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Biopharmaceutical Commodities: Equality of Welfare and Successful Regional Development

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Abstract:
The study aims to investigate the impact of producing biopharmaceutical commodities on regional development and community welfare. The existence of biopharmaceutical plant commodities in developed countries is a tool to realize an increase in the welfare of farmers and accelerate the success of regional development. As a province known as an area that utilizes biopharmaceutical plants, the North Sumatra Province failed to optimize it. The existence of biopharmaceutical plants produced by the North Sumatra Province must be downstreamed. Downstreaming biopharmaceutical plants is possible if one knows what diseases are cured and how the number of sufferers is and how it plays a role in improving the welfare of farmers and encouraging the success of regional development. The calculations using the LQ and SS formulas show four leading biopharmaceutical commodities: ginger, cardamom, kencur, and noni. The results of IJAH Analytics' analysis show that these four commodities can cure 60 types of chronic and acute diseases. The suitability test results of IJAH Analytics and the Health Service report revealed that ginger,

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cardamom, kencur, and noni could cure 48 types of diseases, and more than 618 thousand sufferers would be treated. This potential is an economic opportunity that will change the condition of the primary and secondary sectors: increase the values of NTP and investment, labor absorption, allow easier access to capital, clearer market segmentation, and encourage the success of regional development.

Keywords: agroindustry, traditional medicine small business, traditional medicine micro-business, disease, biopharmaceutical plants, equitable distribution of welfare.

生物制药商品：福利平等与成功的区域发展

摘要：
该研究旨在调查生产生物制药商品对区域发展和社区福利的影响。发达国家生物制药植物商品的存在是实现农民福利增加和加速区域发展成功的工具。北苏门答腊省作为一个以生物制药厂利用地区着称的省份，未能对其进行优化。北苏门答腊省生产的生物制药厂的存在必须进行下游处理。如果人们知道治愈了哪些疾病，了解了患者的数量以及它如何在改善农民福利和鼓励区域发展的成功方面发挥作用，那么下游的生物制药植物是可能的。使用量产和党卫军公式的计算显示了四种主要的生物制药商品：生姜、豆蔻、肯库尔和诺丽果。IJAH分析的分析结果表明，这四种商品可以治愈60种慢性和急性疾病。IJAH分析的适用性测试结果和健康服务报告显示，生姜、小豆蔻、肯库尔和诺丽可治疗48种疾病，将治疗超过618,000名患者。这种潜力是一个经济机会，将改变第一产业和第二产业的状况：增加NTP和投资的价值、劳动力吸收、更容易获得资本、更清晰的市场细分，并鼓励区域发展的成功。

关键词：农产工业、传统医药小企业、传统医药微商、疾病、生物制药厂、福利公平分配。

1. Introduction

The leading commodity of biopharmaceuticals is the result of farming in the horticulture sub-sector (especially growing medicinal plants/herbs), which is competitive, market-oriented, provides high economic value, and meets the needs of the domestic and export markets (Salim & Munadi, 2017). Herbal agroindustry in performing activities increasing the added value of the results of farming in the horticulture sub-sector is needed. Herbal medicines have received worldwide attention because these natural products are safer than chemical and conventional ones (Upton, 2015). In developed countries, such as those of the European Union (EU), the safety profile and quality of herbal medicines have been outlined in a law regulated by the European Medicines Agency (EMA), which aims to protect consumers and provide opportunities for free movement of herbal products in Europe (Lu et al., 2020). According to the previous studies, more than one in three cancer patients in Europe and the United States consume herbal medicines (Ben-Arye et al., 2016). The governments of China and India have also implemented various strategies to promote herbal products produced by traditional medicine micro-enterprises in their countries. Through the program "Outline of the Development of Modernization of Chinese Medicine in 2002-2010", the Chinese government managed to bring its herbal products to penetrate various developed countries in Asia, Europe, and Australia (Fleischer et al., 2017). The policy by the Indian government for the development of herbal medicine is carried out by making traditional medicine a part of official medical activities for the treatment of various diseases (Sharma & Pundarikakshudu, 2019).

Indonesia is a country that has a high diversity of medicinal plants as raw materials for herbal medicines (Ariandi & Khaerati, 2016). The POM Agency has determined 13 out of 283 types of medicinal plants as recommended plant species for cultivation: ginger, galangal, kencur, turmeric, lempuyang, temulawak, temu ireng, vile shard, dringo, kapolaga, temukey, noni, and bitter. For certain types of medicinal plants, namely ginger, Indonesia is the fourth-largest exporting country after China, India, and Nepal (Salim & Munadi, 2017). Centers for planting medicinal plants recommended by the BPOM have spread across 15 provinces in Indonesia, one of which is the North Sumatra Province (Pujiasmanto, 2016).

