

**ANALISIS KEBERLANJUTAN KOMODITI UNGGULAN PALA
KABUPATEN ACEH SELATAN
(Studi Kasus Kecamatan Sama Dua)**

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**PROGRAM STUDI AGRIBISNIS
FAKULTAS PERTANIAN
UNIVERSITAS TEUKU UMAR
ACEH BARAT - MEULABOH
2023**



**KEMENTERIAN PENDIDIKAN, KEBUDAYAAN,
RISET DAN TEKNOLOGI
UNIVERSITAS TEUKU UMAR
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Meulaboh, 23 Februari 2023

Program Studi : Agribisnis
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(Studi Kasus Kecamatan Sama Dua)

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PAPER ACCEPTANCE LETTER

LOA – 336

Dear **Maisarah**,
23 January 2023

Article Title	: ANALYSIS OF THE SUSTAINABILITY OF MAIN COMMODITIES OF NUTMEG IN SOUTH ACEH REGENCY (CASE STUDY OF SAMA DUA DISTRICT)
Author	: 1. Maisarah* 2. Aswin Nasution
Article Type	: Original Article


Thank tou your submission to our journal.

We are pleased to inform you that your paper entitled “**ANALYSIS OF THE SUSTAINABILITY OF MAIN COMMODITIES OF NUTMEG IN SOUTH ACEH REGENCY (CASE STUDY OF SAMA DUA DISTRICT)**” reviewed by 2 reviewers and had a positive opinion. This paper has been **accepted** for publication at the peer-reviewed “**Multidiciplinary Output Research For Actual and International Issue (MORFAI JOURNAL)**” to Published in **Volume 3, Number 1, January 2023.**

Thank you for publishing with us. We look forward to receiving future manuscripts from you.

Yours sincerely,




Muhammad Multazam, SE.,CPRM
CV.RADJA PUBLIKA
Directur

Analisis Keberlanjutan Komoditi Unggulan Pala Kabupaten Aceh Selatan (Studi Kasus Kecamatan Sama Dua)

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Abstrak : Pala yang merupakan tanaman asli Indonesia, juga merupakan tanaman unggulan perkebunan di Kabupaten Aceh Selatan. Sebagai tanaman unggulan yang menyangkut dengan kehidupan banyak petani, keberlanjutan tanaman pala perlu mendapat perhatian. Penelitian keberlanjutan yang dilakukan di Kecamatan Samadua ini dilakukan untuk mengetahui kondisi keberlanjutan tanaman pala berdasarkan dimensi ekonomi, sosial, lingkungan, dan budidaya-pasca panen. Hasil penelitian menunjukkan bahwa secara multi dimensi, dimensi sosial, dan dimensi lingkungan tanaman pala berada pada kondisi cukup berkelanjutan. Namun tanaman pala kurang berkelanjutan dalam dimensi ekonomi, budidaya-pasca panen. Oleh karena itu pengembangan pala di Kabupaten Aceh Selatan khususnya di Kecamatan Samadua perlu mempertimbangkan kondisi status keberlanjutan ini, sehingga tercapainya pala yang mampu menjadi pendukung perekonomian masyarakat dalam jangka panjang.

Keywords : Keberlanjutan, Tanaman Pala, Uji MDS

Pendahuluan.

Islam mengajarkan bahwa setiap makhluk telah mendapat jaminan rezeki untuk kehidupannya (Abdullah bin Muhammad, 2005) dalam jumlah yang tidak berkurang atau berlebih dari yang telah ditetapkan Allah SWT (Hamim, 2003), dan salah satu sumber rezeki melimpah yang telah disiapkan oleh Allah SWT adalah sektor pertanian (Magfhirah, 2015). Pertanian telah menyediakan pangan bagi 8 milyar penduduk dunia (Made for mids, 2022), dengan kebutuhan yang meningkat 70% pada tahun 2009-2050 (Foley et al., 2011) dan dikerjakan oleh 874 juta petani di dunia (FAO,2021). Banyaknya keterkaitan manusia dengan pertanian menjadikan pertanian menarik untuk diperbincangkan, termasuk pada jurnal-jurnal ilmiah.

Salah satu subsektor pertanian yang juga banyak diperbincangkan adalah perkebunan yang di dalamnya termasuk komoditi pala. Pala (*Myristica fragrans Houtt*) merupakan salah satu komoditas andalan perkebunan Indonesia dengan produksi 43,97 ribu ton dengan volume ekspor 20 ribu ton senilai 111,68 juta dolar AS tahun 2018 (Hafif, 2021). Sedangkan Aceh sebagai salah satu sentra pala dengan produksi 20,99% dari produksi nasional selain Maluku, Maluku Utara, Sulawesi Utara dan Papua Barat (Pusdatin 2020).

Produksi pala Aceh mencapai 6.567 ton dengan sentra produksi Kabupaten Aceh Selatan dengan luas 16.898 Ha, produksi 5.317 ton atau 80,97% dari produksi Aceh yang dikelola oleh 19.143 KK petani. Kondisi ini menunjukkan pala merupakan komoditas unggulan perkebunan pendukung perekonomian masyarakat Kabupaten Aceh Selatan (Bappeda Aceh, 2018; Ulfah et al, 2020), sehingga perlu dikelola secara berkelanjutan, khususnya di Kecamatan Sama Dua sebagai salah satu sentra produksi pala Kabupaten Aceh Selatan dengan luas 1.450 Ha, produksi 243 ton, dan produktivitas 0,168 ton/ha di bawah produktivitas Aceh Selatan 0,315 ton/ha (BPS Aceh, 2022; BPS Aceh Selatan, 2022). Meskipun pala merupakan komoditi unggulan, rendahnya produktivitas ini menunjukkan ada yang salah dengan pengelolaan pala di Kabupaten Aceh Selatan. Salah satu indikator baik tidaknya pengelolaan komoditi pertanian ada tingkat keberlanjutan dari komoditi tersebut (Nasution, et al, 2021).

