

# INDIAN JOURNAL OF ECONOMICS AND DEVELOPMENT

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# Indian Journal of Economics and Development

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## **SOCIO-ECONOMIC CONSTRAINTS PERCEIVED BY CANE GROWERS IN SUGARCANE PRODUCTION IN PUNJAB**

Abujam Anuradha Devi and S.S.Chahal \*

### **ABSTRACT**

*Sugarcane crop is an annual crop which yields income to the farmers after nine months. Contrarily, most of the farmers were in immediate need of the money for livelihood. This gave rise to manifold obstacle in the production and disposal of sugarcane. Moreover, the farmers pass through various kind of constraints right from the time of sowing till the marketing of the crop. The study is attempted to identify various constraints faced by the cane growers in Punjab. The findings revealed that unaware of new technology, paucity of labour and high rate of wages, insufficient source of irrigation, and higher interest rate along with inadequate credit availability were major technological, socio-economics, infrastructure, financial and marketing problems constraints faced by the famers. The low sugar recovery, shortage of sugarcane supply, inability to pay arrear to the farmers were important problems faced during the processing of sugar which leads to non-viability of the sugar mills.*

**Key words:** Sugarcane, socio-economic constraints and marketing

**JEL Classification:** L11, O17, Q10, Q16

### **INTRODUCTION**

Sugarcane is an annual crop which remains in the field for almost a year before harvesting. The crop does not yield any returns during this period. But most of the sugarcane growers were in immediate need of money. The farmers faced various kind of constraints right from the time of sowing till the marketing of the crop. No doubt, the farmers are well-experienced in the cultivation of sugarcane. Nevertheless, either due to lack of scientific knowledge or ignorance of the ongoing information about the crop, the state witnessed a decline in production of sugarcane in recent period. As such some of the cooperative sugar mills have closed down,

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due to inadequate sugarcane supply to the mill. Moreover, the area under sugarcane has been squeezed over years and most of the farmers have allocated their area to wheat and paddy cultivation. Sugarcane is only crop which is under the control of government for processing, pricing and its disposal. Any change in the government policy affects the operation of the sugar mills as well as supply of cane to the mills to a large extent.

Farmers seek for increasing yields, higher cane prices and timely payment of cane prices to drive higher economic profit at the farm side. For minimizing crop risks, farmers aspire for effective extension services, crop off take assurance, accessibility of timely finances and improved harvesting and transport infrastructure. Millers aim for increasing economic profit through higher availability of cane, better sucrose content in sugarcane, better sugar realizations in domestic market, flexibility to export sugar, higher value addition from by-products including alcohol and removal of competition distorting policy interventions. At the same time, millers in general were looking to reduce sugar price risk through hedging. Overall, millers aspire for ease of regulations and greater influence over business levers. Consumers' primary aspirations appear to be the availability of quality sugar at affordable prices. Both household and industrial consumers also seem to aspire for availability of sugar variety in terms of sugar forms like liquid sugar and processed sugar products, albeit on a lower priority. These highlight problems at every phase of the sugarcane cultivation up to the final product.

Therefore, giving due consideration to the above described problems of the sugarcane farmers and sugar mills, the present study was taken up to examine the various socio-economic problems faced by the cane growers in Punjab.

## **METHODOLOGY**

There were 23 sugar mills in total in Punjab in 2009-10. But at present only 15 mills were operational and some others were under liquidation. All the sugar mills from cooperative and private sectors were listed out along with their TCD. Two sugar mills each from cooperative and private sector were selected having highest TCD to achieve the stipulated objectives. The sugar mills so selected were Morinda Co-operative Sugar Mills, Limited, Morinda, Doaba Co-operative Sugar Mills, Limited, S.B.S. Nagar from co-operative sector and Wahid Sandhar Sugar Limited, Phagwara and Indian Sucrose Limited, Mukerian from private sector.

In addition to this another sugar mill (Zira Co-operative Sugar Mills, Limited, Zira) which was under liquidation was selected purposely from the cooperative sector. In total the sample consist of five sugar mills. A total of 75 sugarcane farmers comprising 15 farmers from each sugar mill were selected randomly. The information pertaining to various constraints faced by the sample respondents in the sugarcane production and its disposal, and socio-economic

problems were collected through personal interview on well structured schedule for 2010-11. The demographic features of the sample farmers were presented and analyzed by using the tabular analysis. The farmers' ages, family size, income level, area under sugarcane crops, experience in sugarcane cultivation and contact of the farmers with cane expert were categorized by using Cumulative Cube Root Method. The percentage of each constraint faced by the respondents was worked out to show the degree of constraint percept by the respondents in sugarcane cultivation.

## **RESULTS AND DISCUSSION**

The various constraints faced by the cane growers were studied for the selected respondents of the study area in Punjab. In order to have indebt knowledge about the problems in sugarcane cultivation, information about the cane growers needs to be studied.

### **Socio-economic Aspects of the Respondents**

The socio-economic aspects of the respondents determine the type and nature of their livelihood as well as their social life. It helps in making sure that both women and men of every socio-economic group in a community or a particular location have the opportunity to participate in a decision making process. The socio-economic analysis and focus group helps in separating groups of people from different socio-economic categories by wealth, occupation, farming experience, age, ethnicity, education, marital status. Socio-economic studies were often necessary to ascertain, information about the respondent and their associated families. This was because the information will provide good understanding of the characteristic of the sugarcane farmers. These characteristics of the cane growers were studied with respect to their age, educational background, and occupation, farming experience, family size, source of income and farm size.

### **Age of the respondents**

The results presented in Table 1 showed distribution of the respondents according to their age. The majority of the respondents (57.33 per cent) who were engaged in the sugarcane cultivation fall into the age group of 43 to 57 years. This could be considered as productive age group. This is followed by those in the age group of less than 43 years which constituted 26.67 per cent of the total respondents, while the remaining 16 percent of the respondents fall into the age group of greater than and equal to 57 years. Haruna and Kushwaha (2003) in their study opined that age group ranging from 30-50 years is the active and productive age group which is important for the processors to optimally utilize their labour for maximum productivity. The analysis further revealed that the minimum group of the respondents was 30 years while the maximum was 70 years. Therefore, the sample famers in the study area were mostly medium age group and hence in productive age.

**Table 1: Distribution of the respondents according to age**

<b>Age (Years)</b>	<b>Frequency</b>	<b>Percent</b>
< 43	20	26.67
43- 57	43	57.33
≥ 57	12	16.00
<b>Total</b>	<b>75</b>	<b>100</b>

This age group of farmers was more innovative and active in the adoption of new production techniques and mechanization in sugarcane cultivation. Girei and Giroh (2012) reported that this age group of the sugarcane farmers may have much energy to work for a longer period of time. The younger and middle age farmers were more active in the adoption of new farming techniques and always willing to change for better than the older ones who are somehow conservative, adamant to change and vulnerable to change involving the adoption and application of modern farming implements and other technologies.

#### **Educational level**

The educational level of the farmers has direct impact on the perception and understanding of the activity in the adoption of new techniques and any changes in the existing farming system. The present study analyzed the educational status of the sample cane growers and the results are presented in Table 2. It was found that all the sample farmers were literate and majority of them (51.66 per cent) had an education up to high school level.

**Table 2: Distribution of the respondents according to educational level**

<b>Education level</b>	<b>Frequency</b>	<b>Percent</b>
Illiterate	1	1.33
Primary (1-5)	10	13.33
Middle (5-8)	9	12.00
High school	35	46.67
Higher secondary	8	10.67
Graduate	10	13.33
Post-graduate	2	2.67
<b>Total</b>	<b>75</b>	<b>100.00</b>

The results also showed that 16.67 and 15 per cent of the respondent were educated up to graduation and primary level. While 8.33, 6.67 and only 1.67 per cent of the total respondents have higher secondary, middle and post graduation education respectively. The study revealed that all the farmers in the study area were literate and in addition majority of the respondents was high school educated and graduated respectively. Hence, mobilization and sensitization of the sugarcane farming in the study area could be easy because flexibility in their perception and ability to decide with minimum guidance will impact positively in their livelihood.

### Occupation

The occupation of the respondents in the study area was studied and the results are presented in Table 3. It was found that 93.33 per cent of the respondents were absorbed in agricultural and allied activities while 6.67 per cent of the respondents in non-agriculture. It can be deduced from the results that majority of the farmers devote their time in crop cultivation and animal rearing.

**Table 3: Distribution of the respondents according to occupation**

Occupation	Frequency	Percent
Agriculture and allied activities	70	93.33
Non-agriculture	5	6.67
<b>Total</b>	<b>75</b>	<b>100</b>

### Income level

The income of the farmers enhances a farmer's ability to farm. High income of the farmers has a higher probability to adopt improved sugarcane varieties and go for mechanization as the problem of labour scarcity prevails in the state. The distribution of the respondents based on income level is presented in Table 4. The results showed that majority of the farmers (83.33 per cent) in the study area had annual income less than ₹6.33 lakh. This was followed by seven and three per cent of the farmers having annual income of ₹6.33 to ₹12.67 lakh and more than ₹12.67 lakh respectively. Therefore, the analysis of the results revealed that most of the farmers were having less annual family income. This brings hindrance in mechanization of the sugarcane farming and was not able to adopt new techniques to improve the production of crop. On other hand, low family income of the farmers indicated low standard of living and less credit worthiness of the farmers.

**Table 4: Distribution of the respondents based on income level**

Income level (₹lakh)	Frequency	Percent
< 6.33	60	80.00
6.33 to 12.67	11	14.67
≥ 12.67	4	5.33
<b>Total</b>	<b>75</b>	<b>100</b>

### Family size

The distribution the respondents based on family size is presented in Table 5. The results showed that majority of the respondents (55 per cent) had a family size between three to five persons, followed by those with the family size greater than five persons constituting 43.33 per cent. Similarly respondents with family size less than three persons constituted only 1.67 per cent of the total respondents. Family size in traditional agriculture determines the availability of labour depending on the type of activity to be performed. Therefore, the analysis of the results

revealed that some of the respondents use family labour. Hence, most of the respondents had labour problem as much it could not be supplied within the family. Welsh (1991) in his study stressed that a farmer incurs less production cost if family labour is being fully utilized for farm production.

**Table 5: Distribution of the respondents according to family size**

<b>Family Size (Number)</b>	<b>Frequency</b>	<b>Percent</b>
< 3	1	1.33
3 to 5	41	54.67
≥ 5	33	44.00
<b>Total</b>	<b>75</b>	<b>100</b>

### **Operational holdings**

The distribution of respondents based on operational holding is exhibited in Table 6. The results showed that majority of the farmers in the study area were operating on 2.0-4.0 hectares of land that come under the medium famers (49.33 per cent). This was followed by large farmers constituting 24.00 per cent for owned land and semi-medium farmers (22.67 per cent). There were meager 2.67 and 1.33 per cent of respondents under small and marginal farmers.

**Table 6: Distribution of the respondents according to operational holding**

<b>Famer category</b>	<b>Frequency</b>	<b>Percent</b>
Marginal	1	1.33
Small	2	2.67
Semi-medium	17	22.67
Medium	37	49.33
Large	18	24.00
<b>Total</b>	<b>75</b>	<b>100</b>

### **Experience in sugarcane production**

The person who could gain experience in sugarcane production and cultivation pattern enhances in specialization in cane production and by implication will help to reduce unemployment and poverty among the respondents. The perusal of Table 7 showed the distribution of the respondents based on an experience in sugarcane production.

**Table 7: Distribution of the respondents based on experience in sugarcane production**

<b>Experience (years)</b>	<b>Frequency</b>	<b>Percentage</b>
< 7.5	7	9.33
7.5-15	20	26.67
15-22.5	26	34.67
≥ 22.5	23	30.67
<b>Total</b>	<b>75</b>	<b>100.00</b>

It was found that 38.33 per cent of the respondents gained an experience of between 15-22.5 years in sugarcane production followed by those with experience greater than 22.5 years, constituting 31.67 per cent. Also, 23.33 and 6.67 per cent of the respondents had experience in sugarcane production of between 7.5-15 and less than 7.5 years respectively. Therefore, it can be deduced from the analysis that the respondents take keen interest and there was gradual increase in sugarcane production as shown by the level of experience recorded in Table 7.

#### **Contact with cane experts**

The distribution of the respondents based on the contact with cane experts is presented in Table 8. The results showed that majority of the farmers (80.00 per cent) have regular contact with the cane experts of nearby mills and experts of Punjab Agricultural University (PAU), Ludhiana. The percentage of the respondents that were not having contact with the can experts was found to be 20.00 per cent. Therefore, the analysis revealed that majority of the farmers was aware about package and practices of cane production adopted in research station and recommendations of PAU in the cultivation of sugarcane.

**Table 8: Distribution of the respondents based on contact with cane experts**

<b>Particulars</b>	<b>Frequency</b>	<b>Percentage</b>
Yes	60	80.00
No	15	20.00
<b>Total</b>	<b>75</b>	<b>100.00</b>

#### **Constraints Perceived by the Respondents in Sugarcane Cultivation**

The sugarcane growers who supply their produce to the sugar mills were interviewed to ascertain the problems faced by them in cultivation of sugarcane. Their points of view regarding different constraints were analyzed and discussed as under.

##### **Technological Constraints**

The constraints perceived by the sugarcane growers regarding the technology of sugarcane production are depicted in Table 9 and discussed under the following sub-heads.

##### ***Seed and seed treatment***

At the overall, 48 per cent of the sugarcane growers were using the recommended rate of seed and spacing. It was estimated that 26.67 per cent of the farmers in cooperative sugar mill were following the recommended rate of seed and spacing while the figure for private sugar mill was estimated to be 70 per cent. As per recommendation the seed should be treated before sowing. The results presented in Table 9 revealed that 51.67 per cent of the farmers treated seeds before sowing. It was found that 26.67 per cent farmers in cooperative sugar mill treated seeds. The figure for private sugar mill was estimated to be 76.67 per cent (Table 9). It was

noticed that the reasons for not treating the seeds were ignorance about treating the cane sets and high cost of chemicals that were used in treatment.

#### ***Seed sowing time***

Most of the farmers in the study area were not sowing sugarcane on the recommended time. The late sowing of sugarcane reduces sucrose content of the cane which lower the recovery per cent of the crop. The perusal of Table 9 depicts that 50 per cent of the farmers had not planted sugarcane in time. The segregation of the results revealed that 60 and 40 per cent of the farmers of private and cooperative sugar mill respectively had not sown the seeds in time. The important reason for not sowing sugarcane in the recommended time as reported by 26.67 per cent of the farmers was unavailability of land, as the same land was used to grow other crops such as wheat, paddy, maize, etc. during that time. The figures for cooperative and private sugar mill were estimated to be 16.67 and 36.67 per cent respectively. The other important reasons which have been reported by the farmers were lack of assured irrigation, insufficient moisture in the soil and scarcity of labour. The lack of assured irrigation and scarcity of labour was reported by 15 and 11.67 per cent of the farmers which caused delayed in sowing of the crop.

#### ***Use of old variety of sugarcane***

The sugarcane growers were interviewed to ascertain the reasons for using the old variety of sugarcane. The results presented in Table 9 revealed that on the overall level, 58.33 per cent of them used old variety seeds such as CoJ 64, CoJ 767, CoJ 1181, and Co 1148. The use of old variety of cane seeds was reported by 86.67 and 30 per cent farmers from the cooperative and private sugar mill respectively. On interviewing the farmers, it was noticed that low income of the cane growers, ignorance about the release of new variety and non-release of new variety of sugarcane were the main reasons for using old variety of sugarcane. It was reported by 26.67 per cent of the total respondents and 53.33 per cent of the farmers from the private sugar mill that non release of new variety of cane having higher sugar content and give higher yield was also other an important reason for that compelled them to plant the old variety of sugarcane. Further, 30 per cent cooperative sugar mill farmers believed that low income was a reason for using an old variety of sugarcane seed. It can be noted that usage of old variety of sugarcane hinders sugarcane production leading to degradation of sugar content and decrease the recovery per cent.

#### ***Fertilizers***

The results of the study indicate that only 51.67 per cent of the farmers applied recommended doses of fertilizer. The recommended doses of nitrogen by the PAU are 60 kg per acre (130 kg per acre of urea) for a new crop and 90 kg per acre (195 kg per acre of urea) for *ratoon* crop. The application of phosphorus is recommended on the basis of the soil fertility status (Anonymous, 2009), whereas 48.33 per cent of the farmers used lower than the recommended dose of fertilizer.

The figures estimated for cooperative and private sugar mill that used recommended dose of fertilizer were 63.33 and 40 per cent respectively (Table 9). The reasons for not following the recommendations were high price of fertilizers, its non-availability and lack of credit. The rise in price of fertilizer increases in the cost of cultivation of sugarcane. Other important reasons were found to be ignorance about the recommended dose and unsuitability of recommended dose of fertilizers. The importance of fertilizers was identified by Chidoko *et al.*, (2011) as an input in sugar cane farming but farmers do not always get it when they need it. Sometimes, the fertilizers were not applied lower than the recommended dosages due to because of its unavailability or its high price. Without recommended dosages of fertilizer and its timely application before productivity cannot be improved.

### ***Irrigation***

Irrigation was one of the important inputs which enhance the productivity of sugarcane. It was found that 51.67 per cent of the farmers have not been confined to recommended number of irrigation, of which 63.33 and 40 per cent of the farmers of private and cooperative sugar mills respectively. It was mentioned in the report of PAU for the year 2009-10 that the efficient number of the irrigation to be followed was 15-18 times. It was recommended that the crop should be irrigated at 7 to 12 days interval during April into June and a month interval during November to January (Anonymous, 2009). The reasons for not applying recommended number of irrigations were mainly due to non-availability of irrigation water in time as reported by 38.33 per cent and high charges of electricity by 8 per cent of the farmers. Girei and Giroh (2012) reported that inadequate water supply was most important factor which militates against the high yield. Since, the sugarcane cultivation is highly dependent on water availability especially during growing period, if these constraints are not addressed, definitely the crop will not give the desired output. The water supply should not only be readily available and timely but also be subsidized diesel should be provided by the government. In addition, the duration of daily electricity supply need to be lengthened.

### ***Inter-culture operation***

Intercultural operation in sugarcane cultivation increases the productivity and production of the cane. The results revealed that intercultural operation in sugarcane cultivation was not followed in the study area indicated by the response of 63.33 per cent of the farmers. The analysis farm per hectare indicated that 83.33 and 43.33 per cent of the farmers of private and cooperative sugar mill respectively were not following the intercultural operation (Table 9). However, high cost of labour was perceived by 58.33 per cent of the farmers as the main reason for not indulging in intercultural operation. The other reasons such as low income of the cane growers and non-availability of labour were also reported as constraints by the farmers.

**Table 9: Technological constraints faced by the respondents of the sugar industry in Punjab**

Particulars	(Percent)		
	Cooperative sector (n <sub>1</sub> =30)	Private sector (n <sub>2</sub> =30)	Overall (n=60)
<b>Do you use the recommended rate of seed and spacing?</b>	<b>26.67</b>	<b>70.00</b>	<b>48.33</b>
<b>Do you treat the seed before sowing? If No, what are the important reasons?</b>	<b>26.67</b>	<b>76.67</b>	<b>51.67</b>
Ignorance/do not know	16.67	-	8.33
High cost of inputs	16.67		8.33
<b>Reasons for late sowing</b>	<b>40.00</b>	<b>60.00</b>	<b>50.00</b>
Land not free on time	16.67	36.67	26.67
Lack of assured irrigation	30.00		15.00
Insufficient moisture in soil	6.67		3.33
Labour scarcity	3.33	20.00	11.67
<b>Reasons for using old variety</b>	<b>86.67</b>	<b>30.00</b>	<b>58.33</b>
Low income	30.00	3.33	16.67
Unaware of new variety released	-	36.67	18.33
No new variety released	-	53.33	26.67
<b>Reasons for not applying recommended doses of fertilizer-</b>	<b>63.33</b>	<b>40.00</b>	<b>51.67</b>
Not known	10.00		5.00
Recommendation not suitable	-	10.00	5.00
Costly fertilizer	20.00	43.33	31.67
Unavailability of fertilizer	23.33	13.33	18.33
Lack of money	26.67		13.33
<b>Reasons for not applying recommended number of irrigation</b>	<b>40.00</b>	<b>63.33</b>	<b>51.67</b>
Sources not available on time	33.33	43.33	38.33
High charges	10.00	6.67	8.33
Not sufficient electricity	6.67		3.33
<b>Reasons for not doing inter-cultural operations</b>	<b>43.33</b>	<b>83.33</b>	<b>63.33</b>
Costly labour	40.00	76.67	58.33
Low income	26.67		13.33
Labour not available	3.33	20.00	11.67
<b>Reasons for not adopting proper plant protection method</b>	<b>40.00</b>	<b>66.67</b>	<b>53.00</b>
Lack of knowledge	13.33	3.33	8.33
Lack of timely identification of diseases/pests	6.67		3.33
Non-availability of chemicals	6.67	16.67	11.67
High cost	20.00	26.67	23.33
Paucity of labour	23.33	26.67	25.00
<b>Reasons for improper harvesting of cane</b>	<b>63.33</b>	<b>83.33</b>	<b>73.33</b>
High cost of labour	33.33	23.33	28.33
Non-availability of labour	43.33	40.00	41.67
Unskilled labour to undertake the job	6.67	43.33	25.00
<b>Reasons for poor management of ratoon crop</b>	<b>83.33</b>	<b>86.67</b>	<b>85.00</b>
Non-availability of labour for operation	70.00	63.33	66.67
Time taking in filling the gappy area	-	63.33	31.67
Large number of labour required for trash mulching	6.67	46.67	26.67
Plants are more prone to disease	3.33	33.33	18.33
Not profitable	10.00	3.33	6.67
<b>Reasons low productivity of sugarcane</b>	<b>46.67</b>	<b>63.33</b>	<b>55.00</b>
Inability of to apply the necessary farm inputs	-	6.67	3.33
Solely dependent from rain water for irrigation	10.00		5.00
High cost starting capital and production inputs	16.67	46.67	31.67
Lack of technology/knowledge and facilities on proper land preparation technique and methods	20.00	13.33	16.67
Labour not available	-	6.67	3.33

The high price of labour and its unavailability made the intercultural operation expensive and thus, perceived as unprofitable by the farmers.

#### ***Plant protection measures***

The proper plant protection measures such as application of herbicides, weedicides, insecticides, pesticides, etc. in time with accurate dose enhance the growth and productivity of sugarcane. It was found that 53 per cent of the farmers did not adopt the proper plant protection measures. The important reasons were found to be paucity of labour, high cost of chemicals and its non-availability, lack of knowledge about the measures and lack of timely identification of diseases or pests. However, paucity of labour and high cost of chemicals were the main reasons for improper plant protection as it was constituted by 25 and 23.33 per cent farmers respectively (Table 9).

#### ***Improper harvesting of cane***

It was observed that mechanization in sugarcane cultivation particularly harvesting was far behind. In the study area sugarcane was harvested manually. The farmers experienced that improper harvesting of cane gave rise to lower production which made them to attain low returns. The results presented in Table 9 highlighted that the reasons for improper harvesting were high cost of labour, not easily availability of labour when needed and if available the labour were unskilled to undertake the job. All the reasons were equally important but non-availability of labour was found to be the main reason as it was perceived by 41.67 per cent of the farmers. The same finding was reported by Murali and Balakrishina (2012) and Kaur and Saran (2011). The figures estimated for both cooperative and private sugar mills were 43.33 and 40 per cent respectively.

#### ***Poor management of ratoon crop***

The cultivation of ratoon incurred lower cost; therefore, proper management of ratoon ensured higher returns to the farmers than the planted crop. The results presented in Table 9 revealed that the ratoon has been poorly managed which was perceived by 85 per cent of the farmers. It was estimated that 83.33 and 86.67 per cent farmers from cooperative and private sugar mills respectively reported poor management of the ratoon crop. The main reason reported by 66.67 per cent of the farmers was non-availability of labour in time. The other important was non-filling empty spaces and requirement of large number of labour for trash mulching.

#### ***Low productivity of sugarcane***

The low productivity of sugarcane in the study area was also an important problem face by 55 per cent of the farmers and, 46.67 and 63.33 per cent farmers from cooperative and private sugar mill respectively. The various reasons were realized by the farmers; however, high cost incurred in the starting of capital and production inputs (31.67 per cent of the respondents) was the main important reason

(Table 9). Arulraj (1998) reported in his study that the constraint affecting sugarcane planting productivity was high fertilizer cost.

The other important reasons were lack of technology or knowledge and facilities on proper land preparation technique and methods. Abdel-Maksoud and El-Sharabassy (2007) observed that sugarcane production problems perceived by the farmers and extension personnel were spread of different kinds of weeds and insects, weak role of agricultural extension, shortage and high costs of fertilizers and labor, high costs of production, insecticides and irrigation. The different constraints faced by the farmers were studied and the important reasons were analyzed. It was found that scarcity of labour and its high wage rate has been the important reasons for the constraints. The same finding was reported by Rao (2012), who stated that the labour shortage was the most important constraint in sugarcane cultivation during crucial operation.

### **Socio-economic Constraints**

The socio-economic constraints perceived by the respondents are exhibited in Table 10. The results revealed that scarcity of labour and non-availability of labour when needed was the most important socio-economic constraints which were reported by 83.33 per cent of the cane growers. The high cost of inputs incurred in sugarcane production was another important constraint perceived by 71.67 per cent of the respondents. The said constraint was reported by 56.67 and 86.67 per cent farmers of cooperative and private sugar mills respectively. On an average, 45 per cent of the farmers were not getting payment in time. It was found that 90 per cent farmers of cooperative sugar mill were not getting payment on time. But, cent per cent farmers of private sugar mill reported that they received the payment in time. Ramaiah (2011) also reported that the farmers after supplying the cane to the factory had to wait for 15 days or more to receive the payment that leads the farmers to heavy financial hardship. Some farmers under cooperative, who were in dire need of finances seek to divert their cane to other mills or organization like gur and *khandsari*.

The results presented in Table 10 further indicated that 61.67 per cent farmers revealed sugarcane production to be a profitable enterprise. Similarly, 56.67 and 66.67 per cent farmers of cooperative and private sugar mill respectively were of the opinion that sugarcane production is profitable. It was reported that 43.33 per cent of the respondents revealed that the price of sugarcane fixed by the state government was not remunerative. The farmers want the price of the sugarcane to be increased with respect to the competing crops (rice and wheat). Wawire (2005) identified the complaints of the cane farmers as low price of sugarcane. The low cane price translates to reduced profit margins for the farmers. Farmers demanded that as price of sugar and farm inputs rise there should be an equal adjustment in cane prices.

**Table 10: Socio economic constraints perceived by the respondents of the sugar industry in Punjab**

Particulars	(Per cent)		
	Cooperative sector (n <sub>1</sub> =30)	Private sector (n <sub>2</sub> =30)	Overall (n=60)
Is sugarcane production a profitable enterprise?	56.67	66.67	61.67
Do you think that price of sugarcane is not remunerative?	36.67	50.00	43.33
Are you getting enough margin of profit for continuing sugarcane cultivation?	20.00	13.33	16.67
Labours are not readily available when required	73.33	93.33	83.33
The mill lift the sugarcane in time	80.00	93.33	86.67
Mill pay dues in time	10.00	100.00	55.00
Inability of sugar factories to procure the produce	36.67	63.33	50.00
High cost of inputs for sugarcane production.	56.67	86.67	71.67
Poor linkage with extension agencies.	13.33	26.67	20.00
Poor linkages with field/extension staff of mills	23.33	-	11.67

In addition, the cultivation of sugarcane was not fetching enough margins to the cane growers. This was evident from the result in Table 10 that only 16.67 per cent of the total respondents were getting enough margins from the sugarcane cultivation. Similarly, the figures estimated for cooperative and private sugar mill were 20 and 13.33 per cent farmers respectively. Besides, poor linkage with extension agencies (perceived by 20 per cent) and lifting the sugarcane by the mills not in time (perceived by 13.33 per cent) were the other constraints faced by the farmers.

