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Consumer Opinion and Belief about Environmental Issues and Farming Practices in Punjab

Santosh Sharma[1, 2], Sandeep Kumar[3, 4] and Manish Bansal[5]
[1]Assistant Professor in Management, Yadavindra College of Engineering,
Punjabi University Guru Kashi Campus Talwandi Sabo-151302, Punjab, India.
[2]Research Scholar in Faculty of Management,
IKG Punjab Technical University Kapurthala-144001, Punjab, India.
[3]Principal, Guru Teg Bahadur College Bhawanigarh-148026, Punjab, India.
[4]Formerly, Shree Atam Vallabh Jain College Ludhiana-141008, Punjab, India.
[5]Associate Professor in Management,
Department of Management Studies MIMIT, Malout-152107, Punjab, India.

(Corresponding author: Santosh Sharma)
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ABSTRACT: The Green revolution made India self-reliant in food grain and cereal production. It transformed its status from 'begging bowl' to 'breakfast basket'. The State of Punjab with only 1.5 per cent of country's geographical area is the major contributor in the success story of India's agricultural production. It has earned name as Bread-Basket of India. However, the benefits of green revolution in today's time have lost its significance in the wake of emergence of a number of health related issues. Although, Punjab placed food security of India on strong foothold but it cannot be denied that it itself caught with several health issues. The ailments like cancer, renal failure, stillborn babies and birth defects have been reported to be due to unabated use of fertilizers and pesticides to extract maximum yield and earning from the paddy-wheat cycle. The traces of pesticides to harmful levels are reported in food grains and potable water and milk. The agricultural cycle being extensively followed by farmers demands excessive use of water for irrigation purpose. It led to fall of underground water table at alarming rate and held us accountable to future generations. There is a seasonal problem of acute air pollution due to stubble burning after harvesting paddy and wheat crops. Despite the serious nature of degradation of soil, water and air quality, there seems no self -curative practice in Punjab in immediate future. This research work is undertaken to examine the belief and opinion of the general public, from their perspective of being consumers, about environmental issues related with and due to professing of agriculture in Punjab.

Keywords: Crop straw, Green revolution, Stubble burning, Ozone depletion, Consumer' Opinion and belief dimension.

I. INTRODUCTION

In consumer research, an attempt is made to communicate with the respondents to get their opinions, beliefs, attitudes, feelings about a given problem and to promulgate in some measurable form. In this paper an attempt is made to communicate with the respondents to let them express their opinions and beliefs about the environmental issues and farming practices in Punjab. The Green Revolution in India was initiated in 1960's [1]. It led to increase in food production that was needed to feed its millions of malnourished people throughout the nation. The introduction of high yielding varieties of wheat during late-1960s and of rice varieties during early-1970s supported by assured irrigation, use of chemical fertilizers, agro-chemicals, farm mechanization and effective procurement policy for grains brought success of green revolution in the country [2]. Punjab and Haryana are those states of India which proved their worth in the success of nation's green revolution; their contribution can be owed to hardworking class of farmers and labor class, fertile land, availability of water for irrigation [3].

The State of Punjab is a leading agricultural state of India in which agriculture sector is an important driver of its economic growth, especially in the rural areas. Rice and wheat are the dominant crops of Punjab. Under Government of India's policy of Minimum Support Price, the paddy and wheat produced in the State is procured by Food Corporation of India (FCI), a nodal agency of Centre Government, along with five State Government Agencies [4].

The production of food grains in Punjab is much above the consumption requirements of its own population. Being surplus state in the production of paddy and wheat, Punjab contributes towards Central Pool storage system to move the stocks to deficit regions. The state with just 1.53 per cent of geographical land area of India almost contributes half of rice and one-third of wheat to the central pool of grains [5]. Assured procurement of

wheat and rice at minimum support price remained a motivating factor for Punjab farmers to grow these crops intensively. Other reasons for the farmers to stick to these crops can be attributed among others to lesser labour and lesser time that would be required at the time of crop harvesting and good yield production. This translates into comparatively higher profitability when compared to remunerative gains from other crops. It is in this way, the State supports its Nation to meet its food security goals by contributing through food grain production. Punjab is rightly being called as the 'food bowl' of India [6]. Thus, Punjab has played an important role towards the attainment of food security of Nation.

