

ASSESSING FARMERS' ADOPTION AND CHALLENGES IN USING ONLINE PLATFORM FOR AYURVEDIC HERBS IN INDIA

Abstract: India's rich tradition of medicinal plants has sustained rural economies and health systems, with Ayurvedic herbs playing a central role. Gujarat, with its Agro-ecological diversity and increasing farmer awareness, has emerged as a key state for herbal cultivation. Despite the transformative potential of digital platforms in agricultural marketing, the uptake among small and marginal Ayurvedic herb farmers remains limited. This study investigates the extent of digital adoption and explores the socio-economic profiles and opportunities and challenges faced by herbal farmers in transitioning to online marketplaces.

Conducted across ten districts of Gujarat with a sample of 200 farmers, the study employed structured questionnaires, semi-structured interviews, and focus group discussions to gather quantitative and qualitative data. Analytical methods included percentage analysis, weighted average means, and Garret ranking.

Findings reveal that most farmers are aged 41–60, have only primary education and operate on small landholdings with limited digital exposure. While awareness of online platforms is growing, adoption remains low due to digital illiteracy, poor internet connectivity, lack of institutional support, and trust issues in digital transactions. Farmers recognize the potential of online platforms for market expansion and better pricing but require targeted training, infrastructural improvements, and policy support. The study highlights the need for an integrated approach to enhance digital participation and improve livelihood outcomes for Ayurvedic herb growers in rural India.

Keywords: Ayurvedic herbs, Herbal farmers, Gujarat, Digital adoption, Analytical methods and rural india.

1. Introduction

The practice of traditional medicine in India has a heritage spanning millennia, with Ayurveda standing as one of the world's oldest and most comprehensive healthcare systems. Rooted in the ancient Vedic scriptures, Ayurveda—derived from the Sanskrit terms *Ayuh* (life) and *Veda* (knowledge)—is defined as the "Science of Life." It offers a holistic approach to health by addressing the physical, psychological, and spiritual well-being of individuals. Historical evidence from texts like the *Rig Veda*, *Atharva Veda*, *Charaka Samhita*, and *Susruta Samhita* highlights the systematic study and application of medicinal plants in ancient India. These traditional practices, once threatened by the rise of Unani and allopathic medicine during foreign invasions and colonial rule, have witnessed a robust resurgence in recent decades, both nationally and globally (Ijnu *et al.*, 2023).

India is one of the world's most biodiverse countries and hosts approximately 1,200 medicinal plant species, of which about 500 are actively traded. These species form the backbone of the Ayurvedic industry. However, around 90% of these medicinal plants are still sourced from the wild, often involving destructive harvesting methods. For instance, roots and bark are exclusively collected in 43% of cases, putting stress on natural ecosystems and biodiversity (Ayush Sector in India: Prospects and Challenges, 2021). While the cultivation of medicinal plants on private land has gradually increased, it still represents only a small share of overall supply. Notable traded species include *Aloe vera*, *Chlorophytum borivillianum*, *Terminalia chebula* and *Withania somnifera*, which are sold across six major, twenty-one medium and thirty-seven minor market centers, with key exports routed through metropolitan cities such as Delhi, Mumbai and Chennai (Ayurvedic medicinal industry: Current status and sustainability,

2002).

India's domestic Ayurvedic industry has grown significantly, driven by rising consumer awareness about the benefits of natural and holistic healthcare. The market, which includes pharmaceuticals, personal care items, and dietary supplements, was valued at INR 748.5 billion in 2023 and is projected to reach INR 3,207.6 billion by 2032, growing at a CAGR of 17% (IMARC, 2025). Internationally, the global herbal medicine market has also expanded rapidly, reaching an estimated value of USD 657.5 billion in 2020, with a projected increase to USD 746.9 billion by 2022 (Grand View Research, 2025). Countries such as the USA, Germany, and the UK have seen a surge in demand for Ayurvedic products, further stimulating exports and investments in this sector.

Corporate involvement has further legitimized Ayurveda's commercial potential. Leading firms such as Dabur India Ltd. (80.2% AYUSH-based turnover), Patanjali Ayurved Ltd. (52.8%), and GlaxoSmithKline Pharmaceuticals Ltd. (38.5%) have strategically incorporated AYUSH products into their business models, blending traditional knowledge systems with modern branding and supply chain strategies (Ayush Sector in India: Prospects and Challenges, 2021). These companies have contributed to making Ayurvedic formulations more widely available and accessible to a global audience.