### **Infrastructural Constraints**

The infrastructural constraints faced by the respondents are presented in Table 11. Most of the roads in the villages were connected with metallic road so there was smooth transportation of sugarcane to the mills. The study brought out complaints made by 40 per cent of the farmers that they were not getting inputs such as high yielding variety varieties, fertilizers, plant protection chemicals, etc. for sugarcane production in time and at local level. The high transportation cost impedes the regular and timely supply of sugarcane to the mills.

Transportation has become a significant factor affecting the production costs of the commodities. The cost of transporting sugar cane from the farm gate to the mills was quite high, owing to the multiple transport facilities and time-

consuming activities involved in the delivery process (Chetthamrongchai *et al.*, 2001). This was mainly attributed to the prevailing mode of transportation which incurred higher cost. It was found that almost all the farmers (88.33 per cent) transported their products only by tractor. There was no other means of transportation through which they could reduce the transportation charges. It was reported, that the transportation charges were high which absorbed larger share of their income, by 61.67 per cent of the respondents.

**Table 11: Infrastructural constraints faced by the respondents of the sugar industry in Punjab**

Particulars	(Per cent)		
	Cooperative sector (n <sub>1</sub> =30)	Private sector (n <sub>2</sub> =30)	Overall (n=60)
Village connected with metallic/Pucca road	33.33	93.33	63.33
Village connected with kacha road	40.00	6.67	23.33
Are the inputs available locally in appropriate time?	66.67	53.33	60.00
Tractor is the only means of transportation of sugarcane to the mill	76.67	100.00	88.33
Do you think transportation charges are			
<i>High</i>	43.33	80.00	61.67
<i>Low</i>	43.33	16.67	30.00
Electricity availability is			
<i>Sufficient</i>		10.00	5.00
<i>Insufficient</i>	36.67	80.00	58.33
<i>Timely</i>	6.67	10.00	8.33
<i>Untimely</i>	46.67	36.67	41.67
Unsatisfied source of irrigation	66.67	63.33	65.00
If no, regular supply of electricity is expected	26.67	70.00	48.33
Is there any provision for extension programmes like information support, TV, computer, SMS, Training, etc.?	83.33	10.00	46.67
Harvesting of cane not done by mill	80.00	83.33	81.67

The other important infrastructural constraints were insufficient and untimely availability of electricity. Insufficient availability of electricity caused inconvenience which 58.33 per cent of the farmers were facing in the sugarcane cultivation while the figures estimated for cooperative and private sugar mills respectively were 80 and 36.67 per cent farmers. The untimely availability of electricity hindered the cane production, as the cane crop is water loving crop, and requires timely irrigation. This hindrance was faced by 41.67 per cent of the cane

growers in the study area. Moreover, the available source of irrigation was reported unsatisfactory by 65 per cent of the cane growers and they wanted the source to improve and expected there should be regular supply of electricity.

The provision of extension programmes such as information support, television, computer, SMS, trainings, etc. were received by 46.67 per cent of the farmers. The cane growers should have a regular contact with the extension personnel for the update of the knowledge. The extension contact of sugarcane grower had a significant contribution with the variation of technologic gap in adoption of sustainable cultivation of sugarcane. Frequent contact with extension experts of sugarcane factory was attributed to the fact that these were the main liaison persons between farmers and the sugar factories. They are the main source of information regarding availability of inputs like planting material, fertilizers, harvesting time, etc. (Maraddi, 2006). Lastly, 81.67 per cent of the farmers viewed that the harvesting of cane should be done by the sugar mill so that losses accrued during harvesting could be minimized through mechanic harvesting.

### **Financial Constraints**

The financial constraints faced by the respondents of the sugar industry in Punjab are exhibited in Table 12. The results depict that the credit facilities provided by the sugar mills were enjoyed by 78.33 per cent of the sample cane growers. The proportion of farmers who were getting such facilities has been 100 per cent in private sugar mill and 56.67 per cent in cooperative sugar mill. The major sources of credit were cooperative societies and commercial banks which have been reported by 38.33 and 21.67 per cent respectively. It was also found that 50 and 26.67 per cent farmers from cooperative and private sugar mill depend on cooperative societies for their credits requirement. While 16.67 and 33.3 per cent of the farmers for cooperative and private sugar mills finds that the availability of credit was adequate .it was found that 15 per cent of the farmers reported timely availability of credit. The figures for cooperative and private sugar mills were found to 6.67 and 23.33 per cent.

It was revealed by 40 per cent of the farmers that rate of interest was very high which act as an impediment to raise credit from the banks. Further, the results presented in Table 12 indicate that 63.33 per cent of the farmers know about Kisan Credit Card (KCC) and 43.33 per cent of the farmers possess them. It was noticed that 3 per cent of the respondents at the overall level and 26.67 per cent of the farmers from cooperative sugar mill were found to be raising loan through KCC. While none of the famers of private sugar mills availed this facility through KCC. The reason cited for not raising loan through KCC was the lengthy procedure in acquiring KCC. Besides, the farmers revealed that they do not have much knowledge about the Kisan Credit Card facility and its importance and were reluctant to take any loan through this card. The farmers revealed that the financial problems either for subsistence or for the farm operations was compounded by

delayed payment of cane by the mills. The same findings were reported by Wawire (2005).

**Table 12: Financial constraints faced by the respondents of the sugar industry in Punjab**

Particulars	(Per cent)		
	Cooperative sector (n <sub>1</sub> =30)	Private sector (n <sub>2</sub> =30)	Overall (n=60)
Credit facilities given by sugar mill	56.67	100.00	78.33
If no, what is your major source of credit?			
<i>Co-operatives</i>	50.00	26.67	38.33
<i>Commercial Bank</i>	40.00	3.33	21.67
Do you think credit is available:			
<i>Adequately</i>	16.67	33.33	25.00
<i>Timely</i>	6.67	23.33	15.00
Rate of interest is high	53.33	26.67	40.00
Know about Kisan Credit Card	66.67	60.00	63.33
Possess Kisan Credit Card	50.00	36.67	43.33
Loan taken from Kisan Credit Card	26.67	-	13.33
If no, what is the reason?			
<i>Lengthy procedure</i>	6.67	3.33	5.00
<i>Credit not required</i>	6.67	13.33	10.00

### Marketing Constraints

During the disposal of sugarcane farmers faced various problems. The marketing constraints faced by the respondents of the sugar industry are presented in Table 13. The cane growers supplied their products to the mills. Though no middlemen were involved in the marketing of sugarcane, yet the farmers (63.33 per cent) were not satisfied with the prevailing marketing system. They have to wait for longer period for their turn with loads of sugarcane at the mill's gate. Sometimes, they have to stay overnight to unload their produce. Moreover, there were no regulated markets for sugarcane similar to that of wheat and rice. However, only 11.67 per cent of the farmers revealed that there should be regulated market for sugarcane in Punjab.

The sorting of crop based on their shape and size before sale has enables the farmers to get higher price for their produce. Only 33.33 per cent of the farmers sorted the cane before selling. The reason for not sorting the cane was indifference in the price of sorted and unsorted sugarcane as reported by 26.67 per cent of the respondents. The figures estimated for cooperative and private sectors sugar mill were 50 and 3.33 per cent respectively.

**Table 13: Marketing constraints faced by the respondents of the sugar industry in Punjab**

Particulars	(Per cent)		
	Cooperative sector (n <sub>1</sub> =30)	Private sector (n <sub>2</sub> =30)	Overall (n=60)
Satisfied with marketing facilities	56.67	70.00	63.33
If no, regulated market is expected	6.67	16.67	11.67
Sort the produce before selling	6.67	60.00	33.33
If no, why?			
Price difference not much	50.00	3.33	26.67
Labour not available	26.67	3.33	15.00
Mill purchase sugarcane based on maturing stage	3.33	6.67	5.00
No sorting of sugarcane in Punjab	-	10.00	5.00
No availability of storage facility (cane and jaggery)	10.00	90.00	50.00
Selling during lean season		10.00	5.00
Unloading of sugarcane in the mill took longer time period	23.33	-	11.67
Discourteous behavior of mill workers.	3.33	6.67	5.00
Delay in Purchase of crops by mills	20.00	3.33	11.67
Availability of large quantity of non-mill able cane	20.00	13.33	16.67

Non-availability of labour for sorting was another reason which was reported by 15 per cent of the farmers. The other important reasons for not grading cane were purchase of cane by the mills based on maturing stage and no grading of sugarcane was operated in Punjab as reported by five per cent. The results revealed that 11.67 per cent of farmers reported that mills take longer period of time for unloading the cane. Discourteous behaviour of the mill workers, gate keepers and other administrative staffs of the mills were reported as one of the constraint faced by the farmers during unloading of sugarcane. It was found that five per cent of the farmers reported that the workers of the mill do not behave properly with them. The study was in consonance with the findings of Kaur and Saran (2011). The farmers claimed that the large quantity of sugarcane supply to the mills was unfit for processing due to immature cane reported by 16.67 per cent and 11.67 per cent of the farmers informed that the sugar mill delayed the purchase of sugarcane as disburse of quota slip to the farmers was late.

#### **Constraints Faced in the Operation of Sugar Industry in Punjab**

The sugar industry in India is totally under the control of Central and State Government. Moreover, sugar is the only commodity where burden for purchase of cane and processing of sugar was borne by the producing industry and not by the

government (Saraogi, 2010). The various constraints were discussed briefly under the following heads:

#### **Low sugar recovery**

The per cent recovery of the sugarcane determines the amount of sugar to be produced by the sugar mills. The study found that the per cent recovery of the sample sugar mills was lower as compared to the state average. It was estimated to be 8.76 and 9.69 per cent for cooperative and private sugar mill respectively. Upon analysis of the reasons for low recovery, it was found that poor quality of sugarcane which was used by the mills for processing leads to low recovery. The use of obsolete machines for processing and under-utilization of machines was important reasons. In addition, climatic constraints such as chill temperature during harvesting and transportation of cane to the sugar mills results in low recovery of sugarcane. The Government fixed zonal prices on weighted average sugar recovery and simple average duration of the season (Somaiya, 1971). As such, the price of the cane will lower which in turns affect the acreage under sugarcane.

#### **Shortage of sugarcane supply**

Sugarcane was the only raw material used for sugar production in the country unlike other countries which uses sugar beet in the sugar industry. Irregular or decline in supply of sugarcane adversely affect not only sugar production but also cost of production. The mills official revealed that lower availability of cane has led to steep decline in the capacity utilization of the mills. This problem was localized to individual mill and industry as a whole. The declined in area under sugarcane leads to lower production of sugarcane which in turn brings shortage in supply of cane to the sugar mills. The cane growers in the study area have incurred a high cost in sugarcane production and at the same time margins were not realized by the farmers. The incentive to grow sugarcane is affected in the next season and hence, the farmers shift their area to paddy and wheat cultivation. Moreover, gap in communication of the cane growers with the sugar mill often leads to shortage of cane to the mills. Since, harvesting of cane by the farmers depends on the quota slip issued by the mills.

#### **Inability to pay arrears to the cane growers**

This was problem where shareholders, farmers of the mills and government policy makers were concerning about. The millers were not able to pay in time to the farmers for their cane. As such the farmers squeezed the area under sugarcane and shifted to paddy and wheat cultivation for which the price was assured and received in time. On the other side, the millers claimed that the price fixed by the state government was high and no parity is maintained between the prices of the sugar and sugarcane. The SAP for sugarcane in Punjab was ₹230 per quintal and price for levy sugar was ₹1795 per quintal. However, the price for free sugar was ₹3500 per quintal which depends on the market force for demand and supply. In cooperative sugar

mills, the cost of sugarcane incurred for the production of one quintal sugar was estimated to be ₹2625.57 (per cent recovery of 8.76). While in private sugar mill, the figure was work out to be ₹2373.58 (per cent recovery of 9.69). The reduction in sugar production also incorporated to the problems of mill's inability to pay. Moreover, the excise duty imposed on the sugar mills was ₹97.85 per quintal for both levy and free sugar, which was reported to be high by the respective mills. Therefore, imposition of high tax on sugar makes the sugar mills unable to pay in time. In addition, irregular and slow inflow of funds to the sugar mills was another reason for untimely payment to the farmers for their products. Nevertheless, Nawanshahar Cooperative Sugar Mill was the only mill that paid the sale proceeds to the farmers in time who supply sugarcane.

### **Low sugar production**

The sugar mills experienced the low sugar production in the period under study. It was estimated to be 2.63 lakh quintals in 2006 and declined to 2.05 lakh quintals in 2011 in case of the selected cooperative sugar mills. The figures estimated for private sugar mills for the above paid years were 4.22 lakh quintals and 5.63 lakh quintals respectively. The reasons for low sugar production were found to be the lack of supply of sugarcane and lower recovery of sugar. Further, it was revealed that obsolete technology used in sugar processing and increasing losses during the processing of sugar gave rise to low sugar production.

### **Low level of profitability of the sugar mills**

Some of the sugar mills under cooperative sector in the state have been under liquidation. These could not afford the expenses for running the mills. The decline in profit of the sugar mills was the main reason. The low level of profitability was brought out by many factors such as under utilization of the capacity, low production of sugar, forced sale of the levy sugar at low price, poor quality of sugarcane used in crushing and shortage of labour.

### **Non-viability of the sugar mills**

The excessive government interference on sugar mills operation often lead to non-viability of sugar mills. The policy of partial decontrol on sugar in which 10 per cent of the total sugar produced has to sold to the government as levy sugar. The remaining 90 per cent as free sugar has to be sold in the market. Further, the quota was imposed on the release of free sugar for the disposal in open market on monthly basis. The price for the free sugar has been highly fluctuated and price for levy sugar has been discounted by the government. Therefore, the realization from both levy and free sugar has been low which in turn makes the mill financially non-viable. In sugar mills, either cooperative or private sectors, there has been no provision for investment on Research and Development for sugarcane production technology.

## **Other Problems**

Besides the above discussed constraints, the other operational constraints of the sugar mills were examined. The sample sugar mills produced only white sugar and its by-products such as bagasse and molasses. There was no provision for subsidiary units like production of alcohol and co-generation plant which added more income of the mills. The huge funds were needed for the installation of the subsidiary plants which the mills could not be afforded. Moreover, there has been dearth for skilled and technical staffs. Limitation was that area under sugarcane covered by the particular sugar mills could not be increased as the zonal requirement has been fixed by the Central Government. This was one of the important reasons for shortage of cane supply. At the end the problems have intertwined relationship with each other which falls under string of Government control.

## **CONCLUSIONS**

The results revealed that the farmers were unaware of the package of practices for sugarcane cultivation accompanied by the problems of labour scarcity and high wage rate. These were the technological constraints faced by the cane growers. The farmers were not satisfied with infrastructural facilities available to them. Unsatisfactory source of irrigation and insufficient electricity, high transportation cost and non-availability of factors of sugarcane production in time and at local level were the important infrastructural constraints. The financial constraints faced by the cane growers were high interest rate, inadequate and untimed credit available. It was found that lack of marketing and storage facilities for cane were main marketing constraints faced by the cane growers. Further, the study indicated that non-availability of labour when needed and lower profit margins were an important socio-economic constraint. The study brought out that the sugar mills were facing problems due to low sugar recovery, shortage of sugarcane supply, inability to pay arrears to the cane growers in time, low level of profitability and non-viability of sugar mills. The other important problems were provision of no subsidiary units like production of alcohol and co-generation plant, dearth of skill and technical staffs, etc. The realization to adopt low cost sugar production technology and use of modern machinery is in immense need to improve percent recovery of sugar. A timely and regular supply of electricity and irrigation in sugarcane growing areas is also needed to improve infrastructural facilities. There should be easy availability of credit to the sugarcane farmers and sugar mill at cheapest rate of interest.

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## MARKET INTEGRATION AND PRICE VOLATILITY IN DOMESTIC MUSTARD MARKETS

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### ABSTRACT

*This paper tests the extent of co-integration of wholesale prices of Mustard among major markets of Haryana and Rajasthan by using Johansen, Granger Causality Tests and also captures the speed of adjustment to deviations in long run equilibrium in mustard markets by using Vector Error Correction Model. The monthly wholesale price data were used for the study. Out of four markets only two markets were co-integrated. The pair-wise Grangers Causality Test for Hisar and Sirsa markets was significant statistically which was indicative of mutual influence exerted by the markets on each other. On the other hand Sri-Ganganagar market exhibited unidirectional influence on Rewari market. The results of the price volatility test pointed out that Sirsa market was the leader. The existence of price volatility in mustard prices in Sirsa market was relatively more volatile than Hisar and Rewari markets which were confirmed through GARCH Estimation.*

**Key words:** Co-integration, volatility, equilibrium, GARCH and mustard

**JEL Classification:** D4, G14, P22

### INTRODUCTION

The *Oleiferous brassica* species, commonly known as rapeseed-mustard, are one of the economically important oilseed crop. The rapeseed-mustard comprising eight different species such as Indian mustard, toria, yellow sarson, brown sarson, gobhi sarson, karan rai, black mustard and taramira. The mustard species are being cultivated in 53 countries spreading all over the globe. In India, the mustard-rapeseed is the most important oilseed crop of the Indo-gangetic Plains after groundnut accounting around 25 per cent of total oilseed production. Indian mustard (Rai) cultivation has occupied about 85-90 per cent of total area under cultivation of mustard-rapeseed. The traditional mustard-rapeseed grown in India contains high amount of erucic acid and glucosinolates and this does not conform to the international standard 'canola' quality. In our country, the oil obtained from mustard-rapeseed accounted for two third edible oil consumption in the country.

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The projected demand for oilseeds in India by 2020 will be around 34 million tonnes which is to be met by mustard-rapeseed. It is estimated that about 90 per cent of domestic production of mustard-rapeseed is crushed for extracting edible oil, which is mostly traded and consumed in Northern, North-eastern, Eastern and Central India.

An efficient functioning of markets provides remunerative prices for the produce to the farmer-sellers. Integrated markets are those where prices are determined interdependently. One of the common indicators of an efficient functioning of the markets is the existence of high degree of integration among them. In an integrated market, price of a commodity is responsive to price changes of the same quality products in other markets, as such price differences for a particular variety of product in different markets of the area as a rule should not exceed the cost involved in the transportation and handling of the produce. The analysis of price movements for variety of the commodity in the corresponding and linked markets helps in judging the extent of efficiency of the marketing system in the region for the selected crops.

The majority of the studies used the econometric techniques of time series to test the integration of the markets. The development of these techniques, which include the co-integration and the correction of errors models, became the standard tools to analyze the spatial relations of the markets, thus, replacing the old empirical tools, such as the regression and correlation coefficient. However, the analysis of the time series was also criticized as being not very reliable (Blauch, 1997 and Barrett and Li, 2002).

The market integration is the relationship between two markets. The study on integration can suggest to the producer's as to where, when and how much to sell, which in turn will have bearing on their production strategies and hence, resource allocation. The spatial price relationships have been widely used to indicate overall market performance. In the backdrop of this the present study was conducted to assess the market integration and price volatility in domestic mustard markets Haryana and Rajasthan.

## **METHODOLOGY**

### **Selection of Markets**

In order to achieve the stipulated objectives of the present investigation Hisar, Rewari, Sirsa market of Haryana and Sri-Ganganagar of Rajasthan were selected purposively being the major mustard growing markets. The data pertaining to the wholesale monthly prices were collected for the period from 2006 to 2011 to examine the co-integration of sample mustard markets and price volatility. The following techniques have been used to analyse the data:

### Co-integration Engle-Granger Approach

An autoregressive distributed lag (ADL) model for the Granger-Causality Test developed by the Engle and Granger (1987) by using the statistical package E-View-7.

### Error Correction Methodology (ECM)

To capture ECM the short-run disequilibrium situations as well as the long-run equilibrium adjustments between prices ECM model has been used by using the statistical package E-View-7. For the present analysis, Johansen's Vector Error Correction Model (VECM) has been used. It permits the testing of co-integration as a system of equations in one step. Another advantage of this approach is that one does not need to carry over an error from one step into the rest. In addition, it does not require the prior assumption of endogeneity or exogeneity of the variables. Also, ARCH and GARCH Model was used to test the volatility in mustard prices in the sample markets.

## RESULTS AND DISCUSSION

### Production Scenario in India

The area, production and productivity have shown an increasing trend over the years. The perusal of Table 1 revealed that area, production and productivity increase with average compound growth rates of 1.95, 4.08 and 2.09 per cent per annum, respectively from the period 1950-51 to 2009-10 in India. The increase in production and productivity were higher as compared to area due to development of HYVs, improvement of management practices and government oilseed mission programmes.

**Table1: Compound growth rate of area, production and productivity of rapeseed-mustard in India**

Year	(CGR percent)		
	Area	Production	Yield
1950-51 to 1959-60	2.64	2.73	0.09
1960-61 to 1969-70	0.18	1.83	1.65
1970-71 to 1979-80	0.15	-1.19	-1.34
1980-81 to 1989-90	1.95	7.29	5.25
1990-91 to 1999-00	0.72	0.78	0.05
2000-01 to 2009-10	3.28	5.53	2.17
<b>1950-51 to 2009-10</b>	<b>1.95</b>	<b>4.08</b>	<b>2.09</b>

### Haryana Scenario of Mustard Production

Haryana ranks fourth in area and third in production at the national level. Haryana contributes 8.90 and 11.43 per cent to the total Indian mustard area and production respectively. The area of mustard in the state increased from 4.09 lakh

hectares in 2000-01 to 5.04 lakh hectares in 2010-11. Similarly, the production has increased from 5.60 lakh tonnes in 2000-01 to 9.42 lakh tonnes in 2010-11. Since, the mustard crop mostly grown in the rain fed regions of Haryana. Therefore, the area under rapeseed-mustard and its production depends upon the winter rainfall and other climatic factors. With the increase in demand of mustard oil and mustard cakes in the country as well as in the international market this crop became highly remunerative to the farmers of Haryana. The area, production and productivity have shown an increasing trend over the years (Fig. 1).

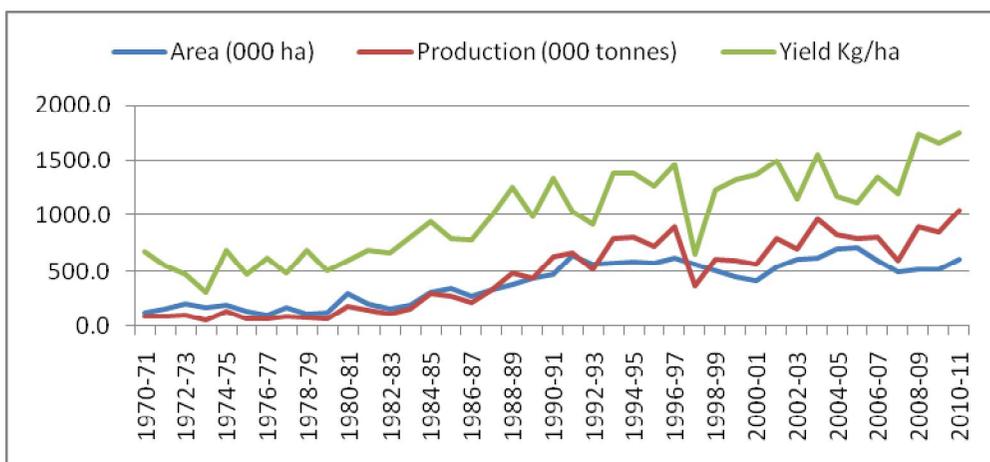


Fig.1: Area, production and productivity of mustard in Haryana

In Haryana the area, production and productivity increased with average compound growth rates of 4.45, 7.69 and 3.11 per cent per annum, respectively from the period 1970-71 to 2010-11. In the period from 1981-82 to 1990-91 due to favorable climatic factors and price support along with state government support area, production and productivity increased with average compound growth rates of 9.93, 16.85 and 7.26 per cent per annum, respectively (Table 2).

**Table 2: Compound growth rate of area, production and productivity of rapeseed-mustard in Haryana**

Year	(Percent/annum)		
	Area	Production	Yield
1971-72 to 1980-81	-0.76	-0.03	0.91
1981-82 to 1990-91	8.93	16.85	7.26
1991-92 to 2000-01	-1.32	-0.70	0.61
2001-02 to 2010-11	0.36	2.03	1.64
<b>Overall CGR</b>	<b>4.45</b>	<b>7.69</b>	<b>3.11</b>

### District-wise Distribution of Mustard Area in Haryana

In Haryana, the major mustard growing and producing districts are Bhiwani, Mahendergarh, Rewari, Hisar, Sirsa and Jhajjar constituting 83 per cent of the area and production in Haryana during 2008-09. Only 22 per cent of the total mustard area is taken as un-irrigated/rain fed crop in Haryana. Mahendergarh and Bhiwani districts are important for rain fed cultivation of mustard. While in other districts it is grown both in irrigated and un-irrigated areas. Bhiwani and Mahendergarh contribute about 50 per cent share in area and production of mustard in the state. However, Haryana has achieved the highest productivity of 1869 kg per hectare for rapeseed and mustard in the country as against the national average of 1,179 kg per hectare during Rabi 2010-11. The state has produced 9.42 lakh tonnes of rapeseed and mustard with 5.04 lakh hectares of area under cultivation. The achievement of Haryana has been followed by Gujarat which attained productivity of 1521 kg per hectare and it produced 3.30 lakh tonnes by cultivating rapeseed and mustard over an area of 2.17 lakh hectares, Punjab ranked third in productivity with 1250 kg per hectare and it had 0.32 lakh hectares of area under their cultivation and produced 0.40 lakh tonnes of rapeseed and mustard. The main districts of cultivation of rapeseed and mustard in the State included Bhiwani, Mahendergarh, Hisar, Rewari, Sirsa, Jhajjar, Mewat, Gurgaon and Fatehabad. Bhiwani had a higher area of 1.37 lakh hectares under rapeseed and mustard. This was followed by Mahendergarh, Hisar, Rewari and Sirsa with an area of 0.89, 0.70, 0.62 and 0.42 lakh hectares, respectively.

### Forecasts and Validation for Mustard Price

The perusal of Tables 3 and 4 revealed that regular pre-sowing and post-harvest price forecasts of mustard were made by the Agricultural Market Intelligence Centre (AMIC) functioning in Department of Agricultural Economics, CCS Haryana agricultural University, Hisar.

**Table 3: Validation of Price forecast of Mustard (2010-11)**

Month and Year	Forecasted price	Actual market price	Validity (%)	(₹q <sup>-1</sup> )
				Trader's survey price
<b>Pre-sowing Price forecast</b>				
October-2010	2340-2360	2325	99.35	2450
November-2010	2400-2450	2375	98.96	2500
December-2010	2300-2350	2355	99.78	2300
<b>Post-harvest Price forecast</b>				
April-2011	2000-2150	2170	99.08	2100
May-2011	2200-2300	2225	100.00	2250
June-2011	2300-2350	2243	97.52	2400

The validity of the pre-sowing and post-harvest forecasts were done during the year 2010-11 and pre-sowing price forecast during the crop year 2011-12 varied from 97.52 per cent to 100.00 per cent. The pre-sowing forecast was done to strengthen the decision making of farmer for the allocation of area as well as to sale their stored produce of previous season. The post-harvest forecasting of mustard price was made to facilitate the farmers about whether to sale the produce just after harvesting or to store it for future sale.

**Table 4: Validation of Pre-sowing Price forecast of Mustard, 2011-12**

(₹q <sup>-1</sup> )				
Month and Year	Forecasted Price	Actual market price	Validity (%)	Trader's survey price
<b>Pre-sowing Price forecast</b>				
October-2011	2500-2560	2540	98.42	2500
November-2011	2550-2580	2780	92.80	2600
December-2011	2550-2600	2841	91.52	2600
<b>Post-harvest Price forecast</b>				
April-2012	2900-3000	3230	92.88	3100
May-2012	3100-3150	3290	95.74	3140
June-2012	3100-3150	3260	96.62	3200

### **Impact Assessment of Price Forecast**

Impact studies conducted by the CCS, HAU, Hisar centre in Mustard in Bhiwani district revealed that farmers realized additional income in the range of ₹200 to ₹225 per quintal by following the NAIP-AMIC CCSHAU advice. In the same district farmers realized an income of ₹58400 per hectare by following the NAIP-AMIC CCSHAU, sale advice in favour of storage of mustard and selling in the month of May as against regular practice of selling in just post harvest month of March where income was ₹54200 per hectare. Thus farmers realized about ₹4200 per hectare additional income.