Fig. 1. Seasonal Paddy harvesting with Combine Harvester leaving behind heavy moist straw.

There is another face of the success story of State of Punjab being a surplus state in the production of rice and wheat. Among other implications of growing paddy and wheat crops on larger area and as first preference by Punjab farmers, there in an unavoidable problem related with the proper disposal or management of crop-straw that would left-over after harvesting of these crops. This problem becomes more pronounced in dealing with disposal of paddy straw because the farmers have only a few days between harvesting of paddy and sowing of wheat. Their requirement to clear the field to sow next Rabi crops especially wheat compelled and stimulates them to set ablaze the crop straw. The resulting high levels of smoke remain there for months till the first downpour settling the smoke down again on earth. The citizen were left to live and compelled to breath in the kind of unhealthy environment. It has become a new challenge to break the monoculture of paddy-wheat crop cycle which has not only got associated with degrading environmental health but it has also taken a toll upon the soil fertility, its contamination and depletion of priceless underground water table to a dangerous low level. Therefore, the skewed growth in Punjab agriculture, achieved through intensive agricultural practices reported to have led to serious implications for environmental sustainability. There are studies which support the viewpoint that poor agricultural practices, and resource mis-distribution have led to substantial human transformation of India's natural environment [7].

Where, intensive agriculture in paddy-wheat cycle in Punjab led to the decline in crop diversity, the depletion as well as contamination of natural resources, rampant use of fertilizers, herbicides and pesticides led to environmental degradation which directly affects the physical and mental health of its residents. Due to abusive use of chemical fertilizers and pesticides, most of the cultivable land in Punjab has become sick. This 'cultivable land turned sick' has become a potential source of health related problems. This is supported by the increase in the number of cancer and hepatitis-C cases especially in the Malwa belt of Punjab [8]. These cases which were unheard a few years back are common in almost every village of the State of Punjab. The cropping pattern has changed towards rice-wheat monoculture over the last years is a major factor that is responsible for another serious implication related with declining groundwater table in Punjab every year. The dependence of agriculture on groundwater resources increased significantly over time and it led to depletion of underground water at alarming rate and has converted many areas into dry zones.

Despite many efforts for crop diversification in the past, there was a limited success in reducing the area under rice or some other crops to maize, pulses, vegetables, fruits. Due to excessive use of fertilizers and pesticides in agriculture production, the harmful traces are reported to have travelled down in grain, milk and water meant for our consumption [9]. The consumer is always at the receiving end under these circumstances. So, it would be useful to study the opinion and belief system of consumers about environmental issues emerging out of the farming practices in Punjab.

II. LITERATURE SURVEY

Chen, *et al.,* (2010) reported that the concept of global warming has lead people to develop interest towards ecological development and reinforced interest towards the environmental issues [10].

Sachdev (2010) reported that rising social concerns for the atmosphere compelled more number of businesses to consider green matters as a chief source of strategic revolution [11].

Upadhyaya and Shukla (2011) reported the fact that in order to devise strategies and policies to meet the green consumers' needs, wants and demands, eco-friendly behavior must be inculcated understood clearly [12].

Joshi and Mishra in 2011 aimed their study to understand their awareness on environment friendly car (EFC) in Maharashtra (India). They stressed the need to create more awareness about EFC in non metros [13]. They stressed that both marketer and the government should create the desired knowledge to make people aware about environmental problems those arise just because of cars in use. In similar research area, the buying behaviour of customers towards small car segment in Haryana has been studied [14].

Singh in 2011 highlighted the emerging awareness of elderly consumers about green products. It is reflected in their purchasing patterns [15].

Valaškova & Klieštik, (2015) found that demographic,

responsibility information and purchasing are the factors needed to understand consumer behavior. In their study they reported that even any recession could not bring any diversion in consumers' positive attitude towards green products [16].

