International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS)

International Journal of Economic, Business, Accounting, Agriculture Management and Sharia Administration (IJEBAS Journal) | ISSN (e): 2808-4713
Volumes 6 No. 4 (2026)

ASSESSMENT OF READINESS OF FARMERS AND MSMES FOR MEDICINAL PLANT-BASED BUSINESS DEVELOPMENT IN KABUPATEN ASAHAN

Adetia Azmi Tanjung[1]*, Windi Triana[2], Rudy Irwansyah[3], Rahmawani[4]
Universitas Muhammadiyah Asahan
E-mail: tia.tanjung92@gmail.com

Received	: 04 June 2026	Accepted	: 25 June 2026
Revised	: 10 June 2026	Published	: 28 July 2026

Abstract

This study aims to assess the readiness of farmers and micro, small, and medium enterprises (MSMEs) for medicinal plant-based business development in Kabupaten Asahan, North Sumatra, Indonesia. A quantitative descriptive design was employed involving 150 respondents, consisting of 90 farmers and 60 MSME actors selected through purposive sampling. Data were collected using structured questionnaires, field observations, and brief interviews. Farmer readiness was measured through land availability, cultivation knowledge, production resources, post-harvest capability, market access, financing, and willingness to collaborate. MSME readiness was assessed through raw-material availability, production capability, technology adoption, product innovation, financial management, licensing, packaging, marketing, and partnership readiness. Data were analysed using frequencies, percentages, mean scores, standard deviations, and a readiness index. The results showed that farmers achieved an average readiness score of 3.47 with a readiness index of 69.4%, while MSMEs obtained an average score of 3.39 with a readiness index of 67.8%. The combined readiness index reached 68.6%, indicating that both groups were generally ready to support medicinal plant-based business development. Farmers demonstrated strong readiness in land availability, farming experience, crop diversification, and collaboration. MSMEs showed strong entrepreneurial motivation, basic processing capability, product innovation, and partnership interest. However, weaknesses remained in post-harvest handling, technology, financing, market access, licensing, product standardization, branding, and digital marketing. The study concludes that Kabupaten Asahan has a favourable foundation for medicinal plant-based business development. Nevertheless, sustainable development requires an integrated value-chain approach involving farmers, MSMEs, local government, universities, financial institutions, and private-sector partners.

Keywords: business readiness; farmers; medicinal plants; micro, small, and medium enterprises; Kabupaten Asahan

INTRODUCTION

Medicinal plants have increasingly gained strategic importance as sources of raw materials for traditional medicines, herbal products, functional foods, cosmetics, and other health-related commodities. This development is supported by growing public interest in natural products and preventive health practices. At the global level, the World Health Organization's *Global Traditional Medicine Strategy 2025–2034* emphasizes the importance of strengthening scientific evidence, safety, regulation, integration into health systems, and the broader economic value of traditional and complementary medicine. Consequently, medicinal plants should no longer be viewed merely as household remedies, but also as agricultural commodities with considerable potential for value creation and rural business development.

Indonesia possesses rich biodiversity and a long tradition of using medicinal plants. Commonly cultivated bio-pharmaceutical commodities include ginger, turmeric, galangal, cardamom, lemongrass, aromatic ginger, and Java turmeric. National medicinal-plant production reached approximately 861,000 tonnes in 2022, indicating a substantial supply base for the development of herbal industries and related businesses. In addition to their economic potential, medicinal plants are closely associated with local knowledge and cultural practices found among Indonesia's diverse ethnic communities. However, this potential has not yet been fully transformed into competitive, standardized, and sustainable commercial products. Limited innovation, inadequate cultivation practices, weak post-harvest management, insufficient product standardization, and poor market integration continue to restrict the development of medicinal plant-based enterprises.

The development of medicinal plant businesses requires an integrated relationship between farmers as raw-material producers and micro, small, and medium enterprises (MSMEs) as processors, distributors, and marketers. Farmers determine the continuity, quantity, and quality of medicinal plant supplies, while MSMEs create added value by transforming agricultural products into dried herbs, herbal beverages, powders, oils, supplements, and other commercially viable products. This relationship can generate additional income, diversify rural livelihoods, create employment, and reduce farmers' dependence on the sale of unprocessed agricultural commodities. As MSMEs account for the vast majority of business units in Indonesia, their involvement is essential for establishing an inclusive medicinal plant-based economic ecosystem.

Kabupaten Asahan has considerable agricultural resources that can support the development of medicinal plant-based businesses. The regional agricultural sector produces various horticultural commodities, demonstrating the availability of land, farming experience, labour, and supporting resources required for agricultural diversification. Recent regional statistics also indicate significant production of commodities such as guava, soursop, lemon, and other plants that may be processed into health-oriented products. These conditions provide an opportunity for Kabupaten Asahan to develop a local business ecosystem that connects medicinal plant cultivation, processing, packaging, branding, and marketing.

Nevertheless, the availability of natural resources alone does not guarantee successful business development. The readiness of farmers and MSMEs is a critical factor determining whether medicinal plant commodities can be developed into sustainable and marketable products. Farmer readiness may include knowledge of medicinal plant cultivation, willingness to diversify crops, access to quality planting materials, land availability, production capacity, adherence to good agricultural practices, and ability to maintain consistent product quality. Good agricultural practices are particularly important because medicinal plant raw materials must meet safety, purity, traceability, and quality requirements. Government cultivation guidelines therefore stress the need for proper production management accompanied by technical assistance for farmers and business actors.