### **Market Integration**

The results pertaining to the Augmented Dickey Fuller Test (ADF) are presented in Table 5. The results revealed that the ADF based unit root test procedure was done to check whether the price series of mustard were stationary or not. It could be inferred that ADF Test values were above the critical value (1%) given by Mackinnon Statistical Tables at levels implying that the series were non-stationary at their levels indicating the existence of unit root. After taking first difference, all the series becomes stationary which is obvious from the calculated values for all the markets are less than the critical value (1%) and were free from the consequence of unit root.

**Table 5: ADF Test results of mustard prices in the sample mustard markets**

Markets	Level		First difference	
	Coefficient	Critical value (1%)	Coefficient	Critical value (1%)
Hisar	-0.085447	-1.057678	-12.33885	-3.507394
Rewari	-0.566789	-4.486366	-9.929222	-3.508326
Sirsa	-0.258740	-3.561969	-11.49808	-3.507394
SGN	-0.025794	-0.522166	-12.34738	-3.507394

\**MacKinnon (1996) one-sided p-values.*

SGN: Sri-Ganganagar.

### Results of Johansen's Multiple Co-integration Analysis

The results are presented in Tables 6 based on the Johansen's multiple co-integration procedure and the integration between the markets were analysed by using E-Views software which indicated the presence of at least one integration equation at 5 per cent level of significance. Hence, markets are having long run equilibrium relationship.

**Table 6: Unrestricted Co-integration Rank Test (Maximum Eigen value)**

Particulars	Hypothesized No. of CE(s)			
	None*	At most 1	At most 2	At most 3
Eigen value	0.402991	0.129425	0.078825	0.051158
Max-Eigen Statistic	43.3291	11.64249	6.89688	4.411129
0.05 Critical Value	32.11832	25.82321	19.38704	12.51798
Probability**	0.0014	0.8938	0.9076	0.6821

*Max-Eigen value test indicates 1 co-integrating equations at the 0.05 level*

\* *Denotes rejection of the hypothesis at the 0.05 level*

\*\**Mac Kinnon-Haug-Michelis (1999) p-values*

### Granger Causality Test

In order to examine the direction of causation between the markets Granger Causality Test was applied. The Grangers causality results are presented in Table 7. The results indicated that mustard prices of Hisar market influences the prices of Rewari, Sirsa and Sri-Ganganagar markets and there existed unidirectional causality from Hisar market mustard price to Rewari and Sirsa market. But, there was bidirectional causality in Hisar and Sri Ganganagar markets. There was bidirectional causality between Sirsa and Rewari markets and Sri-Ganganagar and Sirsa markets. However, Sri-Ganganagar market prices cause unidirectional influence on Rewari market mustard prices.

**Table 7: Pair-wise Granger Causality Test for the sample markets****(Sample 1: 89)**

Null Hypotheses	Observations	F-Statistic (Lags 2)	Probability
Rewari does not Granger Cause Hisar	87	1.46472	0.2371
Hisar does not Granger Cause Rewari	2.60006	0.0804	
Sirsa does not Granger Cause Hisar	87	0.53305	0.5888
Hisar does not Granger Cause Sirsa	6.00392	0.0037	
SGN does not Granger Cause Hisar	87	4.32033	0.0164
Hisar does not Granger Cause SGN*	3.89628	0.0242	
Sirsa does not Granger Cause Rewari	87	2.98828	0.0559
Rewari does not Granger Cause Sirsa	5.00403	0.0089	
SGN does not Granger Cause Rewari	87	5.06198	0.0085
Rewari does not Granger Cause SGN	0.83507	0.4375	
SGN does not Granger Cause Sirsa	87	2.69795	0.0733
Sirsa does not Granger Cause SGN	3.34299	0.0402	

*Mustard price Hisar, Rewari, Sirsa, and \*SGN: Sri-Ganganagar*

### Price Volatility

To assess the presence of price fluctuations in the different markets for mustard ARCH-GARCH analysis was carried out for Hisar, Rewari, Sirsa and Sri-Ganganagar mustard markets. The sum of Alpha and Beta values indicated the presence of persistent fluctuation. The value close to one indicates the persistence of volatility in the market. The results confirmed that there was no persistent volatility in prices of mustard in these markets with the exception of Sirsa market where there was a presence of volatility in the prices of mustard (Table 8).

**Table 8: ARCH-GARCH analysis of prices for the sample markets**

Market	Alpha ( $\alpha$ )	Beta ( $\beta$ )	$\alpha + \beta$
Hisar	0.122901	0.708987	0.831888
Rewari	0.11716	0.402502	0.519662
Sirsa	1.049004	1.761448	2.810452
Sri-Ganganagar	0.2942	0.0782	0.3724

### Vector Error Correction Model

Since the different mustard markets are integrated in the long run, it is important to study the short run and long run association for equilibrium among the markets. Hence, the Vector Error Correction Model (VECM) was employed to see the speed of adjustments among the markets for long run equilibrium. The results presented in the Table 9 revealed that Hisar and Sirsa markets reached to short run equilibrium as indicated by the level of significance and the speed of adjustment

was rapid as Hisar, Rewari and Sri-Ganganagar market prices are influenced by its own daily price lags for long run equilibrium.

**Table 9: Results of Vector Error Correction Model**

<b>Error Correction</b>	<b>D (Hisar)</b>	<b>D (Rewari)</b>	<b>D (Sirsa)</b>	<b>D (SGN)</b>
CointEq1	-0.080118** (0.02895)	0.075225 (0.04412)	-0.161918** (0.05610)	0.017802 (0.02080)
D [Hisar(-1)]	-0.296191** (0.10978)	0.025188 (0.16733)	-0.152440 (0.21277)	0.115332 (0.07889)
D [Hisar(-2)]	0.028652 (0.11151)	0.039015 (0.16997)	0.375475 (0.21613)	0.109283 (0.08014)
D [Rewari(-1)]	-0.138540 (0.07493)	-0.595837** (0.11421)	-0.275060 (0.14522)	-0.017264 (0.05385)
D [Rewari(-2)]	-0.077684 (0.07409)	-0.193057 (0.11294)	0.046012 (0.14361)	-0.012298 (0.05325)
D [Sirsa(-1)]	0.105834 (0.05702)	-0.028563 (0.08692)	-0.062914 (0.11052)	-0.089758** (0.04098)
D [Sirsa(-2)]	0.073124 (0.05668)	-0.019893 (0.08640)	0.008365 (0.10986)	-0.020566 (0.04074)
D [SGN(-1)]	-0.074190 (0.16121)	0.507118** (0.24572)	-0.603986 (0.31245)	-0.291011** (0.11586)
D [SGN(-2)]	0.012785 (0.15967)	0.543166** (0.24338)	-0.926413** (0.30948)	-0.057123 (0.11475)
R <sup>2</sup>	0.200526	0.362759	0.293404	0.171122

*Mustard price Hisar, Rewari, Sirsa, and SGN- Sri-Ganganagar*

*\*\* Significant at 5 percent level.*

*Figures in parentheses are standard errors.*

It was noticed that prices in Rewari and Sirsa markets were also influenced by the Sri-Ganganagar market prices lags in the long run equilibrium. The speed of adjustment between these markets was also found significantly higher.

## CONCLUSIONS

The results revealed that Haryana contributes 8.90 and 11.43 per cent to the total Indian mustard area and production respectively. The validity of the pre-sowing and post -harvest forecasts made during the year 2010-11 and pre-sowing price forecast during the crop year 2011-12 varied from 97.52 to 100.00 per cent. The results indicated that mustard prices of Hisar market influences the prices of Rewari, Sirsa and Sri-Ganganagar markets and there existed unidirectional Causality from Hisar market mustard price to Rewari and Sirsa market. But, there was bidirectional causality in Hisar and Sri Ganganagar markets. However, Sri-Ganganagar market prices cause unidirectional influence on Rewari market mustard prices. The results of Johansen's Multiple Co-integration Tests revealed that the different markets for mustard had long run equilibrium relationship. There was no

price volatility in the Hisar, Rewari and Sir-Ganganagar market, while there was a presence of price volatility in Sirsa market indicating wide fluctuations in prices in this market.

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## A STUDY INTO PRESENT STATUS AND FUTURE STRATEGIES FOR MARGINAL AND SMALL LAND HOLDERS IN PUNJAB

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### ABSTRACT

*The marginal and small land holders constituted 44.76 per cent of the total holdings in 1990-91 which declined to 31.25 per cent in 2005-06 in Punjab. Some of the problems being faced by them comprised of small size of holdings, low income, small marketable surplus, poor accessibility to the credit, costly farm machinery, etc. The marginal and small farmers are having unviable land holdings which do not generate enough income to sustain their families. The present study suggests that the cropping intensity of marginal and small land holders can be increased by choosing crops such as vegetables, oilseeds, pulses, fodder, etc. which will help to supplement their income. There are different suggestive cropping systems if adopted which not only generate higher productivity than rice-wheat system but also help to save irrigation water. The cost of production can be reduced by employing the family labour as its marginal efficiency is higher than the hired labour. The contract farming and group marketing arrangements have to be strengthened in order to help the marginal and small land holders. On the whole, it seems that it would be possible to ameliorate the condition of marginal and small land holders, if, they become proactive to adopt the cropping system which will provide them with additional income.*

**Key words:** Cropping intensity, marginal efficiency, contract farming

**JEL Classification:** E24, F66, H21, Q15.

### INTRODUCTION

Indian agriculture is dominated by small land holders with nearly 80 per cent of the farmers operating less than two hectares of land. Since, over 700 million of India's population lives in villages and their principal source of livelihood is agriculture, comprising crop and animal husbandry, forestry, fisheries, agro-processing and agri-business. Therefore, accelerated progress in enhancing the productivity, profitability, stability, and sustainability of the major farming systems is the best safety net against hunger and poverty. India's agricultural economy and food security depend vitally on the small land holders. In relation to their aggregate

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land holding, the holdings less than one hectare contribute proportionately more. Despite of this, these farmers comprise almost three fifth of the nation's hungry and poor. It is, therefore, incumbent upon the nation to assist the small and marginal land holders to increase their productivity and to augment their assets and entitlements (Gautam *et al.*, 2007). Punjab is one of the most progressive states of India and is having a similar type of land distribution though little better than the Indian situation. The marginal and small land holders constituted 44.76 per cent of the total holdings in 1990-91 which declined to 31.25 per cent in 2005-06 in Punjab. The marginal and small land holders faced various problems while trying to modernize agriculture on their farms. Some of the problems being faced by the small and marginal land holders in Punjab comprised of small size of holdings, low income, small marketable surplus, poor accessibility to the credit, costly farm machinery, etc. This group is mainly embroiled in the vicious cycle of low savings and even dissaving, low investments and low returns.

In the past several studies were conducted on the issue related to viability of marginal and small land holders at micro-level. Pasha, 1991 examined the role of animal husbandry and common property resources for sustainability and viability of small and marginal land holders in drought-prone region and found that ruminant livestock and common property resources played important role for viability and sustainability of marginal and small land holders. Chandra, 2001 reported that small farms are not viable unless they are supported with some supplementary income. Singh, 2012 concluded that the falling groundwater table is effectively excluding marginal and small land holders from utilizing this common natural resource, leading to tension and social strife in the state of Punjab. Singh *et al.* (2009) examined the contribution of various factors in viability of marginal and small land holders in state of Punjab and suggested that creation of off-farm employment opportunities, public investments to remove regional productivity gap, assuring remunerative prices of output and up-scaling of input supply to promote dairy and other allied activities should be made helpful to marginal and small land holders. It was suggested that corporatization and diversification of agriculture, introduction of new generation co-operatives and contract farming should be strengthened to make the marginal and small land holders viable ones (Singh, 2000). In the backdrop of this, the present investigation was carried out to examine present status and future strategies for marginal and small land holders in Punjab.

## **METHODOLOGY**

In order to achieve the stipulated objectives, the requisite data were collected from various published sources such as Statistical Abstract of India, Statistical Abstract of Punjab, Indian Agriculture at a Glance, published reports

pertaining to the marginal and small land holders, etc. The data so collected related to gross cropped area, net sown area, cropping intensity, land use pattern, net income, indebtedness, etc. In addition to these data some of the information was collected from the Department of Agronomy, Punjab Agricultural University, Ludhiana pertaining to the adoption of various agronomic practices vis-à-vis productivity of some of the crops. Some of the studies were also reviewed to supplement the findings of the present investigation. The data were analyzed by using simple statistical tools such as averages, percentages, etc.

## **RESULTS AND DISCUSSION**

The results obtained from the analysis of data were discussed under different sub-heads as follows:

### **Present Status of Marginal and Small Land Holders**

The present status of the marginal and small land holders is discussed under various heads as under:

#### **Unviable land holdings**

The marginal and small land holders are having unviable land holdings which do not generate enough income to sustain their families. A perusal of Table 1 revealed that on the basis of total disposable income from crops and dairy, the marginal and small land holders were unable to meet their household requirements. They were experiencing a deficit to the tune of ₹3027.38 at overall level. The deficit in the case of marginal land holders was estimated to be ₹11072.76 while the small land holders were on the bank of survival with a small surplus of ₹5018.00 per annum.

**Table 1: Economic surplus from crops and dairy of marginal and small land holders in Punjab**

<b>Particulars</b>	(₹/annum)		
	<b>Marginal</b>	<b>Small</b>	<b>Overall</b>
Farm business income from crops and dairy	33813.98	60032.15	46923.06
Domestic expenditure	44886.74	55014.15	49950.44
Economic surplus from crops and dairy over domestic expenditure	-11072.76	5018.00	- 3027.38

*Source: Singh, 2006*

#### **Lack of labour**

In the earlier times, the whole family worked on the farm to carry out operations manually which increased the efficiency of work and reduced the cost of production. Presently, 60 to 70 per cent of the farming operations are carried out by hired labour. The marginal efficiency of hired labour is always lower as compared to the marginal efficiency of the family members employed on the farm. This has added to the cost of production and lowering the farm income.

### **Under employment of family labour**

It had been shown in many studies that the family labour of this group of farmers was under-employed due to growing of only wheat and paddy crops, the field operations of which had been mechanized, hence, require very lesser human labour. If they undertake the farming of high labour intensive crops then their family member can be employed gainfully on the farm itself. This in turn will supplement their income.

### **Lack of proper technology equipments**

The various studies conducted to examine the level of machinery being used on different size of farms had shown that all the farm machinery is under-utilized. At present, none of the modern technology equipments are available in the market which suits the small and marginal land holders. Furthermore, at present none of tractor is available in the market with small horse power of 15-20. As such, these remain under-utilized and add to the cost of production which in turn affects the income of the marginal and small land holders adversely.

### **Lower per capita Income**

The per capita net annual income in the case of marginal land holders was estimated to be ₹4062, ₹8492, ₹7965, ₹11550 and ₹21607 in 1991-92, 2005-06, 2006-07, 2007-08 and 2010-11 respectively (Singh *et al.*, 1994; Singh *et al.*, 2008; 2009 and 2012). The corresponding figures for small land holders were estimated to be ₹5875, ₹11647, ₹16885, ₹21048 and ₹32477 respectively (Table 2). If one compares these figures with the state per capita average net annual income, these are much lower. This has supplemented the above stated facts that the small and marginal land holders are driven out of the farming due to lower income and it is very difficult for them to sustain their life on small size holdings.

**Table 2: Net annual income of marginal and small land holders in Punjab**

Year	Marginal	Small	State* (₹capita <sup>-1</sup> )
1991-92	4062	5875	9872
2005-06	8492	11647	36199
2006-07	7965	16885	41833
2007-08	11550	21048	49380
2010-11	21607	32477	69837(P)

Source: Singh *et al.* 2008, 2009 and 2012

\* Statistical Abstract of Punjab, 1993 and 2010

### **Small marketable surplus**

The size of the family was around five for this group of farmers. It had observed that due to small holding size they were left with a small volume of the produce to be marketed after meeting the personal requirements of the family, feed for animals, seed, payment in kind to labour and artisans, etc. Sometimes it becomes

un-economical to take the produce to the local regulated market as the residual produce was less than tractor-trolley load of the produce and they were forced to dispose of the produce in the village itself at lower price.

### **Sticky land supply**

Out of a total geographical area of 5,036 thousand hectares in Punjab, about 15 per cent land is not available for cultivation (Table 3). The agricultural land comprising net area sown and fallow land increased from 4053 thousand hectares in 1970-71 to 4158 thousand hectares in 2010-11. This is also referred to as crop land. At present, 83 per cent of the total area of Punjab is under cultivation as compared with a national average of 43 per cent. The perusal of Table 3 showed that apart from increase in area under crop land, the cropping intensity in Punjab had increased from 140 per cent in 1970-71 to 190 per cent in 2010-11. This reflected a very effective and intensive use of the agricultural land in Punjab.

**Table 3: Shifts in land use pattern in Punjab, 1970-71 to 2010-11**

(000' ha)						
Year	Geographical area (GA)	NSA	NSA as % to GA	Area sown more than once	GCA	Cropping Intensity (%)
1970-71	5036	4053	81	1625	5678	140
1980-81	5036	4191	83	2572	6763	161
1990-91	5036	4218	84	3284	7502	178
2000-01	5036	4250	84	3691	7941	187
2001-02	5036	4254	85	3687	7941	187
2002-03	5036	4201	83	3572	7773	186
2003-04	5036	4201	83	3704	7905	188
2004-05	5036	4200	83	3732	7932	188
2005-06	5036	4192	83	3676	7868	189
2006-07	5036	4184	83	3677	7861	184
2007-08	5036	4187	83	3683	7870	189
2008-09	5036	4171	83	3741	7912	190
2009-10	5036	4158	83	3718	7876	189
2010-11	5036	4158	83	3724	7882	190

*Source: Statistical Abstracts of Punjab*

Likewise, the area sowed more than once increased from 1625 thousand hectares in 1970-71 to 3724 thousand hectares in 2010-11 showing that 83 per cent of the land in the state is already under cultivation. Increasing it further will be a difficult proposition and it will be damaging to our fragile agro-eco-system. The cropping intensity however can be increased from the present level of 190 per cent which is not an easy proposition.

### Increasing debt burden

The amount of debt per sample household as well as per indebted household was directly related with the farm size. It was the highest in the case of large farms and the lowest in the case of marginal land holders of the state. However, in relation to land (per hectare basis), the association was negative. The perusal of Table 4 revealed that relative indebtedness of the marginal land holders on per hectare basis was three times than the larger farmers. It was ₹101321 and ₹35363 per ha per sample household in 2005-06 and ₹170184 and ₹26668 per ha per sample household in 2012-13 and ₹126063 and ₹38341 per ha in 2005-06 and ₹190606 and ₹39217 per ha in 2012-13 on per indebted household basis for marginal and large land holders, respectively.

**Table 4: Incidence of debt among Punjab farmers in 2005-06 and 2012-13**

Farm-size categories	Amount of debt (₹farm <sup>-1</sup> )				Amount of debt (₹ha <sup>-1</sup> )			
	Per sample household		Per indebted household		Per sample household		Per indebted household	
	2005-06	2012-13	2005-06	2012-13	2005-06	2012-13	2005-06	2012-13
Marginal farmers	72018	107216	89604	120082	101321	170184	126063	190606
Small farmers	112441	146859	126813	161545	68549	104155	77310	114571
Semi-medium farmers	210023	228949	231177	244419	67807	83864	74637	89531
Medium farmers	215290	242146	234128	280669	42332	40629	46036	47092
Large farmers	309949	397882	336050	585121	35363	26668	38341	39217
<b>Total</b>	<b>178934</b>	<b>218092</b>	<b>201427</b>	<b>247832</b>	<b>50140</b>	<b>50021</b>	<b>56442</b>	<b>56842</b>

*Source: Singh et al. (2007) and Singh (2013)*

The tractor owner farmers were more heavily indebted than other farmers (₹264320 versus ₹99589) as they had a higher share of the institutional loan (66 versus 53 per cent). As many as, 59 out of 289 tractor owning holdings were those of the marginal and small land holders, their average indebtedness was also more than ₹200000 and had lower share of institutional loan than the other (larger) tractor owning farmers (61 versus 66.5 per cent) whereas the average indebtedness of the marginal and small land holders without owning tractor was ₹61303 only.

The total family income of the small and marginal land holders owning tractor, other farmers owning tractor and all farmers without owning tractor was ₹97867, ₹387489 and ₹161132, respectively. Hence, a caution is needed in assessing the bank-ability of tractors for the marginal and small holdings (Singh *et al.*, 2007).

### Skewed cropping pattern

The perusal of Table 5 showed that for both *kharif* and *rabi* seasons the analysis revealed a trend towards crop specialization especially wheat in *rabi* and rice in *kharif* season. A number of factors had influenced the shift in cropping pattern *viz.* spread of irrigation facilities, market intervention and support by the government in certain crops and perhaps most significant of all, the changing

relative prices between different crops and stability in its productivity. This indicated that the cropping pattern of the state revolves around a few crops and it runs in conflict with the current emphasis on diversification of agriculture. Also, cereal based cropping sequence would have deleterious effect on soil health as the area under pulses and oilseeds, which are source of important natural nutrients, has declined. It is often said that rice-wheat rotation is believed to be the main cause of environment imbalance and un-sustainability of Punjab Agriculture.

**Table 5: Shifts in cropping pattern in Punjab**

Crop	(Per cent of GCA)				
	1970-71	1980-81	1990-91	2000-01	2010-11
Rice	6.9	17.5	26.9	33.3	35.9
Wheat	40.5	41.6	43.6	43.4	44.5
Maize	9.8	5.6	2.5	2.1	1.7
Bajra	3.7	1	0.2	0.1	0.03
Barley	1	0.9	0.5	0.4	0.2
Total pulses	7.3	5	1.9	0.7	0.3
Total oilseeds	5.2	3.7	1.3	1.1	0.7
Sugarcane	2.3	1	1.3	1.5	0.9
Cotton	7	9.6	9.3	6.0	6.1
Total vegetables	0.9	1.1	0.7	1.4	1.3
Total fruits	0.6	0.4	0.8	0.4	0.9
Cropping intensity (%)	140.1	161.4	177.9	186.8	189.6
GCA, 000' ha	5678	6763	7502	7847	7882
NSA 000' ha	4053	4191	4218	4250	4158

*Source: Statistical Abstracts of Punjab*

### Over-exploited irrigation potential

The perusal of Table 6 revealed that in the year 2010-11, Punjab had 98 per cent of the cropped area under irrigation of which 27.42 per cent was irrigated by canals and 72.58 per cent by tube-wells.

**Table 6: Source-wise net irrigated area in Punjab**

Source	(000' ha)				
	1970-71	1980-81	1990-91	2000-01	2010-11
Canal	1286 (44.53)	1430 (42.28)	1669 (42.70)	962 (24.33)	1116 (27.42)
Tube-well	1591 (55.09)	1939 (57.33)	2233 (57.10)	3074 (75.62)	2954 (72.58)
Other sources	5 (0.17)	13 (0.39)	7 (0.20)	2 (0.05)	-
Total	2888 (100)	3382 (100)	3909 (100)	4038 (100)	4070 (100)
GIA (000' ha)	2157.3	5781.3	7054.8	7663.8	7723.8
GIA as per cent to GCA	74.7	85.4	94.0	96.5	98.0

*Source: Statistical Abstracts of Punjab*

*Figures in parentheses are percentage to the total*

*GIA: Gross irrigated area*

The figures for canal irrigated and tube well irrigated were estimated to be 44.53 and 55.09 percent, respectively in 1970-71. This shows now the farmers are more dependent on tube wells for irrigating their farms which led to sharp decline in water table. The results have revealed that yield variability decreased with the increase in area irrigated by tube-wells. Further, it is an established fact that productivity is higher where the water is at the command of the farmers (Singh, 2004). It was pertinent to mention here that due to ever declining water table in Punjab the mono-block pumps were being replaced by submersible pumps. The cost of digging a submersible tube well ranges from ₹70000 to ₹100000 lakh. The marginal and small land holders who were having a very low disposable income face the problem in meeting out the financial requirement for this venture but they were forced to do so in order to sustain their livelihoods. In order to meet this venture they resort to borrowing the funds but unable to repay on time. This lends them in debt trap which leads to many social and economic problems such as drug addiction, mental depression which ultimately leads to suicides.

#### **Inaccessibility to extension services**

It had been noticed that the extension services remain beyond the reach of the marginal and small land holders as they had limited resources to contact the extension experts in case of emergencies arising due to various factors, such as attack of insect-pest diseases, frost, etc. This affected the productivity of the crops adversely and affects the total production as well as the income.

#### **Future Strategies for Marginal and Small Land Holders**

The following strategies, if followed, will go a long way to improve the economic fortune of the marginal and small land holders of Punjab.

#### **Proper land and ground water management**

To tackle the problem of inequity existing in groundwater resources there is a need for institutional restructuring of groundwater regulations such as using permits for drilling wells, maintenance of inter-well space, optimum number of wells and banning additional wells in over-exploited areas till the groundwater situation improves. State policies such as subsidized electricity for groundwater irrigation have an adverse impact on groundwater development. Hence, appropriate pricing, incorporating marginal cost of extraction is desirable. The decline in productivity growth is attributed, *inter alia*, to deterioration in soil health and water shortages including ground water depletion. Therefore, land and water management should be given top priority. Both investment and efficiency in use of water are needed. Investment in irrigation, watershed development and water conservation by the community are needed under water management. Water use efficiency and participatory irrigation management are important to have adequate returns to major and medium projects.

### **Increasing cropping intensity**

Under the present circumstances, the land supply is limited and cannot be increased by any means due to ever increasing demand for land for non-agricultural uses. The solution lies only in increasing the cropping intensity by choosing the cropping system which enhance the cropping intensity of the farm. This is possible by choosing crops such as vegetables, oilseeds, pulses, fodder crops, etc. This will help to increase the cropping intensity and also supplement the income of the farmers. Singla (2004) reported that the returns over variable cost in the case of peas were 89.49 per cent more than the returns in the case of wheat. There was a need to check the size of a farm from going below a particular limit through necessary changes in the law of succession. This will discourage the division of land below the economically viable size.

### **Minimization of risk**

Farmers should go for the oilseed and pulse crops as cash crops and they can get a good monetary return from the crop production, which may enable them to achieve the sustainable livelihood security. In this way the livelihood security of the small and marginal land holders can be improved by increasing the productivity of oilseed and pulses crops (Gautam *et al.*, 2007).

### **Undertaking manual work**

The cost of production can be reduced by employing the family labour on the farm as their marginal efficiency was higher than the hired labour. This will add to the income of the farmers and will raise their standard of living. This will help to curtail the expenditure on hired labour, which sometimes constitutes of one-third of the cost of production.

### **Adoption of allied agricultural enterprises**

The farmers should adopt the other allied activities such as dairy, poultry, piggyery, floriculture, bee-keeping, seed production, etc. to supplement their incomes and will create more employment opportunities on the farm itself.

### **Boundary plantation of trees**

The small land holders can go for boundary plantation of trees in their fields. It was empirically proved that on boundaries we can plant trees without any major effect on the regular crop yields. There was a variety of trees which ripe in 7-10 years and give a handsome income to the farmers upon maturity.

### **Development of suitable technologies**

There is need to develop technologies which are suitable for the marginal and small land holders such as small horse power tractors, which are commonly used in developed countries like China and Japan.

### **Non-farm employment**

The farmers should try to find some non-farm income generating avenues during the slack season to supplement their income in the nearby cities or towns.

This has already become evident from the decreasing number of marginal and small holdings in the state. The small and marginal holdings constituted 44.76 per cent of the total holdings in 1990-91 which declined to 31.25 per cent in 2005-06 in Punjab. This showed that the small and marginal land holders were driven out of the farming due to uneconomical holdings. There is a need to create the off-farm jobs for small and marginal land holders, especially during the off-season. For this, labour intensive industries should be established in rural areas so that these people can work there and return to their homes in evenings instead of looking for odd jobs in the urban areas.