The growing role of digital platforms is reshaping Ayurvedic product distribution. E-commerce channels and online consultation platforms have become essential conduits for reaching both urban and rural markets. Government-backed initiatives such as e-CHARAK have created digital marketplaces for medicinal plant trade, while programs like Aushadhi Vanaspati Mitra (AVM) aim to support community engagement in cultivation, conservation, and marketing. The Voluntary Certification Scheme for Medicinal Plants Produce, introduced by the National Medicinal Plants Board, further aims to improve quality standards and boost exports (Pujari *et al.*, 2022).

Despite these promising trends, challenges persist, particularly for small and marginal farmers in states like Gujarat. Many herbal growers lack formal education and digital literacy, which, combined with inadequate internet infrastructure and distrust in digital transactions, hampers their integration into online markets. Although farmers recognize the potential of online platforms for expanding market reach and improving price realization, their adoption is limited. Additional obstacles include unorganized logistics, language barriers, and the absence of reliable intermediaries.

To address these gaps, various state governments—including Uttar Pradesh, Kerala, and Himachal Pradesh—have introduced industry-specific policies that offer incentives for AYUSH enterprises. These include subsidies for capital investment, clinical trials, quality certification, and preferential land allotments. While Gujarat lacks a dedicated AYUSH policy, it benefits from general medical manufacturing policies that support drug and herbal product development through broader industrial reforms.

In this context, it becomes critical to understand the socio-economic dimensions of Ayurvedic herb cultivation, particularly in agriculturally diverse and emerging hubs like Gujarat. The potential for digital transformation in this sector remains high, provided there is coordinated policy support, capacity building, and infrastructure development to enable inclusive participation and sustainable growth.

1.1 Objectives

1. To study the socio-economic profile of Ayurvedic herbal farmers
2. To assess the farmers' perception to adopting online marketplaces for selling Ayurvedic herbs

3. To identify the key opportunities and challenges faced by farmers in marketing Ayurvedic herbs online

2. Literature review

Farmers engaged in cultivating Ayurvedic herbs benefit from the dual advantages of economic upliftment and sustainable livelihoods. Planned cultivation and commercialization of medicinal plants have been shown to significantly support traditional healthcare systems while improving the economic condition of marginalized and landless farmers. Key challenges in this area include lack of awareness, poor infrastructure, and overexploitation of plant resources. The literature emphasizes the need for sustainable harvesting practices, strong market linkages, value addition, and fair trade to enhance farmers' socio-economic status and contribute to rural development and poverty alleviation (Bader *et al.*, 2023). The integration of Ayurvedic practices with agricultural systems can diversify income sources and promote rural entrepreneurship. Studies in the Shivalik Hills reveal that although the global popularity of Ayurveda is rising, local farmers still face economic stagnation. Encouraging commercialization of traditional herbal knowledge and supporting biodiversity can lead to socio-economic empowerment and sustainable rural development (Gautam *et al.*, 2023). In-depth ethnobotanical surveys in the Hamirpur district indicate that traditional Ayurvedic plant-based remedies have greater economic value than conventional crops. These practices not only preserve biodiversity but also offer sustainable income, particularly for youth and small-scale farmers. However, promotion of sustainable cultivation practices and increased awareness are necessary to prevent resource depletion (Umer & Sharma, 2022).

Focusing on high value crops like turmeric, amla, and tulsi offer good market returns, small-scale farmers in Punjab often struggle with challenges like poor planting material, limited market access, and lack of training. Adoption is hindered further by difficulties in navigating regulatory environments and securing fair prices. Improved technical knowledge and digital mapping tools can help bridge these gaps and enhance the adoption of medicinal crops (Singh *et al.*, 2021). Findings from rural Bangladesh reflect a similar pattern where medicinal plant cultivation plays a vital role in reducing healthcare costs and providing income for landless farmers. However, cultivation is constrained by lack of resources, awareness, and support. Interventions such as training, credit facilities, and cultivation incentives are needed to make this sector more inclusive and economically viable (Bari *et al.*, 2017).

