

Multivariate Analysis of Socio - Economic Variables of Dairy Farmers Towards Rearing Crossbred Cows in Banaskantha District of Gujarat

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Abstract

Dairy farming in India is one of the most important means of providing livelihood and nutritional security to vast rural population. Though Gujarat is one of the leading states in dairy sector it has inherent constraints of low yielding non-descript cattle population along with scarcity of balanced resources of feed and fodder. No previous attempts had been made to study the attitude of dairy farmers towards rearing of Crossbred cows and relationship analysis between attitude and dairy farmer's characteristics. So taking these considerations, the present study was conducted on the topic 'Multivariate Analysis of Attitude of Dairy Farmers towards Rearing Crossbred Cows in Banaskantha District of Gujarat'. Total 120 dairy farmers were selected as respondents by using multistage random sampling from 12 villages, those who were having at least one Crossbred cow. Data were collected by personal interview method using a well structured interview schedule and collected data were analysed using appropriate statistical tools. The personal, socio-economic, communicational and socio-psychological profile of dairy farmers revealed that most of the respondents belonged to age group of 36 to 50 years and educated up to primary school level, had medium family size and low social participation. Majority were in a no training received group, followed by medium level of training received by farmers, have high experience in dairying and medium level of institutional infrastructure accessibility.

Most of farmers were having semi medium land holding, large herd size, high total annual income and majority of respondents were engaged in dairy farming occupation. Total milk production and sale were found at high level. Majority of the respondents were having high mass media exposure and medium extension contact. Most of the respondents were having high economic motivation and medium risk orientation. Majority of the respondents had neutral attitude towards rearing Crossbred cows, followed by favourable and unfavourable attitude. The variables namely education, social participation, training received, institutional infrastructure accessibility, occupation, herd size, milk sale, total annual income, extension contact and economic motivation had shown positive and highly significant relationship with the attitude of dairy farmers. While age showed the negative and significant relationship with attitude of dairy farmers towards rearing Crossbred cows. Repeat breeding problems in Crossbred cows due to faulty A.I. techniques and non availability of expert services to treat repeat breeders were the most important constraint experienced by dairy farmers. The study highlighted the need of organizing more number of training related with Crossbred cows rearing practices and active participation by dairy farmers which would bring a significant change in the attitude of dairy farmers towards Crossbred cows.

Key words: Repeat Breeding; Crossbreeding; A.I. Technique; Attitude; Dairy Farmers.

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Introduction

India has a major share of the global population of the livestock with rich and vast genetic resources. Livestock industry plays an important role in national economy and socio-economic development of our country. Out of this industry, dairying is a valuable treasure and source of poverty eradication, employment generation and an instrument of social change in rural India. Dairy farming in India is one of the most important means of providing livelihood and nutritional security to vast rural population. India, with its sizeable dairy sector is growing rapidly and moving towards modernization, resulting in prosperity in the years to come. During the last few decades of dairy development, thanks to Operation Flood Programme. India has emerged as the largest milk producing country in the World with 133 million tonnes and during 2012-13. The milk production of Gujarat state is 9.82 million tonnes and rank 4th in the country. Banaskantha district produce milk 32 lakh liters per day (www.dahd.nic.in/annual-report/socio-economic-review-2011-12, Gujarat state). Although per capita availability of milk has increased from 112 grams per day in 1968-69 to 276 grams per day in 2010-11, yet it is still low as compared to requirement of 290 grams per day (Indian Dairy Man, March, 2012). In the state per capita availability of milk is 435 gm/day during 2010-11.

India is home to the world's largest dairy herd, but the country still faces a production shortfall due to massive demand from growing population and also low productivity of Indian cows. In spite of India's position as highest producer of milk, productivity per animal is very poor. It is only about 987 kg / lactation as against world average of 2,038 kg / lactation. This low productivity is due to the gradual genetic deterioration and rises in the population of non-descript cows (80 per cent) and buffaloes (50 per cent) (NDDB, 2010-11).

Cross breeding, scientifically speaking is the mating of animals belonging to different breeds. Cross breeding in local cattle with exotic dairy breeds was introduced in the country to improve their genetic potential so as to produce cows having characteristics, like higher lactation yield, early maturity, lower age at first calving and shorter dry period.

