

Original Research Article

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## A Critical Comprehension of Enactment Behavior in Bee Keeping Management by Farmers of Madhya Pradesh

R. S. Gurjar<sup>1\*</sup>, Arun Kumar<sup>1</sup> and S. K. Badodiya<sup>2</sup>

<sup>1</sup>Department of Agricultural Extension Education, BRAUSS Mhow Indore (MP), India

<sup>2</sup>RVSKVV, Krishi Vigyan Kendra, Barwani (MP), India

\*Corresponding author

### ABSTRACT

#### Keywords

Enactment behavior, Bee keeping farmers, Bee keeping management practices, Planning ability, Coordinating ability and Self-confidence

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Management is the coordination and administration of tasks to achieve a goal. The present study was conducted in adjoining area Morena city of Madhya Pradesh. A list of farmers who are involved in bee keeping farming was prepared. From this list 200 bee keeping farmers were selected by random sampling method. The study revealed that majority 66.50 percent respondents had medium level of adoption behavior about bee keeping management practices. The adoption behavior was positively and significantly related with education, bee keeping experience, land holding, bee keeping colony possession, occupation, annual income, material possession, extension contact, economic motivation, market orientation, scientific orientation, information seeking behavior of bee keeping farmers towards bee keeping farming and knowledge of improved bee keeping management practices found to have positive and significant relationship with adoption behavior. The major general constraints expressed by respondents were poor irrigation facilities for growing flower crops (62.00%), Lack of technical-know how about disease management practice (68.00%) and high cost of bee keeping farming and its equipments (60.00%).

### Introduction

Adoption of a bee keeping is a method of commercial sponsorship in the bee keeping farming raising sector. Entrepreneurship is a key factor for the survival of small scale farming in an ever-changing and increasingly complex global economy. In agripreneurship, the most important thing that stakeholders need to remember is that the business needs to now have a much more enhanced commercial

activity that involves trade and trading in every form.

The enterprise which in this case is the business or organization that provides goods or services aiming to make a profit needs to have a value capture. That means that the enterprise needs to maintain the percentage of the value they provide in every single transaction. Entrepreneurship, after all, is all about high quality and value.

Beekeeping has great scope in our country to develop as prime agro-horticulture based rural cottage industry, ideally suited to the rural, tribal, youth and other categories of the weaker sections of society. The peculiarity of this industry is that it does not require any raw material from the artisan like other industries. The raw material is in the form of nectar and pollen from flowers which is freely available in nature. Beekeeping as an enterprise, can be started by anyone who takes keen interest, man or woman, skilled or unskilled, having own land or not. This enterprise implies a technology that is simple, easily accessible; demanding the least capital investment and the produce (honey and wax) can be stored for a long period.

Honey is largely used on a small scale as well as at an industrial level in baked products, confectionary, candy, marmalades, jams, spreads, breakfast cereals, beverages, honey products and many preserved products. In particular, the relatively new industry of 'Natural', health and biological products uses honey abundantly as the sweetener of first choice. The other major role of the honey bees as agents of pollination is rarely appreciated, though available information reveals that annual income through augmentation of crop yields due to bee pollination is at least 20 times or even more than the one from honey and bees wax.

Technology in agriculture can be used in different aspects of agriculture. Small scale farmers face both internal and external challenges as far as the adoption of modern agricultural technologies is concerned. Management is essential for an organized life and necessary to run all types of management. Good management is the backbone of successful organizations. Managing life means getting things done to achieve life's objectives and managing an organization means getting things done with and through

other people to achieve its objectives. Keeping the above facts in view, the present study has been designed to analyze the enactment behavior of dairy farmers. The following specific objectives have been formulated for the study.

1. To study the socio-economic profile of beekeeping farmers.
2. To study the extent of adoption of scientific beekeeping management practices of beekeeping farmers.
3. To explore the relationship between socio-economic profile of bee keeping farmers with their adoption of beekeeping management practices.
4. To find out the constraints faced by beekeeping farmers in adoption of beekeeping enterprise.

### **Materials and Methods**

This study was conducted in Morena district of Madhya Pradesh purposively due to the research centre namely Integrated Beekeeping Development Centre was established at ZARS Morena by National Bee Board New Delhi. A list of villages where maximum numbers of farmers were engaged in bee keeping was prepared with the help of extension official; out of these 5 villages of Kailarash and Joura blocks were purposively selected due more number of farmers were engaged in bee keeping, a total 10 villages were randomly selected for study. A village wise list of bee keeping farmers was prepared and 20 farmers from each village were randomly selected. Thus, the total sample consisted of 200 farmers spread over ten selected villages. The primary data were collected from the respondents by using a semi-structured interview schedule, which was pre-tested before actual application. The respondents were interviewed individually by the investigator. Secondary data were collected from records & statistical office. Statistical

tools like- mean, SD, percentage and Karl Pearson's coefficient of correlation and multiple regression analysis were used for analysis of data.

