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A comparative study on the personal, socio-economic and psychological characteristics of beneficiaries and nonbeneficiaries of Mahabaleshwar Madhotpadak Sahakari Society

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Abstract

The present study was conducted to compare the personal, socio-economic and psychological characteristics of the beneficiaries and non-beneficiaries of the Mahabaleshwar Madhotpadak Sahakari Society in Satara district of Maharashtra. An ex-post facto research design was adopted and a total of 320 respondents, comprising 160 beneficiaries selected through proportionate random sampling from 1,668 registered members and 160 non-beneficiaries from the same area, were included in the study. Primary data were collected through a structured and pre-tested interview schedule and analysed using frequency, percentage and range. The findings revealed that the majority of both beneficiaries (53.75%) and non-beneficiaries (61.88%) belonged to the middle-age group. Most beneficiaries had completed secondary education (38.23%), practiced apiculture along with agriculture (59.37%), possessed marginal landholdings (45.63%) and belonged to the low annual income (73.12%) and low beekeeping income (50.00%) categories. The majority also exhibited medium risk orientation (66.25%), high marketing behaviour (51.25%) and incurred low cost of per hive honey production (61.25%). Beeswax (88.75%) and pollen (55.00%) were the major by-products obtained, while 48.75 per cent maintained a low number of bee hives. Comparative analysis indicated that beneficiaries possessed relatively higher educational status, beekeeping experience, annual income, income from beekeeping, risk orientation, marketing behaviour and number of bee hives, while incurring lower production costs and having better access to institutional credit than non-beneficiaries. The study concluded that membership in the Mahabaleshwar Madhotpadak Sahakari Society has contributed positively to improving the socio-economic and psychological profile of beekeepers and has enhanced the adoption of improved beekeeping practices, thereby promoting the sustainable development of cooperative-based apiculture.

Keywords: Apiculture, cooperative society, beneficiary and non-beneficiary profile, socio-economic characteristics, psychological characteristics, marketing behaviour, Maharashtra

1. Introduction

Beekeeping (apiculture) has emerged as an important allied agricultural enterprise that contributes significantly to rural livelihoods, income diversification, employment generation and ecological sustainability. Besides producing honey and other valuable hive products such as beeswax, propolis, royal jelly and pollen, honeybees play a crucial role in pollinating agricultural and horticultural crops. It is estimated that nearly 75 per cent of the world's leading food crops depend, at least partially, on animal pollination, with honeybees being among the most efficient pollinators (Klein *et al.*, 2007). In India, beekeeping has gained increasing importance due to its low initial investment, high income-

generating potential and suitability for small and marginal farmers, landless labourers and rural youth. Government initiatives such as the National Beekeeping and Honey Mission (NBHM) have further strengthened the sector by promoting scientific beekeeping, infrastructure development, skill enhancement and market support. Despite its enormous potential, the beekeeping sector continues to face several production, technical, institutional and marketing challenges. Limited access to improved technologies, inadequate scientific knowledge, pest and disease incidence, fluctuating market prices and weak market linkages often reduce the profitability and sustainability of beekeeping enterprises. In this context,

cooperative organizations have emerged as effective institutional mechanisms for addressing these challenges through collective action, resource sharing, capacity building, input supply, processing, value addition and organized marketing. By providing technical guidance, extension services, financial support and improved market access, beekeepers' cooperative societies have significantly contributed to enhancing the socio-economic status of their members.

Among such organizations, the Mahabaleshwar Madhotpadak Sahakari Society has played a pioneering role in promoting scientific beekeeping in Satara district of Maharashtra. The society has facilitated access to quality bee colonies, modern beekeeping equipment, technical training, financial assistance and collective marketing facilities, thereby improving productivity, profitability and livelihood security of its beneficiaries. It has also contributed to rural employment generation, women empowerment, biodiversity conservation and sustainable agricultural development through pollination services and environmentally friendly beekeeping practices.

The effectiveness of any development programme largely depends on the characteristics of its beneficiaries. Personal characteristics such as age, education, farming experience and family background; socio-economic characteristics including landholding, occupation, annual income and social participation; and psychological characteristics such as achievement motivation, scientific orientation, economic motivation, innovativeness, risk orientation and market orientation influence the adoption of improved technologies, participation in cooperative activities and overall benefits derived from development interventions. Understanding these characteristics helps researchers, extension personnel and policy-makers design need-based training programmes, formulate appropriate extension strategies and strengthen cooperative functioning for greater impact.