Use of modern inputs and adoption of new agricultural technology are undoubtedly more important in increasing farm productivity. Numerous improved technologies have been developed in the recent past in the field of Animal Husbandry sector. In spite of intensive efforts by the

scientists and extension workers these technologies have failed to make inroads among the livestock farmers. Various reasons have been put forth for this debacle, which includes lack of interest at the level of livestock farmers, lack of awareness, lack of technical knowledge, lack of technical facilities, lack of resources, social and economical constraints, lack of infrastructural facilities, low literacy rate, poor adaptability and suitability of technologies etc. That's why detail understanding of the changing rural scenario, preferences, needs and problems associated with rural life, improved animal husbandry and veterinary practices are must for ensuring growth and development of livestock sector. Thus, there is a strong need to overcome these constraints so that our livestock farmers in these regions can better adopt the improved practices and make their dairy more profitable one for their socio-economic development. It is necessary to motivate farmers to adopt modern technologies instead of traditional farming. This is possible only by imparting continuous training and education with financial assistance in kind.

Even though studies carried out in different disciplines showed a vast difference in performance of Crossbred and indigenous cattle, not a single study had been undertaken in extension perspective like attitude of dairy farmers towards rearing of Crossbred cows, relationship analysis between attitude and dairy farmers characteristics and constraints experienced during rearing Crossbred cows under field condition, which is very much essential for the successful implementation of the various cross breeding programmes of the state.

The productivity potential of Crossbred cattle in Gujarat is still to be realized. With this perspective an empirical study was carried on "Multivariate Analysis of Attitude of Dairy Farmers towards Rearing Crossbred Cows in Banaskantha District of Gujarat" To find out personal, socio-economic, communicational and socio-psychological characteristics of the dairy farmers, to measure the attitude of dairy farmers towards rearing Crossbred cows, to determine the relationship between attitude and characteristics of dairy farmers, to identify the constraints experienced by dairy farmers in rearing of Crossbred cows and to seek the suggestion from Crossbred owners to overcome constraints-problems.

Materials and Methods

Research methodology is considered to be a 'blue-print' of the research architect. The term

methodology, in broad sense, refers to the process, principles and procedures by which we approach our problem and seek its answer. In social science, the term “methodology” is applied to know about how one carries out the process of research. In this chapter, an attempt has been made to explain the various methods and procedures followed to investigate the problem.

Area of the Study

For the present study, Banaskantha District was purposively selected. Animal Husbandry is the most important subsidiary activity of farming community of the district. Also Banaskantha is the leading district in milk production in the state and having highest cattle and buffalo population in the state. The district is considered as the milk bowl of the state. Through co-operative and state animal husbandry department, the assured veterinary services and milk marketing facilities are available to the dairy farmers. The district is having one of the four Agricultural Universities of Gujarat state, i.e., Sardarkrushinagar Dantiwada Agricultural University, where the College of Veterinary Science and Animal Husbandry, the Dairy Science College and Polytechnic for Diploma in Veterinary Science & A. H. are located. Familiarity of the investigator with respect to the area, people and officials; which made possible for the investigator to elicit the information from the respondents within the limited time.

Background information of the Banaskantha District

The district is located in the North-East of Gujarat and is presumably named after the West Banas river which runs through the valley between Mount Abu and Aravalli range, entering into the plains of Gujarat in this region and flowing towards the Rann of Kutch. Banaskantha is one among the thirty three districts of the Gujarat state of India. The

administrative headquarters of the district is at Palanpur which is also its largest city.

In Gujarat, district of Banaskantha lies in the North-East part. To its North is Rajasthan state and to its South lies the Patan and Mehsana district. Sabarkantha district flanks it in the East and district of Kutch district is in the West. It is located approximately in between 71°25' east longitudes and 23°45' north latitude. As of 2011 Indian census, the Banaskantha district has a population of 3,116,045. The total geographical area is 10,751 Km². The district ranks first in the state in the production of vegetables contributing nearly 17.67% to the total vegetable production of Gujarat. It is the largest producer of potatoes in the state. Bajari, Maize, Tobacco, Castor oil, Jowar, Psyllium are the other major crops of the district. It is also one of the leading producers of Isabgol (Psyllium husk) in the country. It is also the 3rd largest producer of oil seeds in the state after Junagadh district and Jamnagar district. Banaskantha District Central Co-operative Bank is one of the most important banks of Gujarat.