## **Results and Discussion**

### **Profile and entrepreneurial behavior of bee keeping farmers**

The data in Table 1 shows that maximum number of the respondents (47%) belonged to middle age group and higher percentage (29.00%) of bee keeping farmers educated up to primary level followed by 21.50 percent of the respondents had education at high school level. Majority of the beneficiary respondents (53.50%) belonged to Other Backward Caste (OBC), followed by General Caste category (25.00%), majority 50.50 per cent of the respondents had medium family size and less than half of bee keeping farmers (42.50%) had high level of experience (above 10 years) in bee keeping. The data in Table 1 indicates that less than half of (44.00%) the bee keeping farmers possessed small level of bee keeping colony/material and maximum (42.50%) bee keeping farmers possessed up to 1 ha. of land. The data exhibits the distribution of bee keeping farmers according to their occupation. The data shows that most of the 42.50 per cent of the respondents engaged in farming + agriculture followed bee keeping farming. Majority (51.00%) of the bee keeping farmers had low level of annual income. It is apparent that majority (61.00%) of the bee keeping farmers possessed medium level of material possession.

The perusal of data indicates that majority (57.50%) of the respondents had medium level of extension contact and the majority 60.50 percent of respondents was from medium category of economic motivation. The majority 64.00 percent of the bee keeping

farmers had medium market orientation towards bee keeping farming and majority of bee keeping farmers (70.00%) had medium level of scientific orientation. Majority 59.00 per cent of the bee keeping farmers had medium information seeking behavior and majority 64.00 per cent of the bee keeping farmer had medium knowledge level about bee keeping farming while 22.50 per cent had low knowledge level. Almost similar findings were reported by Badodiya *et al.*, (2017), Shah *et al.*, (2010) and Pooja *et al.*, (2014).

### **Extent of adoption of scientific beekeeping technologies by beekeepers**

Extent of adoption of scientific beekeeping technologies by farmers has been presented in Table 2. It reveals that majority (66.50 per cent) of the beekeepers had a medium level of adoption of scientific beekeeping technologies and 18.50 per cent of the beekeepers had high level of adoption of scientific beekeeping technologies. Only 18.00 per cent of the respondents had low level of adoption of scientific beekeeping technologies. The possible reason for medium to high level of adoption of scientific beekeeping practices is the technical support provided by various agencies promoting beekeeping in the area such as Chambal Beekeeping Society, Non Government Organization like Morena Honey, and Zonal Agriculture Research Station Morena. This result is similar to the results obtained by Esakkimuthu (2015) and Gurjar *et al.*, (2019).

### **Practice wise adoption and overall adoption behavior of bee keeping farmers with regards to improved bee keeping management practices**

In the present study, extent of adoption of twelve scientific beekeeping technologies was studied. These include sugar solution to honey bees during April-June, beehive inspection at

least once a week, application of formic acid at 0.01% to control the bee enemies, heating of honey before bottling, use of mechanical honey extractor for the extraction of honey, beehive handling training, keeping of honeybee box in the forest area/community land, placing of the bee box in the north-south direction, extraction of any other product apart from honey, use of sugarcane molasses/pine apple extract as feed, keeping the beehives near fruit/flowering plants and making of any other value added product from honey. Extent of adoption of each of these twelve technologies has been presented in Table 3.

Artificial feeding of sugar solution to honey bees during lean season (April - June) and handling of beehive frames was adopted by maximum number of the beekeepers (92.00 per cent). High adoption of this technology was due to emphasis given by extension staff of Morena Beekeeping Society during training programs. Artificial feeding of honey bees during lean season is essential for their survival till the next monsoon.

Handling of beehive frames was also adopted by a large number of beekeepers (90.00%) as all the beekeeping promoting institutions provide skill training on how to handle the beehives without disrupting the bees.

The practice of beehive inspection for predators at least once a week by the beekeepers was also highly adopted (91.00 per cent). Inspection of beehives was included in the training programs due to which the farmers had adopted this practice on a large scale. While explaining the procedure, they were also made aware of the need to protect the honey bees from natural enemies like wasps, red ants, termites, etc. and regular inspection is also necessary to avoid rotting of honey.