Digital platform adoption by farmers is largely determined by perceived ease of use and usefulness, as explained by the Technology Acceptance Model (TAM). External support such as government incentives, platform usability, training, and social learning all contribute to farmers' willingness to use e-commerce platforms. For Ayurvedic herb farmers, tailored interventions including digital literacy programs, financial support, and trust-building features are crucial for increasing participation in online markets (Chen *et al.*, 2024). A case study in Wuchang City found that socio-demographic factors like age, gender, and household labor force significantly influenced e-commerce adoption. Infrastructure availability had mixed effects—hindering initial adoption but aiding deeper engagement post-adoption. Awareness of relevant policies and a positive perception of benefits are key drivers. These findings underscore the importance of localized training, awareness campaigns, and infrastructure improvements to encourage online sales (He *et al.*, 2024).

Analysis of e-NAM adoption in India revealed that variables such as education, credit access, and innovativeness heavily influence digital engagement. Confidence in digital platforms is significantly boosted through training and exposure to market information. Promoting digital marketing practices through government policies and support mechanisms can therefore play a transformative role in how farmers perceive and utilize digital tools (Praneeth *et al.*, 2024). Trust and service delivery shape farmer preferences for online platforms. Cooperative or government-linked digital platforms are more accepted than private ones due to perceived

credibility. Farmers value features such as personal consultations, buyer matching services, and access to credit. Collaboration between government and private players may enhance platform adoption and market accessibility (Singh & Kapoor, 2024). Research in rural China emphasizes the central role of digital literacy in improving participation in e-commerce. Educated and entrepreneurial farmers are more likely to engage in digital sales. By improving digital skills and promoting tailored support structures, policymakers can empower Ayurvedic herb farmers to effectively use online markets (Su *et al.*, 2021).

Digital platforms have the potential to increase consumer trust in Ayurvedic products by offering transparency, scientific backing, and easy access. Trust, perceived value, and the holistic nature of Ayurveda are pivotal in influencing consumer purchase behavior. A robust digital presence with consumer education can significantly enhance sales of herbal products (Mahale & Bharathi, 2023). Digital marketing strategies, especially via platforms like WhatsApp and Instagram, offer small-scale herbal businesses cost-effective ways to promote products. By aligning with health trends, such as immunity-boosting during pandemics, these platforms enable firms to communicate benefits directly to consumers. Visual content and story-driven marketing improve reach and engagement (Ayu *et al.*, 2022). With increasing demand for natural wellness products, farmers can benefit from cultivating herbs like ashwagandha, tulsi, and neem. Strengthening public sector support for these markets and ensuring farmers have access to growing demand can enhance both incomes and rural employment (Srinivasan & Sugumar, 2017).

Despite the opportunities, challenges like lack of training, financial constraints, labor shortages, and low market access persist. In Odisha, even experienced farmers shy away from medicinal plant cultivation due to climate risk, weak government support, and inadequate training programs. Addressing these barriers through targeted government interventions can expand the reach of medicinal agriculture (Panda & Giri, 2024). Global growth of Ayurveda is tempered by challenges such as lack of standardization, insufficient technological adoption, and unregulated markets. Intellectual property rights and protection of traditional knowledge must be secured to ensure benefits return to local communities. Innovation must align with tradition to create sustainable and credible Ayurvedic markets (Katiyar & Dubey, 2023). Though digital platforms helped farmers during the COVID-19 pandemic by providing direct consumer access, issues like poor internet connectivity, lack of digital skills, and high operating costs hinder profitability. Inequity in access to digital tools makes online marketing less viable for small-scale or resource-poor farmers (Pesci *et al.*, 2023). In Kerala, farmers reported issues such as poor storage, pricing of perishable products, and complex payment systems. Ayurvedic herb farmers also face challenges with inconsistent demand and certification hurdles. Strengthening storage infrastructure, training programs, and simplifying e-commerce interfaces could help overcome these issues (Shibi & Aithal, 2022).

2.1 Gap of Study

Existing literature clearly outlines the socio-economic and environmental benefits of Ayurvedic herb cultivation. It emphasizes the role of medicinal plants in sustainable rural development, poverty alleviation, and biodiversity conservation. However, most of these studies focus on cultivation practices, ecological value, and broader marketing constraints, while the specific experience of Ayurvedic herb farmers in accessing and benefiting from digital marketplaces remains underexplored.