### **Enhance the coverage of MNREGA**

There is a need to bring the marginal and small farmer under the ambit of MNREGA, so that they can get employment in their villages for 100 days in a year when they are free from the farming (Shukla, 2009). The different types of work undertaken in Punjab remained always incomplete. If the marginal and small land holders are also provided the employment opportunity under MNREGA, the task might have been completed. This would have certainly increased their income and reduced their indebtedness.

### **Selection of suitable cropping system**

It had been emphasized that crops and cropping system should be selected in such a way that the residual nutrient left by one crop is efficiently utilized by the following crops. The studies on evaluation of prominent cropping systems by the Department of Agronomy, Punjab Agricultural University, Ludhiana revealed that there was a scope to shift from rice-wheat cropping system (spread over 72 per cent of the cultivated area) to other cropping system. There were different cropping systems which not only gave more productivity than rice-wheat system but also helped to save irrigation water.

**Table 7: Yield, net returns and irrigation water applied of different cropping systems**

<b>Cropping system</b>	<b>Rice equivalent yield (tha<sup>-1</sup>)</b>	<b>Net returns (₹ha<sup>-1</sup>)</b>	<b>Irrigation water applied (cm)</b>
Rice-Wheat	13.59	42899	214
Maize-Wheat-Summer Moongbean	17.29	54313	89
Maize-Potato-Summer Moongbean	22.72	69753	108
Maize-Potato-Onion	32.60	108344	128
Summer-Groundnut-Potato-Bajra (Fodder)	21.24	64260	106

*Source: Department of Agronomy, PAU, Ludhiana*

These included Maize-Wheat-Summer Moongbean, Maize-Potato-Summer Moongbean, Maize-Potato-Onion and Summer Groundnut-Potato-Bajra (fodder) which produced rice equivalent yield as 17.29, 22.72, 32.60 and 21.24 tonne per

hectare, respectively as against 13.59 tonne per hectare in Rice-Wheat System. The corresponding saving of water over rice-wheat system was 89, 108, 128 and 106 cm, respectively (Table 7). It is thus evident that there is an urgent need to educate the farmers about the selection of appropriate cropping system for the rational use of resources and improving crop productivity.

#### **Ensure the access to information**

The communication gap between the extension agency and the small land holders should be bridged. Otherwise, paradoxical results may emerge. Agriculture will progress, but at the same time a major portion of the agriculturists will remain ill informed and hence poor. An institutional support in the form of better production technology, quality input supplies and market infrastructure should be provided.

#### **Enhance the role of self help groups**

The self help group phenomenon should be encouraged as a movement to save and reduce the dependence of marginal and small land holders on money-lenders, traders and landlords.

#### **Encourage the value addition**

There should be value-added production and close linkage between small land holders and agro-processing units. This strategy will be quite important in view of the new economic policy under which multinationals are taking up the food processing projects in India and are likely to favour the large rather than the small land holders. The implementing agencies should ensure the participation of marginal and small land holders in value addition ventures. Moreover, marginal and small land holders should be trained to undertake value addition at their own level. This will help them to realize better returns for their produce and also create employment opportunities on the farm itself.

#### **Promote kitchen gardening**

The small and marginal land holders should themselves produce the commodities required for self-consumption rather than buying these commodities at a higher rate from the market. This will help them to diversify their cropping pattern and provide greater employment besides producing the commodities at little cost.

#### **Contract farming and group marketing**

The contract farming arrangements are particularly useful in where small-scale agriculture is widespread. The small and marginal land holders have problems in getting inputs, credit, extension and marketing. The services provided by the contract farming companies would thus be useful for small-scale agriculture. The contract farming arrangements have to be strengthened legally in order to help the small land holders. There is also a need to strengthen co-operatives and group marketing to ensure better deal to marginal and small land holders.

## CONCLUSIONS

The finding of the study revealed that the marginal and small holdings constituted 44.76 per cent of the total holdings in 1990-91 which declined to 31.25 per cent in 2005-06 in Punjab. Some of the problems being faced by the small and marginal land holders in Punjab comprised of small size of holdings, low income, small marketable surplus, poor accessibility to the credit, costly farm machinery, etc. The marginal and small land holders were having unviable land holdings which did not generate enough income to sustain their families. At present, none of the modern technology equipments are available in the market which suits the small and marginal land holdings and as many as 59 out of 289 tractor holdings were those of the marginal and small land holders, their average indebtedness was also more than ₹200000. The per capita net annual income in the case of marginal land holders was estimated to be ₹4062 in 1991-92 and ₹21607 in 2010-11 respectively. The corresponding figures for small land holders were estimated to be ₹5875 and ₹32477 respectively. The lower per capita net annual income than the state average shows that the small and marginal holdings are not economically feasible. The findings of the study suggest the cropping intensity in Punjab increased from 140 per cent in 1970-71 to 190 per cent in 2010-11. The relative indebtedness of the marginal land holders on per hectare basis was three times higher than the larger farmers. Furthermore, the indebtedness among Punjab farmers increased about ₹46405 per household in 2012-13 over 2005-06. Moreover, the marginal and small land holders faced problems on account of small marketable surplus, higher cost of irrigation, under-employment of family labour, inadequate access to extension services, etc. The solution lies only in increasing the cropping intensity by choosing the cropping system which enhance the cropping intensity of the small farms. This is possible by choosing crops such as vegetables, oilseeds, pulses, fodder crops, etc. This will help to increase the cropping intensity and also supplement the income of the farmers. The cost of production can be reduced by employing the family labour on the farm as their marginal efficiency is higher than the hired labour. There is a need to provide off-farm jobs to small and marginal land holders, especially the latter during the off-season. There are different cropping systems which not only gave higher productivity than rice-wheat system but also helped to save irrigation water. Communication gap between the extension agency and the small farmer should be bridged. The implementing agencies should ensure the participation of marginal and small land holders in value addition ventures also. The contract farming and group marketing arrangements have to be strengthened in order to help the marginal and small land holders. On the whole, it seems that it would be possible to ameliorate the condition of marginal and small land holders, if, they

become proactive to adopt the cropping system which will provide them with additional income.

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## SERVICE QUALITY ASSESSMENT: A COMPARATIVE ANALYSIS OF MULTINATIONAL AND INDIAN FAST FOOD RESTAURANTS

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### ABSTRACT

*The present study was undertaken to assess and compare the services offered by Multinational and Indian fast food restaurants in Punjab. An adopted SERVQUAL scale was used to assess the service quality. The study revealed that the perceived performance on all dimensions fell short of expectations. This indicates that the service quality offered did not meet the customers' expectations on all the dimensions. In the case of multinational fast food restaurants the highest gap between perception and expectation was -1.03 for empathy and least gap was (-0.76) for assurance while in the case of Indian fast food restaurants the highest gap between perception and expectation was -1.07 for responsiveness and least gap was -0.82 for tangibles.*

**Key words:** Service quality, fast food restaurants, SERVQUAL

**JEL Classification:** D11, D12

### INTRODUCTION

A number of fast food restaurants have mushroomed all over India. There is a socio-economic shift among the Indian consumers today. With the opening up of economy, consumers have been gradually exposed to a range of better-quality products including food items. This explains why multiplexes and multinational fast food outlets (MFFRs) are doing well in big cities and organized retailing is sold as shopping-plus-experience. Moreover, families are becoming nuclear, women are venturing out thus, there is double income, and domestic help is becoming scarcer, which are fuelling the food business. Today, the Indian youth is very much inclined towards fast food and this has become a major factor towards the growth of these restaurants (Kiran, 2011).

The fast food and eating out has dramatically grown in India in the past 20 years. These restaurants can be eat-in or take-out, or a combination of both. The

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menu is limited and prices are comparatively lower. Because of lower prices, a high traffic volume is critical. A fast food restaurant has to stay open long hours, and generally seven days a week. Recently many multinational chains like KFC, McDonalds, Subway and Domino's have succeeded in India because of their product development, quality standards and effective localization strategies to Indian market. Lee and Ulgado (1997) found that a growing number of US fast-food franchises are expanding operations to overseas markets Yum Brands Inc is preparing for massive expansion across the country with plans to open 1000 fast food outlets by 2015 (Bharatbook, 2009). The reasons for the growth of fast food restaurants in India can be summarized as, the transformation of gender roles, scarcity of time, growth in personal income, urbanization, growing number of women in the workforce, expanding young population which is less traditionally bound and is more receptive to the western fast food concept and change in the attitude to food culture and 'Dining out' concept.

The market is highly competitive with a large number of Indian and foreign players showing interest in the fast food restaurant business. To compete and survive in such a competitive market, every fast food brand is planning various strategies. One such important strategy is the improved service quality of the fast food restaurants that lead to customer satisfaction. Ding *et al.* (2007) found that the evaluation of service quality is very important for fast food industry. The service quality is the core concept to attract customers in the fast food industry. There are seven factors affecting the overall service quality: friendliness, hygiene, task accuracy, comfort, store appearance, convenience and interior design. Qin and Prybutok (2009) developed the Fast Food Restaurant (FFR) success model, using the original five dimensions in the SERVPERF scale and another new dimension "recovery" to measure service quality in the fast food industry. Trujillo and Vera (2010) found that service quality was composed of several different factors depending on the type of service and the cultural context being analyzed.

The service quality is defined as difference between perceptions and expectations on items representing the areas of performance, specific to a service. The service quality is a critical factor that helps a service firm to position itself strongly in a competitive environment. Perception of high service quality and high customer satisfaction generally leads to higher levels of customer loyalty and helps to attract new customers. SERVQUAL is a multi-item scale developed to assess customers' expectations and perceptions of service quality in services and retail businesses. The scale has high construct reliability and validity in measuring service quality in fast food restaurants. SERVQUAL scale uses 22 questions to measure the five dimensions of service quality: reliability, tangibility, security, empathy and responsibility. SERVQUAL represents service quality as the gap between a customer's expectations for a service offering and the customer's perceptions of the

service received, requiring respondents to answer questions about both their expectations and their perceptions (Parasuraman *et al.*, 1988). The present investigation was undertaken with the specific objective to assess and compare the quality of service offered by multinational and Indian fast food restaurants.

## METHODOLOGY

The present study was restricted to Punjab as a number of Indian and multinational fast food restaurants are coming up fast in Punjab. The population for the study consists of all the customers of fast food restaurants of Ludhiana in Punjab. In the first stage, five Indian fast food restaurants (Café Coffee Day, Barista, Hot Millions, Yellow Chilli and Sagar Ratna) and five multinational fast food restaurants (McDonalds, KFC, Pizza Hut, Dominos and Subway) were selected on judgment basis. Thus, a total number of 10 fast food restaurants were selected. Efforts were made to select the giant fast food restaurants. In the second stage, 20 customers each from Indian and multinational fast food restaurants were selected on convenience basis. An ultimate sample consisted of 200 respondents.

The primary data were collected with the help of a structured, non-disguised schedule. An adopted SERVQUAL model given by Parasuraman, Zeithmal and Berry (Parasuraman *et al.*, 1988) was used for the study. The service quality is measured on five dimensions namely tangibles, reliability, responsiveness, assurance and empathy. The respondents were asked to rate their expectation and perception on scale of 1 to 5 where 1 stands for least important and 5 stands for most important. The mean scores were calculated and gap was found for each dimension. The service quality gap was calculated first for multinational fast food restaurants (MFFRs), then for Indian fast food restaurants (IFFRs) and then a comparison of service quality of Indian and multinational fast food restaurants was made.

The SERVQUAL scale requires the respondent to rate the 22 items on scale from 1 to 5 twice, first to indicate the expectations and next to give their perception of the actual service provided. This gives the expectation and perception scores of each item in the five service dimensions. Further, the difference between the customers' expectations and perception of the service received gives the service quality gap. The collected data were then grouped into tables and analyzed using various statistical tools like percentage, mean scores, single mean Z-test and two mean Z-test. The Single Mean Z-test was used to see if the differences between sample mean and the population mean. The Spearman's Rank Correlation Coefficient was computed to find the correlation to examine the relation between quality of services offered by MFFR and IFFR.

## RESULTS AND DISCUSSION

This section includes a brief profile of the respondents and service quality assessment and comparison of the multinational and Indian fast food restaurants.

### Demographic Profile of the Respondents

The perusal of Table 1 shows that in MFFRs, 74 percent of respondents were male and 26 percent were female. It was seen that 68 and 12 percent of respondents fall under the age group of 20-29 and 30-39 years, respectively. Also, the 37 and 35 percent of respondents have annual income between ₹3-4 lakhs and ₹2-3 lakhs respectively. The results show that 66 and 12 percent of respondents were students and were in service respectively.

**Table 1: Demographic profile of respondents**

Parameters	Multinational fast food restaurant	Indian fast food restaurant	Total (Percent)
<b>Gender</b>			
Male	74	72	73
Female	26	28	27
<b>Age (Years.)</b>			
<20	12	12	12
20-29	68	74	71
30-39	12	8	10
40-49	6	5	5.5
>49	2	1	1.5
<b>Annual Family income (Rs. Lac)</b>			
<1	2	2	2
1-2	14	8	11
2-3	35	28	31.5
3-4	37	42	39.5
>4	12	20	16
<b>Occupation</b>			
Student	66	74	70
Service	12	14	13
Businessmen	10	8	9
Professional	10	4	7
Retired	2	0	1
<b>Frequency of visit</b>			
More than once a week	9	9	9
Once a week	40	36	38
Once a fortnight	25	35	30
Once a month	19	17	18
Less than once a month	7	3	5
<b>Expenditure per visit</b>			
Less than Rs100	3	3	3
Rs101- Rs500	48	38	43
Rs 501-Rs1000	40	50	45
More than Rs1000	9	9	9

Further, 40 percent of respondents go for eating out once a week. The results revealed also showed that 48 and 40 percent of respondents spend within range of ₹101- ₹501 and spend within range of ₹501- ₹1000, respectively. It was

found that in the IFFRs 72 and 28 percent of respondents were male and female respectively. It was seen that 74 and 12 percent of respondents of IFFR were in the age group of 20-29 and below 20 years respectively. It was found that of the respondents have annual income between ₹3-4 lakhs and ₹2-3 lakhs were came out to be 42 and 28 percent, respectively. Similarly, 74 and 14 percent of respondents were students and in job respectively. The results further revealed that 36 and 35 percent of respondents go for eating out once a week and once a fortnight respectively. It was found that 38 and 50 percent of respondents spend between ₹101- ₹501 and ₹501- ₹1000 respectively.

### **Service Quality Assessment of MFFR**

The perusal of Table 2 shows that for the parameter ‘Tangibles’, the difference between the mean scores for expectations and that for actual experience for MFFR was the lowest (-0.33) for the statement that their employees were well dressed and appear neat and the highest difference (-1.01) for the statement that the fast food restaurant has modern equipments. The overall mean score for difference from the parameter ‘Tangibles’ comes out to be -0.81 for MFFR.

The difference between the mean scores for expectations and that for actual experience was the lowest (-0.82) in respect of reliability show that the fast food restaurant maintains error free sales transactions and records. The highest difference (-1.17) for the statement that when the fast food restaurant promises to do something, by a certain time, it does. The overall mean score for difference from the reliability came out to be -0.99.

As far as responsiveness was concerned the difference between the mean scores for expectations and that for actual experience for the MFFR was the lowest (-0.97). This shows that the staff services performed services as per the expectations of the customers. The difference between the mean scores for expectations and that for actual experience was the highest (-1.12) which showed that the fast food restaurant employees were always willing to help customers. The overall mean score for difference from the parameter responsiveness comes out to be -1.01. The difference between the mean scores for expectations and that for actual experience in respect of assurance for MFFRs was the lowest (-0.19) showing that the fast food restaurant employees were polite. The highest difference was (-0.97) showing that the customers feel safe in the transactions done by this fast food restaurant’s employees. The overall mean score for difference for assurance was estimated to be -0.76. The results presented in Table 2 revealed that the difference between the mean scores for expectations and that for actual experience for empathy in the case of the MFFR was estimated to be -0.92 indicating that the fast food restaurant operating hours were convenient to the customers. The highest difference was estimated to be -1.16 for empathy. This showed that the employees of sample restaurants understand the needs of their customers.

**Table 2: Service quality gap for multinational fast food restaurants**

Particulars	Actual service Received (P) Mean Score	Expected service (E) Mean Score	(P-E)	Z-value
<b>Statements relating to the dimension tangibles</b>				
Fast food restaurant has up-to date equipment	3.59	4.60	-1.01	25.11**
The physical facilities at this fast food restaurant are visually appealing	3.55	4.49	-0.94	25.28**
Their employees are well dressed & appear neat	3.90	4.23	-0.33	38.87**
The appearance of physical facilities (serving trays, menu cards) of their fast food restaurant is according to the kind of services provided.	3.30	4.24	-0.94	31.17**
<i>Overall score of tangibles</i>	<i>3.58</i>	<i>4.39</i>	<i>-0.81</i>	
<b>Statements relating to the dimension reliability</b>				
The order delivery time is according to the time promised.	3.41	4.38	-0.97	27.05**
If customers have problems, the fast food restaurant is sympathetic and reassuring.	3.39	4.37	-0.98	28.11**
The fast food restaurant is dependable	3.17	4.19	-1.02	29.20**
When the fast food restaurant promises to do something by a certain time, it does.	2.91	4.08	-1.17	24.88**
The fast food restaurant maintains error free sales transactions and record.	3.18	4.00	-0.82	32.42**
<i>Overall score of reliability</i>	<i>3.21</i>	<i>4.20</i>	<i>-0.99</i>	
<b>Statements relating to the dimension responsiveness</b>				
The staff tells the customers exactly when services will be performed.	3.48	4.45	-0.97	26.94**
It is realistic for customers to expect prompt services from employees of this fast food restaurant	3.50	4.48	-0.98	26.73**
The fast food restaurant employees are always willing to help customers.	3.30	4.42	-1.12	26.90**
The fast food restaurant's employees are never too busy to respond to customer requests promptly.	3.35	4.34	-0.99	26.92**
<i>Overall score of responsiveness</i>	<i>3.40</i>	<i>4.42</i>	<i>-1.01</i>	
<b>Statements relating to the dimension assurance</b>				
Customers are able to trust employees of this fast food restaurant.	3.41	4.37	-0.96	25.47**
Customers feel safe in the transactions done by this fast food restaurant's employees.	3.41	4.38	-0.97	26.58**
The employees of this fast food restaurant are polite.	4.15	4.34	-0.19	40.70**
The employees get adequate support from this fast food restaurant to do their jobs well.	3.21	4.13	-0.92	34.54**
<i>Overall score of assurance</i>	<i>3.54</i>	<i>4.31</i>	<i>-0.76</i>	
<b>Statements relating to the dimension empathy</b>				
The customers get individual attention in this fast food restaurant	3.34	4.30	-0.96	29.04**
Employees of this fast food restaurant give personal attention to the customers	3.50	4.48	-0.98	25.00**
The employees of this fast food restaurant understand the needs of their customers.	3.22	4.38	-1.16	23.11**
The employees of this fast food restaurant have their customers' best interest at heart.	3.30	4.41	-1.11	6.89**
The fast food restaurant has convenient operating hours.	3.38	4.30	-0.92	27.20**
<i>Overall score of empathy</i>	<i>3.34</i>	<i>4.37</i>	<i>-1.03</i>	

\*\*Significant at 5 percent level of significance (Z-table = 1.96)

The overall mean score for difference for empathy came out to be -1.03. The values for all the dimensions were negative which showed that expectations

were higher than perception. The results also show that the MFFRs were strong in assurance which means that the employees of restaurant were highly courteous and trustworthy while they were weak in empathy which means that the restaurant did not provide personalized and a careful attention to the customers. It was noticed that all the difference between expectations and actual experience was significant statistically.

### **Service Quality Assessment of IFFR**

The perusal of Table 3 exhibits the service quality gap for the IFFRs. The results showed that the difference between the mean scores for expectations and that for actual experience in respect of tangibles for IFFRs was the lowest (-0.42). The implied that their employees were well dressed and appear neat. The difference in the case of physical facilities was -0.99 which show that the physical facilities at this fast food restaurant were visually appealing. The overall mean score for difference from the parameter tangibles estimated to be -0.82.

As far as parameter reliability was concerned the difference between the mean scores for expectations and that for actual experience for IFFRs was -0.84 which show that the sample restaurant maintains error free sales transactions and records. The highest difference was observed to be -1.2 for the statement that if customers have problems, the IFFRs were sympathetic and reassuring. The overall mean score for difference from the parameter reliability comes out to be -1.04.

The difference between the mean scores for expectations and that for actual experience for IFFRs was the least (-0.37) in the case of assurance which showed that the employees of IFFRs were polite in their dealings. P-E in the case of reliability was estimated to -1.04 indicating that the customers were trust employees of IFFR. The overall mean score for difference from the parameter 'Assurance' comes out to be -0.83. In the case of empathy the difference between the mean scores for expectations and that for actual experience for the IFFRs was -0.93 which showed that the IFFRs have convenient operating hours. The value of P-E (-1.16) showed that the employees of IFFRs have their customers best interest at heart. The overall mean score for difference from the parameter 'empathy' comes out to be -1.06. The value for all the dimensions was negative which shows that expectations are higher than perception.

The results show that the IFFRs were strong in tangibles which mean that the physical facilities offered by the restaurant were up to the mark while weak in responsiveness which means that the employees were not receptive towards the needs of the clients. It was noticed that all the difference between expectations and actual experience was significant statistically. This showed that there was a significant difference between expectations and actual experience.

**Table 3: Service quality gap for Indian fast food restaurants**

Particulars	Actual Service Received (P) Mean Score	Expected Service (E) Mean Score	(P-E)	Z-value
<b>Statements relating to the dimension tangibles</b>				
Fast food restaurant has up-to date equipment	3.67	4.65	-0.98	30.11**
The physical facilities at this fast food restaurant are visually appealing	3.55	4.54	-0.99	27.32**
Their employees are well dressed & appear neat.	3.79	4.21	-0.42	40.00**
The appearance of physical facilities (serving trays, menu cards) of their fast food restaurant is according to the kind of services provided.	3.31	4.21	-0.90	33.05**
<i>Overall score of tangibles</i>	3.58	4.40	-0.82	
<b>Statements relating to the dimension reliability</b>				
The order delivery time is according to the time promised.	3.51	4.58	-1.07	27.34**
If customers have problems, the fast food restaurant is sympathetic and reassuring.	3.55	4.57	-1.02	26.99**
The fast food restaurant is dependable	3.19	4.39	-1.20	27.91**
When the fast food restaurant promises to do something by a certain time, it does.	3.38	4.45	-1.07	27.07**
The fast food restaurant maintains error free sales transactions and record.	3.53	4.37	-0.84	30.95**
<i>Overall score of reliability</i>	3.43	4.47	-1.04	
<b>Statements relating to the dimension responsiveness</b>				
The staff tells the customers exactly when services will be performed.	3.39	4.51	-1.12	25.75**
It is realistic for customers to expect prompt services from employees of this fast food restaurant	3.26	4.39	-1.13	27.72**
The fast food restaurant employees are always willing to help customers.	3.44	4.45	-1.01	28.17**
The fast food restaurant's employees are never too busy to respond to customer requests promptly.	3.36	4.39	-1.03	28.64**
<i>Overall score of responsiveness</i>	3.36	4.43	-1.07	
<b>Statements relating to the dimension assurance</b>				
Customers are able to trust employees of this fast food restaurant.	3.52	4.56	-1.04	27.69**
Customers feel safe in the transactions done by this fast food restaurant's employees.	3.42	4.38	-0.96	29.32**
The employees of this fast food restaurant are polite.	3.83	4.20	-0.37	42.19**
The employees get adequate support from this fast food restaurant to do their jobs well.	3.21	4.15	-0.94	37.84**
<i>Overall score of assurance</i>	3.49	4.32	-0.83	
<b>Statements relating to the dimension empathy</b>				
The customers get individual attention in this fast food restaurant.	3.54	4.55	-1.01	28.12**
Employees of this fast food restaurant give personal attention to the customers	3.46	4.55	-1.09	26.98**
The employees of this fast food restaurant understand the needs of their customers.	3.10	4.19	-1.09	31.50**
The employees of this fast food restaurant have their customers' best interest at heart.	2.93	4.09	-1.16	28.69**
The fast food restaurant has convenient operating hours.	2.98	3.91	-0.93	43.76**
<i>Overall score of empathy</i>	3.20	4.26	-1.06	

\*\*Significant at 5 percent level.

## Comparison of Service Quality of MFFRs and IFFRs

The perusal of Table 4 represents comparison of service quality of MFFRs and IFFRs. It shows that the overall mean score for difference between perception and expectation (P-E) for the parameter tangibles comes out to be -0.81 and -0.82 for MFFRs and IFFRs respectively.

**Table 4: Comparison of service quality gap of Indian and multinational fast food restaurants**

Particulars	(P-E) Multinational fast food restaurant	(P-E) Indian fast food restaurant	Two mean Z- value
<b>Statements relating to the dimension tangibles</b>			
Fast food restaurant has up-to date equipment	-1.01	-0.98	
The physical facilities at this fast food restaurant are visually appealing	-0.94	-0.99	
Their employees are well dressed & appear neat.	-0.33	-0.42	
The appearance of physical facilities (serving trays, menu cards) of their fast food restaurant is according to the kind of services provided.	-0.94	-0.90	
<i>Overall score of tangibles</i>	<i>-0.81</i>	<i>-0.82</i>	<i>0.25<sup>NS</sup></i>
<b>Statements relating to the dimension reliability</b>			
The order delivery time is according to the time promised.	-0.97	-1.07	
If customers have problems, the fast food restaurant is sympathetic and reassuring.	-0.98	-1.02	
The fast food restaurant is dependable	-1.02	-1.2	
When the fast food restaurant promises to do something, by a certain time, it does.	-1.17	-1.07	
The fast food restaurant maintains error free sales transactions and record.	-0.82	-0.84	
<i>Overall score of reliability</i>	<i>-0.99</i>	<i>-1.04</i>	<i>0.63<sup>NS</sup></i>
<b>Statements relating to the dimension responsiveness</b>			
The staff tells the customers exactly when services will be performed.	-0.97	-1.12	
It is realistic for customers to expect prompt services from employees of this fast food restaurant	-0.98	-1.13	
The fast food restaurant employees are always willing to help customers.	-1.12	-1.01	
The fast food restaurant's employees are never too busy to respond to customer requests promptly.	-0.99	-1.03	
<i>Overall score of responsiveness</i>	<i>-1.01</i>	<i>-1.07</i>	<i>0.98<sup>NS</sup></i>
<b>Statements relating to the dimension assurance</b>			
Customers are able to trust employees of this fast food restaurant.	-0.96	-1.04	
Customers feel safe in the transactions done by this fast food restaurant's employees.	-0.97	-0.96	
The employees of this fast food restaurant are polite.	-0.19	-0.37	
The employees get adequate support from this fast food restaurant to do their jobs well.	-0.92	-0.94	
<i>Overall score of assurance</i>	<i>-0.76</i>	<i>-0.83</i>	<i>1.45<sup>NS</sup></i>
<b>Statements relating to the dimension empathy</b>			
The customers get individual attention in this fast food restaurant.	-0.96	-1.01	
Employees of this fast food restaurant give personal attention to the customers	-0.98	-1.09	
The employees of this fast food restaurant understand the needs of their customers.	-1.16	-1.09	
The employees of this fast food restaurant have their customers' best interest at heart.	-1.11	-1.16	
The fast food restaurant has convenient operating hours.	-0.92	-0.93	
<i>Overall score of empathy</i>	<i>-1.03</i>	<i>-1.06</i>	<i>6.36<sup>**</sup></i>

**\*\*Significant at 5 percent level.**

**NS: Non-significant**

The corresponding figures for reliability were -0.99 and -1.04 for MFFRs and IFFRs respectively. In the case of responsiveness the overall mean score for P-E was estimated to be -1.01 for MFFRs and -1.07 for IFFRs. The respective figures for parameter assurance MFFRs and IFFRs came out to be -0.76 and -0.83. The P-Es for MFFRs and IFFRs in the case parameter empathy were estimated to be -1.03 and -1.06 respectively. The negative sign for all parameters showed that expectations were higher than perception.

