindyck and Rubinfeld, 1981).

$$P_i = F(Z_i) = F(\alpha+\beta X_i) = 1/\{1+e^{-zi}\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

Where;

P_i = Probability that an individual will make a certain choice, given X's,

$F(Z_i)$ = Value of the standard normal density function associated with each possible value of the underlying index ,Zi

e = The base of the normal logarithm,

$\mathbf{Z_i}$ = Stimulus index for i^{th} observation ,and

$\mathbf{X_i}$ = i^{th} observation of the independent variable

If the probability of ocurrence is Pi that of not occurrenace is (1-Pi). So, the relationship between two probabilities could be expressed as:

$$\mathbf{Pi / 1\text{-}Pi = 1+ e^{zi} / 1+ e^{-zi}} \quad \text{.....(2)}$$

Where (Pi / 1-Pi) is the odd ratio when Y=1 (When insecticides is used for paddy)

Equation (2) can be transformed into a linear form of equation as in equation (3) below.

$$\mathbf{L_i = ln\ (Pi/1\text{-}Pi) = Zi = \beta_1 + \beta_2 X_i} \quad \text{..... (3)}$$

The empirical Model

It was treated that farmers who had used insecticides as adopters and those who had not used insecticides as non-adopters. If insecticides were used the value of Y=1 and value of Y = 0 if not used. The empirical model used to study the factors influencing the insecticide buying behavior of paddy farmers is presented in equation (4):.

$$\mathbf{L_i = ln\ (Pi/1\text{-}Pi) = Zi = \beta 0 + \beta 1 X1 + \text{.....} + \beta_9 X_9 + Ui} \quad \text{..... (4)}$$

Where,

βi's = Partial regression coefficients

X_1 = Household income per month in Rupees

X_2 = Extent of paddy cultivated (Acres)

X_3 = Farming experience of the respondent (years)

X_4 = Impact of advices of retailers (*a Scale of 1-5*)

X_5 = Impact of price of insecticides (*a Scale of 1-5*)

X_6 = Impact of peer farmers influence (*a Scale of 1-5*)

X_7 = Impact of influence of the Agricultural Extension Services (*a Scale of 1-5*)

X_8 = Impact of sales promotion (*1- if concern, otherwise 0*)

X_9 = Impact of Brand name/trade name of the insecticide (*1- if concern, otherwise 0*)

Ui = Stochastic error term

Results and Dicussion

Contribution of different Factors to Purchasing of Insecticide

A logistic function was estimated using forward stepwise logistic regression technique. Stepwise chi-squares are the likelihood ratios that change the value of -2LL between steps. A Large value of -2LL indicates that the model fitted is poor. The -2LL value of the fourth step of the model specification was 52.778 and it implies that independent variables explain the dependent variable at a considerable level. Even though the fitted model is not a perfect fit but, is good enough for prediction. Results of the analysis are presented in the Table 1.

Table 1
Results of the Forward Stepwise Logistic Regression

Description of the variable	β	S.E.	Wald	Sig.	Exp(B)
Constant	-.298	.354	0.706	.401	0.742
Extension services	.910	.374	5.909	.015	2.483
Price	.822	.369	4.963	.026	2.274
Brand/Trade name	.998	.394	6.412	.011	2.713
Peer farmer	.911	.426	4.568	.033	2.487

These β values tell the amount of change (+ or -) in the predicted log odd ratio, the chance of a non adopter to become an adopter, in response to one unit change in the predictor, cetaris paribus. Only four factors became significant. The coefficient of the extension service is 0.910 and it means that one unit increase in agricultural extension service can expect a 0.910 increase in the log odds for demand of insecticides (probability of using insecticides) cetaris paribus. Rest of the β coefficients could be interpreted in the same manner. Results of the empirical analysis indicate that brand name / trade name of the chemical, influence of peer farmers, extension service and price of the chemicals are the factors that have influenced significantly on farmers' decision to apply insecticides.

Wald chi-square value and two- tailed p- values were used in testing the null hypothesis, that the coefficient parameter is zero. Coefficients having significance level equal to or less than 0.05 (or a + value) would be statistically significant. According to this rule estimated values of all coefficients are statistically significant at 5 % level of significance.

Exp (β) is the odd ratio for an independent variable, represents the factor by which the odds (events) change for a one- unit change in the independent variable. If Exp (β) =1.0 there is no effect and if the value is less than unity it mean that the independent variable decrease the logistic and the odds (event). A value of Exp (β) greater than unity means that an increase in the independent variable increases the logistic and therefore increases the (event). According to the results, all four variables have impacted positively on the farmer's decision to use insecticides in paddy production.

Conclusions and Recommendations

Demand for insecticide depends on the impact of the extension service, price of the insecticide, brand/trade names of chemicals and the influence of the peer farmers. As it is clear that the extension efforts can stimulate the demand for insecticides strengthening agricultural extension activities in the area would be beneficial in promoting appropriate use of insecticides because farmers do concern about the price of the chemical that they apply. So, effective and efficient use of the chemical could be promoted through agricultural extension programs as giving mere consideration to price of the insecticides in choosing insecticides is not the correct way to select the chemical since opportunistic traders could sell low quality chemicals at high prices. Farmers also do consider the brand name /trade name of the insecticide. This is not an uncommon phenomenon where sources of information are ineffective. If this situation continued over a long period of time in an area where agricultural extension service is not functioning properly farmers' choice of the insecticide will be influenced by level of the product promotion efforts launched by the firm that is selling the chemical. Finally farmers have selected insecticides based on the opinion of the peer farmers and this is the reality when farmers are not readily access to the agricultural extension services. It is clear that in the absence of reliable source of technical information farmers had used various sources of information but, the sources other than the agricultural extension service are imperfect and could be misguided.

If the government finds difficulties in strengthening the agricultural extension service it is recommended to use the mass media to disseminate such information. At the same time, the Department of Agriculture (DOA) could use Information Communication Technology (ICT) to disseminate this information through the existing services of the DOA such as cyber extension units and the toll free advisory service. Further more, the DOA should explore the possibilities of disseminate this information through the national level computer networks such as "Vidatha Centers", "Nenasala" and so on.

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