These studies rarely account for the unique context of Ayurvedic herb farmers, whose products differ from conventional crops in terms of perishability, certification needs, buyer awareness, and niche demand. The current research lacks a clear understanding of how these farmers perceive online platforms, what specific features or services they expect, and what support systems they require for successful digital engagement.

Moreover, most studies emphasize general infrastructural or policy-level recommendations without capturing farmers' voices, socio-economic conditions, and real-world experiences

related to online selling. There is limited insight into how digital literacy, trust in platforms, availability of resources, and institutional support affect the willingness and ability of Ayurvedic herb growers to adopt e-commerce solutions.

This study seeks to bridge these gaps by focusing specifically on the socio-economic profiling of Ayurvedic herb farmers, their perceptions of digital marketplaces, and the key opportunities and challenges they face. It aims to offer actionable insights for making digital platforms more inclusive, accessible, and beneficial for farmers in the Ayurvedic herb sector.

3. Materials and Methods

The study employed a descriptive research design to assess farmers' adoption and challenges in using online platforms for Ayurvedic herbs in India. A non-probability purposive sampling method was used to select 200 farmers from ten districts of Gujarat. Data were collected over 60 days using semi-structured schedules through personal interviews and focus group discussions. Primary data were gathered directly from the farmers, while secondary data were obtained from relevant literature, government publications, and reputable online sources. Data analysis involved descriptive statistics, Weighted Average Mean, and the Henry Garrett Ranking Method.

3.1 Analytical Tools

Descriptive statistical tools like frequency analysis, percentage analysis, and graphical representation were used to study the socio-economic profile of Ayurvedic herb farmers. To assess farmers' perceptions of adopting online marketplaces, Descriptive statistical Weighted Average Mean (WAM) and the Henry Garrett Ranking Method were applied.

The Garrett Ranking Method used the formula:

$$\text{Percentage Position} = 100(R_{ij} - 0.5)/N_j,$$

where R_{ij} = rank given for the i th variable by j th respondent, and N_j = total number of variables ranked by j th respondent.

To identify key opportunities and challenges in marketing Ayurvedic herbs online all three tools used,

WAM was calculated using:

$$\text{Weighted Average Mean } (\bar{x}) = \frac{(F1X1 + F2X2 + F3X3 + F4X4 + F5X5)}{Xt}$$

where F = weight given to each response, X = number of responses, and Xt = total number of responses.

4. Result and Discussion

4.1 To study Socio-economic profile of Ayurvedic herbal farmers

Table 1. Socio-economic profile of Ayurvedic herbal farmers

Sr. No.	Particulars	Respondents	Percentage
1	Age		
	Below 30	8	4
	31-40	15	7.5
	41-50	114	57
	Above 50	63	31.5
	Total	200	100
2	Education		
	Below SSC	124	62
	SSC	36	18
	HSC	26	13
	Graduation and above	14	7
	Total	200	100

3	Gender		
	Female	07	3.5
	Male	193	96.5
	Total	200	100
4	Farming Experience		
	Below 10	18	9
	11-20	24	12
	21-30	105	52.5
	Above 30	53	26.5
	Total	200	100
5	Occupation status		
	Agricultural Crop Farming	67	33.5
	Livestock Farming	37	18.5
	Mixed Farming	53	26.5
	Herb Farming	31	15.5
	Others	12	6
	Total	200	100
6	Type of Farmer		
	Marginal Farmer (<1ha)	32	16
	Small Farmer (1-2 ha)	49	24.5
	Semi-medium Farmer (2 -4 ha)	55	27.5
	Medium Farmer (4-10 ha)	52	26
	Large Farmer (10 > ha)	12	06
	Total	200	100
7	Annual income		
	Below 2 lakh	72	36
	2-4 lakhs	53	26.5
	4-6 lakhs	48	24
	Above 6 lakhs	27	13.5
	Total	200	100
8	Growing frequency		
	Year-round	23	12.5
	Seasonal	56	28x
	Occasionally, depending on crop and demand	119	59.5
	Total	200	100
9	Number of memberships		
	1	86	43
	2	45	22.5
	3 or More than 3	26	13
	Not associated with any organization	43	21.5
	Total	200	100
10	Type of Membership		
	Farmer Producers organization	47	29.93
	ATMA	58	36.94
	Sevasahakari mandali	34	21.65

Non-Governmental Organization	18	11.46
Total	200	100

The survey shows that most farmers (57%) are between 41 and 50 years old, suggesting a mature group with plenty of farming experience. Farming in the region is still largely male-dominated, with 96.5% of respondents being men. Over half of the farmers (52.5%) have been working in agriculture for 21 to 30 years, showing long-term commitment to the profession.