MSME readiness involves a broader range of entrepreneurial and organizational capabilities, including access to capital, processing technology, product innovation, business licensing, quality assurance, packaging, branding, digital marketing, distribution networks, and partnerships. Enterprises must also understand consumer preferences and the legal requirements applicable to herbal and health-related products. Without adequate readiness in these areas, medicinal plant businesses may remain informal, small-scale, and unable to reach wider markets. The development process must therefore be supported by cooperation among farmers, MSMEs, local government, universities, financial institutions, health authorities, and private-sector partners.

Previous discussions on medicinal plant development have generally focused on biodiversity, cultivation, pharmacological benefits, or the use of individual plant species. Relatively limited attention has been given to the combined readiness of farmers and MSMEs within a specific regional business ecosystem. In particular, empirical information remains limited regarding whether farmers in Kabupaten Asahan are prepared to supply medicinal plant raw materials consistently and whether local MSMEs possess the capabilities required to process and commercialize them. This information is essential because business-development programmes that do not correspond to stakeholders' actual readiness may lead to inappropriate training, underutilized equipment, weak market performance, and unsustainable production.

Therefore, this study aims to assess the readiness of farmers and MSMEs for medicinal plant-based business development in Kabupaten Asahan. The assessment covers production resources, knowledge and skills, technological capacity, financial access, entrepreneurial orientation, product-processing capability, regulatory preparedness, marketing readiness, and willingness to collaborate. The study is expected to identify existing strengths, major constraints, and priority areas for intervention. Its findings can provide an empirical basis for designing training programmes, technical assistance, financing schemes, business partnerships, and regional policies that support an integrated and sustainable medicinal plant industry. Ultimately, the development of this sector is expected to strengthen farmer income, improve MSME competitiveness, create local employment, preserve medicinal plant knowledge, and contribute to inclusive rural economic development in Kabupaten Asahan.

LITERATURE REVIEW

Medicinal Plants as Strategic Agricultural Commodities

Medicinal plants are agricultural commodities that contain active compounds and can be used as raw materials for traditional medicines, herbal beverages, functional foods, cosmetics, and health-supporting products. Their economic value has increased along with growing public awareness of healthy lifestyles and the use of natural

ingredients. Medicinal plants such as ginger, turmeric, aromatic ginger, galangal, lemongrass, cardamom, and Java turmeric can be cultivated on household land, agricultural fields, or integrated farming areas.

The development of medicinal plants provides opportunities for agricultural diversification and additional income for rural communities. Compared with selling unprocessed crops, the processing of medicinal plants into dried materials, powders, instant beverages, herbal oils, and packaged products can generate higher added value. However, the commercial development of medicinal plants requires consistency in production quantity, raw-material quality, product safety, and market availability.

Medicinal plant-based business development should therefore be approached as an integrated value-chain activity. Farmers function as producers of raw materials, while MSMEs play a role in processing, packaging, branding, distributing, and marketing the products. The success of this business depends not only on the availability of plants but also on the readiness of all actors involved in the production and commercialization process.

Readiness for Business Development

Readiness refers to the condition in which individuals or organizations possess the willingness, resources, knowledge, skills, and capacity required to undertake a particular activity. In the context of medicinal plant-based business development, readiness reflects the ability of farmers and MSMEs to adopt new production practices, develop processed products, meet market requirements, and maintain sustainable business operations.

Business readiness is multidimensional. It includes technical readiness, human-resource readiness, financial readiness, technological readiness, regulatory readiness, and market readiness. Technical readiness relates to the ability to conduct cultivation, harvesting, processing, storage, and quality control. Human-resource readiness concerns knowledge, experience, skills, motivation, and willingness to learn. Financial readiness includes access to working capital, investment funds, and financial-management capabilities.

Technological readiness refers to the availability and ability to use appropriate machinery, production equipment, packaging technology, and digital platforms. Regulatory readiness concerns the ability to fulfil business permits, production standards, labelling requirements, and product-safety provisions. Market readiness includes knowledge of consumer needs, distribution channels, promotional strategies, pricing, and competition. These dimensions are interrelated and jointly determine the feasibility of medicinal plant-based business development.

Farmer Readiness

Farmers are the primary actors responsible for ensuring the availability, quality, and continuity of medicinal plant raw materials. Farmer readiness can be assessed through land availability, experience in medicinal plant cultivation, access to seeds, knowledge of cultivation techniques, production capacity, labour availability, and willingness to diversify agricultural commodities.

Knowledge of good cultivation practices is essential because the quality of medicinal plant products is strongly influenced by planting materials, soil conditions, cultivation methods, pesticide use, harvesting time, and post-harvest handling. Improper cultivation and storage may reduce the active compounds, cleanliness, and safety of raw materials. Therefore, farmers need technical training and continuous assistance to produce medicinal plants according to quality standards.

Farmer readiness is also influenced by perceived economic benefits and market certainty. Farmers may be reluctant to cultivate medicinal plants when they have limited information about selling prices, buyers, production risks, and profit potential. Partnership arrangements with MSMEs, cooperatives, government agencies, or private companies can increase farmer confidence by providing market access, production guidance, planting materials, and purchase guarantees.

The willingness to collaborate is another important element of farmer readiness. Individual farmers often face limitations in production volume, bargaining power, and access to technology. Through farmer groups or cooperatives, production can be coordinated, quality standards can be applied collectively, and marketing activities can be conducted more efficiently.

MSME Readiness

MSMEs have a strategic role in transforming medicinal plants into products with higher economic and commercial value. MSME readiness refers to the ability of business actors to manage raw materials, production processes, product innovation, quality assurance, packaging, licensing, financing, and marketing.

Production readiness requires suitable equipment, clean processing facilities, standard operating procedures, and sufficient production capacity. Medicinal plant products must be processed hygienically to maintain their quality

and ensure consumer safety. MSMEs also need to establish consistency in taste, colour, aroma, composition, packaging size, and product durability.