The perusal of Table 4 revealed that the MFFRs were strong in assurance which means that the employees of restaurant were courteous and trustworthy while they were weak in responsiveness indicating thereby that the employees did not give careful and personalized attention to customers. While, the IFFRs were strong in tangibles which show that the physical facilities offered by the restaurant were up to the mark while weak in responsiveness. This revealed that the employees were not receptive towards the needs of the clients.

All the calculated Z-values for all the parameters were non-significant statistically except empathy. It means that there was a significant difference between mean scores of the MFFRs and IFFRs in respect of empathy.

The overall gap for each dimension comes out to be negative which shows that expectation for each service dimension was higher than perception. Rank I in the case of MFFRs for assurance means that the employees of restaurant were courteous and trustworthy (Table 5).

**Table 5: Correlation between the service quality of multinational and Indian fast food restaurants**

Dimensions	MFFRs		IFFRs		D = R <sub>1</sub> -R <sub>2</sub>	D <sup>2</sup>	r <sub>s</sub>
	(P-E)	Rank	(P-E)	Rank			
	Mean Score	(R <sub>1</sub> )	Mean Score	(R <sub>1</sub> )			
Tangibles	-0.81	II	-0.82	I	1	1	0.8
Reliability	-0.99	III	-1.04	III	0	0	
Responsiveness	-1.01	IV	-1.07	V	-1	1	
Assurance	-0.76	I	-0.83	II	-1	1	
Empathy	-1.03	V	-1.06	IV	1	1	

The Rank I for IFFRs and Rank II for MFFRs for tangibles means that the physical facilities of the restaurant were up to mark. The rank pertaining to the assurance was II showing that the employees of restaurant were courteous and trustworthy of IFFRs. In the case of empathy rank came out to V with highest gap of -1.03 which indicated that the MFFR employees did not give careful and personalized attention to the customers. The Rank V in the case of IFFRs in responsiveness was -1.07, means that the employees were not receptive towards the needs of the clients. Also, the rank correlation coefficient was estimated to be 0.8.

This shows that correlation exists between the dimensions of service quality of MFFRs and IFFRs.

## CONCLUSIONS

The study revealed that the perceived performance on all dimensions fell short of expectations. This indicates that the service quality offered did not meet the customers' expectations on most aspects. There is a need to reduce the gap between expectation and perception dimension in the responsiveness, empathy and reliability. While comparing the service quality of MFFRs and IFFRs it was found that the former have highest gap in empathy, therefore, MFFRs should give more careful and personalized attention to the customers. In the case of the IFFRs, the highest gap between perception and expectation was for responsiveness which showed that employees should be more receptive towards their customers.

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## **PATTERN OF ENERGY UTILIZATION IN GROUNDNUT CULTIVATION IN RAJASTHAN**

Renu Verma, I.P.Singh and Shirish Sharma\*

### **ABSTRACT**

*The present study was conducted to analysis energy requirement in groundnut crop and relationship between energy inputs and groundnut yield in Rajasthan. The analysis of energy requirement revealed that highest energy was used in irrigation followed by harvesting and threshing and seedbed preparation. The operational energy was found to be highest on large farms followed by medium and small farms. The source-wise energy analysis revealed that diesel, fertilizer, seed and human labour were main energy inputs which affected the groundnut production. The highest use of renewable energy was on small farms while non-renewable energy use was highest on large farms. In groundnut, the energy ratio was 5.27 suggesting that groundnut crop was highly remunerative crop. The analysis of functional relationship between groundnut yield and energy inputs revealed that seed, nitrogen, human, machinery and irrigation energy contributed significantly to the groundnut yield.*

**Key words:** Indirect, Non-renewable, renewable energy and groundnut

**JEL Classification:** O13, Q2, Q3, Q42

### **INTRODUCTION**

Agriculture uses large quantities of locally available non-commercial energies such as seed, manure, animate energy and commercial energies directly and indirectly in the form of diesel, electricity, fertilizer, plant protection chemicals, irrigation water, machinery etc. An efficient use of these energies helps to achieve increased production and productivity which contributes to profitability and competitiveness of agricultural sustainability of rural living. Energy plays a key role in the developmental process of a country and the quantum of energy input used in different sectors including agriculture determines the level of progress and the standard of living of its people. In the agricultural sector, the energy use pattern for unit production and processing of crops has been observed to vary under different agro-climatic zones. The introduction of modern inputs changed the energy scenario

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of crop production. Therefore, it is imperative to analytically study the energy use patterns and predict what is likely to happen on the energy front. Understanding energy usage in agricultural production is very important. The main problems facing energy usage are insufficient resources, high production costs, wrong resource allocation and increasing national and international competition in agricultural trade. Therefore, these limitations must be taken into consideration in order to implement sustainable agricultural production and self-sufficient resource allocation in Groundnut production. The present study is an attempt to document energy use pattern and the availability of resources in the ecosystem of Indira Gandhi Canal Command (IGNP) area of Bikaner for planning to meet the energy demand through use of alternate energy and scarce available resources in Rajasthan.

## MATERIALS AND METHODS

The study was conducted in Bikaner district of Rajasthan state. A multi-stage sampling was used for the selection of farmers. Bikaner district was purposively selected because it has Rajasthan Canal Command Area (IGNP) where groundnut is grown. The study was conducted in three villages namely, Badrasar, Dulmera and 2 LKD where groundnut was grown. For the selection of respondents, a complete enumeration of all the farmers in the selected village was made as such. 40 farmers belonging to small, medium and large farm categories were selected with probability proportional to number of farmers in each size group. An appropriate schedule was prepared for the purpose of data collection. It covered different agricultural operations done in cultivation of groundnut. The physical data on different agricultural operations were converted into energy equivalents given in Appendix-I. The data pertained to the agricultural year 2010-11. The primary data were compiled and tabulated. A tabular analysis of data were undertaken to arrive at the final results. The descriptive statistics were used for the analysis of data. A multiple linear regression model was fitted to estimate the impact of various energy inputs on groundnut yield.

The form of the regression model used is as under:

$$Y = a + \sum_{i=1}^n b_i x_i + \mu$$

Where,

- Y = Output (kg ha<sup>-1</sup>)
- x<sub>1</sub>: Seed energy used (Mjha<sup>-1</sup>)
- x<sub>2</sub>: Nitrogen energy used (Mjha<sup>-1</sup>)
- x<sub>3</sub>: Phosphorus energy used (Mjha<sup>-1</sup>)
- x<sub>4</sub>: Human energy used (Mjha<sup>-1</sup>)
- x<sub>5</sub>: Animal energy used (Mjha<sup>-1</sup>)
- x<sub>6</sub>: Machine energy used (Mjha<sup>-1</sup>)

$x_7$  : Irrigation energy used ( $\text{Mjha}^{-1}$ )

$x_8$  : Chemical energy used ( $\text{Mjha}^{-1}$ )

$b_i$  = Regression coefficients

$i = 1, 2 \dots 8$

$\mu$  = Random term with usual properties

The independent variables were tested for their stochastic independence.

## RESULTS AND DISCUSSION

The results obtained from the analysis of data were discussed under various sub-heads as under:

### **Power Sources in Cultivation of Groundnut**

The perusal of Table 1 shows use of power sources in cultivation of groundnut. The highest number of man-hours per hectare for seed bed preparation was used on small farms (34.2) and lowest on large farms (18.6) on an overall basis. For seed bed preparation, the highest man-hours per hectare ( $\text{mhha}^{-1}$ ) were used in Dulmera (24.8) followed by 2 LKD (24.1) and Badrasar (23.5). It was mainly because of the fact that large farms used highest number of tractor hours for seed bed preparation ( $7.5\text{ha}^{-1}$ ). It was found that the use of animal in the preparation of seedbed was highest on small farms ( $26.7 \text{ hours ha}^{-1}$ ) followed by medium ( $5.1 \text{ hours ha}^{-1}$ ) and large farms ( $2.9 \text{ hours ha}^{-1}$ ). The tractor use in tillage was highest on large farms ( $7.5 \text{ hours ha}^{-1}$ ) followed by medium ( $4.7 \text{ hours ha}^{-1}$ ) and small farms ( $2.5 \text{ hours ha}^{-1}$ ). The results revealed that the tractor use had a tendency to increase with increase in the size of land holding. The use of animal power, on the contrary, had a tendency to decrease with increase in the size of holding.

For sowing both tractors and draft animals were used. The use of tractor was in the range of 0.6-2.2 hours per hectare. It was lowest on small farms ( $0.6 \text{ hours ha}^{-1}$ ). The use of animal power was highest for sowing on small farms ( $3.9 \text{ hours ha}^{-1}$ ). The use of tractor for sowing was highest in Badrasar and 2 LKD ( $1.5 \text{ h/ha}$ ) and lowest in Dulmera ( $1.3 \text{ hours ha}^{-1}$ ). The animal energy was not used by large farms for sowing of groundnut. The use of man-hours per hectare for sowing ( $4.4\text{-}7.1 \text{ ha}^{-1}$ ) decreased with increase in the size of land holding. For sowing, highest number of man hours were used in Dulmera ( $6.1 \text{ hours ha}^{-1}$ ) followed by 2 LKD ( $5.9 \text{ hours ha}^{-1}$ ) and lowest in Badrasar ( $5.0 \text{ hours ha}^{-1}$ ). On an overall average basis, use of man-hours per hectare was higher (7.1) on small farms mainly because animals were used for sowing. It was noticed that the large farms used more tractor-hours per hectare (2.2) for sowing. The results revealed that bund making consumed highest number of man-hours per hectare on small farms (5.9) followed by medium (4.3) and lowest on small farms (3.8) on an overall basis. It was due to the fact that large farms used tractor drawn bund maker, thereby, reducing man power required for the operation.

**Table 1: Use of power sources for groundnut in selected villages under irrigated conditions**

Operation	Badrasar				Dulmera				2 LKD				Overall		
	S	M	L	A	S	M	L	A	S	M	L	A	S	M	L
<b>(ha<sup>-1</sup>)</b>															
<b>Seed bed preparation</b>															
Man hours	34.5	18.7	17.4	23.5	36.5	19.3	18.5	24.8	31.6	20.7	19.9	24.1	34.2	19.6	18.6
Animal hours	25.9	5.4	2.9	11.4	27.9	4.8	3.5	12.1	26.2	5.0	2.3	11.2	26.7	5.1	2.9
Tractor hours	1.9	4.3	7.0	4.4	3.0	5.2	8.0	5.4	2.5	4.7	7.5	4.9	2.5	4.7	7.5
Diesel (lha <sup>-1</sup> )	8.3	19.3	30.9	19.5	13.6	24.7	35.6	24.6	11.6	20.8	32.8	21.7	11.2	21.6	33.1
<b>Sowing</b>															
Man hours	5.3	5.2	4.6	5.0	8.5	5.6	4.3	6.1	7.6	6.0	4.2	5.9	7.1	5.6	4.4
Animal hours	3.6	1.2	0.0	1.6	4.1	1.2	0.0	1.8	3.9	2.3	0.0	2.1	3.9	1.6	0.0
Tractor hours	0.6	1.6	2.3	1.5	0.5	1.6	1.9	1.3	0.6	1.7	2.3	1.5	0.6	1.6	2.2
Diesel (lha <sup>-1</sup> )	2.5	6.5	10.3	6.4	2.2	7.1	8.5	5.9	2.5	7.6	10.3	6.8	2.4	7.1	9.7
<b>Bund making</b>															
Man	5.2	4.0	3.5	4.2	6.6	4.3	4.1	5.0	5.8	4.7	3.8	4.8	5.9	4.3	3.8
Tractor	1.1	1.5	2.3	1.6	1.5	2.0	2.3	1.9	1.0	1.7	2.1	1.6	1.2	1.7	2.2
Diesel (l)	4.6	7.1	10.2	7.3	6.6	8.9	10.2	8.6	4.3	7.5	9.4	7.1	5.2	7.8	9.9
<b>Irrigation</b>															
Man hours	75.6	70.9	62.7	69.7	77.8	73.4	65.2	72.1	73.2	65.7	59.8	66.2	75.5	70.0	62.6
Engine hours	22.2	23.8	26.5	24.2	20.6	24.5	28.3	24.5	21.9	22.1	23.7	22.6	21.6	23.5	26.2
Diesel (lha <sup>-1</sup> )	21.9	24.5	25.9	24.1	19.9	24.3	29.3	24.5	20.8	22.0	23.5	22.1	20.9	23.6	26.2
Canal hours	16.8	18.5	20.5	18.6	18.7	19.1	19.7	19.2	18.9	20.9	22.1	20.6	18.1	19.5	20.8
<b>Weeding</b>															
Man hours	135.6	122.4	103.9	120.6	133.5	120.9	105.5	120.0	144.9	121.6	94.7	120.4	138.0	121.6	101.4
<b>Fertilizer application</b>															
Man hours	8.5	7.3	6.2	7.3	7.8	7.1	6.7	7.2	8.1	6.5	5.4	6.7	8.1	7.0	6.1
<b>Spraying</b>															
Man hours	3.5	4.3	5.3	4.4	3.7	4.9	5.6	4.7	3.2	4.5	5.1	4.3	3.5	4.6	5.3
<b>Harvesting and threshing</b>															
Man hours	186.5	173.8	152.3	170.9	188.6	171.6	148.5	169.6	187.9	172.8	150.5	170.4	187.7	172.7	150.4
Tractor hours	5.8	6.2	6.6	6.2	5.5	5.7	5.9	5.7	5.2	6.0	6.2	5.8	5.5	6.0	6.2
Diesel (l)	23.8	25.4	27.1	25.4	22.6	23.4	24.2	23.4	21.3	24.6	25.4	23.8	22.6	24.5	25.6
<b>Transportation</b>															
Man hours	7.3	6.9	5.9	6.7	8.2	5.6	5.2	6.3	6.9	5.9	5.5	6.1	7.5	6.1	5.5
Animal hours	2.1	1.4	1.0	1.5	2.4	1.0	1.0	1.5	1.9	1.2	1.1	1.4	2.1	1.2	1.0
Tractor hours	1.0	1.8	2.3	1.7	1.0	1.8	2.3	1.7	1.4	1.2	1.7	1.4	1.1	1.6	2.1
Diesel (l)	1.1	3.2	4.3	2.9	1.1	3.2	4.3	2.9	2.5	2.3	3.1	2.6	1.6	2.9	3.9

S : Small; M: Medium; L: Large and A : Average

The highest number of man hours was used in Dulmera village ( $5.0 \text{ ha}^{-1}$ ) followed by 2 LKD ( $4.8 \text{ ha}^{-1}$ ) and lowest in Badrasar ( $4.2 \text{ ha}^{-1}$ ) village. The highest tractor-hours per hectare were used in Dulmera village (1.9). On an overall basis, the highest use of tractor hours per hectare was on large farms (2.2) followed by medium (1.7) and small farms (1.2) for bund making. For irrigation, the canal and diggies (operated by diesel engine) were used. For irrigation, the use of diesel engine was highest on large farms ( $26.2 \text{ hours ha}^{-1}$ ) followed by medium and small farms. The use of diesel engine was highest in Dulmera village (24.5) followed by Badrasar and 2 LKD villages. The use of canal water energy was more or less same on all the farms. The small farms utilized highest man power per hectare for irrigation purpose (75.5) followed on medium farms and large farms. The highest number of man hours per hectare in irrigation was in Dulmera (72.1) followed by Badrasar (69.7) and 2 LKD (66.2) village.

The weeding in groundnut required a lot of man power. The highest manpower (hours per hectare) was used on small farms (138.0) and lowest on large farms (101.4) because large farms used weedicides for control of weeds. The use of man power was highest in 2 LKD on small farms ( $144.9 \text{ hours ha}^{-1}$ ) and lowest in 2 LKD on large farms. The fertilizer application required 6.1-8.1 man hours per hectare. On an overall basis, the highest manpower was used on small farms (8.1) followed on medium and large farms respectively. The use of manpower was highest (8.5 man-hours per hectare) on small farms in Badrasar and lowest in 2 LKD on large farms for the application of fertilizer. On an overall basis, the use of man power was highest in spraying on large farms and lowest on small farms. This is due to the fact that large farms used more of chemical for the control of disease and insect-pest in groundnut.

It was noticed that the harvesting of groundnut was done manually which used 150.4-187.7 man-hours per hectare of labour on an overall basis. For harvesting and threshing, it was highest on small farms ( $187.7 \text{ man-hours ha}^{-1}$ ) and lowest on large farms ( $150.4 \text{ man-hours ha}^{-1}$ ) in 2LKD village. The use of man-hours per hectare was highest in Dulmera village on small farms (188.6) and lowest on large farms of Dulmera village (148.5). The use of tractor for harvesting and threshing was more or less same on all the farms ( $5.5\text{-}6.2 \text{ hours ha}^{-1}$ ). The tractor was the main mode of transportation on large farms, whereas, other categories of farms used both tractor as well as camel carts in transportation. There was higher use of man-hours and animal-hours on small farms than on large farms.

### **Energy Use Pattern**

The operation-wise energy use ( $\text{Mjha}^{-1}$ ) on different categories of farms for cultivation of groundnut is given in Table 2. The total energy needed for groundnut cultivation was highest on large farms which was followed by medium farms ( $13346 \text{ Mjha}^{-1}$ ) and small farms ( $11572 \text{ Mjha}^{-1}$ ) respectively.

**Table 2: Operation-wise energy use for groundnut in selected villages of Bikaner district****(Mjha<sup>-1</sup>)**

Operation	Badrasar				Dulmera				2 LKD				Overall average			
	S	M	L	A	S	M	L	A	S	M	L	A	S	M	L	A
Seed bed preparation	927	1472	2282	1560	1324	1833	2623	1927	1151	1584	2422	1719	1134	1630	2443	1735.66
Sowing	229	498	746	491	216	532	617	455	236	579	746	520	227	536	703	488.66
Bund making	344	510	739	531	487	646	740	624	322	548	680	517	385	568	720	557.66
Irrigation	7074	7747	8491	7771	7352	7938	8595	7962	7526	8104	8584	8071	7317	7929	8557	7934.33
Weeding	266	240	204	236	262	237	207	235	284	238	186	236	270	238	199	235.66
Fertilizer application	17	14	12	14	15	14	13	14	16	13	11	13	16	14	12	14
Spraying	7	8	10	9	7	10	11	9	6	9	10	8	7	9	10	8.66
Harvesting and Threshing	2101	2196	2274	2190	2016	2042	2057	2038	1924	2134	2150	2070	2014	2124	2160	2099.33
Transportation	166	331	421	306	171	324	420	305	269	235	313	272	202	297	385	294.66
<b>Total</b>	<b>11130</b>	<b>13017</b>	<b>15179</b>	<b>13109</b>	<b>11850</b>	<b>13577</b>	<b>15283</b>	<b>13570</b>	<b>11735</b>	<b>13444</b>	<b>15102</b>	<b>13427</b>	<b>11572</b>	<b>13346</b>	<b>15188</b>	<b>13368.67</b>

**S: Small; M: Medium; L: Large and A: Average**

The highest total energy was used in Dulmera village (13570 Mjha<sup>-1</sup>) followed by 2 LKD (15102 Mjha<sup>-1</sup>) and Badrasar (13109 Mjha<sup>-1</sup>). The total energy consumed in different farm operations increased with the increase in the size of land holding. The highest energy was used in irrigation followed by harvesting and threshing and seedbed preparation. The highest energy was used in irrigation on large farm (8557 Mjha<sup>-1</sup>) followed on medium farms (7929 Mjha<sup>-1</sup>) and small farms (7317 Mjha<sup>-1</sup>) at overall level. The highest energy in irrigation was used in 2 LKD village (8071 Mjha<sup>-1</sup>) and lowest in Badrasar village (7771 Mjha<sup>-1</sup>).

The use of energy for harvesting and threshing was highest in Badrasar (2190 Mjha<sup>-1</sup>) and lowest in Dulmera (2038 Mjha<sup>-1</sup>). On an overall basis, the highest energy was used for harvesting and threshing on large farms (2160 Mjha<sup>-1</sup>) followed on medium farms (2124 Mjha<sup>-1</sup>) and small farms (2014 Mjha<sup>-1</sup>). For seedbed preparation, the use of energy was highest in Dulmera (1927 Mjha<sup>-1</sup>) followed by 2 LKD (1719 Mjha<sup>-1</sup>) and Badrasar (1560 Mjha<sup>-1</sup>). On an overall basis, the highest energy was used in seedbed preparation on large farms (2443 Mjha<sup>-1</sup>) followed on medium farms (1630 Mjha<sup>-1</sup>) and lowest on small farms (1134 Mjha<sup>-1</sup>). The use of energy in bund making and sowing increased with the increase in the size of land holding. For bund making, the highest energy was used on large farms (720 Mjha<sup>-1</sup>) and lowest on small farms (385 Mjha<sup>-1</sup>). Similarly, in sowing, the highest energy was used on large farms (703 Mjha<sup>-1</sup>) followed by medium (536 Mjha<sup>-1</sup>) and small farms (227 Mjha<sup>-1</sup>). Transportation by tractor drawn trolley required more energy on large farms since more diesel was consumed in transporting the produce (Table 2). The use of energy in weeding and fertilization application decreased with increase in the size of land holding while reverse trend was observed in spraying, which increased with increase in the size of holding.

### **Source-wise Energy**

The perusal of 3 showed that total energy input varied between 9396-10977 mega joules per hectare (Mjha<sup>-1</sup>) on an overall basis (Table 3). The total energy used in different operation was highest on large farms and lowest on small farms. The total energy use was highest in Dulmera and lowest in 2 LKD. Energy use through man power source was highest on small farms (916 Mjha<sup>-1</sup>) and lowest on large farms (702 Mjha<sup>-1</sup>). The man power use was highest in Dulmera (815 Mjha<sup>-1</sup>) followed by Badrasar (808 Mjha<sup>-1</sup>) and 2 LKD (801 Mjha<sup>-1</sup>). The man power energy decreased with the increase in the size of land holding. Energy used through animal source was highest on small farms (330 Mjha<sup>-1</sup>) and lowest on large farms (40 Mjha<sup>-1</sup>). The use of diesel energy was highest on large farms (6105 Mjha<sup>-1</sup>) followed by medium (4925 Mjha<sup>-1</sup>) and small farms (3588 Mjha<sup>-1</sup>). Energy used through diesel was highest in Dulmera village (5061 Mjha<sup>-1</sup>) followed by Badrasar (4821 Mjha<sup>-1</sup>) and 2 LKD (4736 Mjha<sup>-1</sup>) villages. The indirect energy used through seeds was highest on small farms (2063 Mjha<sup>-1</sup>) and lowest on large farms (1625 Mjha<sup>-1</sup>).

**Table 3: Source-wise energy use for groundnut in selected villages**

(Mjha<sup>-1</sup>)

Operation	Badrasar				Dulmera				2 LKD				Overall average			
	S	M	L	A	S	M	L	A	S	M	L	A	S	M	L	A
<b>Direct energy</b>																
Human	906	810	709	808	924	809	713	815	920	800	684	801	916	807	702	808.33
Animal	319	81	39	147	347	71	45	155	323	86	34	148	330	79	40	149.66
Diesel	3501	4844	6119	4821	3714	5156	6312	5061	3549	4775	5886	4736	3588	4925	6105	4872.66
Sub total	4726	5735	6867	5776	4985	6036	7070	6030	4791	5661	6604	5686	4834	5811	6847	5830.66
<b>Indirect energy</b>																
Seeds	3000	2500	2000	2500	2750	2500	2250	2500	2500	2500	2250	2417	2063	1875	1625	1854.33
Fertilizers	2127	1869	1679	1892	2441	2082	1593	2039	2091	1834	1731	1885	2219	1928	1668	1938.33
Chemicals	72	144	180	132	108	180	228	172	36	84	120	80	72	136	176	128
Machinery	171	404	636	404	239	465	677	461	212	438	670	440	207	435	661	434.33
Sub total	5370	4917	4495	4927	5538	5227	4749	5171	4839	4855	4771	4822	4561	4375	4130	4355.33
<b>Total input energy</b>	10096	10652	11362	10703	10523	11263	11818	11202	9631	10517	11375	10507	9396	10186	10977	10186.33

**S: Small, M: Medium, L: Large and A: Average**

Similarly, the fertilizer energy was highest on small farms (2219 Mjha<sup>-1</sup>) followed by medium (1928 Mjha<sup>-1</sup>) and large farms (1668 Mjha<sup>-1</sup>) at the overall level. It was highest in Dulmera village (2039 Mjha<sup>-1</sup>) followed by Badrasar village (1892 Mjha<sup>-1</sup>). The energy used through machinery was highest on large farms (661 Mjha<sup>-1</sup>) and lowest on small farms (207 Mjha<sup>-1</sup>). The use of on machinery was highest in Dulmera (461 Mjha<sup>-1</sup>) and lowest in Badrasar (404 Mjha<sup>-1</sup>). The seed and fertilizer energy input decreased with the increase in the size of land holdings while reverse trend was observed in sprays of chemicals which increased with increase in the size of holdings.

### Yield and Energy Ratio of Groundnut

The perusal of Table 4 shows yield and energy ratio for groundnut crop on different farm size holdings. The yield of groundnut crop was in the range of 2367-3400 kg per ha on an overall average basis. The yield was highest on large farms (3400 kgha<sup>-1</sup>) and lowest on small farms (2367 kgha<sup>-1</sup>). The yield had a tendency to increase with increase in farm size. The yield was highest in the 2 LKD village (2967 kgha<sup>-1</sup>) and lowest in the Badrasar (2833 kgha<sup>-1</sup>) village.

**Table 4: Yield and energy ratio for groundnut crop in selected villages**

Farm Category	Yield (kgha <sup>-1</sup> )	Total operational energy (GJha <sup>-1</sup> )	Total input energy (GJha <sup>-1</sup> )	Output energy (GJha <sup>-1</sup> )	Energy ratio <sup>#</sup>	Renewable energy, (Mjha <sup>-1</sup> )	Non-renewable energy, (Mjha <sup>-1</sup> )
<b>Badrasar</b>							
Small	2200	11.1	10.1	55	5.4	4225	5871
Medium	2800	13	10.7	70	6.6	3391	7260
Large	3500	15.2	11.4	87.5	7.7	2749	8614
Average	2833	13.1	10.7	70.8	6.6	3455	7248
<b>Dulmera</b>							
Small	2500	11.9	10.5	62.5	5.9	4021	6502
Medium	2900	13.6	11.3	72.5	6.4	3380	7884
Large	3200	15.3	11.8	80	6.8	3008	8810
Average	2867	13.6	11.2	71.7	6.4	3470	7732
<b>2 LKD</b>							
Small	2400	11.7	9.6	60	6.2	3743	5888
Medium	3000	13.4	10.5	75	7.1	3386	7131
Large	3500	15.1	11.4	87.5	7.7	2968	8407
Average	2967	13.4	10.5	74.2	7	3366	7142
<b>Overall average</b>							
Small	2367	11.6	9.4	44.4	4.7	3309	6087
Medium	2900	13.3	10.2	54.38	5.3	2761	7425
Large	3400	15.2	11	63.75	5.81	2367	8610
Average	2889	13.36	10.2	54.17	5.27	2812.33	7374

<sup>#</sup>Energy Ratio: output energy per unit of input energy)

The energy ratio (output energy per unit of input energy) varied from 4.7 to 5.8 on different categories of farms. The highest energy ratio was found on large farms (5.8) followed by medium farms (5.3) and small (4.7) farms respectively. It was highest in Badrasar and 2 LKD (7.7) on large farms and lowest in Badrasar (3.4) on small farms. The use of renewable energy required for cultivation of

groundnut had a tendency to decrease with increase farm size. It was highest on small farms (3309 Mjha<sup>-1</sup>) and lowest on large farms (2367 Mjha<sup>-1</sup>). The use of non-renewable energy for cultivation of groundnut was highest on large farms (8610 Mjha<sup>-1</sup>) and lowest on small farms (6087 Mjha<sup>-1</sup>). The use of renewable energy had a tendency to decrease with increase in the size of land holding. The use of non-renewable energy was more on medium and large size holdings.

### Energy Inputs and Crop Yield Relationship

The functional relationship between different energy inputs and yield of groundnut is given in Table 5. The Coefficient of Determination (R<sup>2</sup>) revealed that variables included in the regression model explained 87 percent variation in productivity of groundnut. The empirical results indicated that exogenous variables like seed, nitrogen, machinery, human and irrigation energy were found statistically significant and contributed to yield of groundnut (endogenous variables). The coefficient of human energy was significant indicating that the crop yield responded significantly to manual weeding.