Proper placement of beehives near fruit/flowering plants was adopted by large number of the beekeepers i.e. 92.50 per cent. In the study area it was noticed that large area is under cultivation of horticultural crops as it receives rainfall from both monsoons. Large number of beekeepers also places the beehive boxes near annual and perennial trees like Tamarind tree, Mango tree, Eucalyptus tree which leads to maximum yield of honey.

Among the highly adopted technologies, use of sugarcane molasses extract as an artificial feed for honeybees, was adopted by (91.50 per cent) of the beekeepers. This technology was adopted by vast number of beekeepers due to easy availability of pine apple and sugarcane molasses as industrial waste. High adoption of this technology can be attributed to significant enhancement in yield following adoption and easy availability of sugarcane molasses/pine apple extract from industries.

Application of formic acid at 0.01% concentration level to control the predators (red ants) was adopted by large number of the beekeepers (80.00 per cent). During training programs, the importance and rewards of application of formic acid was conveyed by Morena honeybee keeping Society extension staff. Wide adoption of this technology can also be attributed to demonstration of preparation of 0.01% formic acid solution during the training programs.

Placing honeybee box in the community land was adopted by 70.00 per cent of the beekeepers. In the study area, maximum numbers of respondents were marginal, small farmers due to which they have to place the honey bee boxes in the community land, forest land and public land and near the water bodies for easy collection of honey by the honeybees. Further, yield of honey is also high when the bee boxes are shifted frequently.

**Table.1** Profile of the bee keeping farmers

<b>SN</b>	<b>Traits</b>	<b>Category</b>	<b>Frequency</b>	<b>Percentage</b>	<b>Mean</b>	<b>SD</b>
<b>1</b>	Age	Young (below 35 yrs)	50	25.00	2.03	0.72
		Middle (35-55 yrs)	94	47.00		
		Old (above 55 yrs)	56	28.70		
<b>2</b>	Education	Illiterate	39	19.50	1.73	1.27
		Up to primary	58	29.00		
		Up to middle	40	20.00		
		High school	43	21.50		
		Higher sec. &above	20	10.00		
<b>3</b>	Caste	General	51	25.50	1.96	0.68
		OBC	107	53.00		
		SC/ST	42	21.50		
<b>4</b>	Farming experience	Low(below 5 yrs)	49	24.50	2.19	0.80
		Medium(5-10 yrs)	66	33.00		
		High(above 10 yrs)	85	42.50		
<b>5</b>	Bee keeping colony possession	Low (<0.99)	88	44.00	1.85	0.84
		Medium (0.99-2.69)	53	26.50		
		High(>2.69)	59	29.50		
<b>6</b>	Land holding	Marginal (up to 1 ha.)	85	42.50	2.02	1.37
		Small (1.1 to 2 ha.)	32	16.00		
		Medium (2.1 to 5 ha.)	37	18.50		
		Large (above 5.1 ha.)	46	23.00		
<b>7</b>	Occupation	Bee keeping Farming	71	35.50	1.86	0.74
		Bee keeping Farming + Agriculture	85	42.50		
		Bee keeping Farming + Agriculture+ Other	44	22.00		
<b>8</b>	Annual income	Low (<0.87)	102	51.00	1.72	0.82
		Medium (0.87-2.53)	50	25.00		
		High (>2.53)	48	24.00		
<b>9</b>	Material Possession	Low (<15.52)	50	25.00	24.90	9.28
		Medium(15.52-34.14)	122	61.00		
		High (>34.14)	28	14.00		
<b>10</b>	Mass media participation	Low (<2.74)	65	32.50	4.79	2.06
		Medium (2.74-6.86)	107	53.50		
		High (>6.86)	28	14.00		
<b>11</b>	Extension contact	Low (<7.65)	50	23.00	10.94	3.41
		Medium (7.65-14.0)	115	59.00		
		High (>14.0)	35	17.50		
<b>12</b>	Economic motivation	Low (<29.44)	51	25.50	19.73	6.44
		Medium (29.44-72.92)	121	60.50		
		High (>72.92)	28	14.00		
<b>13</b>	Scientific orientation	Low (<4.94)	44	22.00	7.37	2.43
		Medium (4.94-9.8)	140	70.00		
		High (>9.8)	16	08.00		
<b>14</b>	Knowledge about improved bee keeping practices	Low (<17.62)	45	22.50	12.60	5.25
		Medium (17.62-32.28)	118	59.00		
		High (>32.28)	37	18.50		

**Table.2** Distribution of the respondents based on extent of adoption of scientific beekeeping technologies (N=200)

S. No	Category	Frequency	Percentage
1	Low (<13.74)	36	18.00
2	Medium (13.74-27.68)	133	66.50
3	High (>27.68)	37	18.50
<b>Total</b>		<b>200</b>	<b>100.00</b>
<b>Mean</b>		20.72	
<b>SD</b>		6.91	