Product innovation is essential because consumers increasingly demand medicinal plant products that are practical, safe, attractive, and easy to consume. Innovation may include the development of instant herbal drinks, tea bags, powders, syrups, extracts, oils, snacks, and functional food products. Innovation can also involve improvements in packaging design, product information, branding, and environmentally friendly materials.

Financial readiness determines whether MSMEs can purchase raw materials, improve production equipment, obtain licences, develop packaging, and expand marketing activities. Limited access to capital often prevents MSMEs from improving production scale and product quality. Financial literacy is therefore necessary to support budgeting, cost calculation, pricing, cash-flow management, and investment decisions.

Digital readiness is increasingly important for MSME competitiveness. Digital platforms can be used to promote medicinal plant products, communicate with consumers, receive orders, process payments, and expand distribution. However, the effectiveness of digital marketing depends on the ability of business owners to create promotional content, manage online stores, respond to customers, and build consumer trust.

Entrepreneurial Orientation

Entrepreneurial orientation reflects the tendency of individuals or organizations to innovate, take calculated risks, and act proactively in identifying business opportunities. In medicinal plant-based business development, entrepreneurial orientation encourages farmers and MSMEs to respond to changes in consumer preferences, experiment with new products, adopt technology, and enter new markets.

Innovativeness refers to the willingness to introduce new cultivation methods, production processes, products, packaging, or marketing strategies. Proactiveness concerns the ability to anticipate market opportunities and act before competitors. Risk-taking reflects the willingness to allocate resources to uncertain but potentially beneficial business activities.

Farmers and MSMEs with strong entrepreneurial orientation are generally more prepared to diversify their products, adopt modern technology, establish partnerships, and expand their markets. Conversely, low entrepreneurial orientation may result in dependence on traditional production practices, limited innovation, and resistance to business development programmes.

Technological Readiness

Technological readiness is the ability and willingness of individuals or organizations to adopt and use technology to improve performance. In medicinal plant businesses, technology can support cultivation, drying, grinding, extracting, mixing, packaging, storing, and marketing activities.

Appropriate technology can increase production efficiency, improve product consistency, reduce waste, and extend shelf life. For farmers, technology may include cultivation tools, irrigation systems, drying equipment, and information applications. For MSMEs, technology may include grinders, dehydrators, mixers, filling machines, sealing machines, labelling equipment, and digital-marketing platforms.

Technology adoption is affected by perceived usefulness, ease of use, cost, technical skills, and access to training. Business actors are more likely to adopt technology when they understand its benefits and receive practical assistance. Therefore, the provision of equipment should be accompanied by training, maintenance guidance, and business-development support.

Financial and Institutional Support

Financial resources are required throughout the medicinal plant value chain. Farmers need capital for land preparation, seeds, fertilizers, labour, harvesting, and post-harvest handling. MSMEs require working capital for raw materials, equipment, packaging, licensing, promotion, and distribution.

Access to formal financing remains a major challenge for many small business actors. Difficulties may arise from limited collateral, incomplete financial records, low financial literacy, and insufficient information regarding financing programmes. Government credit schemes, cooperatives, microfinance institutions, banks, and partnership programmes can help address these constraints.

Institutional support also includes training, technical assistance, certification, market facilitation, and business mentoring. Local governments, universities, health agencies, agricultural extension officers, and private-sector partners can contribute different forms of expertise. The sustainability of medicinal plant businesses requires coordination among these institutions rather than isolated and short-term interventions.

Regulatory and Product-Quality Readiness

Medicinal plant products are closely related to consumer health and safety. Therefore, product quality and regulatory compliance are important components of MSME readiness. Business actors must understand requirements concerning business registration, production permits, food-safety certification, halal certification, product labels, composition, expiration dates, and marketing claims.

Regulatory readiness strengthens consumer trust and expands access to formal markets, including supermarkets, pharmacies, online marketplaces, and institutional buyers. However, many MSMEs encounter difficulties in understanding administrative procedures, preparing documents, and financing certification processes. Simplified information, mentoring, and coordinated licensing services are therefore needed to assist MSMEs.

Quality assurance must begin from the raw-material stage. Traceability, cleanliness, moisture content, storage conditions, processing hygiene, and packaging quality influence the safety and durability of medicinal plant products. Collaboration between farmers and MSMEs is necessary to establish agreed standards for raw-material quality.

Market Readiness

Market readiness refers to the ability of farmers and MSMEs to identify target consumers, understand market demand, determine prices, develop distribution channels, and communicate product value. Medicinal plant products compete not only with similar herbal products but also with modern health beverages, supplements, and functional foods.

Consumer purchasing decisions are influenced by product quality, safety, effectiveness, taste, price, packaging, brand reputation, and availability. Therefore, MSMEs need to conduct market analysis before developing products. Products should be designed according to the characteristics and preferences of the intended consumer groups.

Branding and packaging are particularly important because they shape consumer perceptions of professionalism and product quality. Clear information regarding ingredients, benefits, usage instructions, production dates, and legal status can increase consumer confidence. Digital promotion, exhibitions, local retail partnerships, and tourism-related marketing can further expand market access.

Collaboration in the Medicinal Plant Business Ecosystem

Medicinal plant-based business development requires collaboration among farmers, MSMEs, government institutions, universities, financial institutions, health professionals, distributors, and consumers. Collaboration enables the exchange of knowledge, technology, resources, and market information.

Farmers and MSMEs need mutually beneficial partnerships. Farmers require market guarantees and technical guidance, while MSMEs need reliable supplies of high-quality raw materials. Local governments can facilitate partnerships, provide infrastructure, organize training, and integrate medicinal plant development into regional economic programmes.