Therefore, studying comparing the personal, socio-economic and psychological characteristics of the beneficiaries and non-beneficiaries of the Mahabaleshwar Madhotpadak Sahakari Society is essential for understanding the profile of cooperative members and identifying factors associated with their participation and development. Such information will be valuable for strengthening cooperative-based beekeeping development programmes, improving extension interventions and formulating evidence-based policies for sustainable apiculture and rural development.

2. Methodology

The present study was conducted to compare the personal, socio-economic and psychological characteristics of beneficiaries and non-beneficiaries of Mahabaleshwar Madhotpadak Sahakari Society in Satara district of Maharashtra. An ex-post facto research design was adopted as the independent variables had already occurred and were beyond the control of the researcher. The study was purposively conducted in the operational area of the Mahabaleshwar Madhotpadak Sahakari Society, covering Mahabaleshwar, Waiand Jaoli tehsils of Satara district. A total of 160 beneficiaries and 160 non-beneficiaries were selected, making the total sample size 320 respondents. The

160 beneficiaries were selected from 1,668 registered members of the society using the proportionate random sampling technique, comprising 83 respondents from Mahabaleshwar, 44 from Waiand 33 from Jaoli tehsils. Primary data were collected through personal interviews using a structured and pre-tested interview schedule specifically designed in accordance with the objectives of the study. The variables included personal characteristics (age, education, gender and family size), socio-economic characteristics (occupation, landholding, annual income, income from beekeeping, beekeeping experience, cost of honey production and indebtedness) and psychological characteristics (risk orientation and marketing behaviour). The collected data were coded, classified, tabulated and analysed using appropriate descriptive statistical tools such as frequency, percentage and range method to draw meaningful interpretations regarding the profile of the beneficiaries.

Table 1: Tahsil-wise Distribution of Beneficiaries and Sample Respondents Selected for the Study

Sr. No.	Tahsils	Tahsil wise total number of beneficiaries	Number of respondents selected for study
1.	Mahabaleshwar	866	83
2.	Wai	461	44
3.	Jaoli	341	33
	Total	1668	160

3. Results and Discussion

The findings and discussion of the study are presented below.

3.1. The profile of the respondents

3.1.1. Age

Age denotes the chronologically completed years by the respondents. Age influences the behavior of an individual by exposing him or her to varied situations, a number of times. It also shows maturity and rationality of an individual in decision making.

Table 2: Distribution of the member respondent and non-member respondent beekeeping farmers according to their age

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq	Pct.	Freq	Pct.
1	Young (up to 35)	22	13.75	46	28.75
2	Middle (36 to 55)	86	53.75	99	61.88
3	Old (56 and above)	52	32.50	15	9.37
	Total	160	100.00	160	100.00

Table 2 reveals that more than half of the beneficiaries (53.75%) belonged to the middle-age group (36–55 years), followed by the old-age group (32.50%), while only 13.75 per cent belonged to the young-age group (up to 35 years). The findings indicate that middle-aged beneficiaries constituted the largest proportion of the respondents, suggesting that individuals in their economically active and experienced years were more actively engaged in beekeeping and cooperative activities.

3.1.2. Education

Education was operationally defined as the number of years of formal education acquired by the respondents. Formal education enhances the comprehensibility and skill of an individual.

Table 3: Distribution of the member respondent and non-member respondent beekeeping farmers according to their education

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq	Pct.	Freq	Pct.
1	Illiterate	3	1.87	4	2.5
2	Pre-primary (1-4 th)	3	1.87	25	15.62
3	Primary (5-7 th)	23	14.37	25	15.62
4	Secondary (8-10 th)	61	38.23	47	29.38
5	Higher secondary (11-12 th)	37	23.13	34	21.26
6	Graduation and above	33	20.63	25	15.62
	Total	160	100.00	160	100.00

Table 3 indicates that the highest proportion of beneficiaries (38.23%) had completed secondary education, followed by higher secondary education (23.13%) and graduation and above (20.63%). About 14.37 per cent of the beneficiaries had primary education, while 1.87 per cent each were illiterate or had pre-primary education. The findings indicate that the majority of the beneficiaries had attained secondary or higher levels of education, suggesting that a reasonable level of formal education may have facilitated their adoption of improved beekeeping practices and participation in cooperative activities.

3.1.3. Gender

Gender pertains to the classification of respondents as male or female. It plays a significant role in shaping roles, responsibilities and participation in various economic and social activities. Gender may influence access to resources, decision-making power and involvement in beekeeping and marketing practices.