Keberlanjutan pada dasarnya merupakan konsep pemenuhan kebutuhan manusia untuk saat ini tanpa mengorbankan kebutuhan generasi masa yang akan datang (Dehen *et al.*, 2013;

Nasution et al., 2021). Selain itu keberlanjutan juga merupakan suatu gagasan normatif tentang bagaimana peranan manusia dalam bertindak terhadap alam, bertanggung jawab terhadap satu sama lain, dan masa depan generasi (Baumgärtner and Quass, 2010), dan keberlanjutan di sektor pertanian telah diyakini dapat memberikan pendapatan yang baik dan menjanjikan bagi masyarakat luas khususnya bagi petani (Karim *et al.*, 2016). Menurut (Todaro, 2011) suatu wilayah yang menginginkan tercapainya pembangunan berkelanjutan baiknya memulai dari sektor pertanian dengan komoditi unggulan yang memiliki pertumbuhan nyata, berwawasan lingkungan, berorientasi pasar, berdayasaing tinggi, dan terintegrasi dengan sektor lain. Tanaman pala berikut agribisnis turunannya merupakan komoditi perkebunan yang memiliki kreteria berkelanjutan, karena selain sebagai bahan rempah, panganan dan minyak atsiri pala memiliki nilai ekonomi yang mampu meningkatkan perekonomian petani dan pembangunan wilayah.

Mengetahui informasi status keberlanjutan pala di Kabupaten Aceh Selatan khususnya di Kecamatan Samadua menjadi penting, karena informasi ini menjadi standart eksisting kondisi pala yang ada, dapat menjadi acuan dasar pengembangan pala, dan meminimalisir kegagalan dan dampak negatif pengembangan pala. Hal ini juga terkait Kabupaten Aceh Selatan khususnya Kecamatan Samadua sebagai sentra pala yang melibatkan perekonomian petani dan masyarakat luas.

Metode Penelitian

Waktu dan Lokasi

Penelitian dilaksanakan pada bulan Agustus-Desember 2022 di Kecamatan Samadua Kabupaten Aceh Selatan, pilihan lokasi penelitian dengan pertimbangan daerah ini merupakan sentra produksi pala di Kabupaten Aceh Selatan.

Populasi dan Sampel

Populasi penelitian ini adalah stakeholder perkebunan pala yang terdiri dari petani, kepala desa, pengusana yang terafiliasi dengan pala yang berjumlah 28 orang pada 28 desa di Kecamatan Samadua Kabupaten Aceh Selatan. Pengambilan sampel dilakukan secara cluster dimana 1 responden untuk tiap desa.

Data dan Teknik Pengumpulan Data.

Penelitian dilakukan secara deskriptif dengan menggunakan data primer dan skunder. Data primer diperoleh dari jawaban responden terhadap persoalan keberlanjutan tanaman pala pada dimensi ekonomi, sosial, lingkungan, dan budidaya dan pasca panen melalui indikator yang diukur dengan kreteria buruk (skor 1) hingga baik (skor 4) mengikuti konsep RAPPISH dan *judgement knowledge* dari pakar/stakeholder. Pengumpulan data primer dilakukan secara observasi, wawancara dan pengumpulan data skunder melalui literatur dan dinas terkait.

Variabel Penelitian

Adapun variabel keberlanjutan pala pada penelitian ini adalah dimensi ekonomi, sosial, lingkungan, budidaya dan pasca panen. Masing-masing dimensi memiliki atribut yang mengacu pada pendapat ahli sebagaimana Tabel 1.

Tabel 1. Dimensi dan Atribut Penelitian.

Atribut Dimensi Ekonomi		Atribut Dimensi Sosial	
1	Pendapatan pekebun pala	1	Kepatuhan petani terhadap hukum dan adat setempat
2	Harga pala	2	Sttus sosial petani
3	Ketersediaan pasar	3	Kegiatan sosial masyarakat
4	Hubungan perkebunan dengan lapangan kerja	4	Sttus gizi keluarga petani pala

5	Pertumbuhan sektor ekonomi lain akibat pengembangan perkebunan pala	5	Pendidikan anak petani pala
6	Motivasi masyarakat menanam pala	6	Organisasi petani pala
Atribut Dimensi Lingkungan		Atribut Dimensi Budidaya dan Pasca Panen	
1	Praktek konservasi	1	Penggunaan bibit unggul
2	Menjaga dan melindungi species hewan langka	2	Pemupukan
3	Praktek pengendalian hama penyakit tanaman	3	Perawatan tanaman
4	Banjir akibat perkebunan pala	4	Kondisi Tanaman Pala
5	Kebakaran hutan/lahan akibat perkebunan pala	5	Perlakuan pasca panen
6	Lahan kritis dan kerusakan lingkungan yang terjadi akibat perkebunan pala	6	Penyiangan / pembersihan kebun
7	Perambahan hutan lindung untuk perkebunan pala	7	Kepedulian pemerintah terhadap petani pala
8	Kesesuaian lahan yang digunakan untuk perkebunan pala		

Metoda Analisa Data

Pengukuran dan penentuan status serta indeks keberlanjutan tanaman pala dilakukan dengan uji Multi Dimensional Scaling (MDS) melalui tehnik Rap-Insus (Rapid Appraisal-Index Sustainability) yang dimodifikasi dari Rappfish (Pitcher and Preikshot, 2001; Kavanagh, 2007; Fauzi dan Anna, 2005). Skala indeks dan status keberlanjutan diukur dengan range 0,00-25,00 buruk (tidak berkelanjutan); 25,01-50,00 kurang (kurang berkelanjutan), 50,01-75,00 cukup (cukup berkelanjutan) dan 75,01-100,00 baik (sangat berkelanjutan) (Kavanagh dan Pitcher, 2004), dan masing-masing dimensi keberlanjutan divisualisasikan dalam bentuk diagram layang-layang.