Rahbar & Wahid, (2011) studied the effect of green marketing tools on the purchase behavior of consumers. They reported that consumer behaviour towards eco-friendly products depends upon their level of their trust in eco-label and eco-brand of products and also on environmental advertisements [17].

Kumar & Anand, (2013) reported that the purchase intentions are positively influenced towards eco-friendly paper by attitude and personal norms of consumers [18]. Ali & Adil, (2014) undertook study on green consumer behavior in India to determine its predictors [19]. There are studies to cite how poor agricultural practices lead to deplorable condition of people.

Patki, (2017) reported that pesticides/insecticides used to protect crops from the ravages of pests were environmental toxins. Farmers are using more and more pesticides to protect their crops to get commercial benefits at the cost of human health. The general population directly engaged in agriculture practices is the labour who is exposed to pesticides through the food chain. The relative risks which evolve out of this practice are the rising symptoms and signs of diseases, physiological disorders [20].

The pesticides not only pose a risk to the workforce involved directly in growing crops, instead, its traces trickle down in the agriculture produce.

Dar *et al.*, (2018) report that pesticides contamination of fruits, vegetables and grains has become a health issue across the entire world [21]. In order to make indirect observation of consumer preferences in the euphoria of unhealthy agricultural grain production, the present authors Sharma *et al.*, (2019) recently carried a study to inspect the expenditure patterns of Punjab's consumers on Environmental Goods [22].

III. PROBLEM FORMULATION

In India the Green revolution of 1960s made it self-reliant in food production and converted its status from 'begging bowl' to 'breakfast basket'. The state of Punjab with only 1.5 per cent of country's geographical area became the major contributor in the success story of India's agricultural production and being called as India's granary or Bread basket of India. But, the green revolution benefits in today's time have lost its significance as a number of health related issues are emerging day by day. A few years back, a study undertaken by Post Graduate Institution of Medical Education & Research (PGIMER) reported a direct connection of growing incidents of cancer with the use of pesticides in the region [23]. The state of Punjab which spearheaded a victory against food scarcity and remained instrumental in providing food security to the Nation itself caught by ailments like cancer, renal failure, stillborn babies and birth defects because of a number of reasons. The cotton plants in the last more than two decades develop immunity against pesticides which compelled the farmers to make frequent and high doses of pesticides. These pesticides ultimately precipitate partially into the soil and recycle through food chain in the living organism and have started playing havoc with citizens' health. The frequent use of pesticides and that of fertilizers has made our land sick. Now, the paddy and wheat crops, brought as an alternative to cash crops like cotton, are being extensively grown by Punjab's farmers. The trend of growing of these crops witnessed rampant use of fertilizers and pesticides. The rampant use of fertilizers and pesticides has polluted air and soil and also led to contamination of water. In many areas, the traces of harmful components are found more than permissible limits in water, milk and other eatables. After harvesting paddy and wheat crops, there occurs a seasonal problem of acute air pollution due to stubble burning (Fig. 2, 3).

Fig. 2. A scene of stubble burning post-Paddy harvesting to clear field for next sowing season.

Fig. 3. A scene of wheat-straw burning post- harvesting to clear field for next sowing season.

The depletion of ozone layer to some extent is related with the rampant use of chemical fertilizers especially when they are applied to rice crops [24]. The efflux of nitrous gas acts as greenhouse gas as well as is a potential agent which causes depletion of ozone layer in stratosphere. It is this layer which protects biosphere from cancer causing ultraviolet radiations coming from Sun [25].

Despite the serious nature of degradation of soil, water, air quality and ozonosphere, there seems no self-

curative practice in Punjab in immediate future. It is pity that no political party in our country has so far brought any environmental issue on the agenda of its election manifesto. Although, there are reports of protests organized by some social activists but they are confined only to a few places. So far, the issue of environmental degradation couldn't become an issue of masses in Punjab or in India. In USA for the last 50 years, in contrast to present position in India, the environmental issues remained not only on the top of public agenda but also in the domain of national politics. Throughout these years, despite ups and downs, the environmental issues did not fade away from either the public watch or the political agenda [26].