Table 4: Distribution of the member respondent and non-member respondent beekeeping farmers according to their gender

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq	Pct.	Freq	Pct.
1	Male	139	86.88	148	92.50
2	Female	21	13.12	12	7.50
	Total	160	100.00	160	100.00

Table 4 indicates that the majority of the beneficiaries (86.88%) were male, while only 13.12 per cent were female. The findings reveal that beekeeping activities were predominantly carried out by male beneficiaries, which may be attributed to greater involvement of men in managing commercial beekeeping enterprises and related marketing activities. However, the participation of women highlights their growing role in supporting beekeeping as an allied agricultural enterprise.

3.1.4. Size of Family

Family size denotes the total number of members living together in a household. It affects labor availability,

consumption needs and economic decisions of the family. Larger families may provide more labor for beekeeping activities but may also increase financial pressure.

Table 5: Distribution of the member respondent and non-member respondent beekeeping farmers according to their size of family

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq	Pct.	Freq	Pct.
1	Low (Up to 5)	86	53.75	74	46.25
2	Medium (6 - 8)	60	37.50	71	44.38
3	High (9 and above)	14	8.75	15	9.37
	Total	160	100.00	160	100.00
High Value =10, Low Value = 3, Range = 7, r Value = 2.3					

Table 5 indicates that more than half of the beneficiaries (53.75%) belonged to the small family size category, followed by 37.50 per cent with medium-sized families, while only 8.75 per cent had large families. The findings suggest that the majority of the beneficiaries had small to medium-sized families, which may facilitate effective management of household resources and beekeeping activities while reducing dependency pressure.

3.1.5. Occupation

Occupation refers to the primary and secondary work activities undertaken by the respondents to earn their livelihood. It indicates the economic engagement and level of diversification in income sources. Occupation may influence the time, interest and investment in beekeeping practices.

Table 6: Distribution of the member respondent and non-member respondent beekeeping farmers according to their occupation

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Apiculture + Agriculture	95	59.37	90	56.26
2	Apiculture + Agriculture + Service/Business/Self employed	26	16.26	23	14.37
3	Apiculture + Agriculture + Sheep and Goat/poultry	24	15.00	28	17.50
4	Apiculture + Daily wages	15	9.37	19	11.87
	Total	160	100.00	160	100.00

Table 6 indicates that the majority of the beneficiaries (59.37%) were engaged in apiculture along with agriculture, followed by 16.26 per cent involved in apiculture, agriculture and service/business/self-employment. About 15.00 per cent of the beneficiaries combined apiculture and agriculture with sheep/goat rearing or poultry, while 9.37 per cent practiced apiculture along with daily wage labour. The findings indicate that apiculture was primarily practiced as a supplementary enterprise alongside agriculture, reflecting the diversified livelihood strategies adopted by beneficiaries to enhance household income and reduce occupational risk.

3.1.6. Land Holding

Land holding denotes the total area of land owned or cultivated by the respondents, usually measured in acres or

hectares. It reflects the resource base and economic strength of the individual. Land size may influence the scope for beekeeping activities and placement of bee colonies.

Table 7: Distribution of the member respondent and non-member respondent beekeeping farmers based on their land holding

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Marginal	73	45.63	82	51.25
2	Small	59	36.88	58	36.26
3	Semi-medium	16	10.00	13	8.12
4	Medium	07	4.37	04	2.5
5	Large	05	3.12	03	1.87
	Total	160	100.00	160	100.00

Table 7 indicates that the highest proportion of the beneficiaries (45.63%) belonged to the marginal landholding category, followed by 36.88 per cent in the small landholding category. About 10.00 per cent of the beneficiaries possessed semi-medium landholdings, while 4.37 per cent and 3.12 per cent belonged to the medium and large landholding categories, respectively. The findings indicate that the majority of the beneficiaries were marginal and small farmers, suggesting that beekeeping serves as an important subsidiary enterprise for farmers with limited land resources by providing an additional source of income.

3.1.7. Beekeeping Experience

Beekeeping experience denotes the number of years the respondent has been involved in beekeeping activities. It shows the level of skill, knowledge and practical exposure in managing bee colonies. Greater experience often leads to better productivity and management practices.