Universities can contribute through research, product development, quality testing, business mentoring, and community-service activities. Financial institutions can provide accessible financing, while health and regulatory institutions can assist with product safety and licensing. A collaborative ecosystem can reduce business risks and improve the sustainability of the medicinal plant value chain.

Conceptual Framework

Based on the literature, the readiness of farmers and MSMEs for medicinal plant-based business development can be assessed through several dimensions. Farmer readiness includes production resources, cultivation knowledge, post-harvest capability, motivation, market orientation, and willingness to collaborate. MSME readiness includes production capability, technology adoption, product innovation, financial capacity, regulatory compliance, marketing capability, and partnership readiness.

The overall level of readiness determines the potential for developing a sustainable medicinal plant business ecosystem in Kabupaten Asahan. High readiness indicates that farmers and MSMEs possess sufficient resources and capabilities to initiate or expand medicinal plant-related businesses. Moderate readiness indicates that development is possible but requires targeted assistance. Low readiness suggests that fundamental capacity-building interventions are needed before large-scale business development can be implemented.

This study therefore positions farmer readiness and MSME readiness as the main foundations of medicinal plant-based business development. The assessment of these dimensions is expected to provide a comprehensive understanding of existing conditions, identify readiness gaps, and determine appropriate policy and business interventions in Kabupaten Asahan.

METHOD

This study used a quantitative descriptive design to assess the readiness of farmers and micro, small, and medium enterprises (MSMEs) for medicinal plant-based business development in Kabupaten Asahan, North Sumatra. Data were collected from January to March 2026 in selected agricultural and MSME areas with potential for medicinal plant cultivation and processing.

The population consisted of farmers and MSME actors whose activities were related to agriculture, horticulture, food processing, herbal products, or other relevant businesses. Respondents were selected using purposive sampling based on their experience, business relevance, and willingness to participate. A total of 150 respondents were involved, comprising 90 farmers and 60 MSME actors.

Primary data were collected through structured questionnaires, field observations, and brief interviews. Secondary data were obtained from official reports, government documents, and relevant scientific publications. The questionnaire used a five-point Likert scale ranging from 1, “strongly disagree,” to 5, “strongly agree.”

Farmer readiness was measured through land and resource availability, cultivation knowledge, access to production inputs, post-harvest capability, market knowledge, financing access, and willingness to collaborate. MSME readiness was assessed through raw-material availability, production capacity, technology adoption, product innovation, financial management, licensing, product quality, packaging, marketing, and partnership capability.

The instrument was tested for validity using corrected item-total correlation and for reliability using Cronbach’s alpha, with a minimum acceptable value of 0.70. Data were analysed using frequencies, percentages, means, standard deviations, and a readiness index. Mean scores were classified into very low, low, moderate, high, and very high readiness categories. Comparative tests were also used, where appropriate, to identify differences based on education, experience, training, and access to financing.

Participation was voluntary, informed consent was obtained, and all respondent information was kept confidential and used only for research purposes.

RESULTS AND DISCUSSION

Respondent Characteristics

A total of 150 respondents participated in this study, consisting of 90 farmers and 60 micro, small, and medium enterprise actors in Kabupaten Asahan. The characteristics of the respondents were analysed based on age, education, business experience, participation in training, and access to financing.

Most respondents were within the productive age group. Among the farmers, 42.2% were aged between 41 and 50 years, while 31.1% were between 31 and 40 years. Only 10.0% of the farmers were below 30 years of age. Among MSME actors, 40.0% were aged between 31 and 40 years, followed by 33.3% aged between 41 and 50 years. These findings indicate that medicinal plant-based business development in Kabupaten Asahan is predominantly supported by economically active respondents who have sufficient physical capacity and business experience.

In terms of education, most farmers had completed senior high school, accounting for 48.9% of the farmer respondents. Approximately 27.8% had completed junior high school, while 14.4% held a diploma or university degree. Among MSME actors, 55.0% had completed senior high school and 30.0% held a diploma or bachelor’s degree. The higher educational background of MSME actors may support their ability to understand product development, marketing, business administration, and regulatory requirements.

Most respondents had considerable experience in their respective activities. Approximately 46.7% of the farmers had more than ten years of farming experience, while 35.6% had between five and ten years of experience. Among MSME actors, 43.3% had operated their businesses for five to ten years, and 28.3% had operated for more than ten years. This experience represents an important foundation for the development of medicinal plant-based enterprises.

However, only 36.7% of all respondents had participated in training related to medicinal plants, food processing, entrepreneurship, or digital marketing. Furthermore, only 31.3% had accessed formal financing from banks, cooperatives, or government credit programmes. These findings indicate that training and financing remain important areas requiring further intervention.

Overall Readiness of Farmers

The descriptive analysis showed that the overall mean score of farmer readiness was 3.47, indicating a high level of readiness. The readiness index reached 69.4%, which placed farmers in the "ready" category. Nevertheless, readiness differed across the assessed dimensions.

Farmer Readiness Dimension	Mean Score	Category
Availability of land and production resources	3.92	High
Willingness to diversify crops	3.78	High
Farming experience and basic cultivation skills	3.71	High
Access to labour and production inputs	3.45	High
Knowledge of medicinal plant cultivation	3.34	Moderate
Post-harvest handling capability	3.18	Moderate
Market knowledge and access	3.09	Moderate
Access to financing and institutional support	2.96	Moderate
Willingness to collaborate	3.82	High
Overall mean	**3.47**	**High**

The highest farmer-readiness score was recorded for the availability of land and production resources, with a mean of 3.92. Most farmers had agricultural land that could be used for crop diversification, either through dedicated plots, intercropping, or household-yard cultivation. This condition provides a favourable production base for medicinal plants such as ginger, turmeric, aromatic ginger, galangal, lemongrass, and Java turmeric.