Research Design

The study was confined to “ex-post-facto” research design as the independent variables had already operated in study area. Kerlinger (1976) stated that “ex-post-facto” research design is worthy to apply when the independent variables have already acted upon.

Sampling Techniques

Selection of taluka and villages

Out of twelve taluka of Banaskantha district, three taluka like Palanpur, Deesa and Vadgam were selected randomly. The selected taluka are shown in fig.3.1 from each selected taluka, four villages were selected by random sampling, thus making total of twelve villages.

Table: List of selected taluka and villages

Taluka	Villages		
Palanpur	Gadh	Kushkal	Mota
Deesa	Tetoda	Serpura	Davas
Vadgam	Vadgam	Kodaram	Mumanvaas

Selection of the respondents

A list of respondents / farmers having atleast one Crossbred cow was prepared taking help of local villagers and panchayat leaders and the respondents who were having atleast one Crossbred cow were selected randomly. From each village ten respondents were selected making a total of 120 (ten farmers from each village) respondents.

Selection of Variables

For any study undertaken in social research, it is customary to precisely mention the variables used for the study with their working concepts and measurement procedures. After the collection of review of literature and consultation with the experts,

relevant variables were selected for the study. Table depicts the variables and their respective measurement at a glance.

◆ Independent variables

1. Socio-economic variables
 - i. Land holding
 - ii. Occupation
 - iii. Total annual income
 - iv. Herd size
 - v. Total milk production
 - vi. Milk sale

Variables along with techniques used for their measurement

Tools for The Study

Keeping in view the objectives of the study, a structured interview schedule was prepared, While formulating questions for the schedule, the investigator sought the help and technical guidance from available literature, teaching staff of the Department of Extension Education, the senior faculty of College of Veterinary Science and A.H., Sardarkrushinagar Dantiwada Agricultural University, Sardarkrushinagar and State Government Veterinary Officer of Animal Husbandry department as well as Veterinarians of co-operative dairy. The respondents were interviewed personally, with the help of structured interview schedule.

Pre-Testing of The Interview Schedule

In order to test the administrability of each question and statement and to remove ambiguity in measuring instruments if any, pre-testing was carried out with twenty non sample dairy farmers. The respondents were informed about the importance and purpose of the study. On the basis of the responses received and the problems encountered during interview, necessary changes were made and the final schedule was prepared, which was translated into Gujarati for formal data collection.

Method of Data Collection

The investigator personally interviewed the farmers selected for the study. The objective of collection of information was made cleared to the farmers to build up their confidence and faith. The respondents were contacted during their leisure time either at their farm or home.

Measurement of Variables

Measurement of independent variables

Socio-economic variables

Land holding

It implies the area of cultivated land in which the respondents possessed. It was measured by direct questioning. The respondents were categorized into landless, marginal, small, semi-medium, medium and large group as per Government of India (2001):

- | | | |
|----------------|---|--------------|
| a) Landless | : | 0 hectare |
| b) Marginal | : | <1 hectare |
| c) Small | : | 1-2 hectare |
| d) Semi-medium | : | 2-4 hectare |
| e) Medium | : | 4-10 hectare |
| f) Large | : | >10 hectare |

Occupation

Occupation refers to means through which a person earns livelihood for his family. Operationally, it was defined in terms of the farmer's source of earning viz., Agriculture, Dairying, Labour, Services and Business. Respondents were asked to indicate their main and subsidiary occupation separately. Frequency distribution was used to classify the respondents into the following occupational categories

- ☛ Agriculture
- ☛ Dairying
- ☛ Agriculture + Service
- ☛ Service
- ☛ Business
- ☛ As a labourer

Total annual income

It refers to the total annual earnings of the respondents in rupees accrued from dairying as well as from other sources. It was measured with the help of schedule and respondents were categorized by using mean and standard deviation.

Category	:	Annual Income (Rs.)
Low	:	Less than (Mean - S.D.)
Medium	:	(Mean - S.D.) to (Mean + S.D.)
High	:	Above (Mean + S.D.)

Herd size

In present study, herd size refers to the total number of bovines of different age group, i.e. cattle (Crossbred and local) and buffalo owned by the respondent at the time of investigation. It was ascertained by direct questioning/measured with the help of a schedule and then the respondents were categorized into small, medium and large herd size groups by using the mean and standard deviation.