Selanjutnya evaluasi pengaruh eror pada proses pendugaan nilai ordinasi keberlanjutan analisa MDS dilakukan analisa Monte carlo (Ramadhan *et al.*, 2015). Perbedaan nilai indeks antara hasil analisa MDS dengan Monte Carlo menunjukkan tingkat kepercayaan sistem yang dikaji, semakin kecil perbedaannya maka akan semakin tinggi tingkat kepercayaannya atau semakin kecil kesalahan yang terjadi (Thamrin *et al.*, 2007). Nilai goodness of fit yang ditunjukkan dengan S-stress dan R² pada analisa Monte Carlo menjelaskan peubah yang digunakan telah mewakili objek yang dibandingkan, jika nilai S-Stress < 0,25 dan R² mendekati 1 atau 100 % menunjukkan maka model yang diuji baik (Kavanagh dan Pitcher, 2004).

Hasil dan Pembahasan

Deskripsi Responden.

Responden yang digunakan dalam penelitian ini adalah stakeholder pala Kabupaten Aceh Selatan. Pendiskripsian diperlukan untuk mendapatkan informasi karakteristik responden sebagai informasi kondisi responden. Informasi ini dibutuhkan untuk mendukung penelitian berdasarkan asumsi bahwa tindakan seseorang dalam pengambilan keputusan berkorelasi kuat dengan karakter kepribadiannya, dan mendasari tingkah lakunya dalam berbagai situasi kerja, pemberian pendapat dan pengambilan keutusan (Damihartini dan Jahi, 2005). Adapun deskripsi responden dalam penelitian ini Tabel 2.

Tabel 2. Deskripsi Responden Penelitian.

No	Umur (Tahun)	Jumlah (Org)	%	No	Pendidikan	Jumlah (Org)	%
1	< 23	1	4	1	Di bawah SLTP	3	11
2	24-30	7	25	2	SLTA	19	68
3	31-35	6	21	3	Diploma	4	14
4	36-40	5	18		S1	2	7
5	46-50	2	7		Jumlah	28	100
6	50-60	6	21	No	Pekerjaan selain Petani Pala	Jumlah (Org)	%
7	>60	1	4	1	Guru	1	4

	Jumlah	28	100	2	Paramedis	7	25
No	Jenis Kelamin	Jumlah Org	%	3	PNS	6	21
1	Pria	18	64	4	Pegawai Honorer	5	18
2	Wanita	10	36	5	Buruh harian	2	7
	Jumlah	28	100	6	Petani	6	21
No	Paham Konsep Keberlanjutan	Jumlah Org	%	7	Penjahit	1	4
1	Ya, Sedikit	18	64		Jumlah	28	100
2	Ya, Banyak	10	36	No	Luas Kebun	Jumlah (Org)	%
	Jumlah	28	100	1	< 1 Ha	18	64
				2	1 – 2 Ha	9	32
				3	>2 Ha	1	4
					Jumlah	28	100

Sumber : Hasil Penelitian (2022)

Tabel 2. menunjukkan 71% responden berusia 24-50 tahun, dengan tingkat pendidikan 89 % SLTA ke atas, 64 % pria, 79 % petani memiliki profesi lain, 36 % memahami konsep keberlanjutan secara baik, dan 96 % memiliki kebun pala < 2 Ha. Responden dengan usia 24-50 tahun yang dominan ini menunjukkan berada pada usia produktif rentang usia 15-64 tahun (UU No.13 Tahun 2003), dimana umur seseorang merupakan indikator yang dapat digunakan mengukur produktivitas dalam bekerja (Soekartawi, 2001), dimana bertambahnya usia seseorang maka akan menurunkan kemampuan fisik dan berpikir manusia (Isyanto, 2011). Tingkat pendidikan yang umumnya SLTA ke atas menunjukkan responden cakap dalam memberikan pendapat terhadap questioner yang diajukan, sedangkan tingkat pendidikan yang rendah akan menyulitkan bagi seseorang dalam memahami informasi dan perkembangan teknologi (Damihartini dan Jahi, 2005).



Gambar 1. Peta Titik Lokasi dan Peta Penggunaan Lahan Kecamatan Samudra Kabupaten Aceh Selatan
Sumber : Bappeda Aceh (2018)

Kondisi Wilayah Penelitian.

Kecamatan Samudra Kabupaten Aceh Aceh Selatan berada pada sisi selatan pulau Sumatera dan berbatasan dengan Samudra Indonesia.(Gambar.1) Penggunaan lahan di

daerah ini didominasi oleh kebun campuran dan hutan lahan kering skunder atau bekas tebanan, dan pada penggunaan inilah kebun pala di usahakan petani. Sebagai daerah pesisir selatan Pulau Sumatera daerah ini memiliki curah hujan 1.500-2.000 mm/tahun, ketinggian 0-1.500 meter DPL, jenis tanah ultisol dan inceptisol, serta kelerengan 8-15 %, 15-25 %, dan >40% (Bappeda Aceh, 2018). Type lahan dan iklim seperti ini merupakan yang sesuai untuk budidaya tanaman pala.