From the literature survey, it can be seen that research work is being carried out on the subject of environmental issues world-wide. In addition to the geographical location, the consumerism is the main determinant to the environmental health of an area or the region. The degradation of environment components has been a topic of research for the last decade in our country and abroad [27-28]. So, there is a strong need to examine the belief and opinion of the general public about environmental issues related with and due to professing of agriculture in Punjab. For the last 10-15 years, the state of physical health of people of Punjab is reported to have been crippled by fatal diseases like cancer and hepatitis region [23]. The plausible reason behind this aspect is the pollution manifested in air, water, soil and noise pollution which is not uncommon in other countries too [29]. The environmental degradation can be handled by exploring the environmental sensitivity. One mode of testing the environmental sensitivity of the population is by studying the consumer behavior with respect to their priority for environmental goods whenever they owe to acquire any market good and how they prioritize to think to make expenditure on environmental goods. So in this context, the knowledge supplement from the research undertaken in the present study would be of much importance to the society, environmental policy makers and potential new business.

IV. OBJECTIVES AND RESEARCH METHODOLOGY

The study of environmental Beliefs and Opinions of the general public is important because it can provide insight knowledge of 'degree of concern' that people have developed with the chosen environmental concerns of the specific area. The conclusions of this study can be expected to impress upon the policy makers to address the environmental issues for the benefits of consumers and general public. So, the current research work was undertaken to examine the belief and opinion of the general public about environmental issues related with and due to professing of agriculture in Punjab. In the proposed research, the sample was taken from students, faculty and staff of different colleges in the state of Punjab. At the first stage, multistage sampling design method was used to select the sample that would represent target population of the state. The target population selected from adult residents of Punjab. With 5% Margin of Error and sticking to 95% Confidence Interval, a sample size of around 500 is taken. Assuming the response rate of 50%, the questionnaire entrusted to 1000 respondents from different districts (Amritsar, Barnala, Bathinda, Faridkot, Fatehgarh Sahib, Fazilka, Ferozpur, Gurdaspur, Hoshiarpur, Jalandhar, Kapurthala, Ludhiana , Mansa, Moga, Mohali, Mukatsar, Patiala, Pathankot, Ropar, Sangrur, NawanShahr and Tarntaran) in the state. The elements of the sample were the young college going students, faculty and staff members chosen by multistage sampling design followed by the choice of respondents guided by random sampling. The choice of respondents only from colleges is guided by convenient sampling. 'The proportion of the respondents in the sample' was decided in a way that would represent their respective districts' proportional population in the total population of Punjab. The census data of the year 2011 is taken as reference for sample size calculation [30].

To meet the set objectives, the Eco scale: A Scale for the measurement of Environmentally Responsible Consumers has been put into use. All the items in this scale are scored on 5-point scales ranging from strongly disagree to strongly agree or ranging from never to always. This scale was originally developed by Stone *et al.*, [31]. A total of 37 questions comprising stubble burning, air, soil and water pollution, unregulated use of fertilizers and pesticides, their rampant use making cultivable land sick for health, concept of organic farming and its comparison to traditional farming, sticking to paddy-wheat cycle, lack of crop diversification, opinion towards economic growth at the cost of environmental degradation, sensitization of consumer toward environmental issues, role of consumer to protect the environment, receding underground water table, green revolution and environmental degradation, role of government in protection of environmental health, global warming, solid waste management, prevalence of electrical efficient appliances were designed to know how the respondents as consumers form a system of belief and opinion about these environmental issues emerging out of traditional farming practices in Punjab.

The data collection was done on the basis of the questionnaire designed for this specific purpose. For analysis, Mean of scores and Standard Deviation (SD) was calculated; the statistical tools: T-test and ANOVA were employed to evaluate the output as a function of demographic profile of the consumers. Then, interpretation of the results is made accordingly.