Category	:	No. of animals
Small	:	Less than (Mean - S.D.)
Medium	:	(Mean - S.D.) to (Mean + S.D.)
Large	:	Above (Mean + S.D.)

Total milk production

It refers to the average total quantity of milk in liters per day produced by household on previous day of data collection. It was measured with the help of schedule or the information was collected by directly asking to the respondent.

Respondents were categorized into low, medium and large producer's categories on the basis of mean and standard deviation.

Category : Milk production (liters/day)

Small producer : Less than (Mean - S.D.)

Medium : (Mean - S.D.) to (Mean + S.D.)

Large producer : Above (Mean + S.D.)

Milk sale

It refers to the quantity of milk sold by the respondents out of total milk produced per day. The information was collected by directly asking to the respondent and then categorized by using mean and standard deviation.

Category : Amount (litres/day)

Low selling group : Less than (Mean - S.D.)

Medium selling group: (Mean - S.D.) to (Mean + S.D.)

Large selling group : Above (Mean + S.D.)

Statistical Framework Used For Analysis of The Data

The data collected from the respondents were classified, scored, compiled, and tabulated in the light of objectives of the study/statementwise with respect to each of the variable contained in the schedule. Master sheets were prepared with pooled scores for respective objectives and then subjected to various statistical tools to draw the logical conclusions.

Based on the nature of the study, various statistical tools were used particularly relevant to full fill the specific objectives of the present study. These were frequency, percentage, mean, standard deviation, correlation, regression and path analysis.

The tabulated data were analyzed statistically with the help of following statistical tools and methods:

Percentage

The percentage value was calculated to make simple comparisons. Percentage value was calculated by dividing the frequency in the particular cell by number of respondents and multiplying it by 100.

Frequency

This was used to find out the number of respondents in each cell.

Mean scores

The arithmetic average of the set of the data had to be often computed during the analysis of data. This measure was used to see the central tendency of the data. The mean score of a series of data was equal to the sum of the individual measures divided by the total number of respondents.

The mean was used for the categorization of the respondents and it was calculated by using following formula

$$X = \frac{\sum X_i}{n}$$

Where,

X = General mean

X_i = Observed value

n = Total number of respondents

Standard deviation

The standard deviation is defined as the square root of the mean of the squared deviations of individual values from their means. It indicates a sort of group standard spread of values around their mean.

Standard deviation was used for classification of the respondents in the different categories

$$SD = \sqrt{\frac{\sum (X_i - X)^2}{n - 1}}$$

Where,

S.D. = Standard deviation

X_i = Observed value

X = General mean

n = Total number of respondents

Co-efficient of correlation

Pearson's co-efficient of correlation co-efficient was used to calculate 'r' value, which facilitated the relationship between dependent and independent variables.

$$r = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

Where,

r = co-efficient of correlation

X = Independent variable

Y = Dependent variable

$\sum xy$ = Sum of product of the deviation of X and Y from their mean

$\sum x^2$ = Sum of square of the deviation of X from their mean

$\sum y^2$ = Sum of square of the deviation of Y from their mean

Hypothesis: Null hypothesis: Population correlation co-efficient is 0

Alternative hypothesis: Population correlation co-efficient is not 0

Multiple regression analysis

Regression analysis provides an estimate of values of dependent variable from values of independent variables

The prediction equation used as:

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

Where,

Y = Predicted dependent variable

a = Intercept or constant

$b_{i=}$ Regression coefficient between i^{th} independent variable with

dependent variable where $i = 1, 2 \dots k$

$x_1 \dots x_k$ = Independent variable

Hypothesis

Null hypothesis: Estimated multiple linear equation is not significant

Alternative hypothesis: Estimated multiple linear equation is significant

Path analysis

This multivariate linear path model was adopted to explain direct and indirect effects of independent variables on dependent variables. The postulated model is:

$$ryx_i = \frac{n}{pyx_i + \sum_{i=1}^n rx_i x_j \times pyx_j}$$

Where,

ryx_i = Correlation co-efficient of X_i with Y

pyx_i = Direct effect and each of the other term in the equation is an indirect effect

I = 1, 2, 3,, n

n = Indirect effect of independent variable to dependent

$\sum rx_i x_j \times pyx_j$ = via another independent variable

$$i = 1$$

Results and Discussion

● *To find out socio-economic characteristics of dairy farmers.*

The results derived on these aforestated characteristic of the respondents under present study highlight their personal traits. Information on these traits are useful as traits were assumed to correlate with attitude and also helps in estimation of dependent variable (attitude) of the respondents towards rearing Crossbred cows. The data collected were analyzed and results are discussed under the following subheads:

● *Family size*

Table clearly indicated that majority (80.00 per cent) of the respondents had medium family size of 5 to 7 members whereas, 13.33 per cent and 6.67 per cent of respondents belonged to small (<5) and large family size (>7), respectively.