The willingness to diversify crops also received a high mean score of 3.78. Farmers generally expressed interest in cultivating medicinal plants when market demand, selling prices, and buyer availability were clearly established. This finding indicates that farmers are open to innovation, but their willingness is influenced by perceptions of economic benefit and market certainty.

The dimension of farming experience and basic cultivation skills obtained a mean score of 3.71. Most respondents were familiar with horticultural cultivation, soil preparation, fertilization, weed control, and harvesting. However, their knowledge was primarily based on conventional agricultural practices rather than specific standards for medicinal plants.

Knowledge of medicinal plant cultivation was classified as moderate, with a mean score of 3.34. Although several farmers had grown medicinal plants for household consumption, only a limited number understood commercial cultivation requirements, appropriate harvest periods, active-compound preservation, traceability, and quality standardization. This gap suggests that practical training should focus on good agricultural and collection practices for medicinal plants.

Post-harvest capability recorded a mean score of 3.18. Farmers generally understood basic activities such as cleaning and sun-drying, but they had limited knowledge of moisture control, hygienic storage, sorting, grading, and packaging. Inadequate post-harvest handling may reduce raw-material quality and limit the ability of farmers to meet MSME or industrial standards.

Market knowledge and access received a mean score of 3.09. Most medicinal plants were sold in fresh form through traditional markets or local collectors. Farmers had limited information regarding processing industries, contractual buyers, product specifications, and price trends. This weak market connection creates uncertainty and discourages farmers from expanding production.

Access to financing and institutional support was the lowest-rated dimension, with a mean score of 2.96. Farmers commonly relied on personal funds and informal loans to finance agricultural activities. Limited financial records, collateral requirements, and insufficient information regarding government financing programmes restricted their access to formal credit.

Despite these constraints, willingness to collaborate received a high mean score of 3.82. Farmers were interested in joining farmer groups, cooperatives, contractual farming arrangements, and partnerships with MSMEs. Collaboration was perceived as a means of obtaining seeds, technical guidance, production equipment, market certainty, and more stable prices.

Overall Readiness of MSMEs

The overall mean score of MSME readiness was 3.39, which was classified as moderate and close to the high-readiness threshold. The MSME readiness index reached 67.8%, placing MSME actors in the "ready" category, although several important capability gaps remained.

MSME Readiness Dimension	Mean Score	Category
Availability of local raw materials	3.74	High
Basic production and processing capability	3.58	High
Entrepreneurial motivation	3.86	High
Product innovation capability	3.46	High
Availability and use of technology	3.17	Moderate
Financial management and access to capital	3.08	Moderate
Licensing and regulatory compliance	2.94	Moderate
Packaging and branding capability	3.31	Moderate
Marketing capability	3.37	Moderate
Partnership readiness	3.62	High
Overall mean	**3.39**	**Moderate**

The availability of local raw materials received a mean score of 3.74. MSME respondents believed that medicinal plants could be obtained locally, although supply quantity and quality were not always consistent. Seasonal production, the absence of contractual arrangements, and variations in post-harvest quality were identified as major concerns.

Basic production and processing capability obtained a mean score of 3.58. Several MSMEs had experience producing herbal drinks, powdered beverages, traditional foods, spices, and other agricultural products. Their existing experience provides a foundation for medicinal plant processing. However, most production activities were still conducted on a household scale using simple equipment.

Entrepreneurial motivation was the strongest MSME dimension, with a mean score of 3.86. Respondents showed considerable interest in developing new products and expanding their businesses. Many MSME actors viewed medicinal plant products as promising because of increasing consumer awareness of health, natural ingredients, and preventive lifestyles.

Product innovation capability obtained a mean score of 3.46. MSME actors were interested in developing instant herbal beverages, dried herbal teas, powders, syrups, herbal oils, snacks, and functional food products. However, product development was often based on personal experience rather than market research, laboratory testing, or systematic product trials.

Technological readiness recorded a moderate mean score of 3.17. Most MSMEs possessed basic equipment such as grinders, blenders, stoves, sealers, and manual packaging tools. More advanced technologies, including controlled-temperature dryers, extractors, mixers, filling machines, and moisture-testing equipment, were rarely available. Limited access to appropriate technology may affect production efficiency, product consistency, and shelf life.

Financial management and access to capital received a mean score of 3.08. Many MSME actors combined business and household finances, maintained limited financial records, and relied primarily on personal capital. These conditions may restrict business expansion and make it difficult to obtain external financing.

Licensing and regulatory compliance obtained the lowest score, with a mean of 2.94. Several MSMEs had business identification numbers, but fewer had complete food-production permits, halal certification, registered trademarks, or product-testing documentation. Respondents also had limited understanding of the regulations governing herbal-product claims and labelling. This finding indicates that regulatory assistance is necessary before medicinal plant products can enter broader formal markets.

Packaging and branding capability received a moderate mean score of 3.31. Some MSMEs had adopted labelled plastic or bottle packaging, but product designs were generally simple and lacked complete information regarding composition, net weight, production date, expiration date, usage instructions, and storage recommendations. Improving packaging could increase product attractiveness and consumer trust.

Marketing capability recorded a mean score of 3.37. Conventional marketing through local markets, neighbourhood networks, exhibitions, and resellers remained dominant. Some MSMEs used WhatsApp, Facebook,

Instagram, and online marketplaces, but digital marketing activities were generally irregular and lacked professional content. Therefore, respondents require support in content creation, online-store management, customer communication, and digital promotion.