**Table 5: Functional relationship between yield (kg/ha) and different energy inputs of groundnut under irrigated conditions**

Variables	Regression coefficient (b <sub>i</sub> )	S.E.	t-value
Constant	2.611	-	-
Seed energy (x <sub>1</sub> )	0.312**	0.051	6.136
Nitrogen energy (x <sub>2</sub> )	0.779**	0.067	11.696
Phosphorus energy (x <sub>3</sub> )	0.105 <sup>NS</sup>	0.421	0.249
Human energy (x <sub>4</sub> )	3.301**	0.496	6.661
Animal energy (x <sub>5</sub> )	-0.137 <sup>NS</sup>	0.073	-1.869
Machinery energy (x <sub>6</sub> )	1.127**	0.300	3.761
Irrigation energy (x <sub>7</sub> )	0.682**	0.063	10.903
Spray energy (x <sub>8</sub> )	3.559 <sup>NS</sup>	6.615	0.538
R <sup>2</sup>	0.87		

\*\* Significant at 5% level

NS: Non-significant

It was found that with one percent increase in seed energy the productivity of groundnut will increase by 0.312 percent. Similarly, with one per increase in nitrogen, human, machinery and irrigation energies the yield of groundnut will increase by 0.779, 3.301, 1.127 and 0.682 percent respectively.

## CONCLUSIONS

The analysis of energy requirement in groundnut revealed that use of energy was highest in irrigation, seedbed preparation, sowing and picking. The operational energy was found to be highest on large farms followed by medium and small farms. The source-wise energy analysis revealed that fertilizer, diesel and human labour were main energy inputs which affected the groundnut productivity.

The highest renewable energy was used on small farms while non-renewable energy was used highest on large farms. The overall energy ratio was 5.27 suggesting that in irrigated area, groundnut was the most remunerative crop. The analysis of functional relationship between groundnut yield and energy inputs revealed that machinery and irrigation energy contributed significantly to the crop yield. The spray energy was non-significant statistically indicating its excess use in groundnut. The use of renewable energy had a tendency to decrease with increase in the size of land holding, whereas use of non-renewable energy had a tendency to increase with increase in size of land holding.

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## Appendix-I

### Energy equivalents of inputs and outputs

Particulars	Units	Equivalent energy, MJ
<b>1. Human Labour</b>		
Adult man	Man-hour	1.96
Women (1 adult women =0.8 adult man)	Women-hour	1.57
Child (1 child = 0.5 Adult man)	Child-hour	0.98
<b>2. Animals</b>		
Bullocks	Pair-hour	14.05
Large	Pair-hour	10.10
Medium	Pair-hour	8.07
He-buffalos	Pair-hour	15.15
Camel or Horse	Animal-h	10.10
<b>3. Diesel</b>		
	Litre	56.31
<b>4. Petrol</b>		
	Litre	48.23
<b>5. Electricity</b>		
	kWh	11.93
<b>6. Kerosene</b>		
	Litre	43.00
<b>7. Machinery</b>		
Electric motor	Hour	64.80
Prime movers other than electric motors	Hour	68.40
Farm machinery excluding self propelled machines	Hour	62.70
<b>8. Chemical fertilizers</b>		
Nitrogen	Kg	60.60
Phosphorus	Kg	11.10
Potassium	Kg	6.70
<b>9. Chemicals</b>		
Insecticide/pesticide	Kg/litre	120.00
Zinc sulphate	Kg	20.9
<b>10. Outputs</b>		
<i>I. Main product</i>		
Cereal crop (wheat, barley)	Kg (dry mass)	14.7
Pulse crops (moth bean, moon bean, gram)	Kg (dry mass)	14.7
Oilseeds crops (Groundnut and mustard)	Kg	25.0
Fodder crops (Guar and Bajra)	Kg	18.0
Fiber crops (Groundnut )	Kg	18.0
<i>II. By products</i>		
Straw, vines etc	Kg	12.5
Stalks, cobs, fuel wood	Kg	18.0
Dung	Kg	18.0
Fire woods	Kg	18.0
Agriculture waste	Kg	18.0

*Sources: Singh et al. (1996) and Taki et al. (2012)*

## OVERSEAS MARRIAGES: THE COURSE OF EVENTS FROM MARRIAGE TILL ABANDONMENT

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### ABSTRACT

*An exploratory study on overseas marriages was conducted in all four districts of Doaba region of Punjab. It was endeavored to trace the course of events from settling the marriage till abandonment. The study found that marriages were settled by friends and relatives with no prior meeting of bride with groom and within two weeks time. The parents of brides spent lakhs of rupees on marriage ceremonies which were solemnized in marriage palaces. It was noticed that 13.33 per cent of such marriages were not registered. More than half of NRIs went back within 20 days after marriage and three fourth never called back their brides. At overall level, 58 per cent got conceived and just 10 per cent succeeded in going abroad to join their husband.*

**Key words:** Overseas marriages, abandonment, NRIs, Doaba region

**JEL Classification:** Z10

### INTRODUCTION

Abandonment of married women by their Non-Resident Indian (NRI) husband is an emergent, unique form of violence against women. The problem of women being deserted by their NRI husbands is prevalent in Delhi, Uttar Pradesh, Haryana, Maharashtra, and Gujarat. This phenomenon is harsher in Punjab and Andhra Pradesh (Singh *et al.*, 2007). The abandoned women are a group of women who have been left out by their husbands after marriage without any intimation and time limit. It is a total repudiation of the obligation of marriage. The period of martial life among the deserted women varies from a few days to many years. The reasons for desertion are many. The most important reason for desertion of women irrespective of their socio-economic, religious and cultural status is the extramarital relationship or bigamy of husbands. Moreover, demand of excess dowry after marriage and ill treatment of wives without any reason also lead to desertion. The marriages of NRI grooms and Indian brides had become an organized business

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being run much like mafia. The matrimonial advertisements in vernacular newspaper seeking NRI grooms are mostly bogus (Ramoowalia, 2003). Most of these marriages which are solemnized in a hush rush situation, end up being treated as a *honeymoon marriages*. There is barely any commitment on the part of the bridegroom or his family. What motivates these men to marry, when they have no intention to honor their marital obligations remains to appease their parents, who want an Indian *bahu* for their son despite his living aboard (Anonymous, 2012).

The allegations of cruelty by the husband or his relatives, criminal breach of trust by misappropriation of a woman's personal property, dowry wrongs, criminal neglect to maintain spouse or children, bigamous marriages and commission of adultery are commonly cited criminal offences in NRI marriages (Malhotra, 2011). There are 20,000 cases of NRI marriage failures in Punjab (Venkatesh, 2008). Of the three regions of Punjab, *Doaba* as against *Malwa* and *Majha*, has established a sort of world record of such marital discord. From this region, every third house has at least one person immigrated to foreign land; an entire family in every sixth house of Punjab has settled abroad (Sharma, 2003). Punjab, which constitutes the highest proportion of NRIs among the 30 million NRI populations living in 180 countries, owes a moral duty to its residents to curtail this crime against the humanity. The rhetoric, empty promises, platitudes and non-remedial forum will not serve the purpose. With this backdrop present exploratory study was conducted to trace the course of events from settling the marriage till abandonment in Punjab.

## **THEORETICAL FRAMEWORK**

The functionalists viewed family as a social system necessary to maintain equilibrium in society. The functional imperatives of family were to maintain value 'pattern' and provide mechanisms for internal tension management (Parsons, 1966). They interpreted divorce as a sign of social disorganization. This point of view tends to condemn divorced individuals for irresponsibly furthering the disintegration of society and stresses the devastating effects of divorce on children. Merton's emphasis on dysfunctional aspects of marriage and family living explains that these supposedly indispensable institutions may not be functional for some individuals and groups at all. Instead, Neo-functionalists looked on divorce as freedom from dissatisfactory marital relations (Raab and Selznick, 1964).

This is especially significant in the case of overseas marriages. The brides have always sought security and improved social status for themselves while tying the knot. However, in most of the overseas marriages (if not all), brides are subjected to all sorts of humiliation, fraud, molestation and injustice before final abandonment. Under the influence of modernity the social ties are ruthlessly exploited and the sacramental character of marriage is steadily diluted (Beck, 1992).

The contemporary Indian society in the wake of globalization is passing through dramatic changes. There has been tremendous increase in the number of divorces as marital difficulties seems to be more evident now than before. Traditions are gradually getting weak at the hand of modernity impacting the structure and functions of social institutions (Gupta, 2000). This is partly because the traditional structure of society was no longer supported by men and women who believe in traditional values. The changes in the status of women, both legal and social, have made an enormous impact on their psychology. Moreover, girls are brought up today in a more liberal, less rigid and less conforming to the traditional feminine etiquette. The old values are being eroded, women are earning and society as a whole is becoming more liberal. The sanctity and piety of sacred institution like family and marriage has got a severe blow (Mehta, 1975 and Giddens, 1990). Under the spell of materialism, overseas marriages are more a mean of minting easy money for NRI grooms and such alliances are seen as the most coveted ones, promising better future not just for bride but for her entire family.

## METHODOLOGY

This study was conducted in *Doaba* region of Punjab in 2011-12. The *Doaba* region of Punjab purposively selected as it had the highest number of abandoned brides by NRI grooms. The study was conducted in Kapurthala, Nawashahar (SBS Nagar), Jalandhar and Hoshiapur districts representing *Doaba* region of Punjab. After the selection of the districts, fifteen respondents were selected randomly from each district on the basis of First Information Reports (FIRs) lodged with NRI Police Station, complaints filed at Regional Passport Office, Jalandhar and Sanjeevani Home. Thus, making the total sample of 60 abandoned brides. The research instrument used in the study was interview schedule. The primary data pertaining to incidences before marriage such as consent in marriage, intermediary, prior meeting, courtship period, etc. were collected. The information regarding incidences during marriage like registration of marriage, extent of money spent, etc. was collected. Similarly, incidences after marriage such as whether went for honeymoon, bride's stay, her conception, etc. were collected. The data on socio-cultural and psychological factors held responsible of bride for abandonment such as extra martial relations of husband, dowry, etc. were also collected. In order to analyse the data descriptive statistical tools such as frequency distribution, percentages, etc. were used. To analyze the regional difference in factors responsible for abandonment, Kendall's Coefficient of Concordance was used.

## RESULTS AND DISCUSSION

### Socio-Economic Profile of the Respondents

The socio-economic profile of abandoned brides indicated that desertion took place within few years of marriage as nearly three fourth of brides were up to 25 years of age and were fighting for their divorce (Table 1). It was found that only five per cent of abandoned brides were illiterate. The level of education was not so good as many as 71.6 per cent of the respondents were educated up to higher secondary level only. The district SBS Nagar and Jalandhar had an edge over other two districts as these two didn't have any illiterate respondent. More than half of the abandoned brides were housewives while 41.67 per cent of the respondents were engaged in semi-skilled/skilled services. Majority of abandoned brides were depended on their parents for their needs.

**Table 1: Socio-economic profile of respondents in the sample in Punjab (Percent)**

Particulars	Kapurthala (n <sub>1</sub> =15)	SBS Nagar (n <sub>2</sub> =15)	Jalandhar (n <sub>3</sub> =15)	Hoshiapur (n <sub>4</sub> =15)	Total (n=60)
<b>Age</b>					
Up to 25	80.00	73.33	86.67	46.67	71.67
Above 25	20.00	26.67	13.33	53.33	28.33
<b>Education</b>					
Illiterate	13.33	-	-	6.67	5.00
Up to higher secondary	60.00	46.67	86.67	93.33	77.167
Graduate & Above	26.67	53.33	13.33	-	23.33
<b>Occupation</b>					
Housewives	53.33	46.67	73.33	60.00	58.33
Semi-skilled/ Skilled	46.67	53.33	26.67	40.00	41.67
<b>Income (₹month<sup>-1</sup>)</b>					
Up to 5, 000	42.85	12.50	12.50	60.00	32.00
5,000-10,000	42.85	57.14	50.00	20.00	10.00
Above 10,000	14.28	37.50	12.50	40.00	28.00
<b>Caste</b>					
Jat Sikh	80.00	86.60	80.00	86.67	83.33
SC/BC	6.67	-	13.33	-	5.00
Others*	13.33	13.33	6.67	13.33	11.67
<b>No. of child</b>					
Nil	40.00	33.33	40.00	53.33	41.67
1& more	60.00	66.67	60.00	46.67	58.33

It was noticed that 40 of the respondents, who were earning up to ₹10, 000 per month while 28.00 per cent earned above ₹10,000. Majority of the respondents (83.33%) were Jat Sikhs. On the other hand five per cent belonged to SC/BC category. Nearly, 40 per cent of the respondents had no child and 28.33 per cent of them had only one child.

### **Incidences from Settling the Marriage till Abandonment**

Marriage is one of the three great events in life along with birth and death. Birth just happens and death is largely beyond our control. However, marriage is a more likely affair which can be influenced and it has multiple dimensions. Since, the study aims to find out the issues related to the desertion of married women, it is essential to analyze the detailed history of marriage and related issues.

In general, NRI marriages are arranged in a short period of time, without having proper enquiry about the details of the bridegrooms and finally, the poor girls becoming the victims of fraudulent marriages (Ramoowalia, 2003, Deo, 2012, and Anonymous, 2012). The sequence of events happened right from settling the marriages till abandonment are discussed as under:

#### **Incidences before marriage**

The findings of the study indicate various incidences before marriage which includes consent in marriage, type of marriage, intermediary, spousal communication, meetings, etc. The result presented in Table 2 revealed that marriages of majority of the respondents (91.67%) were performed with their prior consent. It was observed that craze for foreign land prompted instant 'yes' among majority of the respondents. The results further showed that in majority of the cases, the marriages were arranged by parents and elders of the family, while five per cent were love marriages. As most of the marriages were arranged one, this showed a strong hold of institution of family, in private domain of life in Doaba region of rural Punjab.

The results highlighted that 58.33 per cent of marriages to NRI were proposed by relatives while one-fourth of them received the proposal through friends. Only 16.67 per cent of marriages were materialized through marriage bureaus. It was concluded that in majority of the marriage proposals, relatives and friends were the main intermediary (go-between). It was observed that lure of going abroad was rampant among not only young girls and boys but in one and all.

The personal communication was the main source which enables a person to know about others involved and make judgment. It was highlighted only 18.33 per cent had some communication before marriage with their spouse which revealed that majority of the respondent (81.67%) did not share any word with their spouse due to cultural taboos or other reasons. It was found that only 11.67 per cent of the respondents got the chance to meet their fiance before marriage.

The courtship period means time period between engagement and marriage. The engagement is a ceremony held before the marriage. It has a social significance, because it is an occasion of sharing with families and friends the joy of deciding to formalize a relationship which is a more serious commitment. The time span between engagement and marriage is important. The study revealed that 55.00 per cent of the respondents had their courtship period of less than two weeks. It was

found about one-fifth of the respondents got one month of courtship between settling the proposal and marriage, where as 21.67 per cent of them had more than a month of courtship period. It indicated that in an eagerness, not to let go off such promising offers, marriages were performed in hush rush manner. The formal engagement ceremony was conducted in one fifth of the respondents and in 26.67 per cent of the cases the *shagun* ceremony was performed. After marriage, 11.67 per cent of NRI grooms also threw a gala reception.

**Table 2: Distribution of respondents on the basis of incidences before marriage (Percent)**

<b>Incidences before marriage</b>	<b>Kapurthala (n<sub>1</sub>=15)</b>	<b>SBS Nagar (n<sub>2</sub>=15)</b>	<b>Jalandhar (n<sub>3</sub>=15)</b>	<b>Hoshiapur (n<sub>4</sub>=15)</b>	<b>Total (n=60)</b>
Consent in marriage	86.67	93.33	86.67	100.00	91.67
Type of marriage					
<i>Arranged</i>	93.33	3.33	100.00	93.33	95.00
<i>Love marriage</i>	6.67	6.67	-	6.67	5.00
Intermediator					
<i>Relative</i>	53.33	53.33	66.67	60.00	58.33
<i>Friend</i>	26.26	26.67	20.00	26.67	25.00
<i>Marriage bureaus/ Advertisement</i>	20.00	20.00	13.33	13.33	16.67
Communication	20.00	20.00	13.33	20.00	18.33
Prior Meeting	26.67	6.67	6.67	6.67	11.67
Courtship Period					
<i>Less than 2 week</i>	53.34	53.34	53.34	60.00	55.00
<i>One month</i>	20.00	33.33	26.67	13.33	23.33
<i>More than one month</i>	26.67	13.33	26.67	20.00	21.67
Ceremonies*					
Engagement	13.33	20.00	20.00	33.33	21.67
Shagun	46.67	40.00	13.33	6.67	26.67
Reception	6.67	13.33	16.67	20.00	11.67

*Figures in parentheses indicate percentage*

*\*Multiple Responses*

### **Incidences during marriage**

The results pertaining to incidences during marriage are presented in the Table 3. The results indicate various incidences during marriage which included money spent on marriage, place of marriage, number of *baraties*, registration of marriage, dowry demanded and gifts given. The results showed that nearly one third of the families spent up to ₹5 lakh on the marriage whereas one fifth each of the families spent ₹5 to ₹10 lakh and ₹10 to ₹15 lakh respectively.

The results further show that 15 per cent of the families spent ₹15 to ₹20 lakh on marriage of their daughters. It was noticed that twelve per cent of the families spent even above ₹20 lakh on the marriage ceremony. This revealed that about half of the families spent up to ₹10 lakh and another half spent above ₹10 lakh on the marriage on their daughter. The results revealed that three fourth of the respondents had their marriage performed at marriage palace while 21.67 per cent

of the respondents had their marriage performed at home by erecting tents in home or in village lane. This is the clear testimony fact that in Punjab people spend ostentatiously on marriage ceremony and this is particularly true in NRI dominated *Doaba* region of Punjab (Table 3).

The desertion and divorce is on the increase among the NRI marriages, so it is necessary to register marriage. In case the marriage has not been registered then wife can presume that her husband has no intention to take her overseas because spouse or marriage visa can only be issued on producing certificate of registration of marriage. Due to non-registration of marriage victims could not make any legal claim for maintenance from their husbands. The study showed that despite, registration of marriage made compulsory as high as 13.33 per cent of the marriages were not registered (Table 3).

**Table 3: Incidences during marriage in Punjab**

Incidences during marriages	(Percent)				
	Kapurthala (n <sub>1</sub> =15)	SBS Nagar (n <sub>2</sub> =15)	Jalandhar (n <sub>3</sub> =15)	Hoshiapur (n <sub>4</sub> =15)	Total (n=60)
Money Spent (₹ Lakhs)					
<i>Up to 5</i>	40.00	26.67	33.33	26.67	31.67
<i>5-10</i>	26.67	20.00	20.00	13.33	20.00
<i>10-15</i>	20.00	26.67	20.00	20.00	21.67
<i>15-20</i>	6.67	13.33	20.00	20.00	15.00
<i>Above 20</i>	6.67	13.33	6.67	20.00	11.67
Place of marriage					
<i>Marriage Palace</i>	73.33	80.00	80.00	80.00	78.33
<i>Home</i>	26.67	20.00	20.00	20.00	21.67
<i>Registration of Marriage</i>	80.00	86.67	93.33	86.67	86.67
<i>Dowry Demanded</i>	73.33	73.33	60.00	60.00	66.67
<i>Gifts given**</i>					
<i>Cash</i>	26.67	20.00	13.33	26.67	21.67
<i>Car</i>	-	-	13.33	6.67	5.00
<i>Others*</i>	93.33	80.00	100.0	80.00	88.33

*Figures in the parentheses indicate percentage*

*\* Other items like household goods, electric appliances, Furniture etc.*

*\*\* Multiple responses*

The dowry and related issues are the major reported causes of desertion and divorce in India. The parents of all the respondents gave dowry during marriage that included gold jewellery, household articles, furniture, vehicle, landed property and lump sum amount of cash and gifts to family members in the form of household articles and gold. The demand was in the form of cash, vehicle, bank deposit, transferring property to husband's name, etc. The results further highlighted that

66.67 per cent of the groom's family openly demanded dowry from the respondent's family whereas one third didn't demand dowry openly. But, did not refuse even to take the dowry in one or the other form by bride's family.

Any property or gift given to women before marriage or at the time of marriage or later is her property, may be gifted by anyone. The results presented in Table 3 highlighted that in all the respondents were given gold jewellery to the mother in-law, sister in-laws, spouse or other members of the family. It was found that 21.67 per cent were given cash in their marriage. Similarly, five per cent of the respondents were also given car in marriage. Majority of the respondents were given other items like household goods, electric appliances, furniture, etc. in the form of gifts (Table 3).

### **Incidences after marriage**

To understand the phenomenon of abandonment, it is important to analyze the incidences happened immediately after marriage to unfold the social relationship existed between bride and her in-laws, which eventually lead to desertion. The results presented in Table 4 revealed that three fourth of the respondents did not go for honeymoon after marriage. Among half (46.67%) of the respondents who went for honeymoon, expenses were bore by parents. Similarly, 53.70 percent of the grooms stayed for two to three weeks after their marriage in India. The results revealed that 10 per cent of the respondents who were staying in India at the time of marriage and initiated immigration process only after two or more than two years after marriage. It was reported that two third of the respondents stayed at their in-laws place after the spouse left India and rest one third of the brides went back to stay with their parents. It was reported that either in-laws did not offer them for the stay or there was nobody from in-laws side staying in India.

It was observed that only 36.67 per cent of the respondents went to airport to bid farewell to their spouses, while the 63.33 per cent of the respondents were not taken to airport by their in-laws/ husbands. One fifth of the respondents divulged that they didn't know about the plan of their husbands and he flew abroad without any prior intimation. It was reported by deserted brides that their grooms made commitment with them, that they will take them soon to abroad and soon will send immigration papers to them. With this hope they tried to live. Similarly, three fourth of the respondents didn't received even a single call from their spouse. This showed a total repudiation of the marital obligations. The results revealed that more than one fourth of the respondents revealed that their spouse remained in touch with them for sometime varied from few months to years.

It was further divulged by respondents that after the NRI groom returned abroad, women faced many problems in matrimonial family and maintain that they were not in touch with them. The results presented in Table 4 revealed that nearly three fourth (71.67%) of the respondents observed change in the behavior of their

in-laws whereas, 28.33 per cent of them didn't notice any change in behavior of their in-laws or other family members. The respondents invariably revealed that their in-laws ignored them, restricted her contacts with family and friends, abused family members, and insulted them in fronts of others. Although, communication through internet sources is the easier way but, some of them didn't know how to access the internet or didn't have this facility at the home or nearby them or due to the family background.

**Table 4: Incidences after marriage in Doaba region of Punjab, 2010-11 (Percent)**

Incidences after marriage.	Kapurthala (n <sub>1</sub> =15)	SBS Nagar (n <sub>2</sub> =15)	Jalandhar (n <sub>3</sub> =15)	Hoshiapur (n <sub>4</sub> =15)	Total (n=60)
<b>Went for honeymoon</b>					
Yes	33.33	20.00	20.00	26.67	25.00
<b>Who spent?</b>	<b>(n=5)</b>	<b>(n=3)</b>	<b>(n=3)</b>	<b>(n=4)</b>	<b>(N=15)</b>
Parents	40.0	100.0	33.33	33.33	46.67
Husband	20.00	-	33.33	75.0	33.33
In-laws	40.0	-	33.33	-	20.00
<b>Husband's stay(days)</b>					
0-10	25.00	30.76	40.0	28.57	31.48
10-20	33.33	30.76	6.67	1.42	22.22
20-30	25.00	23.08	33.33	28.57	27.78
More than 30	16.67	15.38	20.00	21.42	18.51
<b>Bride's stay</b>					
In-laws	46.67	66.67	73.33	66.67	63.33
Parents	53.33	33.33	26.67	33.33	36.36
<b>Went to see off</b>	33.33	26.67	46.67	40.00	36.67
<b>Called after reaching abroad</b>	33.33	20.00	26.67	26.67	26.67
<b>Changed behavior of in-laws</b>	66.67	86.67	73.33	60.00	71.67
<b>Initiated Immigration</b>	26.67	20.00	26.67	33.33	26.367
<b>Conceived</b>	60.00	66.67	60.00	46.67	58.33
<b>Went abroad</b>	13.33	20.00	6.66	-	10.00
<b>Reasons for not going abroad*</b>					
Ignorant about Procedure	15.38	25.00	7.14	13.33	14.81
Cumbersome Paperwork	15.38	25.00	28.57	33.33	25.92
Lack of funds	30.76	25.00	28.57	26.67	27.77
Ignorant about husband's whereabouts	15.38	8.33	14.28	13.33	12.96
Husband never wished so	23.07	16.67	21.42	13.33	18.51

*Figures in the parentheses indicate percentage*

*\*Multiple responses*

Majority of the respondents didn't have any communication through internet. Only 13.33 per cent of the respondents had communication through telephone. Majority (78.33%) of the respondents were not allowed to talk to their husbands (Table 4). It was reported that their in-laws hid the information of the phone calls from them and maintained that they were not in touch with their son. One fifth (21.67%) were allowed to talk to their husbands but for few minutes and that too in front of in-laws only. One fourth (26.67%) of the respondents reported that when they initiated the talk about the immigration process, the spouse disconnected the call on one or the other pretext.

It was noticed that if some of the spouses tried to send the papers of immigration to his family, they hid it from the bride or burnt the papers. Some of them didn't want to talk about this issue at all. The results revealed that three fourth (73.33%) of them didn't talk about the immigration procedure whereas 26.67 per cent talked about the procedure with their in-laws. The perusal of Table 4 shows that the majority of the families didn't discuss the matter of immigration. They just dumped all type of talks related to it. This was how innocent girls were deserted by NRI grooms. The results revealed that 58.33 per cent of the bride got conceived after marriage. Some of the brides got chance to accompany their spouse to abroad after their marriage and some didn't get even a single chance to go there. Those who got chance to go abroad (10%), made effort on their own or their parents arranged the whole tour for them. Their husband didn't send any immigration papers to call her there.

The brides who didn't get any chance to visit their spouse, was either due to cumbersome paperwork (25.92%) or lack of funds (27.8%). Some were ignorant about husband's whereabouts (13%) and in some cases husband never wished so (18.5%). Similarly, 14.87 per cent of them were ignorant about procedure. They were either duped by NRI husbands or by some professional lawyers who cheat them by charging lakhs of rupees in the name of arranging visa for their daughters. The ignorant victims and their families become prey to these professionals without any fruitful results. They become helpless and remained under debt for ever. Nearly three fourth of the dejected brides disclosed that they never met their groom again, once they flew abroad.

### **Factors Responsible for the Abandonment of the Bride**

The socio-cultural factors held responsible by the respondents behind abandonment are presented in Table 5. The results revealed that two third of the respondents accorded dowry as the major reasons behind their present state. The brides were abused for bringing insufficient dowry by their husbands and in-laws before abandonment.

The results revealed that as high as half of the respondents stated that an extra martial relationship of their husbands was the major reason behind their desertion. It was find that husbands did not reveal about this for the fear of their parents. They divulged that these men had no interest to honor marital obligations and married just to appease their parents, who wanted an "Indian *Bahu*" for their son despite his living abroad. The results revealed that one third of the respondents found after marriage that their husbands were already married to another woman. One fourth of the brides who found their husbands hooked to one or the other drug, accorded drug addiction of husband as a main reason behind dissolving their conjugal relationships. The results further showed the ranks for various socio-cultural factors among four districts. The significant value for Kendall's Coefficient

of Concordance indicates the high degree of similarity of various socio-cultural factors in the selected districts (Table 5).