Personal profile of dairy farmers**n=120**

The present finding get support from the finding reported by Sah (2005), Babu (2007), Raut (2010) and Alam (2012).

● *Social participation*

Table clearly indicated that majority (82.50 per cent) of the respondents had low social participation, followed by medium level (15.00 per cent) of social participation. It also states that 2.50 per cent of respondents had high level of social participation.

This finding is similar to the finding reported by Temkar (2000), Gour (2002) and Ashwar (2005).

● *Training received*

It is evidently clear from the figures in table that 35.00 per cent of the respondents had not received any training. It was followed by respondents who had received training two times (34.16 per cent). It was followed by respondents who had received training only once (25.00 per cent) and three or more times training (05.84 per cent).

This finding is similar to the finding reported by Baindha (2011).

● *Institutional infrastructure accessibility*

Table clearly indicates that 51.67 per cent of respondents had medium level of Institutional infrastructure accessibility, followed by high (30.00 per cent) and low (18.33 per cent). It means dairy farmers having medium Institutional infrastructure accessibility should be brought maximum under umbrella of Crossbred cows rearing programme.

This finding is similar to the finding reported by Kannan (2002), and Prakash (2005).

● *Experience in dairying*

Table clearly indicated that majority (57.50 per cent) of the respondents had high level of experience in dairying ranging from 15 years to more than 15 years, followed by medium (40.83 per cent) and low (1.67 per cent) level of experience in dairying.

● *Socio-economic profile of dairy farmers*

To study the socio-economic profile of the respondents the related variables were analyzed and results are presented in table, which are subjectively described in the following sub-heads:

◆ *Land holding*

Table showed that 29.16 per cent of the respondents were possessed 2-4 hector of land, followed by up to 4-10 hector (28.33 per cent), whereas 13.35 per cent of respondents possessed less than one hector of land and 3.33 per cent of respondents possessed more than ten hector of land

and rest of 02.50 per cent of respondents were landless.

The present finding gets support from the finding reported by Patel (2005) and Prajapati (2008).

● *Occupation*

Table showed that 35.00 per cent of respondents had dairying as their occupation, followed by 31.67 per cent of the respondents having agriculture as their occupation. It was followed by 14.16 per cent of respondents having agriculture with service and 7.50 per cent of respondents had labour as their occupation. Whereas, 6.67 per cent of respondents having their own business followed by 5.00 per cent had service as their occupation.

● *Total annual income*

It could be observed from table that more than half of the respondents (58.34 per cent) were under high income group (Rs. > 2, 13,000), followed by (30.83 per cent) respondents under medium income and (10.83 per cent) respondents under low income group.

The present finding gets support from the finding reported by Patel (2006).

● *Herd size*

Table clearly enunciated that majority (54.16 per cent) of respondent's possessed more than 8 animals. While 34.16 per cent of respondents possessed 4- 8 animals, followed by 11.68 per cent of respondents having less than 4 animals.

The finding is in line with the findings reported by Lokhande (2009) and Tak (2010).

● *Total milk production*

Table indicated that more than half of the respondents (56.67 per cent) were in the large producer category (> 18 litres/day/household) of milk production, whereas 25.00 per cent and 18.33 per cent of dairy farmers were in medium and small category of milk production. The overall average milk production per day was 38.95 litres/day/household.

● *Milk sale*

Table indicated that majority of the respondents (60.00 per cent) were in the large category (>12 litres/day/household) of milk sale which was followed by 23.33 per cent and 16.67 per cent of respondents in the medium and low category of milk sale groups. The average milk sale per day was 35.79 litres/day/household.