Education levels are relatively low, with 62% not studying beyond the Secondary School Certificate (SSC). This may make it harder for them to access new techniques or digital tools in agriculture.

Most farmers (33.5%) focus only on crop farming and have not expanded into other areas like livestock. In terms of land size, semi-medium (28.5%) and medium (26%) landholders make up the largest groups, while marginal and large-scale farmers are fewer. Economically, 36% earn less than ₹2 lakh per year, showing that many faces financial challenges.

When it comes to growing Ayurvedic herbs, most do so only occasionally (60%), some grow them seasonally (28%), and only a few (12%) grow them throughout the year. This shows that interest in herbal farming exists but is still developing.

Institutional involvement is moderate. About 43% of farmers are members of at least one organization, mainly ATMA (36.94%) and Farmer Producer Organizations (29.93%), giving them some support and exposure to group-based marketing opportunities.

4.2 To assess the farmers' perception to adopting online marketplaces for selling Ayurvedic herbs

4.2.1 Factors to participate farmers in an online marketplace

Table 2. Factors to participation in online marketplace

Sr. No.	Factors	Total	WAM	Rank
1	Better prices for herbs	200	4.40	01
2	Increased market reach	200	3.76	03
3	Reduced dependency on middlemen	200	3.84	02
4	Easy online platform with user-friendly features	200	3.56	04
5	Regular income opportunities	200	2.98	05

4.2.2 Concerns or challenges faced by farmers while adopting an online marketplace

Table 3. Concerns or challenges faced by farmers

Factors	Particulars	Garret score	Average garret score	Rank
F1	Internet connectivity issues	10423	52.1	4
F2	Lack of time to manage online sales	8104	40.52	7
F3	Charges taken by online platform	10371	51.85	5
F4	Lack of technical knowledge	13356	66.78	1
F5	Trusting the platform	12824	64.12	2
F6	Logistics and delivery issues	9138	45.69	6
F7	Concerns about online payments	11122	55.61	3

4.2.3 Support or assistance farmer need to participate in the online marketplace

Table 4. Support or assistance needed by farmers

Factors	Particulars	Garret score	Average garret score	Rank
F1	Market demand	13558	67.8	2
F2	Support with digital payment systems	8622	43.1	5
F3	Marketing and promotion of my products	13261	66.3	3
F4	Assistance in growing of ayurvedic plants	9562	47.8	4
F5	Training on using the online platform	14942	74.7	1
F6	Assistance with packaging and delivery	8243	41.2	6

To assess the farmers' perception of adopting online marketplaces for selling Ayurvedic herbs, three key dimensions were analyzed: motivating factors, challenges faced, and the support required for participation. Farmers highlighted the potential for better pricing (WAM = 4.40), reduced reliance on intermediaries (WAM = 3.84), and expanded market access (WAM = 3.76) as primary incentives. Ease of use (WAM = 3.56) and prospects for regular income (WAM = 2.98) also contributed to their interest in digital platforms.

However, several barriers impede adoption. The most significant challenges include limited technical knowledge (average Garrett score = 66.78), distrust in online platforms (64.12), and concerns over digital payments (55.61). Additional issues such as poor internet connectivity, logistical constraints, and platform service charges further hinder participation.

To facilitate engagement, farmers expressed a need for targeted support. Training on platform usage (Garrett score = 74.7) emerged as the most critical requirement, followed by assurance of market demand (67.8) and assistance in marketing and promotion (66.3). Support in cultivation practices, digital payment systems, and logistics were also noted as beneficial. These findings underscore the importance of comprehensive support to enhance digital participation among Ayurvedic herb farmers.