Table 8: Distribution of the member respondent and non-member respondent beekeeping farmers according to their beekeeping experience

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 23 years)	83	51.88	124	77.50
2	Medium (24 - 42 years)	70	43.75	33	20.63
3	High (43 years and above)	07	4.37	03	1.87
	Total	160	100.00	160	100.00
High Value = 60, Low Value = 5, Range = 55, r Value = 18.33					

Table 8 indicates that the highest proportion of the beneficiaries (51.88%) had low beekeeping experience, followed by 43.75 per cent with medium experience, while only 4.37 per cent had high beekeeping experience. The findings suggest that most of the beneficiaries had low to medium experience in beekeeping, indicating that the enterprise has attracted relatively new as well as moderately experienced beekeepers. Continuous technical guidance and capacity-building programmes provided through the cooperative society may further enhance their skills and improve the adoption of scientific beekeeping practices.

3.1.8. Cost of Per Hive Honey Production

Cost of per hive honey production indicates total expenditure incurred by the respondents for maintaining a single beehive and producing honey over a specific period, usually one year. It includes costs such as purchase and maintenance of bee colonies, hive equipment, feeding, labor, medicines, transportation and other management expenses. This variable helps in assessing the economic efficiency and profitability of beekeeping practices. Lower cost of production with higher yield indicates better management and resource utilization.

Table 9: Distribution of the member respondent and non-member respondent beekeeping farmers according to their cost of per hive honey production

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 2700)	98	61.25	61	38.13
2	Medium (2701 - 3000)	16	10.00	08	5.00
3	High (3001 and above)	46	28.75	91	56.87
	Total	160	100.00	160	100.00
High Value = 3300, Low Value = 2400, Range = 900, r Value = 300					

Table 9 indicates that the majority of the beneficiaries (61.25%) incurred a low cost of per hive honey production, followed by 28.75 per cent in the high-cost category, while only 10.00 per cent incurred a medium cost. The findings suggest that most beneficiaries maintained a relatively low cost of honey production per hive, which may be attributed to efficient resource utilization, adoption of improved beekeeping practices and access to technical guidance and inputs through the cooperative society.

3.1.9. Annual Income

Annual income refers to the total earnings of respondents from all sources over a year. It indicates the economic status and purchasing capacity of an individual. Higher income levels may facilitate greater investment in improved beekeeping technologies and inputs.

Table 10: Distribution of the member respondent and non-member respondent beekeeping farmers according to their annual income

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 303333)	117	73.12	134	83.75
2	Medium (303334-576667)	21	13.12	21	13.13
3	High (576668 and above)	22	13.76	5	3.12
	Total	160	100.00	160	100.00
High Value = 850000, Low Value = 30000, Range = 820000, r Value = 273333					

Table 10 indicates that the majority of the beneficiaries (73.12%) belonged to the low annual income category, followed by 13.76 per cent in the high-income category, while 13.12 per cent fell under the medium-income category. The findings suggest that most beneficiaries had

relatively low annual incomes, indicating that beekeeping is primarily practiced as a supplementary livelihood enterprise rather than the principal source of household income. However, the presence of beneficiaries in the medium and high-income categories reflects the potential of beekeeping to enhance farm income when adopted on a commercial scale.

3.1.10. Income from Beekeeping

Income from beekeeping refers to the earnings generated specifically through beekeeping activities, including the sale of honey and other bee products. It indicates the economic contribution of beekeeping to the respondent's livelihood.

Table 11: Distribution of the member respondent and non-member respondent beekeeping farmers according to their income from beekeeping

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 40000)	80	50.00	104	65.00
2	Medium (40001 - 75000)	47	29.37	43	26.88
3	High (75001 and above)	33	20.63	13	8.12
	Total	160	100.00	160	100.00
High Value = 110000, Low Value = 5000, Range = 105000, r Value = 35000					

Table 11 indicates that half of the beneficiaries (50.00%) belonged to the low income from beekeeping category, followed by 29.37 per cent in the medium-income category, while 20.63 per cent belonged to the high-income category. The findings suggest that although a majority of the beneficiaries earned relatively low income from beekeeping, a considerable proportion generated medium to high income, indicating the economic potential of beekeeping as a supplementary livelihood enterprise. Increased adoption of improved beekeeping practices, scientific management and value addition can further enhance income from beekeeping.

3.1.11. Indebtedness

Indebtedness refers to the amount of debt or loans borrowed by the respondents from multiple sources such as banks, cooperatives, or moneylenders. It reflects the financial burden and credit dependency of the individual. Indebtedness may influence investment decisions and risk-taking ability.