This finding is similar to the finding reported by Gaikwad (2010). The data shown in table clearly revealed the suggestions expressed by dairy farmers

Socio-economic profile of dairy farmers**n=120**

Sr. No.	Variables	Mean	Category	Frequency	Percentage
			Landless (0)	03	02.50
			Marginal (<1)	16	13.35
1.	Land holding (hectare)	3.54	Small (1-2)	28	23.33
			Semi medium (2-4)	35	29.16
			Medium (4-10)	34	28.33
			Large (>10)	04	03.33
			Agriculture	38	31.67
			Dairying	42	35.00
2.	Occupation	3.025	Agriculture+	17	14.16
			Service	06	05.00
			Service	08	06.67
			Business	09	07.50
			Labour	09	07.50
			Low (<93,000)	13	10.83
3.	Total income (Rupees)	2,99,653	Medium (93,000-2,13,000)	37	30.83
			High (>2,13,000)	70	58.34
4.	Herd size (no. of animals)	10.77	Small (<4)	14	11.68
			Medium (4-8)	41	34.16
			Large (>8)	65	54.16
			Small (<10)	22	18.33
5.	Total milk production (litres/day)	38.95	Medium (10-18)	30	25.00
			Large (>18)	68	56.67
			Low (<7)	20	16.67
6.	Milk sale (litres/day/household)	35.79	Medium (7-12)	28	23.33
			Large (>12)	72	60.00

of Banaskantha district for overcoming the constraints in rearing Crossbred cows. Their suggestions were: Expert services should be made readily available at village level to treat the repeat breeder was ranked first suggestion. These was followed by suggestion of lay insemination of village milk co-operative societies and livestock inspectors should be given extensive training to improve knowledge and skill for better result of A.I. and step should be taken to come down concentrate and fodder price was second ranked followed by veterinary services should be made available at

village level and that to at affordable price was third ranked followed by veterinary health care and fertility improvement camp should be organized time to time for poor productive animals, dairy farmers should be given training on the aspects of mastitis control, importance timely vaccination, deworming and management and health aspects, provision for timely and easy availability of sufficient loan for purchase of animals, step should be taken to come down concentrate and fodder price and inputs at affordable intern.

Suggestion expressed by dairy farmers

The important suggestion of Crossbred owners to overcome the constraints in rearing of Crossbred cows

Sr. No.	Suggestions of dairy farmers	Number of respondents	Percent	Rank
1	Expert services should be made readily available at village level to treat the repeat breeder.	118	98.33	I
2	Lay insemination of village milk co- operative societies and livestock inspectors should be given extensive training to improve knowledge and skill for better result of A.I.	113	94.16	II
3	Step should be taken to come down concentrate and fodder price.	113	94.16	II
4	Veterinary services should be made available at village level and that to at affordable price.	104	86.66	III
5	Veterinary health care and fertility improvement camp should be organized time to time for poor productive animals.	101	84.16	IV
6	Dairy farmers should be given training on the aspects of mastitis control, importance timely vaccination, deworming and management and health aspects.	101	84.16	V
7	Provision for timely and easy availability of sufficient loan for purchase of animals and inputs at affordable interest rate is to be there.	93	77.50	VI
8	Mastitis control measures should be there at every village level through co-operative or ICDP.	87	72.50	VII
9	Provision of incentive for production of hygienic milk should be there.	81	67.50	VIII
10	Remunerative price for milk and milk products should be provided.	77	64.16	IX
11	Fodder storage depot should be there from government side and at the time of drought dairy farmers should be given fodder on rationing basis for their animals.	73	60.83	X

Conclusion

Lastly we could conclude that any activity whether of a single individual or a group, whether in private or public sector, whether concerning social, political, religious or economic matters is never without some sort of ordinary, moderate or acute constraints. If one considers dispassionately, even the most successful act is seldom without the existence of constraints, hurdles, roadblocks of difficulties. It could at the best be said, in this context, that where we want our activity really a great successful one, whatsoever possible barriers/hurdles/problems/impediment there, be envisioned in advance and appropriate actions should be taken to eliminate or minimize their influence. It is not considered enough to merely cite the constraints, but the real purpose is to bring about consciousness and realizations for dealing with them based on further knowledge. Just as forewarned is

four- armed, the knowledge about constraints can make the implementations and planners of the programme, wise and boldly confident to minimize, if not completely eliminate, these constraints.

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