4.3 To identify the key opportunities and challenges faced by farmers in marketing Ayurvedic herbs online

4.3.1 Opportunities in marketing ayurvedic herbs online

Table 5. Opportunities in marketing

Factors	Particulars	Garret score	Average garret score	Rank
F1	Rising demand for herbal and ayurvedic products	11482	57.41	4
F2	Potential to sell directly to consumers via online platforms	13686	68.43	3
F3	Increased awareness about farm or company and health	14678	73.39	2
F4	Opportunities for higher prices	15766	78.8	1
F5	Increasing Government or NGO support for promoting ayurvedic products	8704	43.5	5
F6	Collaboration with ayurvedic product manufacturers	7760	38.80	6

4.3.2 Role of online marketplaces in improving the sale of ayurvedic herbs

Table 6. Role of online marketplaces

Factor	Particulars	Garrett score	Average Garrett score	Rank
F1	Better access to a larger customer base	13446	67.23	1
F2	Easier access to market pricing information	12946	64.73	2
F3	Streamlined sales and payment processes	11332	56.66	4
F4	Increased visibility and branding opportunities	11624	58.12	3
F5	Reduced dependence on intermediaries	10925	54.63	5
F6	Opportunities for better packaging and logistics	10624	53.12	6

4.3.3 Challenges in selling ayurvedic plants online

Table 7. Challenges in selling ayurvedic plants online

Sr. no.	Particulars	WAM	Rank
1.	Lack of knowledge about market demand	4.39	1
2.	Lack of pricing information	4.36	2
3.	Limited access to larger or international markets	2.82	6
4.	Inadequate storage facilities for herbs	4.19	3
5.	Difficulty in reaching potential buyers	2.66	7
6.	Packaging and logistics (roads, transport, etc.)	3.34	5
7.	Competition with other farmers and traders	2.58	8
8.	Lack of quality control or certification	3.6	4

The study identified several key opportunities for farmers marketing Ayurvedic herbs online. The most significant is the potential to secure higher prices for their products, as indicated by the highest average Garrett score of 78.8. Selling directly to consumers via online platforms (average Garrett score: 68.43) reduces reliance on intermediaries, potentially increasing profit margins. Enhanced visibility and awareness of the farm or company, coupled with growing health consciousness among consumers (average Garrett score: 73.39), further bolster the appeal of online marketing. Other notable opportunities include the rising demand for herbal and Ayurvedic products (average Garrett score: 57.41) and increasing support from government and non-governmental organizations for promoting these products (average Garrett score: 43.5).

Online marketplaces play a significant role in improving the sales of Ayurvedic herbs by providing better access to a larger customer base, as reflected by the highest average Garrett score of 67.23. These platforms also facilitate easier access to market pricing information (average Garrett score: 64.73), enabling farmers to make informed decisions. Increased visibility and branding opportunities (average Garrett score: 58.12) help in establishing a stronger market presence. Streamlined sales and payment processes (average Garrett score: 56.66) and reduced dependence on intermediaries (average Garrett score: 54.63) further enhance the efficiency and profitability of

online sales. Opportunities for improved packaging and logistics (average Garrett score: 53.12) also contribute to better product presentation and customer satisfaction.

Despite these opportunities, farmers face several challenges in selling Ayurvedic herbs online. The most significant is the lack of knowledge about market demand (WAM: 4.39), which hampers effective planning and sales strategies. Closely related is the lack of pricing information (WAM: 4.36), making it difficult for farmers to competitively price their products. Inadequate storage facilities for herbs (WAM: 4.19) pose risks to product quality and shelf life. Additionally, the absence of quality control or certification (WAM: 3.6) can affect consumer trust and marketability. Other challenges include packaging and logistics issues (WAM: 3.34), limited access to larger or international markets (WAM: 2.82), difficulty in reaching potential buyers (WAM: 2.66), and competition with other herb farmers and traders (WAM: 2.58).

4. Conclusion

The findings reveal that most farmers involved in Ayurvedic herb cultivation are middle-aged males with moderate farming experience and limited formal education, which may influence their adaptability to new technologies like online platforms. While many cultivate ayurvedic herbs occasionally or seasonally based on market demand, only a smaller group engages in year-round production, often linked to higher resource availability and market orientation. Farmers showed a positive attitude toward adopting online marketplaces, mainly motivated by the potential for better prices and reduced dependency on middlemen. However, limited technical knowledge and unfamiliarity with market demand emerged as major obstacles. The role of institutions such as ATMA and FPOs was notable in supporting capacity-building and collective farming efforts. Opportunities for wider market reach and improved price realization make digital selling attractive, yet the lack of awareness, digital literacy, and consumer insights hinder broader adoption. To enhance participation, targeted training, digital infrastructure support, and market intelligence access are essential for empowering farmers to confidently engage in online herb marketing.

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