Partnership readiness obtained a high mean score of 3.62. MSME actors were willing to establish partnerships with farmer groups, cooperatives, universities, local government agencies, financial institutions, retailers, and distributors. Such partnerships were expected to improve access to raw materials, technology, training, financing, licensing, and markets.

Comparison of Farmer and MSME Readiness

The overall mean readiness score of farmers was 3.47, while that of MSMEs was 3.39. These results indicate that both groups were generally prepared to participate in medicinal plant-based business development, although farmer readiness was slightly higher.

Respondent Group	Mean Score	Readiness Index	Interpretation
Farmers	3.47	69.4%	Ready
MSME actors	3.39	67.8%	Ready
Combined readiness	**3.43**	**68.6%**	**Ready**

Farmers demonstrated stronger readiness in land availability, farming experience, willingness to diversify, and collaboration. MSMEs demonstrated stronger readiness in entrepreneurial motivation, processing experience, product innovation, and partnership development. However, both groups showed weaknesses in financing, technology, market access, quality standardization, and institutional support.

The combined readiness score was 3.43, with an index of 68.6%. This result indicates that Kabupaten Asahan has a suitable initial foundation for medicinal plant-based business development. However, readiness should not be interpreted as the absence of barriers. Rather, it shows that the region possesses basic resources and stakeholder motivation that can be strengthened through targeted programmes.

Production and Raw-Material Readiness

The findings demonstrate that Kabupaten Asahan has adequate land, labour, and basic agricultural knowledge to support medicinal plant production. Farmers' willingness to diversify suggests that medicinal plants may be introduced as complementary commodities rather than replacements for existing crops.

An intercropping approach may be appropriate for reducing farmer risk. Medicinal plants such as ginger, turmeric, galangal, and aromatic ginger can be integrated into existing farming systems. Household yards can also be used for smaller-scale production. This approach enables farmers to test market opportunities before making larger investments.

Nevertheless, continuity of supply remains a key challenge. MSMEs require raw materials with consistent quantity, quality, and delivery schedules. Without production coordination, medicinal plant supplies may fluctuate according to seasons and individual farmer decisions. Farmer groups or cooperatives should therefore coordinate planting schedules, production volumes, harvesting, and quality standards.

Contractual partnerships between farmer groups and MSMEs may provide greater market certainty. Such arrangements can include agreed prices, quality requirements, purchase volumes, and delivery schedules. Farmers may also receive seeds, technical assistance, and production guidance, while MSMEs gain more reliable access to raw materials.

Human-Resource and Knowledge Readiness

Respondents demonstrated considerable experience in farming and small-business management. However, specific knowledge related to medicinal plant cultivation, processing, quality assurance, and regulatory requirements was still limited.

Training should not be limited to theoretical explanations. Farmers require practical demonstrations concerning seed selection, cultivation, harvesting time, cleaning, slicing, drying, moisture control, storage, and grading. MSMEs require training in hygienic processing, formulation, standard operating procedures, shelf-life management, packaging, labelling, and product testing.

Continuous mentoring is more appropriate than one-time training because business-development capabilities require practice and evaluation. Agricultural extension officers, universities, health authorities, and MSME agencies

can provide complementary forms of assistance. Training effectiveness should be measured through improvements in production quality, business practices, and market performance.

Technology and Processing Readiness

The moderate technological-readiness scores indicate that most businesses can begin small-scale production but may encounter difficulty when attempting to increase production volume or meet formal quality standards. Manual processing may result in inconsistent product quality, longer production time, greater contamination risk, and limited shelf life.

Technology assistance should be based on actual business needs. Providing advanced equipment without training, maintenance support, and market planning may lead to underutilization. Priority technologies include controlled drying equipment, grinders, mixers, filling equipment, sealing machines, digital scales, and hygienic storage facilities.

Shared production facilities may provide an efficient solution for MSMEs that cannot individually purchase equipment. A shared processing centre could be managed by a cooperative, MSME group, village enterprise, or local government-supported institution. Such a facility could also support packaging, product testing, storage, and training.

Financial Readiness

Financing was one of the weakest dimensions for both farmers and MSMEs. Limited capital restricts the ability to purchase seeds, production inputs, equipment, packaging materials, and licences. Weak financial records also reduce access to formal financing.

Financial-readiness programmes should combine credit access with financial-literacy assistance. Respondents need practical skills in separating household and business finances, recording income and expenses, calculating production costs, setting prices, managing cash flow, and preparing financing applications.

Financing schemes should be adjusted to the production cycle and business scale. Farmers may need seasonal production loans, while MSMEs may need working capital and equipment financing. Cooperation with banks, cooperatives, microfinance institutions, and government credit programmes can improve access to suitable financing.

Regulatory and Quality Readiness

Regulatory readiness emerged as a significant challenge among MSME actors. Medicinal plant products are closely related to consumer health, meaning that quality, safety, labelling, and marketing claims require careful attention.

Business legality should be developed gradually. Initial assistance may focus on business identification, household food-production permits where applicable, halal certification, trademark registration, and standard labels. More advanced products may require laboratory testing and additional authorization from the relevant regulatory authorities.

Product claims must also be managed carefully. MSMEs should avoid unsupported claims that medicinal products can cure specific diseases. Product labels and promotional materials should use accurate, responsible, and legally permitted information. Collaboration with health professionals, laboratories, universities, and regulatory agencies can help MSMEs develop safe and credible products.

Quality standards should begin at the farm level. Raw materials must be clean, properly harvested, appropriately dried, and safely stored. Agreed specifications between farmers and MSMEs can include plant maturity, moisture level, cleanliness, size, and absence of contamination.

Marketing Readiness

Market readiness was moderate because most businesses relied on local and informal sales channels. Although local markets provide an initial customer base, business growth requires clearer market segmentation and stronger branding.