V. RESULTS AND ANALYSIS

The respondents' demographic profile (Table 1) shows that participation of males in this survey based study is more than females; two-third (66.13%) of the respondents are males. Age group profile shows that most of them belong to 36-45yr age (38.71%) group while place of residence profile shows that more than half of them (56.45%) are from urban background.

Table 1: Respondents' Demographic Profile and Mean of scores and SD of 'Opinion and Belief Dimension'.

Demographic Factor		No. of Respondents		Mean of scores and SD of 'Opinion and Belief Dimension'	
		Frequency	Percentage	Mean (**)	SD (**)
Gender	Male	328	66.13	145.12	12.87
	Female	168	33.87	141.81	23.59
	Total	496	100	-	-
Age Group (in years)	18-25	104	20.96	136.07	14.35
	26-35	112	22.59	147.86	10.22
	36-45	192	38.71	145.04	22.73
	46-55	80	16.13	146.50	8.24
	56 yrs and above	8	1.61	143.00	.000
	Total	496	100	144.00	17.16
Place of Residence	Rural	112	22.58	141.36	13.33
	Urban	280	56.45	143.94	20.17
	Rural as well as Urban	104	20.97	147.00	10.22
	Total	496	100	144.00	17.16
Education Level	Matriculation	8	1.61	143.00	.000
	12th Standard	40	8.07	148.60	9.32
	Graduation	104	20.97	132.15	29.25
	PG/PhD	344	69.35	147.07	10.19
	Total	496	100	144.00	17.16
Education Stream	Arts	72	14.52	134.66	33.03
	Science	160	32.26	149.85	8.59
	Engineering	176	35.48	142.36	13.49
	Management/Commerce	56	11.29	143.57	11.99
	Law	32	6.45	145.50	12.05
	Total	496	100	144.00	17.16
Occupation	Agriculturalist	16	3.22	134.50	29.43
	Own Business	8	1.61	139.00	.00000
	Government Sector	296	59.69	144.35	18.97
	Public/ Private Sector	96	19.35	143.42	13.17
	Unemployed/ Student	64	12.90	145.87	11.29
	Labourer	16	3.23	145.50	2.58
	Total	496	100	144.00	17.16
Family Size	02	8	1.61	147.0000	.00000
	03	88	17.75	135.2727	32.16649
	04	160	32.26	145.9000	12.89298
	05	96	19.35	142.9167	10.46666
	06	104	20.97	150.9231	6.27476
	07	40	8.06	139.6000	6.51940
	Total	496	100	144.0000	17.16186
Earning Members	02	104	20.97	144.9231	14.19674
	03	264	53.23	142.9394	19.98926
	04	48	9.68	147.3333	13.22366
	05	64	12.90	148.5000	6.94651
	06	8	1.61	139.0000	.00000
	07	8	1.61	116.0000	.00000
	Total	496	100	144.0000	17.16186
Average Monthly Income	<10,000	8	1.612	106.0000	.00000
	10,000-25, 000	48	9.68	144.8333	12.99973
	25,100-50,000	80	16.12	135.0000	31.65958
	50,100-75,000	88	17.75	147.4545	6.85299
	75,100-100,000	80	16.13	147.0000	11.04192
	>100,000	184	37.10	146.3043	11.47650
	Total	496	100	144.0000	17.16186

**Source: SPSS output

Note: No one from single earning member family responded. So, no space is kept for this class in the analysis part of this study.

Table 2: T-Test/ANOVA Test Consumers' Opinion and Belief Dimension differentiation within Demographic Groups.

Demographic Field	t-value (**)	F-value (**)
Gender	2.04*	-
Age Group	-	7.99*
Place of Residence	-	2.94
Education Level	-	24.12*
Education Stream	-	11.31*
Occupation	-	1.345
Family Size	-	9.77*
Earning Members	-	6.209*
Monthly Income (Average)	-	13.596*

**Source: SPSS output (*p<0.01)

From the education level profile, it can be seen that most of the respondent (69.35%) possess PG/PhD level of academic education and out of them maximum (35.48%) are from the engineering background. The occupation profile tells that a majority (59.69%) of the respondents are working in the government sector. It is to be further noted that no one from single earning member family responded while most (32.23%) of the respondents have their family sizes of four members. The families with three earning members have maximum (53.23%) representation in this research survey, and most (37.10%) of the respondents have their average monthly income more than one lakh. The mean of scores and standard deviation values with reference to opinion and beliefs of respondents as consumers are also brought in Table 1. The low SD values throughout the entire demographic profile line suggests that the respondents might have converging ideas vis-à-vis their opinion and belief about environmental issues and farming practices in Punjab are concerned.