North Sumatra is a province that has a strong culture of traditional medicine, has a diversity of types of biopharmaceutical plants, a large population, diverse

ethnicities, and access to good and modern health services (Silalahi et al., 2016). This shows that medicinal plants have economic value for the community with good knowledge regarding their use (Dinas Kesehatan Provinsi Sumatera Utara, 2017). Production of biopharmaceuticals in North Sumatra always experiences fluctuating developments every year. The Central Bureau of Statistics of North Sumatra reported that, in 2020, the production of biopharmaceutical plants in North Sumatra reached 11,996,224 kg, and this value increased compared to the previous year (5,078.010 kg). Growth of the Traditional Medicines Industry (IOT) sub-sector was an industry that was still able to grow positively during the Covid-19 pandemic, even with the highest growth (14.96%), when almost all non-oil and gas sectors contracted (Kemenristek, 2020).

The high diversity of biopharmaceutical plant species, the magnitude of the production value, and the highest growth of the IOT sub-sector do not make a benchmark in the welfare of farmers (primary sector). This situation is evidenced by the Farmer's Exchange Rate (NTP) of the North Sumatran horticulture subsector, which is still at < 100 (Bappenas, 2021). Traditional Medicine Small Business (UKOT) and Traditional Medicine Micro-Business (UMOT), which are industries (secondary sector) performing value-adding activities for biopharmaceutical plant commodities produced by farmers, are still relatively underdeveloped due to mismatches between the market demand and products produced (Ratag et al., 2016). In addition, there is no information on product suitability with disease trends in the production area, which is one of the reasons why this industry is unable to stand for a long period (Bejarano et al., 2020). Downstreaming is needed for biopharmaceutical plant production, especially in the North Sumatra Province, emphasizing the usefulness of biopharmaceutical plant commodities as superior ones. Downstreaming is possible if it is known that the superior commodities produced in the North Sumatra Province and the trend of curable diseases are based on the number of sufferers in North Sumatra so that it becomes an important issue positive for the economy of industry players, farmers, and society to encourage successful regional development.

2. Materials and Methods

2.1. Data Sources

The data used in this research is secondary data. The data were obtained from the Central Statistics of the North Sumatra Province, the Department of Agriculture for Food Crops and Horticulture of the North Sumatra Province, and the Health Office of the North Sumatra Province, including data on the production of biopharmaceutical commodities cultivated sustainably and patient history data for 2016-2020 from several hospitals in the North Sumatra Province.

2.2. Data Analysis Method

The data analysis method used in this study is quantitative analysis to get an overview of the development of the research object. The data is then processed using several data analysis methods:

Location Quotient (LQ) analysis is used to determine whether a commodity is base or non-basic. The LQ method aims to calculate the relative difference between the value-added contribution of a sector in an area and the value-added contribution of the sector on a provincial or national scale (Bangun, 2017).

Shift-share (SS) analysis is used to determine the economic potential of a region. The SS method aims to determine the performance or productivity of regional economic performance by comparing larger regions both regionally and nationally (Bangun, 2018).

IJAH Analytics is an online application used to determine chemical compounds produced by biopharmaceutical plants and potentially curable diseases (Pratama & Wijaya, 2019). This method is used to determine the type of disease that can be cured using superior biopharmaceutical products depending on the type or trend of the disease and the number of patients based on the patient history lists of several hospitals in North Sumatra.

Descriptive Analysis (Library Study) is used to integrate research results with various existing literature to support the findings with the alignment of information. This method discusses superior products, curable diseases, and their effects on welfare distribution and regional development success.

3. Results and Discussion

Indonesia has 13 types of biopharmaceutical commodities recommended by BPOM to be cultivated sustainably: ginger, galangal, kencur, turmeric, lempuyang, temulawak, temu ireng, vile shard, dringo, cardamom, temukey, noni, and bitter (Pujiasmanto, 2016). The types of biopharmaceutical commodities with the highest average production produced in the 2019-2020 period in the North Sumatra Province include ginger (5,049,420 kg), turmeric (2,106,575 kg), galangal (853,710 kg), kencur (171,982 kg), noni (86,970), temulawak (84,373 kg) and cardamom (55,309 kg) (Badan Pusat Statistik Sumatera Utara, 2021). From calculations carried out using LQ and SS analysis, it is known that there are four superior commodities owned by the Province of North Sumatra: ginger, cardamom, kencur, and noni. The selection of these superior commodities is based on calculating the LQ and SS values based on the base commodity produced by the Province of North Sumatra, which has fast growth and can compete with other commodities produced in the Province. LQ values of more than 1 are considered basic