**Table 5: Factors responsible for the abandonment of the bride in Punjab**

Socio-Cultural factors						(Percent)
	Kapurthala (n <sub>1</sub> =15)	SBS Nagar (n <sub>2</sub> =15)	Jalandhar (n <sub>3</sub> =15)	Hoshiapur (n <sub>4</sub> =15)	Total (n=60)	Kendall's coefficient W-value
Extra marital affair	60.00	60.00	46.67	40.00	51.67	15.4**
Already married	33.33	40.00	33.33	26.67	33.33	
Drug addict	13.33	26.67	20.00	33.33	23.33	
Dowry	73.33	73.33	60.00	60.0	66.67	
<b>Psychological factors</b>						
Verbal Abuse	40.00	33.33	33.33	26.67	33.33	9.6**
Accusing of loose character	20.00	13.33	26.67	26.67	21.67	
Shoving	26.67	40.00	26.67	33.33	31.67	
Confinement	20.00	6.66	-	20.00	11.67	

*Figures in the parentheses indicate percentage*

*\*\* Significant at five percent level.*

The results presented in Table 5 further highlights the psychological factors held responsible by the respondents for the abandonment. The results revealed that one third of the respondents faced harassment by their spouse and his family who started casting aspersions soon after marriage. They did not let any single moment to humiliate her. One fourth of the respondents were accused of loose moral character by in-laws or husband. Another 31.67 per cent of them were shoved. Similarly, twelve per cent of the respondents were confined to house by their spouse/in-laws and were not allowed to the talk to anyone including her husband, parents and close associates. The NRI grooms isolate their immigrant partner in many ways including preventing her from calling or visiting her family back home. The significant value for Kendall's Coefficient of Concordance indicates the high degree of similarity of various psychological factors in the selected districts.

### **Support Extended to Abandoned Brides by their Parents**

In spite of various socio-cultural compulsions, parents stood behind their betrayed and abandoned daughters in need of hour. The results presented in Table 6 revealed that they were the one who were abused emotionally, economically and socially along with their daughters. Majority of the parents first took the matter to their respective village panchayats. A significant majority of the parents (88.33%) succeeded in filing FIR in the police station which was later referred to NRI police station which mainly deals NRI cases only. One fourth of the parents approached Red Cross Society to seek help from them. Similarly, eighty per cent of the

respondents disclosed that their parents provided maintenance to them and their child/ children.

**Table 6: Support by parents to the abandoned daughters in Punjab**

Parents interventions	(Percent)				
	Kapurthala (n <sub>1</sub> =15)	SBS Nagar (n <sub>2</sub> =15)	Jalandhar (n <sub>3</sub> =15)	Hoshiapur (n <sub>4</sub> =15)	Total (n=60)
FIR lodged	73.33	93.33	93.33	93.33	88.33
Negotiation through Panchayat	93.33	13.33	20.00	13.33	81.67
Complaint through Red Cross Society	33.33	20.00	26.367	20.00	25.00
Maintaining daughter/children	80.00	80.00	86.67	73.33	80.00

*Figures in the parentheses indicate percentage*

### State Intervention

The results presented in Table 7 highlights the respondents who got justice from the state in the form of Alimony, *Challan* issued, got part of house, Look out Circular (LOC) and Passport impound. It was found that one third of the respondents got alimony per month to maintain them and their children. On the other hand 8.33 per cent of the respondents got share in their in-laws home. The *Challans* were issued in one fourth of cases.

**Table 7: Distribution of respondents on the basis of state intervention**

State intervention	(Percent)				
	Kapurthala (n <sub>1</sub> =15)	SBS Nagar (n <sub>2</sub> =15)	Jalandhar (n <sub>3</sub> =15)	Hoshiapur (n <sub>4</sub> =15)	Total (n=60)
Alimony	33.33	40.00	33.33	26.67	33.33
Got part of house	6.66	13.33	6.66	6.66	8.33
Challan issued	20.00	33.33	26.67	20.00	25.00
LOC	6.66	6.66	13.33	6.66	8.33
Passport Impound	-	-	13.33	-	3.33

*Figures in the parentheses indicate percentage.*

*\*Multiple responses*

After strong state intervention LOC was issued in 8.33 per cent of cases following which two passports were impounded with the help of Regional Passport Officer. It was observed that 13.33 per cent of the respondents got impounded their husband's passport in Jalandhar, whereas majority of the respondents got alimony in the SBS Nagar (Table 7).

## CONCLUSIONS

Overseas marriages are prone to all the risks that any marriage in India does have. The added risk factor is that the groom lives abroad. The sequence of incidences of significance, right from settling to marriage till abandonment found

that most of the overseas marriages were settled in great hurry and still people in *Doaba* region, succumbed to the temptation to settle abroad. In their attempt, parents liquidated their assets and marginalized their abandoned daughters. The bride if succeeds in joining her husband abroad is isolated far away from her home and people with no monetary support. The demand for more and more money especially after the wedding and it was the foremost reason reported by brides behind abandonment. The bride and their families mentioned these reasons which they made basis for filling FIRs but if we go deeper into the context then the diehard craze of Punjabis' for foreign country was the prime reason for this sorry state of affairs. However, the parents of the devastated brides extended significant emotional and financial support to them.

### **Rehabilitation Measures Suggested**

The investigation of factors responsible for abandonment suggested the following rehabilitation measure to be taken by the parents, state government and society at large. The study suggested the following rehabilitation measures.

1. Do not take any decision in haste. Verify the antecedents of the groom.
2. Do not ever agree to pay or enter into monetary transactions for any reasons or on any pretext. The bride should also take tough stand against dowry.
3. Educate the girl and equip her with some vocational training for economic independent.
4. Bride should not part with her passport. Keep one copy of passport at a safe place.
5. The police should be sensitized in dealing with such cases.
6. The fast-track special courts should be set up to try these cases against guilty NRI grooms and to provide relief to aggrieved brides and their parents.
7. The traumatized girls should be provided counseling to enable them to come out of the trauma and face the unpleasant situation.
8. To counter the situation of *Hanged Marital Status* marital relations should be severed soon to enable the abandoned brides to move on.

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## GROSS NATIONAL HAPPINESS AND SUSTAINABLE ECONOMIC DEVELOPMENT IN BHUTAN: A QUALITATIVE ANALYSIS

Anil Kumar Dogra\*

### ABSTRACT

*The objectives of Gross National Happiness (GNH) reflected in the shape of its pillar could be accomplished if the latent resources would be explored and exploited through the development of blighted agricultural and embryonic industrial sector with their optimal use. Bhutan's story of progress highlights the importance of cultural, spiritual heritage and natural environment in its approach for development. Under the dynamic leadership, and by learning from other countries' mistakes in natural resource management, Bhutan is progressing to achieve a sustainable development that relies on its natural resources which are considered as significant assets for the common good. Bhutan's unique development path has ignored the theories of development, from classical to neo-liberal schools, that economic progress of the country can be realized without compromising the importance of sanctimonious environment. Bhutan intends to impart an important lesson to the international community how it has been able to achieve persistent economic growth, still maintaining its rich natural heritage and pristine environment.*

**Key words:** GNH, economic, monastic society, environment and GDP

**JEL Classification:** A13, O44, O47, Q01, Q26

### INTRODUCTION

The term *Gross National Happiness* (GNH) was coined in 1972 by the fourth king of Bhutan, Jigme Singy Wangchuk, who had opened Bhutan to the age of modernization soon after the demise of his father, Jigme Dorji Wangchuk. His majesty observes the development as a process that can lead to peace and prosperity. Apart from increasing the gross domestic product and per capita income, developmental plans in Bhutan incorporate all the socio-religious and cultural aspects of life. The people of the present materialistic world avoid the values of their culture, traditions, and pristine environment in the race of attaining the benefits of economic growth and modernization in terms of higher status and accumulate more wealth in the society. They essentially consider the wealth as a sole factor of happiness (Dekidk or Dzhonkha or well being), though, it is an extrinsic aspect of it. Good health (depends upon pristine environment); cultural, religious and traditional

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values of human beings are the intrinsic aspects of life to get impeccable happiness, seem to be strewn up for gaining former one. However, true development occurs when material and spiritual development complement and strengthen each other, and also highlight the mental and physical wellbeing of the people. The Gross National Happiness premises on behalf that every citizen of the country wishes to have happiness in life. The government should generate the necessary conditions that enable citizens to lead a happy and prosperous life. It stresses that collective happiness be addressed through government policies in which happiness is prioritized in all development schemes and programmes. Though, the Gross National Happiness is the patent philosophy of Bhutan, it has positive relevance to the people of the rest of the world, if it is adopted by all countries as a plan for their economic development. All schools of economics consider the gross domestic product (GDP) as the critical index of the economic well-being of a society. The prevailing economic ideology drives people to foster pecuniary aspects for leading prosperous life by disregarding their socio-religious and cultural feelings that necessarily gives them a unique recognition in the world. Unlike, other country of world, Bhutan has suggested Gross national happiness as an index to measure the happiness of the people.

We have now clearly distinguished the happiness in GNH from the fleeting, pleasurable *feel good* moods so often associated with that term. It is a well known fact that abiding happiness cannot exist while others suffer, and comes only from serving others, living in harmony with nature, and realizing our innate wisdom and the true and brilliant nature of our own minds (Thinley, 2009).

### **The Origin of the Gross National Happiness**

Since 1972, as other countries clarified and focused their economies on material expansion, the Kingdom of Bhutan sought, through public action, to expand the wellbeing and true happiness of its people. The goal of Gross National Happiness (GNH) was first articulated by the Fourth King, His Majesty Jigme Singye Wangchuck. He built upon the legacy of Bhutan's Government since the 1729 legal code by Zhabdrung Rimpoche, which dates from the unification of Bhutan. The legal code stated that *if the government cannot create happiness (dekidk) for its people, there is no purpose for the government to exist* (Ura, 2010). Outside Bhutan His Majesty proclaimed GNH, when he was returning from Havana after attending the sixth Non-Aligned Movement (NAM) Summit in 1979, he gave a rare interview to a group of Indian journalists at the Bombay airport in India. A reporter asked: *We do not know anything about Bhutan. What is your Gross National Product?* His Majesty replied: *We do not believe in Gross National Product, because Gross National Happiness is more important.* Eight years later on May 2, 1987, John Elliott of the Financial Times of London published an article *The Modern Path to Enlightenment* in their weekend edition called the Weekend FT. It was the first news article ever to highlight GNH as a development philosophy propagated by His Majesty Jigme Singye Wangchuck. His Majesty is quoted in the article saying: *We are convinced with our aim for contentment and happiness.* In 2008, John Elliott wrote on his blog about the interview *His Majesty put gross national happiness above the more usual economic targets of GNP and listed the GNH parameters: Whether we take five years or ten to raise the per capita income*

*and increase prosperity is not going to guarantee that happiness, which includes political stability, social harmony and the Bhutanese culture and way of life.* In 2004, Bhutan organized the First International Conference on GNH in its capital Thimphu. The second one followed the subsequent year in Canada. It has organized five international GNH seminars so far with the third one in Bangkok in 2007, the fourth in Bhutan in 2008 and in Brazil in 2009.

It was in 2005 that Bhutan decided to quantify happiness and entrusted the responsibility of developing mathematical parameters to measure GNH to the Center for Bhutan Studies (CBS). The CBS finally came out with the mathematical formulae in 2008. It uses a new nine-step methodology of multi-dimensional poverty by Alkire and Foster to measure the GNH index. In its efforts to implement GNH, all initiatives of the government are divided into policies and projects. Each policy or project then has to undergo a GNH screening test where it is scrutinized against several GNH indicators. For example, the mineral development policy has to pass not only the economic indicators but also environmental standards and impacts on other indicators such as culture, religion and social values are weighed. In the parliament, the state-of-the-nation address of the prime minister is always prefixed under GNH priority indicators. In July 2011, history was made when the UN General Assembly unanimously adopted the Bhutan-led resolution on *Happiness: Towards a Holistic Approach to Development*. As a follow up to the resolution, Bhutan convened a High Level Meeting on *Happiness and Well Being: defining a New Economic Paradigm* at the UN Headquarters in April in New York. In Rio+20 Conference on Sustainable Development held on 20-22 June, 2012 in the city of Rio de Janeiro in Brazil, Bhutan called on the world to adopt GNH as the new development paradigm. The Bhutan paper for Rio+20 called *Time for a sustainable economic paradigm* said that it would be a New Bretton Woods System.

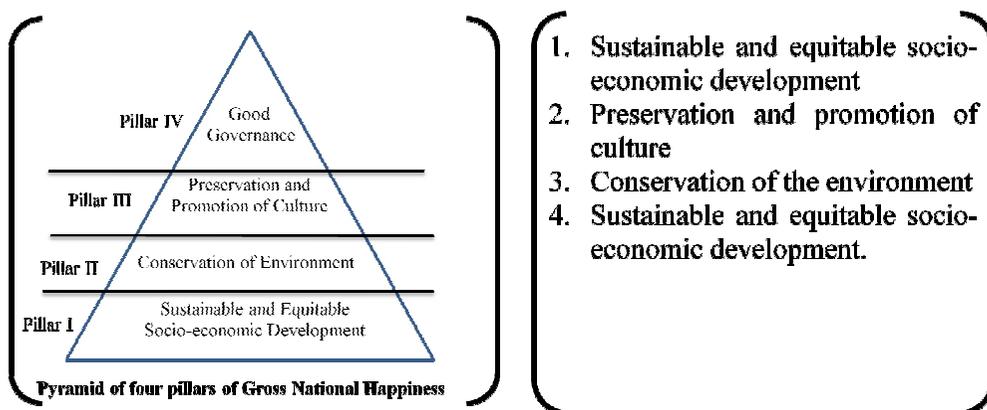
### **Perception of different schools about happiness**

The 18<sup>th</sup> Century British enlightenment thinker Jeremy Bentham argued that public policy should try to maximize happiness, and many prominent economists agreed but could not embrace the idea comprehensively. The social scientists and economists began to spend less time on thinking about death and disease, and more time thinking about happiness. The psychologists and labour economists in the United States and the U.K. began long-term studies asking people to chart their own happiness over time. Meanwhile, advances in technology allowed scientists to see whether, when a person claimed to be happy, the joy center of the brain lit up. That made happiness metrics a little more credible. Happiness is a psychological phenomenon. Therefore, it is difficult to compare one person's happiness with another. However, many happiness economists as Abraham Maslow believe they have solved this comparison problem. The classical economists have used happiness interchangeably with utility as well as the general welfare of the society. The modern classical economists no longer attempts to quantify happiness or satisfaction through measurements in consumption and profits. Instead, modern neo-classical framework argues that individual's preference is revealed through choice. Therefore, if an individual decided to purchase an apple over offering his income in religious ceremonies, the satisfaction one derived from apple is revealed to be greater than participation in religious observance.

The Easternlin Paradox suggests that a society's economic development and its average level of happiness are not linked. The assumption within neo-classic economics that satisfactions are highly subjective found expression in the work of Vilfredo Pareto, whose definition of optimal allocation in the nineteenth century was a crucial contribution that allowed further development of the mathematical precision of the discipline. Pareto argued that because satisfactions are subjective, we cannot know for certain that we have increased the amount of satisfaction in the system if we take a dollar from a billionaire and give it to a starving person to buy food; for all we know, the billionaire might have derived as much satisfaction from that dollar as the starving person does in spending it on food. This counter-intuitive result is the cornerstone of Pareto Optimality: A system is in Pareto Optimality when no one can be made better off (in their own estimation) without making someone worse off (in their own estimation). In practice, "better off" and "worse off" are defined by consumption, by definition, it is always better to consume more.

### **Holistic Approach of Development and Four Pillar of a GNH**

The Gross National Happiness is not the philosophical and rhetorical phenomenon, but it is a holistic approach of development of the Bhutanese economy. It preserves the Buddhist values and retains a balanced relationship with the natural environment and cultural social aspect of life.



The gross national happiness acknowledges the importance of economic growth, but also recognizes that there is more to measure the development beyond this one indicator. Although it is not easy to capture and maintain moral values in development, Bhutan has benefited from this balanced and careful approach. The Gross National Happiness in Bhutan is an institutional system of holistic development that seeks to secure sustainable and equitable development without mitigating the pristine environment, cultural heritage, and delivering good governance by securing participation of the people in all economic activities of the country. Instead of measuring development on the basis of economic growth alone, GNH broadens the concept of development and includes the following four pillars, which have been shown in the pyramidal diagram.

### **Sustainable and equitable socio-economic development**

A sustainable and equitable socio-economic development is one of the significant steps to bring happiness to the people of any country. It involves the improvement of economic conditions of the people by serving to them all necessities and amenities such as mechanization of the agriculture sector, means of transport, education, trade and commerce, employment, urban development and housing. The benefits of all round development must attain to have and have not at egalitarian principle without trimming down the capacity of the coming generation. It involves the optimal use of non-renewable resources with ensured participation of the people in all economic activities of the country. The happiness of the people ought not to be fleeting phenomenon rather it should be abiding one. It could only be possible if people sensitize themselves to live in harmony with the natural world, people in society (community vitality) and maintain and protect their cultural heritage. The sustainability and equitability of development *per se* has paramount significance to serve prosperity to the people as it provides for equal benefit of it and also maintains the pristine environment of the country.

### **Conservation of environment**

The conservation of the environment is one of overriding concerns of all countries in recent time. Bhutan has prioritized this issue by drafting number of policies to conserve and protect the environment during carrying out its developmental activities. It has succeeded to a larger extent in protecting its environment. As per the numerical information Bhutan has succeeded to maintain about 72.5 percent forest cover with simultaneously undertaking various economic activities. The country therefore, provides important lessons for the international community on how to mainstream environment into national development planning and how to balance the demands of globalization with the importance of maintaining natural heritage and the environment. As it has become categorically evident from many summits held at international level that developed countries are eagerly interested to protect the environment because their environment has got absolutely polluted with their widespread economic activities. The people of these countries are suffering from a number of fatal diseases that have drawn the attention of the government to take some stringent steps to clean and protect the environment.

The United Nations Conference on Sustainable Development (UNCSD), also known as Rio 2012, Rio+20 or Earth Summit 2012 was the Third International Conference on Sustainable Development aimed at reconciling the economic and environmental goals of the global community. It was hosted by Brazil in Rio de Janeiro from 13<sup>th</sup> to 22<sup>nd</sup> June, 2012, Rio+20 was a 20-year follow-up to the 1992 earth summit or United Nations Conference on Environment and Development (UNCED) held in the same city, and the 10<sup>th</sup> anniversary of the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg. Major outcomes of the conference include the climate change convention-a climate-change agreement that led to the Kyoto Protocol, Agenda 21, and a convention on biological diversity. It also created new international institutions, among them the Commission on Sustainable Development, tasked with the follow-up to the Rio Conference, the United Nations framework convention on climate change (UNFCCC) and led to the reform of the Global Environment Facility. The themes of

summit were how to build a green economy to achieve sustainable development and lift people out of poverty, including support for developing countries that will allow them to find a green path for development and how to improve international coordination for sustainable development by building an institutional framework.

The subject matter of these international conferences has already been included in the holistic strategy (GNH) for economic development. It should be kept in mind that environment can only be protected until we don't initiate economic developmental activities. His Majesty had proclaimed this holistic plan, when Bhutan was not in condition to start developmental projects and that time environmental issue was the only key issue for the discussion. Today, Bhutan has completed forty years of development journey under this holistic plan by initiating number of projects to give impetus to it, which has started spoiling the environment. The mitigation of the environment because of the initiation of developmental plans appears to be the natural phenomenon because these two were have a trade-off with each other.

### **The preservation and promotion of cultural values**

All countries of the world have pursued development programme, but they have forgotten to maintain their cultural and religious dimensions, which provide unique identity to the people in real sense. People should have recreation and amusement sources to enjoy in line with the country's cultural and religious values, which make us acquainted with the ancestral heritages. His Highness Fourth Druk Gyalpo has proclaimed such a development policy, which not only makes the country progress expeditiously, but also facilitates the institutional planners to preserve the country's religious and cultural dimensions to maintain its distinct identity all over the world. Today, though Bhutan is not economically so sound, its presence is acknowledged by all nations due to its cultural values. It attracts many tourists to observe and feel the uniqueness of the culture of Bhutan, which facilitate the promotion of tourism industry of the country as they like to stay for long period by spending good amount of money in Bhutan. It categorically helps native as they get foreign reserves from tourists on one hand and they also celebrate religious and cultural programme on other.

### **Good Governance**

The Royal Government of Bhutan's initiative of 1999 defined efficiency, accountability, and transparency as the pillars of good governance. Daniel Kaufmann *et al.*, (2005), in aggregating governance indicators, have identified six dimensions of governance are voice and accountability, political stability and non-violence, government effectiveness, regulatory quality, rule of law and control of corruption. In general, most of the literature agrees on common dimensions of governance such as participation, rule of law, transparency, accountability, effective delivery of services and equity.

Good governance is one of the nine domains of Gross National Happiness aimed towards enhancing the well-being of the Bhutanese people. Unlike other domains, governance cut across all domains, and therefore, its effect on the society at large, arises from the cumulative efforts of all sectors. The 9<sup>th</sup> Article of the Constitution of the Kingdom of Bhutan states that the State shall strive to promote those conditions that will enable the successful pursuit of Gross National

Happiness. Though, the constitution has been adopted only recently, happiness has been the main concern of all monarchs of Bhutan, especially of the Fourth Druk Gyalpo. Happiness has also been the ultimate purpose of social and economic development plans and programs since the early seventies.

Although, GNH was not expressed explicitly then, the provision of free health and education services, development of basic infrastructure, supply of clean drinking water, allotment of free timber to build houses, granting land and other *kidu* (grants) have all been aimed towards reducing misery and enhancing the welfare of the citizens. The pursuit of GNH is further continued by changing the political system from a monarchy to a parliamentary democracy. It is evident from the reigns of all the successive Kings of Bhutan that the ultimate purpose of governance has been to bring greater well-being and happiness to a greater number of people. In this respect, governance in Bhutan has always been an integral part of the system of government and of political structures, which reflect and internalize GNH values. As such efficiency, transparency and accountability have been the main thrust of good governance of the country.

#### **Antagonism between development and environment**

Would it be possible to experience development without polluting and spoiling the environment? It seems incredible because development of any country is always experienced at the cost of polluting our environment. This statement is endorsed by the developmental approach of developed nations. The developed nations also sought to conserve their environment all along the process of development, but they could not make it because the creation of the logistics for economic development involves the extraction of natural resources which have spillover impact on environment. The development of any country makes its people more materialistic that cause them to disrespect the environment, cultural, social values, and indigenous industries. No doubt, economic development may increase the volume of gross domestic product, but it does not provide happiness as people have no time for their families, religious and cultural ceremonies.

Many summits on sustainable development and conservation of environment like Rio+20 or Earth Summit 2012, Bonn Agreement (Environment) are being organized at international level, but in an attempt to prevail over each other for becoming economic superpower in the world, all countries are extracting natural resources more than their requirements, expanding their industrial bases to capture the world market tend to be the catalytic for polluting environment and global warming in the world.

It would be difficult for any country to curtail its production efforts in the present consumerist society. Industrialists are bound to meet the rising demand by extracting more natural resources to provide for the final goods in the market. Therefore, it seems more difficult for any country to protect environment at the cost of their economic development. It may be possible in those countries where the scope of development is very meager because of unfriendly terrain of their countries, lack of raw material, man power, required logistics and prerequisites to have big-spurt from the agrarian economy to industrial economy.

### **Could social aspects overcome the pecuniary aspects for happiness of people?**

The question remains still unanswered if human beings would survive without sufficient gross domestic product? It is a pecuniary aspect of living life happily. It would not be possible for human being to survive in this materialistic world without having sufficient nominal income. The gross domestic product is attained and accrued by performing myriad of economic activities such as establishing different kind of industries, institutional and non-institutional departments, by performing agricultural activities, expansion of service sector, and dissemination of infrastructural facilities' network. The execution of the aforesaid economic activities would be possible only if we exploit our natural resources to feed our industries for producing final goods and services. The utilization of natural resources for getting raw material to accomplish our economic activities destroy the environment through eroding the soil, deforestation and reduce the stock of non-renewable natural resources on one hand, pollute the environment by causing air pollution, increasing the population pressure on land in the surroundings areas, where the production units have been set up, on the other.

It stands to the reason that economic development is inescapable phenomenon for rendering the socio-economic justice to the people but it accretes with a host of afflictions such as pollution, diminishing the stock of non-renewable natural resources, contamination of pristine water resources, and also create a society of haves and have not's by unequal distribution of the resources. As far as the utilization of natural resources was concerned, we cannot compromise with their quantity required for the activation of industries except their efficient utilization. A sustainable development seems incredible because there is always an efficient and optimum utilization of natural resources to meet the demands of present generation. It has not been seen any country that does not use its natural as well as human resources efficiently, as it results in an increase in the cost of production which reduces its economic viability because of cost disadvantage in international market.

Therefore, sustainability of economic development is not feasible if the welfare of the society is to be increased to raise the level of happiness of the people. An equitable socio-economic development can be assured if the income of the nation is equally distributed among people by following the utilitarian criteria. Accordingly, people of the country have to be engaged in different economic activities on the basis of their endowment to provide them remuneration for their services in process of production in proportion to their marginal revenue product. We have found that the working class of Bhutan is not getting remuneration equal to their contribution in the gross domestic product as their salaries are not decided on the basis of whole sale price index (WPI), hence it is far less than other countries. Therefore, if the country is unambiguously committed to ensure equitable justice, it has to provide remuneration to the people equal to their productivity. This will conspicuously increase the level of happiness and also reduce the unequal distribution of income as it is prevalent in Bhutan.

### **CONCLUSIONS**

The inclusive progress of the country is seen from its cultural values, quality of environment, social arrangement and the active participation of the

people in every sphere of the economy. The economic progress at the cost of pristine environment, cultural values, social harmony and non-participation of people of the country sounds against the interest and the welfare of the people. There is a big challenge for the government to conserve environment and socio-cultural dimensions with high economic growth contemporarily to realize the objective of self-reliance in all walks of life. The objectives of GNH reflected in the shape of its pillar could be accomplished if the latent resources would be explored and exploited through the development of blighted agricultural and embryonic industrial sector with their optimal use. The optimal utilization of resources alludes the sustainable economic development has drawn the attention of all nations of the world. If the sustainable development is an underlying dynamics of GNH, we have to meet the requirements of the people independently without affecting the economic viability of coming generation. Before adopting the economic sustainability, a question is still lying unanswered that have the demands of the people already been met with the present capacity of the economy independently and if we have not yet met the necessary requirements of them, can we afford to ponder over the economic viability of coming generations? Bhutan's story of progress highlights the importance of cultural, spiritual heritage and natural environment in its approach for development. Under the dynamic leadership, and by learning from other countries' mistakes in natural resource management, Bhutan is in the progressing to achieve a sustainable development that relies on its natural resources which are considered as significant assets for the common good. Bhutan's unique development path has ignored the theories of development, from classical to neo-liberal schools, that economic progress of the country can be realized without compromising the importance of sanctimonious environment. Bhutan intends to impart an important lesson to the international community how it has been able to achieve persistent economic growth, still maintaining its rich natural heritage and pristine environment. However, it is also a fact that Bhutan has succeeded in maintaining its environment and cultural values until now because it has negligible industrial base and it is still considered as a monastic society in the world.

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## PLASTICS AND THEIR ROLE IN ECONOMIC DEVELOPMENT OF INDIA

K.K. Chahal, Ramandeep Kaur and S. Kaushal\*

### ABSTRACT

*The first man made plastic was created by Alexander Parkes called Parkesine from cellulose. Plastics are usually synthetic, most commonly derived from petrochemicals but many are partially natural. A plastic is primarily made up of binder, plasticizer, fillers, pigments and additives. Plastics are of two types namely thermoplastics and thermosets. The one critical factor that plagues the Indian plastic industry is the common perception that plastics are not environmentally friendly. This is mainly due to poor awareness about the energy saving properties of plastics and the benefits to industries that utilize plastics. India is the highest recycler of plastics. The Indian plastic industry is promising industry and is creating new employment opportunities for people of India. The per capita consumption of plastic products in India is growing. The Government of India is trying to set up the economic reforms to elevate and boost the plastic industry by joint ventures, foreign investments and entrepreneurs are trying to provide high quality plastic products so that it becomes a booming industry.*

**Key words:** Plastic, development, biodegradable and employment.

**JEL Classification:** F63, J21

### INTRODUCTION

The first man-made plastic was created by Alexander Parkes who publicly demonstrated it at the 1862 Great International Exhibition in London. The material called Parkesine was an organic material derived from cellulose that once heated could be molded, and retained its shape when cooled. John Wesley Hyatt invented celluloid as a substitute for the ivory in billiard balls in 1868. However, the material was not strong enough to be used as a billiard ball, until the addition of camphor, a derivative of the laurel tree. The new celluloid could be molded with heat and pressure into a durable shape, later celluloid became famous as the first flexible photographic film used for still photography and motion pictures. By 1900, movie

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film was an exploding market for celluloid. After cellulose nitrate, formaldehyde was the next product to advance the technology of plastics. Around 1897, efforts to manufacture white chalkboards led to casein plastics. In 1899, Arthur Smith received British Patent 16275, for phenol-formaldehyde resins for use as an ebonite substitute in electrical insulation. However, in 1907, Leo Hendrik Baekeland improved phenol-formaldehyde reaction techniques and invented the first fully synthetic resin to become commercially successful, trade named Bakelite (Du Bois, 1972). The various times line precursors of plastics discovered from time to time are presented in Table 1 reveals the development of superior quality plastics.