Table 12: Distribution of the member respondent and non-member respondent beekeeping farmers according to their indebtedness

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Nationalised bank	13	8.12	20	12.50
2	Cooperative bank	25	15.60	21	13.12
3	Local traders	08	5.00	12	7.50
4	Money lenders	16	10.00	27	16.87
5	Friends/relatives	21	13.12	25	15.62
	Total	83	51.84	105	65.61

Table 12 indicates that 51.84 per cent of the beneficiaries were indebted. Among them, the highest proportion

(15.60%) had availed loans from cooperative banks, followed by 13.12 per cent who borrowed from friends or relatives. About 10.00 per cent of the beneficiaries obtained loans from money lenders, while 8.12 per cent and 5.00 per cent borrowed from nationalised banks and local traders, respectively. The findings suggest that cooperative banks were the major source of institutional credit for the beneficiaries, indicating better access to formal financial institutions for meeting the financial requirements of beekeeping activities.

3.1.12. Risk Orientation

Risk orientation is the degree to which an individual is willing to take risks in adopting new technologies or practices. It reflects the respondent's attitude toward uncertainty and innovation. Farmers with higher risk orientation are more likely to adopt improved beekeeping and marketing strategies.

Table 13: Distribution of the member respondent and non-member respondent beekeeping farmers according to their risk orientation

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 18)	42	26.25	75	46.87
2	Medium (19 - 21)	106	66.25	81	50.63
3	High (22 and above)	12	7.5	04	2.50
	Total	160	100.00	160	100.00
High Value = 24, Low Value = 15, Range = 9, r Value = 3					

Table 13 indicates that the majority of the beneficiaries (66.25%) exhibited a medium level of risk orientation, followed by 26.25 per cent with a low level of risk orientation, while only 7.50 per cent exhibited a high level of risk orientation. The findings suggest that most beneficiaries possessed a moderate willingness to take risks, indicating a balanced approach toward adopting improved beekeeping technologies and management practices. This moderate level of risk orientation may facilitate the gradual adoption of innovations while minimizing uncertainty in beekeeping enterprises.

3.1.13. Marketing Behaviour

Marketing behavior refers to the practices followed by respondents in selling their beekeeping products, including choice of market, pricing, storage and timing of sale. It reflects the decision-making ability and market awareness of the respondents. Effective marketing behavior can result in improved income realization.

Table 14: Distribution of the member respondent and non-member respondent beekeeping farmers according to their marketing behaviour

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 15)	05	3.12	36	22.5
2	Medium (16 -17)	73	45.63	96	60.00
3	High (18 and above)	82	51.25	28	17.50
	Total	160	100.00	160	100.00
High Value = 19, Low Value = 14, Range = 5, r Value = 1.6					

Table 14 indicates that the majority of the beneficiaries (51.25%) exhibited high marketing behaviour, followed by 45.63 per cent with medium marketing behaviour, while only 3.12 per cent exhibited low marketing behaviour. The findings suggest that most beneficiaries possessed good marketing behaviour, indicating greater awareness of market information, better marketing decisions and improved utilization of marketing channels. This may be attributed to the marketing support, training and collective marketing opportunities provided through the cooperative society.

3.1.14 By-Products

By-products of beekeeping refer to the additional products obtained from bee colonies apart from honey. These include items such as beeswax, pollen, propolis, royal jelly and bee venom, which have economic and medicinal value. The production and utilization of these by-products enhance the overall profitability and sustainability of beekeeping enterprises. Awareness and proper management practices influence the extent to which respondents can exploit these by-products.

Table 15: Distribution of the member respondent and non-member respondent beekeeping farmers according to their by-products

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq	Pct.	Freq	Pct.
1	Bee wax	142	88.75	128	80.00
2	Pollen	88	55.00	54	33.75
3	Pollination	25	15.62	12	7.50
4	Royal jelly	0	00	00	00
5	Propolis	8	5.00	03	1.87
6	Bee venom	0	00	00	00

Table 15 indicates that the majority of the beneficiaries (88.75%) obtained beeswax as the principal by-product of beekeeping, followed by pollen (55.00%), pollination services (15.62%) and propolis (5.00%). None of the beneficiaries reported the production of royal jelly or bee venom. The findings suggest that beeswax was the most commonly utilized by-product among the beneficiaries, while the production of pollen, propolis and pollination services provided additional opportunities for income diversification. The absence of royal jelly and bee venom production indicates the need for advanced technical training and infrastructure to promote the commercial exploitation of high-value bee products.

3.1.15 Number of bee hives

Number of bee hives refers to the total count of bee colonies maintained by the respondents for beekeeping activities. It is an important indicator of the scale and intensity of beekeeping practiced by an individual. A higher number of hives generally reflects greater investment, experience and commercial orientation in beekeeping. It also influences the overall production of honey and income generation potential.