commodities, and commodities prioritized to be superior are commodities with a "main" SS value of at least 5 from all districts/cities in the North Sumatra Province. LQ analysis is used to identify an area's internal potential, which is the criteria for the base and non-base sectors. This analysis assumes that all residents in an area have the same pattern of demand for the product with the pattern of national (regional) demand (Pratama et al., 2017). Bangun added that basic commodities are the main drivers in developing the agricultural sector, especially the horticulture sub-sector, which can be further developed by the growth of the agricultural sector in the North Sumatra Province and has the opportunity to export to other regions (Bangun, 2019).

Utilization of superior biopharmaceutical commodities as the main treatment ingredients will be easy by knowing the content of metabolites produced by these medicinal plants (Alqethami & Aldhebiani, 2020). To determine the content of metabolites contained in medicinal plants, an application called IJAH Analytics can be used. IJAH Analytics is an online application based on network pharmacology used to determine the types of compounds produced by medicinal plants, targeted proteins, and types of curable diseases to filter out the most suitable and potential compounds for the treatment and prevention of certain diseases (Pratama & Wijaya, 2019). Based on the results of IJAH Analytics, the four leading biopharmaceutical commodities of North Sumatra can cure 60 types of chronic and acute diseases. Chronic disease is a type of degenerative disease that develops or persists for a very long time, which is more than six months (Ayub et al., 2020). Acute illness is a condition or physiological abnormality in the body that comes or arises quickly and lasts in a shorter time (Arlati, 2019).

From the suitability test by IJAH Analytics and North Sumatra Provincial Health Office report on the development trend of hospital patient history in the North Sumatra Province, it is known that ginger, cardamom, kencur, and noni can cure 48 types of chronic and acute diseases suffered by people in Sumatra. North. Patients with chronic and acute diseases are concentrated in urban areas, districts, and cities (Kementerian Kesehatan Republik Indonesia, 2020). The number of patients or sufferers of chronic and acute diseases that have the potential to be cured by utilizing medicinal plants from superior biopharmaceutical commodities is estimated to reach more than 615 thousand sufferers (Table 1). The number of chronic and acute disease patients can be grouped into patients with inpatient and outpatient services (Dinas Kesehatan Provinsi Sumatera Utara, 2017).

The potential of superior biopharmaceutical commodities that can cure various types of diseases suffered by the people of the North Sumatra Province is an economic opportunity that will change the condition of the primary and secondary sectors. Matching superior products produced with treatment needs based on disease trends will make it easier for farmers and small and micro-industry players to produce products satisfying the community's needs (World Health Organization, 2019). UKOT and UMOT are secondary sectors of the medical industry that function as direct absorbers and add value to the superior commodities produced by farmers.

Table 1. Potential superior products of biopharmaceutical plants in North Sumatra to cure diseases

No	Plants	IJAH Analytics (diseases)	Health Office (sufferers)	Potential
1	Ginger	1. Amyloidosis	2	√
		2. Nephrogenic syndrome of inappropriate antidiuresis	0	X
		3. Diabetic	236.513	√
		4. Symptomatic deficiency in lactate transport	21	√
		5. Familial hyperinsulinemic hypoglycemia	56	X
		6. Monocarboxylate transporter 1 deficiency	0	X
		7. Systemic lupus erythematosus	188.941	√
		8. Celiac disease	0	X
		9. Autoimmune lymphoproliferative syndrome	10	√
		10. Alzheimer	187.312	√
		11. Cardiomyopathy	194	√
		12. Hypertriglyceridemia	0	X
		13. Hypercholesterolemia	50	√
		14. Prune belly syndrome	0	X
		15. Hypercholesterolemia, autosomal dominant	0	X
		16. Microvascular complications of diabetes	0	X
		17. Hyperlipoproteinemia	0	X
		18. Sea-blue histiocyte disease	35	√
		19. Lipoprotein glomerulopathy	89	√
		20. Amyotrophic lateral sclerosis, juvenile	16	√
		21. Distal spinal muscular atrophy, autosomal recessive	61	√
		22. Familial cold autoinflammatory syndrome	0	X
		23. Autoinflammation, PLCG2-associated antibody deficiency and immune dysregulation	121	√