Indeks dan Status Keberlanjutan.

Tehnik ordinasi Rap-Insus yang menggunakan Multi Dimensional Scaling (MDS) ini menilai indeks dan status keberlanjutan tanaman pala. Adapun hasil analisa indeks dan status dimensi keberlanjutan tanaman pala dengan uji DMS di Kecamatan Samadua Kabupaten Aceh Selatan Tabel 3.

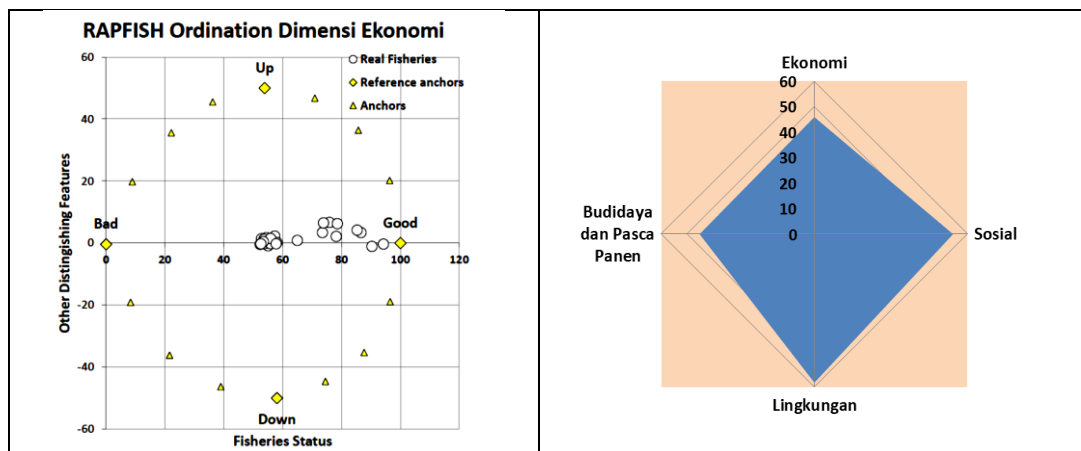
Tabel 3. Goodness of Fit Analisa Indeks dan Status Keberlanjutan Tanama Pala Di Kecamatan Samadua Kabupaten Aceh Selatan.

Dimensi	Indeks Keberlanjutan	Status Keberlanjutan	Monte Carlo	Perbedaan	S-Stress	R ²
Multi Dimensi	51,013	Cukup	50,073	0,940	0,232	0,962
Ekonomi	45,873	Kurang	45,035	0,838	0,245	0,891
Sosial	54,330	Cukup	53,419	0,911	0,235	0,981
Lingkungan	58,238	Cukup	57,307	0,931	0,202	0,912
Budidaya dan pasca Panen	44,973	Kurang	44,078	0,895	0,240	0,888

Sumber : Hasil Penelitian (2022).

Status Keberlanjutan Multi Dimensi

Secara umum nilai indeks dan status keberlanjutan multi dimensi, dimensi sosial dan lingkungan menunjukkan status cukup berkelanjutan. Namun dimensi ekonomi serta budidaya dan pasca panen menunjukkan status kurang berkelanjutan. Perbedaan nilai indeks MDS dengan Monte Carlo dari seluruh dimensi yang diuji masih rendah atau < 1, ini menunjukkan masih tingginya tingkat kepercayaan atau kecilnya kesalahan yang terjadi dari sistem yang diuji (Ramadhan et al., 2015; Thamrin et al., 2007). Selain itu hasil uji nilai S-Stress masih di bawah 0,25 dan R² mendekati 1 atau 100%, nilai-nilai ini menunjukkan model yang diuji baik dan indikator yang digunakan telah mewakili sifat objek yang dibandingkan (Kavanagh dan Pitcher, 2004), cukup akurat dan dapat dipertanggung jawabkan (Fauzi dan Anna, 2005).



Gambar 1. Indeks Status dan Diagram Layang-layang Multi Dimensi Scaling Keberlanjutan Tanaman Pala di Kecamatan Samadua Kabupaten Aceh Selatan.

Secara multi dimensi penggabungan antara dimensi ekonomi, sosial, lingkungan serta budidaya dan pasca panen dengan 27 indikator keberlanjutan menunjukkan nilai indeks 51,013 atau status cukup berkelanjutan. Status keberlanjutan ini didukung oleh dimensi sosial dengan indeks 54,330 dan dimensi lingkungan dengan indeks 58,238, namun indeks ekonomi, budidaya dan pasca panen kurang berkelanjutan. Status keberlanjutan yang tinggi ini divisualisasikan dengan wilayah indeks sosial dan dan lingkungan yang lebih luas pada diagram layang-layang (Gambar. 1).

Status cukup keberlanjutan tanaman pala di Kabupaten Aceh Selatan ini sesuai dengan kondisi faktual yang terjadi bahwa pala merupakan tanaman unggulan perkebunan Kabupaten Aceh Selatan (Zakiah et al., 2015; Bappeda Aceh, 2018). Selain itu pemerintah Kabupaten Aceh Selatan menjadikan pala sebagai icon daerah akan membangun taman wisata pala (Dewi et al., 2022) yang menjadi sarana edukasi bagi masyarakat akan tanaman pala. Dari sisi lahan dan iklim, Kabupaten Aceh Selatan yang didominasi jenis tanah ultisol, ketinggian di bawah 1.500 meter DPL, temperatur rata-rata 27,2 °C, type iklim Oldeman A, B, dan C, A2, curah hujan rata-rata 271,99 mm/bulan dan hari hujan rata-rata 12 hari/bulan (Bappeda Aceh, 2018), dimana lingkungan lahan dan iklim seperti ini diinginkan atau sesuai untuk budidaya tanaman pala (Nasution dan Handayani, 2019; Laimeheriwa et al., 2019). Kondisi lahan dan iklim yang mendukung ini menjadikan dimensi lingkungan tanaman pala di Kabupaten Aceh Selatan cukup berkelanjutan.