The data analysis is carried by employing T-test on Gender and by analysis of variance (ANOVA) on the rest of demographic factors. The t-value and F-values are given in Table 2.

To see any significant differences within each demographic group of the respondents on their opinion and belief about environmental issues and farming practices in Punjab, the following observation are made on the basis of F-value and t-values respectively calculated from ANOVA and T-test:

The Table 2 shows t-value 2.04 within the group of male and female respondents on opinion and belief dimension which is significant at 0.05 level. It indicates that there is significant difference in opinion and beliefs of male and female consumers about environmental Issues and farming practices in Punjab.

The F-value for the main effect of age of consumers on opinion and beliefs came out to be 7.99, which is significant at 0.01 level. It indicates that there are significant age wise differences in opinion and beliefs of consumers on environmental issues.

The F-value for the main effect of place of residence on opinion and beliefs among consumers came out to be 2.94, which is not significant even at 0.05 level. It indicates that there are no significant differences in opinion and beliefs among consumers based on their place of residence.

Thus, the consumers belonging to rural and urban areas are equally sensitive or insensitive to the said environmental issues in their opinion and belief system.

The Table 2 shows that the F-value for the main effect of consumers' educational level on opinion and beliefs came out to be 24.12, which is significant at 0.01 level. It indicates that there are significant differences in opinion and beliefs among consumers based on their level of education. Thus education affects the way of thinking of the consumer towards environmental issues.

F-value 11.31 for the main effect of the education stream on consumers' opinion and beliefs is significant at 0.01 level which indicates that there are significant education stream-wise differences in consumers' opinion and belief about environmental issues.

The F-value 1.345 for the main effect of occupation on opinion and beliefs among consumers not significant even at 0.05 level which indicates that there are no significant occupation-wise differences among consumers in their opinion and beliefs about environmental issues.

The F-values for the main effect of family size and earning members and family income are 9.77, 6.209 and 13.59 which are significant at 0.01 levels. This indicates that there are significant differences within the respective demographic groups of family size and earning members and family income with regard to their opinion and belief about the environmental issues that were placed before them in the form of questionnaire.

Out of the total nine demographics chosen, the differences within the respective groups: Gender, Age, Education Level, Education Stream, Family Size, Earning Members and Average Monthly income with regard to consumers' opinion and beliefs about environmental issues are significant at 0.05 or 0.01 level. It is found that place of residence and occupation do not influence opinion and beliefs significantly even at 0.05 level.

VI. CONCLUSIONS

This research study reveals that consumers' opinion and belief about environmental issues and farming practices in Punjab depend upon class of Gender and differ with the demographic factors of Age, Education Level, Education Stream, Family Size, Earning Members and Average Monthly income.

The outcome of this study that the place of residence do not influence opinion and beliefs significantly even at 0.05 level means that the consumers belonging to rural and urban areas are equally sensitive or insensitive to the said environmental issues in their opinion and belief system and same significance can be attached to the insignificant difference among various occupational groups towards their opinion and belief about environmental issues and farming practices in Punjab.

The results of this study may catch the attention of Punjab government and the State Legislature while formulating strategies to sensitize people about environmental concerns and its implications if the environmental concerns were not well attended. There is immediate need to evaluate the efforts undertaken so far to facilitate the consumers to get access to pure water, clean air and healthy food.

VII. FUTURE SCOPE

The scope of the present study is limited to the State of Punjab (India). Various demographic factors of the target population are taken into consideration to study consumer opinion and belief about environmental issues and farming practices in Punjab.

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