**Table.3** Distribution of respondents according to their adoption behavior about improved bee keeping management practices

SN	Scientific beekeeping technologies	Adoption		Non-adoption	
		Frequency	%	Frequency	%
1	Artificial feeding of sugar solution during lean season (April-June)	184	92.00	16	8.00
2	Handling of beehive frames	180	90.00	20	10.00
3	Beehive inspection for predators at least once a week	182	91.00	18	9.00
4	Placement of beehives near fruits/flowers plants	185	92.50	15	7.50
5	Use of sugarcane molasses extract as feed	183	91.50	17	8.50
6	Application of formic acid near the beehives at 0.01% to control the enemies	160	80.00	40	20.00
7	Keeping honey bee boxes in the community land	140	70.00	60	30.00
8	Placing of the bee boxes in north south directions	132	66.00	68	33.00
9	Extraction of other products apart from honey	118	59.00	82	41.00
10	Use of mechanical honey extractor for extraction of honey	87	43.50	113	56.50
11	Marketing other value added products from honey	30	15.00	170	85.00
12	Heating of honey before bottling	29	14.50	171	85.50

**Table.4** Relationship between adoption behaviors of bee keeping farmers with their characteristics

S. No	Variable	Correlation coefficient (r)
1	Age	0.127 <sup>NS</sup>
2	Education	0.322**
3	Caste	-0.050 <sup>NS</sup>
4	Family size	-0.014 <sup>NS</sup>
5	Experience in beekeeping farming	0.270*
6	Bee keeping colony possession	0.327**
7	Land holding	0.279*
8	Occupation	0.389**
9	Annual income	0.237*
10	Material possession	0.238*
11	Information Seeking Behavior	0.300**
12	Extension Contact	0.268*
13	Scientific orientation	0.208*
14	Economic motivation	0.244*
15	Marketing orientation	0.212*
16	Knowledge	0.674**

\*\*Significant at 1% level.

\*Significant at 5% level.

NS- Non Significant

**Table.5** Distribution of respondents according to the constraints faced in bee keeping management

S.N.	Constraints	Respondents	
		Freq.	%
<b>(I) Economic constraints</b>			
1.	High cost of bee keeping farming and its equipments	120	60.00
2.	High cost of medicines	92	46.00
3.	Difficult loan procedure and lack of financial support	102	51.00
4.	Inadequate finance by bank for purchasing bee keeping box	108	54.00
5	No minimum price for honey and honey based products	110	55.00
<b>(II) Technical constraints</b>			
1.	Lack of technical-know how about disease management practice	136	68.00
2.	Lack of consultancy service of private practitioners	115	57.50
3.	Lack of availability of literature in the village	80	40.00
4.	Lack of technical knowledge to manage the bee keeping enterprise	110	55.00
5.	Unsuitable agro-climatic conditions	114	57.00

<b>(III)Marketing constraints</b>			
1.	Non-remunerative price for honey	95	47.50
2.	Poor marketing outlet of honey	70	35.00
3.	Difficulty to store honey in summer season	98	48.00
4.	Competition from established and large units	60	30.00
5	Lack of organized marketing network for the honey and honey product	58	29.00
<b>(IV)General constraints</b>			
1.	Poor irrigation facilities for growing flower crops	124	62.00
2.	Lack of knowledge about artificial feeding of bee	110	55.00
3.	Non-availability of feeding material	104	52.00
4	Absence of policy frame work	90	45.00
5	Lack of skill up-gradation	80	40.00

Multiple responses possible

Among the identified scientific beekeeping technologies, placing of the bee box in the north-south direction was adopted by above sixty five percent of the beekeepers (66.00 per cent). This technology was adopted by the beekeepers of Morena district due to the impact of training programmes where it was emphasized that the beehive-boxes should be kept in the north-south direction to facilitate communication among the bees.

Extraction of products apart from honey was adopted by above fifty percent (59.00 per cent) of the beekeepers. It was observed that, maximum number of beekeepers make only one particular product from the dried honey comb. After extraction of honey from the beehives, the honey comb is collected separately and then dried under the sun. The dried comb apparently has several medicinal properties especially in curing heart diseases. However, if suitable training is given, the beekeepers can also extract other products like royal jelly, bee venom, propolis which have a high price in the international market.

Out of all the beekeeping technologies listed above, use of mechanical honey extractor was adopted by less than fifty percent (43.50 per cent) of the beekeepers. Low adoption was due to the high cost of the equipment. As

most of the beekeepers were small farmers, they could not afford it. In the study area it was observed that majority of the beekeepers followed traditional method of honey extraction which was done using white muslin cloth as the filter.