Secara dimensi sosial tanaman pala di Kabupaten Aceh Selatan memiliki indeks keberlanjutan cukup berkelanjutan, hal ini sesuai dengan kondisi tanaman pala yang telah cukup familiar di kalangan masyarakat Aceh Selatan. Pala yang merupakan tanaman asli Indonesia berasal dari kepulauan Banda dan Maluku masuk ke Aceh Selatan sejak tahun 1870 melalui Sumatera Barat. Konflik Aceh yang terjadi mengakibatkan petani meninggalkan perkebunan palanya, dan mulai tahun 2005 setelah perdamaian konflik petani kembali mengurus tanaman palanya (Almunawir dan Mursal (2019), namun sebagian tanaman telah rusak. Faktor keamanan sangat mempengaruhi masyarakat dalam beraktifitas dan pemerintah dalam melaksanakan pembangunan, adapun kondisi tidak aman yang terjadi merupakan ancaman bagi masyarakat dalam beraktifitas dan mengganggu jalannya pembangunan (Rani, 2012), termasuk pada tanaman pala yang diusahakan masyarakat.

Penelitian yang dilakukan Pranata dan Agustiar (2022) yang menyatakan bahwa di Kabupaten Aceh Selatan tanaman pala memiliki prospek yang baik untuk dikembangkan, selain itu masyarakat memiliki persepsi yang baik terhadap tanaman pala pada aspek tingkat pengetahuan masyarakat terhadap tanaman pala, dan sirup pala yang merupakan produk turunan pala memberikan nilai tambah ekonomis bagi industri pala. Selanjutnya secara agribisnis perkebunan pala di Kabupaten Aceh Selatan mampu memberikan pendapatan Rp. 36.163.000,-/Ha/tahun dengan R/C Ratio 2,87 (Bappeda Aceh, 2018), sedangkan Almunawir dan Mursal (2019) mencatat bahwa petani pala mampu memperoleh pendapatan Rp. 26-31 juta/tahun. Dimana nilai ini masih lebih baik dari pendapatan petani pala di Halmahera Utara sebesar Rp. 23.624.538,- dengan R/C ratio 1,8 (Hartati et al., 2020). Meskipun berdasarkan status keberlanjutan dimensi ekonomi tanaman pala di Kabupaten Aceh Selatan berada pada kondisi kurang berkelanjutan, sebagaimana kondisi budidaya dan pasca panen tanaman pala yang juga kurang berkelanjutan. Terganggunya budidaya dan pasca panen pala di Kabupaten Aceh Selatan ini terjadi sejak 1990-an, dimana banyak kebun pala yang mengalami serangan hama penyakit penggerek batang, bubuk batang, dan jamur (Almunawir dan Mursal, 2019).

Kesimpulan

Kabupaten Aceh Selatan khususnya Kecamatan Samadua merupakan sentra produksi tanaman pala, dimana pala menjadi tanaman unggulan yang menghidupkan perekonomian masyarakat. Hasil analisa Multi Dimensi Scale (MDS) yang dilakukan terhadap tanaman pala dengan dimensi ekonomi, sosial, lingkungan, budidaya dan pasca panen menunjukkan bahwa secara multi dimensi dengan 27 indikator tanaman pala cukup berkelanjutan. Secara dimensi sosial dan lingkungan cukup berkelanjutan, namun secara ekonomi, budidaya dan pasca panen kurang berkelanjutan. Kondisi dimensi keberlanjutan ini sangat berhubungan dengan tanaman pala dan pola pengelolaan yang dilakukan terhadap tanaman pala seperti kondisi lahan dan iklim yang mendukung, pala yang telah dikenal lama oleh masyarakat, dan sistem tataniaga yang mempengaruhi pendapatan petani. Oleh karena pala menyangkut dengan masyarakat banyak maka perlu peran pemerintah dan stakeholder dalam agribisnis pala di Kabupaten Aceh Selatan melalui penataan dimensi keberlanjutan pala itu sendiri.

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**ANALYSIS OF THE SUSTAINABILITY OF MAIN COMMODITIES OF
NUTMEG IN SOUTH ACEH REGENCY
(CASE STUDY OF SAMA DUA DISTRICT)**

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Abstract

Nutmeg, which is native to Indonesia, is also a superior plantation crop in South Aceh District. As a superior crop that concerns the lives of many farmers, the sustainability of the nutmeg crop needs attention. Sustainability research conducted in Samadua District was conducted to determine the condition of the sustainability of nutmeg plants based on the economic, social, environmental and post-harvest cultivation dimensions. The results showed that in multi-dimensional, social, and environmental dimensions, the nutmeg plant was in a fairly sustainable condition. But the nutmeg crop is less sustainable in the economic dimension, post-harvest cultivation. Therefore, the development of nutmeg in South Aceh District, especially in Samadua District, needs to consider this condition of sustainability status.