Table 16: Distribution of the member respondent and non-member respondent beekeeping farmers according to their number of bee hives

Sr. No.	Category	Member respondents (N=160)		Non-member respondents (N=160)	
		Freq.	Pct.	Freq.	Pct.
1	Low (Up to 40)	78	48.75	120	73.75
2	Medium (41 - 65)	65	40.63	34	21.25
3	High (66 and above)	17	10.62	08	5.00
	Total	160	100.00	160	100.00
High Value = 90, Low Value = 15, Range = 75, r Value = 25					

Table 16 indicates that nearly half of the beneficiaries (48.75%) possessed a low number of bee hives, followed by 40.63 per cent with a medium number of bee hives, while only 10.62 per cent maintained a high number of bee hives. The findings suggest that the majority of the beneficiaries managed a small to medium number of bee hives, indicating that beekeeping was practiced predominantly as a small-scale enterprise. However, a considerable proportion of beneficiaries maintaining medium and high numbers of bee hives reflects the gradual commercialization of beekeeping among cooperative members.

4. Conclusion

The present study revealed that both beneficiaries and non-beneficiaries of the Mahabaleshwar Madhotpadak Sahakari Society were predominantly middle-aged, male and educated up to the secondary level, with most belonging to small families and marginal to small landholding categories. Apiculture along with agriculture was the principal occupation of respondents in both groups and beekeeping was largely practiced as a supplementary livelihood enterprise. However, beneficiaries exhibited comparatively better socio-economic and psychological characteristics than non-beneficiaries. They had relatively higher beekeeping experience, lower cost of per hive honey production, higher annual income and income from beekeeping, greater access to institutional credit through cooperative banks, higher risk orientation, better marketing behaviour and maintained a comparatively larger number of bee hives. Beneficiaries also demonstrated better utilization of beekeeping by-products such as beeswax, pollen, pollination services and propolis, indicating greater commercialization and diversification of beekeeping activities.

The findings demonstrate that membership in the Mahabaleshwar Madhotpadak Sahakari Society is associated with improved socio-economic and psychological characteristics, thereby enhancing the technical efficiency, economic performance and commercialization of beekeeping enterprises. Although no significant differences were observed between beneficiaries and non-beneficiaries with respect to gender, family size and landholding, significant differences were evident in several other profile characteristics that influence the adoption of improved beekeeping practices and enterprise performance. Overall, the findings highlight the important role of cooperative

institutions in strengthening the technical, economic and entrepreneurial capacity of beekeepers and emphasize the need to further expand cooperative-based extension services, capacity-building programmes, market linkages and value-addition initiatives for the sustainable development of the apiculture sector.

5. Implications

The findings of the present study provide valuable insights into the personal, socio-economic and psychological characteristics of the beneficiaries and non-beneficiaries of the Mahabaleshwar Madhotpadak Sahakari Society. The predominance of middle-aged, moderately educated beneficiaries and the observed differences between beneficiaries and non-beneficiaries indicate that beekeeping is primarily practiced by resource-constrained farmers with marginal to small landholdings. These findings can assist extension personnel, cooperative managers and policymakers in identifying the target clientele and designing need-based interventions to improve scientific beekeeping practices, enhance productivity and strengthen the overall functioning of cooperative societies. The study also serves as a useful database for developing beneficiary-oriented extension strategies aimed at improving the socio-economic status of beekeepers.

The study further implies that greater emphasis should be placed on strengthening technical training, digital extension services, entrepreneurship development and market-oriented interventions to enhance the profitability of beekeeping enterprises. Considering the beneficiaries' medium level of beekeeping experience and risk orientation, regular capacity-building programmes, field demonstrations, exposure visits and skill development activities are essential for promoting the adoption of improved beekeeping technologies. Furthermore, the high marketing behaviour observed among beneficiaries suggests considerable potential for expanding collective marketing, value addition, branding, certification and diversification into high-value bee products such as propolis, royal jelly, pollen and bee venom to increase income and livelihood security.

The present study also provides baseline information for future research in the field of agricultural extension and apiculture. The findings may serve as a reference for comparative studies involving different cooperative societies, agro-climatic regions and categories of beekeepers. Further research may focus on examining the relationship between beneficiaries' profile characteristics and technology adoption, entrepreneurial behaviour, market orientation, livelihood improvement and the long-term sustainability of beekeeping enterprises. Such studies will contribute to the formulation of evidence-based policies and extension strategies for the sustainable development of the apiculture sector.

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