**Table 1: Timeline-Precursors of plastics**

<b>Year of discovery</b>	<b>Name of material</b>	<b>Scientist</b>
1839	Natural Rubber- method of processing invented	Charles Goodyear
	Polystyrene (PS) discovered	Eduard Simon
1843	Gutta-Percha	William Montgomerie
1856	Shellac	Alfred Critchlow, Samuel Peck
1856	Bois Durci	Francois Charles Lepag
1862	Parkesine	Alexander Parkes
1863	Cellulose Nitrate or Celluloid	John Wesley Hyatt
1872	Polyvinyl Chloride ( PVC)	first created by Eugen Baumann
1894	Viscose Rayon	Charles Frederick Cross, Edward John Bevan
1908	Cellophane ®	Jacques E. Brandenberger
1909	First true plastic Phenol-Formaldehyde trade name Bakelite	Leo Hendrik Baekeland
1926	Vinyl (PVC)	Walter Semon invented a plasticized PVC
1927	Cellulose Acetate	-
1933	Polyvinylidene chloride or Saran (PVDC)	Accidentally discovered by Ralph Wiley, a Dow Chemical lab worker
1935	Low-density polyethylene ( LDPE)	Reginald Gibson and Eric Fawcett
1937	Polyurethanes trade name Igamid for plastics materials and Perlon for fibers	Otto Bayer and co-workers discovered and patented the chemistry of polyurethanes
1938	Polytetrafluoroethylene (PTFE) trade name teflon	Roy Plunkett
1939	Nylon and Neoprene considered a replacement for silk and a synthetic rubber respectively	Wallace Hume Carothers
1941	Polyethylene Terephthalate (PET)	Whinfield and Dickson
1942	Unsaturated Polyester ( PET)	Patented by John Rex Whinfield and James Tennant Dickson
1951	High-density polyethylene (HDPE) trade name Marlex	Paul Hogan and Robert Banks
1953	Saran Wrap	Dow Chemicals
1954	Styrofoam a type of foamed polystyrene foam	invented by Ray McIntire for Dow Chemicals
1970	Thermoplastic Polyester this includes trademarked Dacron, Melinex and Teton	*
1978	Linear Low Density Polyethylene	*
1985	Liquid Crystal Polymers	*

*\*Information not available*

A plastic material can be synthetic or semi-synthetic organic solids that are moldable. Plastics are typically organic polymers of high molecular mass, but they often contain other substances. They are mostly derived from petrochemicals, but

many are partially natural. The term was derived from the Greek *plastikos*, which means fit for molding. Plastics are a wide variety of combinations of properties when viewed as a whole (Angell 1991). They are used for shellac, cellulose, rubber, asphalt and synthetically manufacture items such as clothing, packaging, automobiles, electronics, aircrafts, medical supplies, and recreational items. One way plastics changed the world was in cost. It was so much cheaper to manufacture than other materials and the various ways it could be used was staggering. For instance, the use of polymers, which are substances with a higher molecule mass and which have a large number of repeating units, is common today. There are naturally occurring polymers, which include starches, cellulose, proteins, and latex. Polymers are molecules that join together like a chain with one or more monomers. The polymers are changed depending on the incorporation of these monomers. If the atoms in the monomers are combined to form the polymer, it is called an addition polymer. When some of the atoms of the monomers are released into small molecules, as in liquid, then the polymer is called a condensation polymer. A double bond between carbon atoms is most common in addition polymers (Arnold, 1968).

### **Composition**

Almost invariably, organic polymers mainly comprise plastics. The vast majority of these polymers are based on chains of carbon atoms alone or with oxygen, sulfur, or nitrogen as well. The backbone is that part of the chain on the main "path" linking a large number of repeating units together. This fine tuning of the properties of the polymer by repeating units molecular structure has allowed plastics to become an indispensable part of twenty first-century world. A plastic is principally made up of binder, plasticizers, fillers and pigments and other additives. The binder gives a plastic its main characteristics and usually its name. Thus, polyvinyl chloride is the name of a binder as well as the plastic into which it is made. Binders may be natural materials, for example cellulose derivatives, casein, or milk protein, but are more commonly synthetic resins. In either case, the binder materials consist of very long chainlike molecules called polymers.

### **Classification**

Thermoplastic polymers and thermosetting plastics are two types of plastics. Thermoplastics do not undergo chemical change in their composition when heated and can be moulded again and again. Examples include polyethylene, polypropylene, polystyrene, polyvinyl chloride, and polytetrafluoroethylene. The common thermoplastic ranges from 20,000 to 500,000 amu (Ungar, 1993). They are usually rigid glasses at low temperature and flexible elastomers above  $T_g$  (the glass transition temperature); and they may actually melt at a still higher temperature. Their properties like tensile strength, elongation at break and flexural modulus and uses (Miller and Dekker, 1996) are determined partially by whether  $T_g$  is above or

below the temperature during use (Table 2). Thermosets are assumed to have infinite molecular weight. These chains are made up of several thousand repeating molecular units. Thermosets can melt and take shape once after they have solidified. In the thermosetting process, an irreversible chemical reaction occurs for instance the vulcanization of rubber. Before heating with sulfur, the polyisoprene is a tacky, slightly runny material, but after vulcanization the product is rigid and non-tacky. The biodegradable plastics are plastics that will decompose in natural aerobic (composting) and anaerobic (landfill) environments (Anonymous, 2013).

**Table 2: Types of plastics, properties, products and applications of some commercially important plastics**

Polymer family and type	Tensile strength (MPa)	Elongation at break (%)	Flexural modulus (GPa)	Typical products and applications
<b>THERMOPLASTICS</b>				
<b>Carbon-chain</b>				
High-Density Polyethylene (HDPE)	20–30	10–1,000	1–1.5	Milk bottles, wire and cable insulation, toys
Low-Density Polyethylene (LDPE)	8–30	100–650	0.25–0.35	Packaging film, grocery bags, agricultural mulch
Polypropylene (PP)	30–40	100–600	1.2–1.7	Bottles, food containers, toys
Polystyrene (PS)	35–50	1–2	2.6–3.4	Eating utensils, foamed food containers
Acrylonitrile-Butadiene-Styrene (ABS)	15–55	30–100	0.9–3.0	Appliance housings, helmets, pipe fittings
Polyvinyl Chloride, Unplasticized (PVC)	40–50	2–80	2.1–3.4	Pipe, conduit, home siding, window frames
Polymethyl Methacrylate (PMMA)	50–75	2–10	2.2–3.2	Impact-resistant windows, skylights, canopies
Polytetrafluoroethylene (PTFE)	20–35	200–400	0.5	Self-lubricated bearings, nonstick cookware
<b>Heterochain</b>				
Polyethylene Terephthalate (PET)	50–75	50–300	2.4–3.1	Transparent bottles, recording tape
Polycarbonate (PC)	65–75	110–120	2.3–2.4	Compact discs, safety glasses, sporting goods
Polyacetal	70	25–75	2.6–3.4	Bearings, gears, shower heads, zippers
Poly ether ether ketone (PEEK)	70–105	30–150	3.9	Machine, automotive, and aerospace parts
Polyphenylene Sulfide (PPS)	50–90	1–10	3.8–4.5	Machine parts, appliances, electrical equipment
Cellulose Diacetate	15–65	6–70	1.5	Photographic film
Polycaprolactam (Nylon 6)	40–170	30–300	1.0–2.8	Bearings, pulleys, gears
<b>THERMOSETS</b>				
<b>Heterochain</b>				
Polyester (Unsaturated)	20–70	<3	7–14	Boat hulls, automobile panels
Epoxies	35–140	<4	14–30	Laminated circuit boards, flooring, aircraft parts
Phenol Formaldehyde	50–125	<1	8–23	Electrical connectors, appliance handles
Urea and Melamine Formaldehyde	35–75	<1	7.5	Countertops, dinnerware
Polyurethane	70	3–6	4	Flexible and rigid foams for upholstery, insulation

Biodegradation of plastics occurs when microorganisms metabolize the plastics to either assimilable compounds or to humus-like materials that are less harmful to the environment (Birley *et al.*, 1988). They may be composed of either bioplastics (Watimo *et al.*, 2001), whose components are derived from renewable raw materials, or petroleum-based plastics which contain additives. Biodegradable plastics degrade upon exposure to sunlight, water, bacteria, enzymes, wind abrasion, and in some instances rodent pest or insect attack are also included as forms of biodegradation or environmental degradation.

**Table 3: Different types of polymers and their uses**

<b>Name and Description</b>	<b>Uses</b>
Polyglycolic acid (PGA)-Hydrolysable polyhydroxy acid	Controlled drug releases; implantable composites; bone fixation parts
Polylactic acid (PLA)-Hydrolysable polyhydroxy acid; polymers derived from fermenting crops and dairy products; compostable	Packaging and paper coatings; other possible markets include sustained release systems for pesticides and fertilizers, mulch films, and compost bags
Polycaprolactone (PCL)-Hydrolysable; low softening and melting points; compostable; long time to degrade	Long term items; mulch and other agricultural films; fibers containing herbicides to control aquatic weeds; seedling containers; slow release systems for drugs
Polyhydroxybutyrates (PHB)-Hydrolysable; produced as storage material by microorganisms; possibly degrades in aerobic and anaerobic conditions; stiff; brittle; poor solvent resistance	*
Polyhydroxyvalerate (PHBV)-Hydrolysable copolymer; processed similar to PHB; contains a substance to increase degradability, melting point, and toughness; compostable; low volume and costly production	Films and paper coatings; other possible markets include biomedical applications, therapeutic delivery of worm medicine for cattle, and sustained release systems for pharmaceutical drugs and insecticides
<b>Plastic Type</b> Vinyl Poly vinyl alcohol (PVOH)-Water soluble; dissolves during composting.	Packaging and bagging applications which dissolve in water to release products such as laundry detergent, pesticides, and hospital washables
Polyvinyl acetate(PVAC)-Water soluble; predecessor to PVOH; has shown no significant property loss during composting tests	*
Polyenlketone (PEK)-Water soluble; derived from PVOH; possibly degrades in aerobic and anaerobic conditions	*

*\*Information not available*

Some modes of degradation require that the plastic be exposed at the surface, whereas other modes will only be effective if certain conditions exist in landfill or composting systems. Starch powder is mixed with plastic as a filler to allow it to degrade more easily, but it still does not lead to complete breakdown. Some researchers revealed that genetically engineered bacteria synthesize a completely biodegradable plastic, but this material, such as Biopol, is expensive at present (Bret *et al.*, 2011 and Brandl and Puchner, 1992) The German chemical

company BASF makes Ecoflex, fully biodegradable polyester for food packaging applications. Biodegradable plastics typically are produced in two forms: **injection molded** (solid, 3D shapes), typically in the form of disposable food service items, and **films**, typically organic fruit packaging and collection bags for leaves and grass trimmings, and agricultural mulch. Different types of biodegradable plastics are polyesters, polyanhydrides, polyvinyl alcohol, most of the starch derivatives like cellulose esters and renewable resource (Polylactic acid) which find use in pharmaceuticals, agriculture and packaging (Table 3). Polylactic acid (PLA) is another completely compostable biopolymer which can fully degrade above 60°C in an industrial composting facility. Fully biodegradable plastics are more expensive, partly because they are not widely enough produced to achieve large economies of scale (Akiyama *et al.*, 2012).

### Plastic Statistics

The one critical factor that plagues the Indian Plastic industry is the common perception that plastic is not environmentally friendly. This primarily is due to the low awareness about the energy saving property of plastics and the benefits to industries that utilize plastics. It is a little known fact that, while India has the lowest per capita consumption in the world, it is the highest recycler of plastics.

**Table 4: Pattern of global consumption of plastics**

<b>Particulars</b>	<b>Kg per capita</b>
World average	20
North America	90
West Europe	65
East Europe	10
Latin America	18
South East Asia	10
China	12
India	5.0

In India, we recycle 60 percent from both industry and urban waste as compared to the world average of 20-25 percent (Anonymous, 2011). The perusal of Table 4 revealed that world average per capita consumption of plastic was 20 kg. It was noticed that North America has highest consumption of plastics, followed by West Europe, Latin America and China. The corresponding figures are 65, 18 and 12 kg per capita respectively. The consumption in the case of South East Asia and East Europe was 10 kg each per capita. It was found that India has lowest per capita consumption of plastic (5 kg).

### Indian Statistics

The Indian plastic processing industry is highly fragmented and comprises 25,000 firms. Barring 10-15 percent of the firms, which can be classified as medium

scale operations, all the units operate on a small-scale basis. More than 95 percent of the firms in the industry are partnership, proprietorship or private limited companies. Further, these small companies get significant advantages in taxes.

**Table 5: Statistics of plastics industries in India: Current status**

<b>Particulars</b>	<b>Unit</b>	<b>Amount/ Quantity</b>
Major raw material producers	No.	15
Processing units	No.	25,000
Turnover (Processing industry)	₹ Crores	85,000
Capital asset (Polymer industry)	₹ Crores	55,000
Raw material Produced	Million metric tonnes	5.3
Raw material Consumed	Million metric tonnes	5.1
Employed Direct/indirect	Million (No.)	3.3
Export Value approx	\$ Crores	190
Revenue to Government	₹ Crores	73000

**Source:** <http://www.dnb.co.in>

The perusal of Table 5 revealed that there are only 15 major raw material producers which produce 5.3 million metric tonnes of raw material meeting the demand for raw materials which is 5.1 million metric tonnes. There are 25,000 processing units in India which create employment for 3.3million people, exporting worth \$190 crores plastic material thereby generating ₹73000 crores of revenue for the government. The processing industry turnover is ₹85000 crores and capital assets in polymer industry up to the tune of ₹55,000 crores. These firms thus provide significant level of competition to the organized sector companies, which combined together are making losses. The organized sector companies thus need to build up significant brand image to survive against the competition from the unorganized sector. The key organized sector players include Nilkamal Plastics Limited and Supreme Industries Limited.

#### **Growth rate of Indian plastic industry**

The plastic industry in India symbolizes a promising industry and is creating new employment opportunities for the people of India. The per capita consumption of plastic products in India is growing and is moving towards 2.5 times GDP growth. This potentiality of the market will surely actuate the entrepreneurs to invest in this industry. The Government of India is trying to set up the economic reforms to elevate and boost the plastic industry by joint venturing, foreign investments and entrepreneurs are trying to provide high quality plastic products, so that it becomes a booming industry.

The overall turnover of the plastics processing industry that currently stands at ₹85,000 crores is expected to touch ₹1, 33,245 crores in the year 2015 on the basis of the expected growth of the demand potential to 12.50 MMT from the

current 9 MMT. The number of processing units from the current 30,000 is expected to increase to 40,000, a 33 percent growth which will in-turn also increase the employment potential of the sector. Independent studies show that the industry that currently hires more than 3 million people, directly and indirectly, is expected to employ 7 million people by the year 2015.

The growth of the plastics industry has seen the increase in the number of processing units. The exponential growth anticipated over the next three years will see this number go up to 40,000 units in 2015. As of today, just about 10 to 15 percent of these units can be classified as medium scale operations and the rest all operate on a small scale basis. Over 70 percent of the industry is in the unorganized sector.

The plastic industry chain can be classified into two primary segments, viz., the Upstream which is the manufacturing of polymers and the Downstream which is the conversion of polymers into plastic articles. The Upstream polymer manufacturers have commissioned globally competitive size plants with imported state-of-art technology from the world leaders. The Upstream petrochemicals industries have also witnessed consolidation to remain globally competitive. The downstream plastic processing industry is highly fragmented and consists of micro, small and medium units. Presently, 75 percent are in the small-scale sector. The small-scale sector, however, accounts for only about 25 percent of polymer consumption. The industry also consumes recycled plastic, which constitutes about 30 percent of total consumption.

Despite the industry's high growth spanning over a period of over 2 decades and crossing several milestones, Indian plastics industry is yet to realize its full potential. The low level of per capita plastics consumption in India is indicative of the massive growth potential of the plastic industry. India has the advantage of high population and is expected to maintain high economic growth. This should propel India's plastics consumption to new levels in coming years. The consumption of plastic polymers is going to increase from 4.7 to 18.9 million tonnes, turnover of plastic industries from ₹35000 to ₹133245 crores and employment from 2.5 to 9.5 million (Table 6).

**Table 6: Vision 2015: Indian Plastic Industry**

<b>Particulars</b>	<b>Unit</b>	<b>2005</b>	<b>2015</b>
Consumption of Plastic Polymer @ 2.15 % CARG	Million tonnes	4.7	18.9
Turnover of Plastic Industries	₹ Crores	35000	1,33,245
Employment In Plastic Industry (Direct+ Indirect)	Million (No.)	2.5	9.5
Export of Plastic Products @ 30% CARG	US\$ Millions	1900	10215
Contribution of Polymers and Plastic Products to the Exchequer	₹Crores	6200	15990
Requirement of Additional Plastics Processing Machines	No.	45,000	68113

The export of plastic products is going to increase from \$1900 to \$10215 million and contribution of polymers and plastic products to the exchequer from ₹6200 to ₹15990 crores. There will be additional requirement of plant processing machines in near future. The next two decades are expected to offer unprecedented opportunities for the plastic industry in India. According to a CRISIL the world plastics trade has touched 140 MMT in 2012 and provides a lucrative opportunity for India, but with just a 1.5 percent share in world export volumes, India is not in a position to capture this opportunity.

## CONCLUSIONS

The Indian plastic Industry going forward, needs to consolidate and enhance capacity, upgrade facilities and improve productivity and increase utilization of critical plastic applications. India has the advantage of high population and is expected to maintain high economic growth. Last but not the least, the various associations need to come together and put in a concerted effort to join hands to enhance the image and the growth of the Indian plastic industry, create opportunities to demonstrate the industry's capabilities, educate all segments of the society about the benefits of plastics. The associations need to create a positive policy framework with all statutory entities and increase per capita consumption of plastics, encourage exports thereby significantly contributing to national growth.

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## **LOSS OF AGRICULTURAL LAND DUE TO LAND ACQUISITION FOR INFRASTRUCTURAL DEVELOPMENT**

Rabindra Kumar Mishra\*

### **ABSTRACT**

*This research paper examines the proportionate loss of agricultural land and the suffering of various categories of farms due to acquisition of land by the government in the name of infrastructural development. Infrastructural development may be a progressive path for economic development provided that the acquisition of agricultural land should not hamper the agricultural potentiality. The small farms have become marginalized and found to be the worst sufferer due to the land acquisition. Consequently, it has been affecting the rural agriculture by way of decrease in agricultural production succeeded by attracting more rural-urban migration, high density of urban population, industrial pollution, slum development, etc.*

**Key words:** Land acquisition, agricultural sector and infrastructure.  
**JEL Classification:** Q24, R52

### **INTRODUCTION**

In the current liberalised and globalised economic situation, infrastructural development is steadily gaining more significance as compared to agricultural development even though, the agricultural sector is more eco-friendly and the mainstay of majority of people of the country. Now, government is involved in the acquisition of agricultural land in the name of infrastructural and economic development. The policy framed by the government for acquisition of agricultural land not only makes the farmers marginalised but also attracts them to migrate to urban areas. As a result the productivity of agricultural sector is getting badly affected and exert hazardous effect on the economy. Thus, the indistinguishable relationship between the infrastructural and economic development should be built in such a way that can create to pave the way for sustainable development.

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The acquisition of land for various types of projects including building of roads has become a serious problem in Uttar Pradesh, Karnataka, Tamil Nadu, Haryana, Orissa and West Bengal. This problem has arisen due to the fact that lands are being acquired unsystematically without proper rehabilitation. According to a report, in the past there were protests by the farmers in as many as 40 districts spread over ten states where nearly four lakh acres of fertile and cultivable land was at stake (Mukherjee, 2011). However, infrastructural development is absolutely critical for the economic growth of India (Sharma, 2009). Accordingly, rapid expansion of infrastructure across the country is highly required. With this, industrialisation has to accelerate and as such urbanisation is inevitable requirement for all the purposes (Ramesh, 2011). For infrastructural development, acquisition of land is important. Before the acquisition of land, its form and the consequent rehabilitation of the land owner should clearly be spelled out. It should not be left for public discourse as has been happening for a number of years (Rajamani, 2011). Besides, urban agriculture is a required to trim down the poverty. So, the policy maker should frame successful policy to alleviate poverty by supporting the agricultural land in urban area instead of the establishment of industries (Mkwambisi *et al.*, 2011). Similarly, the decadence of urban agriculture due to the acquisition of land for the infrastructural and industrial development is a serious problem and considered a threat to economy and ecology (Mishra, 2012). Thus, in recent years, there has been much discussion and debate on land issues related to acquisition for purposes of industrial and infrastructural development.

Most of the studies have emphasized on the causes and effects of growth of the infrastructure, industrialisation and urbanisation without specifically analyzing much about the proportionate loss of agricultural land and thereby, a loss of agricultural production and productivity in the economy due to the acquisition of land. Thus, in the present study, an attempt has been made to examine and analyse the proportionate loss of agricultural land due to the acquisition of land. More specifically the objectives of the study were:

- i. to analyse the proportionate loss of agricultural land due to the acquisition of land in the name of infrastructural and economic development and
- ii. to examine significant difference in the proportionate loss of land per farm due to land acquisition across the areas (irrigated and non irrigated) and farm sizes.

## **METHODOLOGY**

The present study was confined to Bargarh district of Orissa (India). This district is an agriculturally developed district and considered as the rice bowl of Western Orissa. The National Highway-6 (Mumbai to Calcutta) passes through this

district. Recently, the National Highway Authority of India (NHAI) is expanding the National Highway to four lanes and for that government has acquired the agricultural lands without considering its nature and loss of agricultural production.

This study was based on the primary source of data collected through a pre-designed schedule, the help of secondary source of data collected from the published/unpublished records of different departments of the government and other sources has been taken to cross check the primary data for 2011-12. The sample areas were selected by stratified random sampling method. The areas fall in the national highway from Sohela to Bargarh (25 kilometers) both from irrigated (double crop area) and non-irrigated (rain fed) areas. The selection of the sample farmers was made on the basis of Census Method. As such sample consisted of 200 farmers selected randomly who were the victims of land acquisition. The farmers were categorized into three strata such as Small ( $\leq 2$  hectares), Medium ( $\geq 5.01$  and  $\leq 10$  hectares) and Large ( $> 10$  hectares) based on the operational holdings. To test the significant difference in the proportionate loss of land due to land acquisition across the areas and firm sizes, the 'F' value was computed by two-way ANOVA.

## RESULTS AND DISCUSSION

In the name of infrastructural development for the expansion of national highway in the study areas government has acquired the agricultural land without considering its nature, importance and fertility. Due to this, the area operated by the farmers earlier is gradually decreasing and consequently, creating more small and marginal farmers. The total area operated by the farmers before and after acquisition by the government is presented in Table 1.

**Table 1: Area operated by the farmers before acquisition and area acquired by the government**

Farm categories	Farms (%)	Total area operated before acquisition	Percentage of total area operated	Area		Percentage	
				Acquired	Remainder	Acquired	Remainder
<b>Irrigated area (98)</b>							
Small	69.39	82.56	45.95	32.38	50.18	39.22	60.78
Medium	26.53	79.32	44.14	12.14	67.18	15.31	84.69
Large	4.08	17.81	9.91	4.86	12.95	27.29	72.71
Total	100.00	179.69	100.00	49.37	130.32	27.48	72.52
<b>Non irrigated area (102)</b>							
Small	74.50	125.46	54.87	36.42	89.04	29.03	70.97
Medium	20.59	72.85	31.86	14.57	58.28	20.00	80.00
Large	4.91	30.35	13.27	4.05	26.3	13.34	86.66
Total	100	228.65	100.00	55.04	173.61	24.07	75.93
<b>Overall area (200)</b>							
Small	72.00	208.01	50.94	68.80	139.21	33.08	66.92
Medium	23.50	152.17	37.27	26.71	125.46	17.55	82.45
Large	4.50	48.16	11.79	8.90	39.26	18.48	81.52
<b>Total</b>	<b>100</b>	<b>408.34</b>	<b>100.00</b>	<b>104.41</b>	<b>303.93</b>	<b>25.57</b>	<b>74.43</b>

*Source: Field Survey (2011-12)*

*Figures in parentheses are number of farmers.*

It was observed that in irrigated area as the percentage of land operated in the case of small farms was found to be highest (45.95). It was followed by medium (44.14) and large farms (9.91) respectively. Like the irrigated area, the same trend was observed in the case of non-irrigated farms. The percentage of land operated in the case of small farms (54.87) was found to be highest which was followed by medium (31.86) and small farms (13.27) respectively. The results presented in Table 1 revealed that in irrigated area, the percentage of land acquired by the government for the expansion of national highway was found to be highest in the case of small farm (39.22) followed by medium (15.30) and large farms (27.27) respectively.

A similar trend was observed in the case of non-irrigated farms. The area acquired by the government was found to be highest in case of small farm (29.03%) followed by medium (20.00%) and large farms (13.34%) respectively. On the overall level the percentage of acquisition of land by the government was found to be highest in the case of small farm (33.08) followed by large (18.48) and medium farms (17.55) respectively. However, the proportionate loss of land per farm due to land acquisition was different across the areas as well as farm sizes. The perusal of Table 2 revealed that in irrigated area the proportionate loss of land per farm due to land acquisition was found to be highest in the case of small farm (0.39).

**Table 2: Proportionate loss of land per farm due to land acquisition**

Size of the farms	Proportionate loss per farm	
	Irrigated	Non irrigated
Small	0.39	0.29
Medium	0.15	0.20
Large	0.27	0.13
Total	0.27	0.24
F-value across the area		1.18 <sup>NS</sup>
F-value across farm sizes		3.12 <sup>NS</sup>

*Source: Field Survey.*

*NS: Non-significant.*

It was followed by large (0.27) and medium farms (0.15) respectively. However, the trend was quite different in the case of non-irrigated farms. It was found to be highest in the case of small non-irrigated farms (0.29), was followed by medium (0.20) and large farms (0.13) respectively. It was found that there was no significant difference in the proportionate loss of land per farm due to land acquisition across the areas. Similarly, there was no significant difference in the proportionate loss of land per farm due to land acquisition across the farm sizes. The difference in the proportionate loss of land per farm due to land acquisition across the areas and farm sizes are found statistically non-significant. It authenticates that there was proportionate loss of land per farm due to land acquisition irrespective of areas and size classes of farms in the present study.

## CONCLUSIONS

It can be concluded that the proportionate loss of land per farm due to land acquisition by the government for the expansion of national highway in study areas in the case of small farms has higher proportion as compared to other farm sizes. The small farms have become marginalized and found to be afflicted severely. Moreover, it was affecting the rural agriculture due to higher rural-urban migration. This will result in decreased agricultural production succeeded by high density of urban population, industrial pollution, slum development and other natural and human hazards. In order to overcome this problem the farmers should be compensated on the basis of market value of land or allot the land to affected farmers along with adequate compensation for displacement. It is therefore suggested that before the acquisition of land for the expansion of national highways, the government should sensitize the farmers regarding the rehabilitation plan, valuation of land, compensation, employment of the displaced, preservation of environment, etc.

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