Keywords: *Sustainability, Nutmeg Plants, MDS Test*

1. INTRODUCTION

Islam teaches that every creature has received a guarantee of sustenance for his life (Abdullah bin Muhammad, 2005) in an amount that is not reduced or exceeded that which has been determined by Allah SWT (Hamim, 2003), and one source of abundant sustenance that has been prepared by Allah SWT is the agricultural sector (Magfhirah, 2015). Agriculture has provided food for 8 billion people in the world (Made for mids, 2022), with demand increasing 70% in 2009-2050 (Foley et al., 2011) and done by 874 million farmers in the world (FAO, 2021). The many human relationships with agriculture make agriculture interesting for discussion, including in scientific journals.

One of the agricultural sub-sectors that is also widely discussed is plantation which includes the commodity of nutmeg. Nutmeg (*Myristica fragrans* Houtt) is one of Indonesia's mainstay plantation commodities with a production of 43.97 thousand tonnes with an export volume of 20 thousand tonnes valued at US\$111.68 million in 2018 (Hafif, 2021). While Aceh is one of the nutmeg centers with a production of 20.99% of the national production apart from Maluku, North Maluku, North Sulawesi and West Papua (Pusdatin 2020).

Aceh's nutmeg production reached 6,567 tons with a production center in South Aceh Regency with an area of 16,898 hectares, production of 5,317 tons or 80.97% of Aceh's production managed by 19,143 farmer families. This condition shows that nutmeg is a superior plantation commodity that supports the economy of the people of South Aceh Regency (Bappeda Aceh, 2018; Ulfah et al, 2020), so it needs to be managed in a sustainable manner, especially in Sama Dua District as one of the nutmeg production centers in South Aceh Regency with an area of 1,450 Ha, a production of 243 tons, and a productivity of 0.168 tons/ha below the productivity of South Aceh 0.315 tons/ha (BPS Aceh, 2022; BPS Aceh Selatan, 2022). Even though nutmeg is a superior commodity, this low productivity indicates something is wrong with the management of nutmeg in South Aceh District. One indicator of whether or not the management of agricultural commodities is the level of sustainability of these commodities (Nasution, et al, 2021).

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Sustainability is basically the concept of meeting human needs for the time being without compromising the needs of future generations (Dehen et al., 2013; Nasution et al., 2021). In addition Sustainability is also a normative idea about how the role of humans is in acting towards nature, being responsible for one another, and for future generations. (Baumgartner and Quass, 2010), and Sustainability in the agricultural sector is believed to be able to provide good and promising income for the wider community, especially for farmers (Karim et al., 2016). According to (Todaro, 2011) an area that wants to achieve sustainable development should start from the agricultural sector with superior commodities that have real growth, are environmentally sound, market-oriented, highly competitive, and integrated with other sectors. Nutmeg and its agribusiness derivatives are plantation commodities that have sustainable criteria, because apart from being a spice, confectionery and nutmeg essential oil, they have economic value that can improve the farmers' economy and regional development.

Knowing information on the sustainability status of nutmeg in South Aceh District, especially in Samadua District, is important, because this information becomes an existing standard for the condition of existing nutmeg, can become a basic reference for developing nutmeg, and minimizes failures and negative impacts of developing nutmeg. This is also related to South Aceh District, especially Samadua District as a center for nutmeg which involves the economy of farmers and the wider community.

2. RESEARCH METHOD

2.1 Time and Location

The research was carried out in August-December 2022 in Samadua District, South Aceh Regency. The choice of research location was based on the consideration that this area is a center for nutmeg production in South Aceh Regency.

2.2 Population and Sample

The population of this study were nutmeg plantation stakeholders consisting of farmers, village heads, entrepreneurs affiliated with nutmeg, totaling 28 people in 28 villages in Samadua District, South Aceh District. Sampling was carried out in clusters where 1 respondent for each village.

2.3 Data and Data Collection Techniques

The research was conducted descriptively using primary and secondary data. Primary data was obtained from respondents' answers to the issue of nutmeg sustainability in the economic, social, environmental, and cultivation and post-harvest dimensions through indicators that were measured with bad (score 1) to good (score 4) criteria following the RAPFISH concept and judgment knowledge from experts/ stakeholders. Primary data collection was carried out by observation, interviews and secondary data collection through literature and related agencies.

2.4 Research variable

The sustainability variables of nutmeg in this study are the economic, social, environmental, cultivation and post-harvest dimensions. Each dimension has attributes that refer to expert opinion as shown in Table 1.

Table 1 Research Dimensions and Attributes

Economic Dimension Attributes		Dimension AttributeSocial	
1	Income of nutmeg farmers	1	Farmers' compliance with local laws and customs
2	Price of nutmeg	2	Peasant social status
3	Market availability	3	Community social activities
4	The relationship between plantations and employment	4	Nutritional status of nutmeg farming families
5	Growth in other economic sectors due to the development of nutmeg plantations	5	Education of children of nutmeg farmers
6	Community motivation to plant nutmeg	6	Nutmeg farming organization
Dimension AttributeEnvironment		Cultivation and Post-Harvest Dimensional Attributes	
1	Conservation practice	1	Use of superior seeds
2	Maintain and protect rare animal species	2	Fertilization
3	Plant pest control practices	3	Plant care
4	Floods due to nutmeg plantations	4	Nutmeg Plant Conditions
5	Forest/land fires caused by nutmeg plantations	5	Post-harvest treatment
6	Critical land and environmental damage caused by nutmeg plantations	6	Garden weeding/cleaning
7	Encroachment on protected forest for nutmeg plantations	7	The government's concern for nutmeg farmers
8	Suitability of land used for nutmeg plantations		

2.5 Data Analysis Methods

Measuring and determining the status and sustainability index of the nutmeg plant was carried out by the Multi Dimensional Scaling (MDS) test using the Rap-Insus (Rapid Appraisal-Index Sustainability) technique modified from Rapfish (Pitcher and Preikshot, 2001; Kavanagh, 2007; Fauzi and Anna, 2005). The index scale and sustainability status are measured in the range of 0.00-25.00 bad (not sustainable); 25.01-50.00 less (less sustainable), 50.01-75.00 enough (quite sustainable) and 75.01-100.00 good (very sustainable) (Kavanagh and Pitcher, 2004), and each dimension of sustainability is visualized in the form of a kite diagram.