A look at the results presented in Table 3 shows that making of value added products from honey was adopted by only 15.00 per cent of the beekeepers. This technology was adopted by less number of beekeepers due to lack of promotional efforts by the beekeeping agencies like Morena honeybee keeping Society. However, it was found that, beekeepers who were already members of Self Help Groups (SHGs) were using their honey for making value added products like syrup, candy, etc. which have a higher value.

Heating of honey before bottling was adopted by the least number of beekeepers (14.50 per cent) in the study area due to lack of time. In this process, after extraction, the honey is heated and then brought down to room temperature by cooling for 30 minutes.

This process is essential to kill the germs and increase the shelf life of honey. However, this procedure was adopted by very few beekeepers as it is time consuming process

and needs precise regulation of temperature during the heating process.

### **Relationship between adoption behaviors of bee keeping farmers with their characteristics-**

The coefficient of correlation of each of the socio personal characteristics with their entrepreneurial behavior of bee keeping farmers has been furnished in Table 4.

It could be revealed from Table 4 that the coefficient of correlation of each of the socio-personal characteristics of the bee keeping farmers viz., education, bee keeping colony possession, occupation, information seeking behavior, and knowledge of bee keeping farmers, showed positive and significant relationship with adoption behavior at 0.01 level of probability. Experience in beekeeping farming, land holding, annual income, material possession, extension contact, scientific orientation, economic motivation and marketing orientation showed positive and significant relationship with adoption behavior at 0.05 level of probability whereas remaining three variables namely age, caste and family size did not establish any significant relationship with adoption behavior. This result reveals in the line of work done by Gurjar *et al.*, (2019) and Badodiya *et al.*, (2017).

### **Constraints faced by bee keeping farmers with regards to bee-keeping management**

It is detected from the data presented in Table 5 that the major economic constraint expressed by bee keeping farmers was high cost of bee keeping farming and its equipments (60.00%) followed by difficult loan procedure and lack of financial support (51.00%), high cost of medicines (46.00%) and inadequate finance by bank for purchasing bee colonies (54.00%). The fifth

constraint experienced by the (55.00%) beekeepers is absence of minimum support price for honey and honey based products. Most of the beekeepers only produce honey and were not aware of any of the honey based value added products.

In case of technical constraint, major constraint expressed by respondents was Lack of technical-know how about disease management practice (68.00%), followed by lack of consultancy service of private practitioners (57.50%), Lack of availability of literature in the village to manage the bee keeping enterprise (40.00%), Lack of technical knowledge to manage the bee keeping enterprise (55.00%), whereas, only 30.00% of bee keeping farmers had expressed unsuitable agro-climatic conditions.

The major marketing constraint expressed by bee keeping farmers was difficulty to store honey in summer season (48.00%), followed by non-remunerative price of honey (47.5%), competition from established and large units (30.00%), and poor marketing outlet of honey (35.00%) and 29.00 per cent respondents expressed lack of organized marketing network for the honey and honey product.

The major general constraint expressed by respondents was poor irrigation facilities for growing flower crops (62.00%), Lack of knowledge about artificial feeding of bee (55.00%), non-availability of improved feeding material and lack of safety of bee boxes (52.00%) because Beekeepers practicing migratory beekeeping expressed lack of safety to honeybee boxes as another constraint. Honeybee colonies have to be transferred from one place to another depending on the availability of nectar and pollen. Sometimes, the colonies are transferred to areas where rubber is grown. During this time, theft of honey bee boxes is common. Sometimes, when food is scarce, the

bees may also leave the beehive boxes in search of food if artificial feeding is delayed. Absence of policy frame work (45.00%) and only 40.00 per cent respondents expressed their view on lack of skill up-gradation. The findings support with the work of Gurjar *et al.*, (2019) and Tekale *et al.*, (2013)

In conclusions the study revealed that majority 66.50 percent respondents had medium level of adoption behavior about bee keeping management practices. The adoption behavior was positively and significantly related with education, bee keeping experience, land holding, bee keeping colony possession, occupation, annual income, material possession, extension contact, economic motivation, market orientation, scientific orientation, information seeking behavior of bee keeping farmers towards bee keeping farming and knowledge of improved bee keeping management practices found to have positive and significant relationship with entrepreneurial behavior. The major general constraints expressed by respondents were poor irrigation facilities for growing flower crops (62.00%), Lack of technical-know how about disease management practice (68.00%) and high cost of bee keeping farming and its equipments (60.00%).

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