Continuation of Table 1

		24. Periodic fever, menstrual cycle-dependent	83	√
		25. Hyperlipoproteinemia 5	0	X
		26. Obesity, hyperphagia, and developmental delay	41	√
2.	Cardamom	.....		
		.....		
		.....		
		.....		
		.....		
3.	Kencur	1. Nephrogenic syndrome of inappropriate antidiuresis	0	X
		2. Diabetes	236.513	√
		3. Systemic lupus erythematosus	188.941	√
		4. Celiac disease	0	X
		5. Autoimmune lymphoproliferative syndrome	0	X
4.	Noni	1. Nephrogenic syndrome of inappropriate antidiuresis	89	√
		2. Diabetes	236.513	√
		3. Systemic lupus erythematosus	188.941	X
		4. Celiac disease	0	X
		5. Autoimmune lymphoproliferative syndrome	0	X
		6. Alzheimer	187.312	√
		7. Cardiomyopathy	194	√
		8. Pulmonary hypertension, primary	2001	√
		9. Pulmonary veno-occlusive disease, autosomal dominant	0	X
The potential of superior products			615.635	

The business development of the traditional medicine industry tends to fluctuate (Dinas Kesehatan Provinsi Sumatera Utara, 2017). Medan City has 1 IOT and 7 UKOT, Karo has 4 UKOT, Deli Serdang has 5 UKOT and Serdang Bedagai has 2 UKOT. The development of UKOT and UMOT is very contradictory when integrated into RISTOJA, based on the selection of cities in which they are distributed. Small and micro-industries of medicinal plants will develop and survive if they can predict market segmentation and follow drug demands from the community (Bejarano et al., 2020).

The potential of superior commodities that can cure various types of diseases suffered by the people of the North Sumatra Province is a great opportunity in changing the structure of the agricultural system in the horticultural sub-sector. The most fundamental changes include encouraging farmers to increase the production of biopharmaceutical plants, an increase in land area to meet market needs, and an increase in the price of medicinal plants offered to industry players and in response to the direct public demand (Roosta et al., 2017). Changes in the agricultural system of the horticulture sub-sector will positively affect the development of farmers' welfare and the medicinal plant industry (Nurrochmat et al., 2017). The first change is an increase in Farmer's Exchange Rate (NTP) > 100. NTP is a comparison of the price index received by farmers to the price index paid by farmers as an indicator to see the level of ability/purchasing power of farmers. The value of NTP > 100 indicates the strong condition of the trade in agricultural products, goods and services consumed, and production costs, and this indicator refers to the welfare of farmers (Badan Pusat Statistik Sumatera Utara, 2021). The increasing value of FTT can be illustrated by the ease with which farmers can access their primary needs (Keumala & Zainuddin, 2018).

The North Sumatra Province is an area with medicinal plants as leading commodities in the horticulture sub-sector. Medicinal plant commodities should be the leading sector in creating an equitable distribution of farmer welfare (Bangun, 2019). Changes in the agricultural system, in the horticulture sub-sector, are also expected to increase investment value and employment, allow easier access to capital and clearer market segmentation, and encourage successful regional development (Caporale et al., 2020). The key to the success of regional development is determined through the pattern of development and utilization of the potential of human resources and natural resources owned by a region. Equitable distribution of community welfare and increasing economic development is a concept that can be implemented simultaneously through the determination of the leading sectors of products and industries owned by an area (Booker et al., 2016).

4. Conclusion

Biopharmaceutical commodities to improve the welfare of farmers and realize the success of regional development. The researcher concludes that there are superior commodities that can be a tool to realize this. They are ginger, cardamom, kencur, and noni. They can treat chronic and acute diseases suffered by the community. Suppose downstreaming is carried out on these commodities. In that case, it will impact fulfilling the primary needs of farmers more easily and developing small medicinal plant businesses, medicinal plant micro-businesses, traditional medicine, and pharmaceutical industries. The double effect of downstreaming is the realization of successful regional development.

5. Limitations and Further Study

No study covers all aspects of a research problem. The limitations of this research are as follows: (a) The stipulated biopharmaceutical commodities and products cannot be useful in the long term and are not used in other regions; (b) The level of farmer welfare has not been investigated comprehensively. The future scope of the study includes: (a) Form marketing; (b) The composition of the chemical content of the drug following the lifestyle of the urban and rural communities; (c) Business feasibility analysis in the primary medicinal plant industry.

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Authors' Contributions

All authors contributed to the research and writing this article.

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