Furthermore, the evaluation of the effect of error on the process of estimating the ordinate value of the sustainability of the MDS analysis was carried out by means of a Monte Carlo analysis (Ramadan et al., 2015). The difference in index values between the results of the MDS and Monte Carlo analysis shows the level of confidence in the system being studied, the smaller the difference, the higher the level of trust or the smaller the error that occurs (Thamrin et al., 2007). The goodness of fit value indicated by S-stress and R^2 in the Monte Carlo analysis explains that the variables used represent the objects being compared, if the S-Stress value is <0.25 and R^2 is close to 1 or 100%, it indicates that the model being tested is good (Kavanagh and Pitcher, 2004).

3. RESULTS AND DISCUSSION

3.1 Description of Respondents

The respondents used in this study were nutmeg stakeholders in South Aceh District. Description needed to obtain information on the characteristics of the respondents as information on the conditions of the respondents. This information is needed to support research based on the

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assumption that a person's actions in making decisions are strongly correlated with his personality traits, and underlies his behavior in various work situations, giving opinions and making decisions (Damihartini and Jahi, 2005). The description of the respondents in this study Table 2.

Table 2 Description of Research Respondents.

No	Age (Years)	Total (Org)	%	No	Education	Total (Org)	%
1	< 23	1	4	1	Under SLTP	3	11
2	24-30	7	25	2	high school	19	68
3	31-35	6	21	3	Diploma	4	14
4	36-40	5	18		S1	2	7
5	46-50	2	7		Amount	28	100
6	50-60	6	21	No	Jobs other than Nutmeg Farmers	Total (Org)	%
7	>60	1	4	1	Teacher	1	4
	Amount	28	100	2	Paramedic	7	25
No	Gender	Number of People)	%	3	civil servant	6	21
1	Man	18	64	4	Honorary Officer	5	18
2	Woman	10	36	5	Daily laborer	2	7
	Amount	28	100	6	Farmer	6	21
No	Understand the Concept of Sustainability	Number of People)	%	7	Seamstress	1	4
1	Yes, a little	18	64		Amount	28	100
2	Yes a lot	10	36	No	Garden Area	Total (Org)	%
	Amount	28	100	1	< 1 Ha	18	64
Source: Research Results (2022)				2	1 – 2 Ha	9	32
				3	>2 Ha	1	4
					Amount	28	100

Table 2 shows 71% of respondents aged 24-50 years, with an education level of 89% high school and above, 64% male, 79% of farmers have other professions, 36% understand the concept of sustainability well, and 96% have nutmeg plantations < 2 Ha. Respondents with a dominant age of 24-50 years are in the productive age range of 15-64 years. (Law No.13 of 2003), where a person's age is an indicator that can be used to measure productivity at work (Soekartawi, 2001), where increasing a person's age will reduce the physical and thinking abilities of humans (Isyanto, 2011). The level of education, which is generally high school and above, indicates that the respondent is competent in giving opinions on the questionnaires submitted, while a low level of education will make it difficult for someone to understand information and technological developments. (Damihartini and Jahi, 2005).



Figure 1 Map of Location Points and Land Use Map of Samadua District, South Aceh District

3.2 Condition of Research Area

Samadua District, Aceh Selatan District is located on the southern side of the island of Sumatra and borders the Indonesian Ocean. (Fig. 1) Land use in this area is dominated by mixed gardens and secondary or logged-over dryland forests, and it is in these uses that nutmeg plantations are cultivated by farmers. As the southern coastal area of Sumatra Island, this area has rainfall of 1,500-2,000 mm/year, an altitude of 0-1,500 meters DPL, ultisol and inceptisol soil types, and slopes of 8-15%, 15-25%, and > 40%. (Bappeda Aceh, 2018). This type of land and climate is suitable for cultivating nutmeg.

3.3 Sustainability Index and Status

ordination technique The Rap-Insus using Multi Dimensional Scaling (MDS) assesses the index and sustainability status of the nutmeg crop. The results of the analysis of the index and status dimensions of the sustainability of nutmeg plants with the DMS test in Samadua District, South Aceh Regency, Table 3.

Table 3 Goodness of Fit Index Analysis and Sustainability Status of Nutmeg in Plants Samadua District, South Aceh Regency

Dimensions	Sustainability Index	Sustainability Status	Monte Carlo	Difference	S-Stress	R2
Multi Dimensional	51,013	Enough	50,073	0.940	0.232	0.962
Economy	45,873	Not enough	45,035	0.838	0.245	0.891
Social	54,330	Enough	53,419	0.911	0.235	0.981
Environment	58,238	Enough	57,307	0.931	0.202	0.912
Cultivation and post-harvest	44,973	Not enough	44,078	0.895	0.240	0.888

Source: Research Results (2022)

3.4 Multi-Dimensional Sustainability Status

In general, the multi-dimensional sustainability index and status values, the social and environmental dimensions show a fairly sustainable status. However, the economic dimension as

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well as cultivation and post-harvest show less sustainable status. The difference between the MDS and Monte Carlo index values of all the dimensions tested is still low or <1, this indicates a high level of trust or small errors that occur from the system being tested (Ramadhan et al., 2015; Thamrin et al., 2007). In addition, the results of the S-Stress test are still below 0.25 and R^2 is close to 1 or 100%, these values indicate that the model being tested is good and the indicators used represent the nature of the object being compared (Kavanagh and Pitcher, 2004), is quite accurate and can be accounted for (Fauzi and Anna, 2005).