Potential target markets include households, health-conscious consumers, traditional markets, souvenir centres, restaurants, cafés, hotels, pharmacies, retail stores, and online consumers. Product development should be aligned with the needs of each target segment.

Digital marketing provides an opportunity to expand market reach at relatively low cost. However, simply creating social-media accounts is insufficient. MSMEs need consistent content, attractive product photography, clear product information, customer testimonials, responsive communication, and reliable delivery services.

Regional branding may also strengthen product differentiation. Medicinal plant products can be promoted as locally sourced products from Kabupaten Asahan, provided that their quality and identity are consistently maintained. Participation in exhibitions, business-matching events, tourism programmes, and government procurement may further increase market visibility.

Institutional and Partnership Readiness

The high willingness to collaborate among farmers and MSMEs represents an important opportunity. Respondents recognised that medicinal plant-based businesses could not be developed individually because production, processing, licensing, financing, and marketing require different forms of expertise.

Local government agencies should serve as coordinators of the medicinal plant business ecosystem. Agricultural agencies can support cultivation and farmer organization, MSME agencies can assist with business development, health authorities can support safety education, and investment or licensing agencies can facilitate business legality.

Universities can contribute through research, product formulation, laboratory testing, packaging design, digital-marketing assistance, and business mentoring. Financial institutions can provide financing, while private-sector partners can support distribution and market development.

A cluster-based development model is recommended. Under this model, farmers, processors, packaging providers, distributors, and supporting institutions are connected within a defined regional network. This arrangement can reduce coordination costs, improve production continuity, and strengthen collective competitiveness.

Priority Development Strategies

Based on the descriptive findings, several development priorities are required. The first priority is strengthening farmer capacity in standardized medicinal plant cultivation and post-harvest handling. The second is improving MSME processing technology, hygiene, product development, and packaging.

The third priority is establishing partnerships between farmer groups and MSMEs to ensure the continuity and quality of raw-material supplies. The fourth is strengthening financial literacy and access to suitable financing. The fifth is providing integrated assistance for licensing, product testing, halal certification, branding, and digital marketing.

Pilot development should begin with a limited number of medicinal plant commodities that are suitable for local conditions and have identifiable market demand. A phased approach will allow stakeholders to evaluate production feasibility, product acceptance, and market performance before expanding the programme.

Discussion

The findings confirm that the development of medicinal plant-based enterprises depends on more than the availability of natural resources. Farmer and MSME readiness includes technical, financial, technological, institutional, regulatory, and market dimensions. A weakness in one dimension may reduce the effectiveness of the entire value chain.

The relatively high readiness of farmers reflects the availability of land, extensive farming experience, and willingness to diversify. However, technical knowledge and market certainty remain essential. Farmers are unlikely to increase production without clear information regarding buyers, prices, and quality requirements. Therefore, cultivation programmes should be implemented simultaneously with market-development initiatives.

MSME actors showed strong entrepreneurial motivation and interest in innovation. This finding represents a positive basis for developing value-added products. Nevertheless, motivation must be supported by technology, financing, quality assurance, regulatory compliance, and marketing capabilities. Without such support, product development may remain limited to informal household production.

The slight difference between farmer and MSME readiness also indicates a need for balanced interventions. Supporting production without strengthening processing may create oversupply, while supporting MSMEs without securing raw materials may result in production shortages. Development policies must therefore integrate upstream and downstream activities.

The readiness index of 68.6% suggests that Kabupaten Asahan is ready to initiate medicinal plant-based business development through a controlled and collaborative pilot programme. The region does not yet appear ready for immediate large-scale commercialization because gaps remain in standardization, technology, financing, licensing, and formal market access.

Overall, the findings indicate that the most appropriate development model is an integrated business ecosystem involving farmers, MSMEs, government institutions, universities, financial institutions, and market partners. Such collaboration can transform locally available medicinal plants into standardized, marketable, and sustainable products while increasing farmer income, strengthening MSME competitiveness, and supporting regional economic diversification.

CONCLUSION

This study concludes that farmers and MSME actors in Kabupaten Asahan are generally ready to participate in medicinal plant-based business development. The combined readiness index reached 68.6%, indicating that the region has adequate initial potential in terms of land availability, farming experience, entrepreneurial motivation, local raw materials, willingness to diversify, and partnership readiness.

Farmers showed relatively strong readiness in production resources, cultivation experience, willingness to adopt medicinal plant commodities, and collaboration. However, limitations remain in medicinal plant cultivation knowledge, post-harvest handling, market access, financing, and institutional assistance. MSME actors demonstrated strong motivation, basic processing capability, product innovation, and partnership interest, but still faced constraints related to technology, financial management, licensing, product standardization, packaging, branding, and digital marketing.

These findings indicate that medicinal plant-based business development in Kabupaten Asahan should be implemented gradually through an integrated value-chain approach. Development programmes should connect farmers as raw-material suppliers with MSMEs as processors and marketers. Priority interventions should include technical training, post-harvest improvement, appropriate processing technology, access to capital, business licensing assistance, product-quality assurance, packaging development, and market expansion.

Overall, Kabupaten Asahan has a favourable foundation for medicinal plant-based business development. Nevertheless, successful and sustainable commercialization requires coordinated support from local government, universities, financial institutions, farmer groups, MSME associations, and private-sector partners. An integrated and collaborative development model is expected to improve farmer income, strengthen MSME competitiveness, create local employment, and promote regional economic diversification.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211. https://doi.org/10.1016/0749-5978(91)90020-T

Badan Pengawas Obat dan Makanan Republik Indonesia. (2023a). *Peraturan Badan Pengawas Obat dan Makanan Nomor 25 Tahun 2023 tentang kriteria dan tata laksana registrasi obat bahan alam*. BPOM RI.

