

BAB XII

DISKUSI DAN KESIMPULAN

XII.1. Diskusi

Pendirian pabrik asam laktat dari eceng gondok diperoleh melalui proses fermentasi dengan memanfaatkan eceng gondok sebagai bahan baku. Dengan berdirinya pabrik asam laktat ini diharapkan dapat memenuhi kebutuhan pasar asam laktat dalam negeri maupun luar negeri yang dapat meningkatkan pendapatan ekonomi dalam negeri dan meningkatkan nilai eceng gondok.

Kelayakan pabrik asam laktat dengan bahan baku eceng gondok melalui proses fermentasi dapat ditinjau melalui hal berikut:

1. Bahan Baku

Bahan baku yang digunakan dalam pabrik ini adalah eceng gondok. Eceng gondok dipilih karena pertumbuhannya yang sulit untuk dikendalikan dan menimbulkan berbagai macam permasalahan, seperti: mengganggu aliran irigasi, mengganggu kehidupan biota air, serta menimbulkan kekeruhan pada perairan. Apabila dilihat dari kandungannya, eceng gondok dapat dikategorikan sebagai salah satu jenis biomassa yang memiliki komponen penyusun utama berupa selulosa, hemiselulosa, lignin, abu dan air. Hal tersebut yang menjadikan eceng gondok sebagai bahan baku yang terbaharukan untuk memproduksi asam laktat serta dapat meningkatkan nilai dari eceng gondok. Eceng gondok diperoleh dari Rawa Pening yang berdekatan dengan area pabrik yang merupakan kawasan penghasil eceng gondok terbesar di Jawa Tengah.

2. Proses dan Produk yang Dihasilkan

Proses produksi asam laktat dari eceng gondok terdiri dari 5 tahapan proses, yaitu *pre-treatment*, hidrolisis, proses fermentasi, proses pengasaman dan proses pemurnian produk. Persiapan bahan baku dilakukan dengan memperkecil ukuran eceng gondok menggunakan *rotary cutter* dan dikeringkan dengan *rotary dryer* untuk mengurangi kadar air pada eceng gondok. Bahan baku eceng gondok yang telah melewati proses *pretreatment* kemudian dilanjutkan dengan proses hidrolisis untuk memecah rantai panjang selulosa menjadi monomer gula sederhana berupa glukosa.

Pada proses perancangan pabrik asam laktat dari eceng gondok dipilih proses fermentasi dalam produksi asam laktat. Proses fermentasi dengan bahan baku glukosa yang berasal dari eceng gondok digunakan sebagai substrat pada proses fermentasi. Mikroba yang digunakan pada proses fermentasi adalah *Lactobacillus paracasei* karena sifatnya sebagai bakteri homofermentatif yang mampu menghasilkan L-asam laktat dengan kemurnian tinggi. Kondisi pH dan *yield* dari *Lactobacillus paracasei* memiliki pH optimum yang cenderung rendah sehingga dapat meminimalkan biaya penggunaan Ca(OH)_2 . Pada proses pemurnian asam laktat, digunakan proses asidifikasi serta distilasi untuk mendapatkan asam laktat dengan kemurnian 88%.

3. Lokasi

Perencanaan pendirian pabrik asam laktat berbahan dasar eceng gondok ini direncanakan untuk didirikan di Kawasan Industri Kendal, Jawa Tengah. Hal tersebut dilatarbelakangi oleh lokasi pabrik yang berdekatan dengan Daerah Rawa Pening yang merupakan kawasan penghasil eceng gondok terbesar di Jawa Tengah. Selain itu, pendirian pabrik di lokasi ini didukung dengan faktor ketersediaan tenaga kerja, infrastruktur pendukung, utilitas, serta keberadaan pasar.

4. Ekonomi

Kelayakan pabrik asam laktat dari eceng gondok ditinjau dari segi ekonomi, melalui analisa ekonomi dengan metode *discounted cash flow*. Hasil analisa ekonomi menunjukkan:

- a. Laju pengembalian modal (ROI) setelah pajak diatas bunga bank (10%) yaitu 17,50%.
- b. Waktu pengembalian modal (POT) setelah pajak yaitu 4 tahun
- c. Titik impas (*Break Even Point*) berada pada BEP ideal antara 40-60% yaitu 53,20%

Berdasarkan hasil analisa tersebut, dapat disimpulkan bahwa prarencana pabrik asam laktat dari eceng gondok ini layak untuk dilanjutkan ke tahap perencanaan, baik dari segi teknis maupun ekonomi.

XII.2. Kesimpulan

Nama Perusahaan	:	PT. Laktat Asidi Indo Pratama
Kapasitas Produksi	:	25.000 ton/tahun
Bahan Baku Utama	:	Eceng Gondok
Sistem Operasi Produksi	:	<i>Semi-batch</i>
Tahun mulai beroperasi	:	2028
Utilitas	:	
1. Air	:	Air sanitasi = 3,39 m ³ /hari
	:	Air proses = 2.949,24 m ³ /hari
	:	Air pendingin = 2.377,66 m ³ /hari
2. Listrik	:	9.755,44 kW
3. IDO (<i>Industrial Diesel Oil</i>)	:	426.130 L/tahun
4. Solar	:	105.662,45 L/tahun
5. <i>Dowtherm A</i>	:	893.880 kg/tahun
Jumlah Tenaga Kerja	:	106 orang
Lokasi Pabrik	:	Kawasan Industri Kendal, Kecamatan Brangsong, Kabupaten Kendal, Provinsi Jawa Tengah

Hasil Analisa Ekonomi dengan Menggunakan Metode *Discounted Cash Flow*

<i>Rate of Return Investment (ROI)</i> sebelum pajak	=	24,54%
<i>Rate of Return Investment (ROI)</i> setelah pajak	=	17,50%
<i>Rate of Return Equity (ROE)</i> sebelum pajak	=	51,53%
<i>Rate of Return Equity (ROE)</i> setelah pajak	=	36,59%
<i>Pay out Time (POT)</i> sebelum pajak	=	4,00 tahun
<i>Pay out Time (POT)</i> setelah pajak	=	5,10 tahun
<i>Break Even Point (BEP)</i>	=	53,20%

XII.3. Saran

Pada proses pendirian pabrik asam laktat dari eceng gondok perlu ditingkatkan kembali kemurniannya dengan metode distilasi reaktif. Proses distilasi reaktif menggunakan prinsip reaksi esterifikasi dan reaksi hidrolisis. Reaksi esterifikasi menggunakan katalis asam homogen seperti asam sulfat, asam klorida, dan asam mineral lainnya. Penggunaan katalis pada esterifikasi dapat juga menggunakan solid ion-exchange resin sebagai katalis heterogen yang memiliki beberapa kelebihan seperti pemisahan yang lebih mudah dan dapat diregenerasi. Pada reaksi esterifikasi dapat digunakan beberapa jenis alkohol seperti etanol, butanol, dan metanol. Penggunaan etanol digunakan karena memiliki keunggulan dalam perolehan bahan baku dan ekonomis. Penggunaan proses distilasi reaktif dapat meningkatkan selektivitas produk yang tinggi karena air dapat terpisah dari asam laktat karena memiliki perbedaan titik didih yang lebih tinggi dibandingkan dengan asam laktat-air sehingga dapat meningkatkan kemurnian produk yang dihasilkan. Kebutuhan air proses pada pendirian pabrik asam laktat dari eceng gondok dapat dikurangi dengan melakukan *recycle* uap air yang keluar dari evaporator I dan evaporator II menjadi air kembali dengan bantuan kondensor.

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