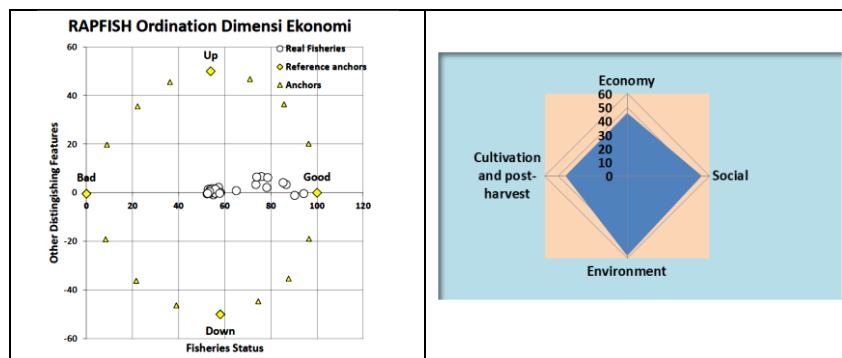


Figure 2 Status Index and Kite Diagrams Multi Dimensional Scaling Nutmeg Plant Sustainability in Samadua District, Regency South Aceh

Multi-dimensionally, the combination of economic, social, environmental and cultivation and post-harvest dimensions with 27 sustainability indicators shows an index value of 51.013 or quite sustainable status. This sustainability status is supported by the social dimension with an index of 54,330 and the environmental dimension with an index of 58,238, but the economic, cultivation and post-harvest indexes are less sustainable. This high sustainability status is visualized with the broader social and environmental index areas on the kite diagram (Fig. 1).

The status of sufficient sustainability of nutmeg plants in South Aceh Regency is in accordance with the factual conditions that occur that nutmeg is a superior plantation crop of South Aceh Regency (Zakiah et al., 2015; Bappeda Aceh, 2018). In addition, the South Aceh Regency government has made nutmeg a regional icon and will build a nutmeg tourist park (Dewi et al., 2022) which is a means of education for the community about nutmeg plants. In terms of land and climate, South Aceh District is dominated by ultisol soil types, altitude below 1,500 meters DPL, average temperature 27.2 0C, Oldeman climate types A, B, and C, A2, average rainfall 271, 99 mm/month and an average rainy day of 12 days/month (Bappeda Aceh, 2018), where the land and climate environment like this is desirable or suitable for nutmeg cultivation (Nasution and Handayani, 2019; Laimeheriwa et al., 2019). These favorable soil and climatic conditions make the environmental dimensions of nutmeg plantations in South Aceh District quite sustainable.

In terms of the social dimension, the nutmeg crop in South Aceh District has a fairly sustainable sustainability index, this is in accordance with the conditions of the nutmeg crop which are quite familiar among the people of South Aceh. Nutmeg, which is native to Indonesia, originates from the Banda and Maluku islands and entered South Aceh in 1870 via West Sumatra. The Aceh conflict that occurred resulted in farmers leaving their nutmeg plantations, and starting in 2005 after the peace conflict the farmers returned to take care of their nutmeg plants (Almunawir and Mursal (2019), but some of the plants have been damaged. The safety factor greatly influences the community in their activities and the government in carrying out development, while the unsafe

conditions that occur are a threat to the community in their activities and disrupt the course of development (Rani, 2012), including nutmeg cultivated by the community.

Research conducted Pranata and Agustiar (2022) which states that in South Aceh District nutmeg plants have good prospects for development, besides that the community has a good perception of nutmeg in terms of the level of public knowledge of the nutmeg plant, and nutmeg syrup, which is a nutmeg derivative product, provides economic added value to the nutmeg industry. Furthermore, in terms of agribusiness, nutmeg plantations in South Aceh Regency are able to provide an income of Rp. 36,163,000./Ha/year with an R/C Ratio of 2.87 (Bappeda Aceh, 2018), whereas Almunawir and Mursal (2019) noted that nutmeg farmers were able to earn Rp. 26-31 million/year. Where this value is still better than the income of nutmeg farmers in North Halmahera of Rp. 23,624,538, - with an R/C ratio of 1.8 (Hartati et al., 2020). Although based on the sustainability status of the economic dimension, the nutmeg crop in South Aceh District is in a less sustainable condition, as the cultivation and post-harvest conditions of the nutmeg crop are also unsustainable. Disruption of nutmeg cultivation and post-harvest in South Aceh District has occurred since the 1990s, when many nutmeg orchards were attacked by stem borer, stem powder, and fungus. (Almunawir and Mursal, 2019).

4. CONCLUSION

South Aceh Regency, especially Samadua District, is a center for the production of nutmeg plants, where nutmeg is a superior crop that revives the people's economy. The results of the Multi-Dimensional Scale (MDS) analysis carried out on nutmeg plants with economic, social, environmental, cultivation and post-harvest dimensions show that in multi-dimensional terms with 27 indicators the nutmeg plant is quite sustainable. From the social and environmental dimensions it is quite sustainable, but economically, cultivation and post-harvest are less sustainable. The condition of this dimension of sustainability is closely related to the nutmeg crop and the pattern of management carried out on the nutmeg crop such as favorable soil and climatic conditions, nutmeg that has been known by the community for a long time, and a trading system that affects farmers' income.

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