Badan Pengawas Obat dan Makanan Republik Indonesia. (2023b). *Peraturan Badan Pengawas Obat dan Makanan Nomor 29 Tahun 2023 tentang persyaratan keamanan dan mutu obat bahan alam*. BPOM RI.

Badan Pengawas Obat dan Makanan Republik Indonesia. (2023c). *Peraturan Badan Pengawas Obat dan Makanan Nomor 30 Tahun 2023 tentang pedoman klaim khasiat obat bahan alam*. BPOM RI.

Badan Pengawas Obat dan Makanan Republik Indonesia. (2024). *Peraturan Badan Pengawas Obat dan Makanan Nomor 10 Tahun 2024 tentang penandaan obat bahan alam, obat kuasi, dan suplemen kesehatan*. BPOM RI.

Badan Pusat Statistik. (2023). *Statistik tanaman biofarmaka Indonesia 2022*. BPS RI.

Badan Pusat Statistik Kabupaten Asahan. (2025). *Kabupaten Asahan dalam angka 2025*. BPS Kabupaten Asahan.

Badan Pusat Statistik Kabupaten Asahan. (2026). *Kabupaten Asahan dalam angka 2026*. BPS Kabupaten Asahan.

Barney, J. B. (1991). Firm resources and sustained competitive advantage. *Journal of Management, 17*(1), 99–120. https://doi.org/10.1177/014920639101700108

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340. https://doi.org/10.2307/249008

Direktorat Budidaya dan Pascapanen Sayuran dan Tanaman Obat. (2016). *Revisi pedoman budidaya tanaman obat yang baik: Good agricultural practices*. Direktorat Jenderal Hortikultura, Kementerian Pertanian Republik Indonesia.

García-García, R., Calle-Sánchez, F., Díaz, R., & Martín-Herrera, D. (2024). Technology readiness level roadmap for developing innovative herbal medicinal products. *Pharmaceuticals, 17*(6), 703. https://doi.org/10.3390/ph17060703

Ghozali, I. (2021). *Aplikasi analisis multivariate dengan program IBM SPSS 26* (10th ed.). Badan Penerbit Universitas Diponegoro.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). *Multivariate data analysis* (8th ed.). Cengage Learning.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). *A primer on partial least squares structural equation modeling (PLS-SEM)* (3rd ed.). SAGE Publications.

Kementerian Koperasi dan Usaha Kecil dan Menengah Republik Indonesia. (2021). *Peraturan Menteri Koperasi dan Usaha Kecil dan Menengah Nomor 3 Tahun 2021 tentang pelaksanaan Peraturan Pemerintah Nomor 7 Tahun 2021 tentang kemudahan, pelindungan, dan pemberdayaan koperasi dan usaha mikro, kecil, dan menengah*. Kementerian Koperasi dan UKM Republik Indonesia.

Kementerian Pertanian Republik Indonesia. (2012). *Peraturan Menteri Pertanian Nomor 57/Permentan/OT.140/9/2012 tentang pedoman budidaya tanaman obat yang baik*. Kementerian Pertanian Republik Indonesia.

Likert, R. (1932). A technique for the measurement of attitudes. *Archives of Psychology, 22*(140), 1–55.

Lumpkin, G. T., & Dess, G. G. (1996). Clarifying the entrepreneurial orientation construct and linking it to performance. *Academy of Management Review, 21*(1), 135–172. https://doi.org/10.5465/amr.1996.9602161568

Organisation for Economic Co-operation and Development. (2021). *The digital transformation of SMEs*. OECD Publishing. https://doi.org/10.1787/bdb9256a-en

Parasuraman, A. (2000). Technology readiness index: A multiple-item scale to measure readiness to embrace new technologies. *Journal of Service Research, 2*(4), 307–320. https://doi.org/10.1177/109467050024001

Pemerintah Republik Indonesia. (2008). *Undang-Undang Republik Indonesia Nomor 20 Tahun 2008 tentang usaha mikro, kecil, dan menengah*. Sekretariat Negara Republik Indonesia.

Pemerintah Republik Indonesia. (2021). *Peraturan Pemerintah Republik Indonesia Nomor 7 Tahun 2021 tentang kemudahan, pelindungan, dan pemberdayaan koperasi dan usaha mikro, kecil, dan menengah*. Sekretariat Negara Republik Indonesia.

Rao, B. R. R., Rajput, D. K., Patel, R. P., & Purnanand, S. (2012). Scope and potential of medicinal and aromatic plants products for small and medium enterprises. *International Journal of Agriculture Sciences, 4*(3), 112–118.

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Saunders, M., Lewis, P., & Thornhill, A. (2019). *Research methods for business students* (8th ed.). Pearson.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill-building approach* (7th ed.). John Wiley & Sons.

Sugiyono. (2022). *Metode penelitian kuantitatif, kualitatif, dan R&D*. Alfabeta.

Teece, D. J. (2007). Explicating dynamic capabilities: The nature and microfoundations of sustainable enterprise performance. *Strategic Management Journal, 28*(13), 1319–1350. https://doi.org/10.1002/smj.640

Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation*. Lexington Books.

World Health Organization. (2003). *WHO guidelines on good agricultural and collection practices for medicinal plants*. World Health Organization.

World Health Organization. (2019). *WHO global report on traditional and complementary medicine 2019*. World Health Organization.

World Health Organization. (2025). *Global traditional medicine strategy 2025–2034*. World Health Organization.

Yuan, H., Ma, Q., Ye, L., & Piao, G. (2016). The traditional medicine and modern medicine from natural products. *Molecules, 21*(5), 559. https://doi.org/10.3390/molecules21050559