

**ANALISIS EKONOMI TEKNIK IMPLEMENTASI TEKNOLOGI
LOW-COST SMART GREENHOUSE DI TARUNA TANI
HIJAUNYA CINTA, DESA SRIHARJO, BANTUL**

INTISARI

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Pertanian konvensional menghadapi tantangan perubahan iklim dalam meningkatkan produktivitas. Padahal permintaan pangan dunia terus meningkat seiring meningkatnya populasi penduduk. *Smart greenhouse* merupakan salah satu teknologi pertanian presisi yang dapat menjaga dan meningkatkan produktivitas pertanian di tengah perubahan iklim dengan mengontrol iklim mikro yang ada di dalam ruangan agar sesuai dengan kondisi dan kebutuhan optimal tanaman. Namun, teknologi ini memiliki biaya investasi dan produksi yang tinggi. Oleh karena itu, hadir inovasi teknologi penyederhanaan dari *smart greenhouse* bernama *Low-Cost Smart Greenhouse* (LSGH). Teknologi LSGH berfokus pada optimalisasi dan otomatisasi pengaturan nutrisi tanaman yang merupakan elemen terpenting dalam budidaya hidroponik. Pada penelitian ini, dilakukan analisis implementasi teknologi LSGH dalam budidaya sayuran dengan sistem hidroponik di Taruna Tani Hijaunya Cinta Desa Sriharjo, Bantul. Penelitian ini bertujuan menganalisis kelayakan dan sensitivitas usahatani LSGH dengan pendekatan ekonomi teknik. Analisis ekonomi teknik dilakukan dengan mengetahui biaya investasi awal dan biaya produksi serta penerimaan dan pendapatan usahatani. Nilai tersebut digunakan untuk analisis kelayakan dan sensitivitas ekonomi menggunakan metode *net present value* (NPV), *benefit-cost ratio* (BCR), *internal rate of return* (IRR), *payback period* (PBP), dan *break event point* (BEP). Melalui pengumpulan data dan analisis, diperoleh hasil biaya investasi awal senilai Rp89.116.358 dan total biaya produksi sebesar Rp49.605.080. Berdasarkan analisis kelayakan ekonomi, penggunaan LSGH pada usahatani dinyatakan layak untuk jangka waktu 10 tahun ke depan. Nilai NPV yaitu Rp60.816.353; BCR rata-rata setiap tahun sebesar 1,57; IRR sebesar 21,8%; PBP selama 4 tahun 1 bulan 15 hari, dan BEP sebesar Rp35.101.255. Berdasarkan hasil analisis sensitivitas, *switching value* usahatani terhadap biaya produksi adalah 23%; penerimaan sebesar (-13,8%); investasi awal naik 52%, dan kapasitas produksi berubah (-3,2%). Selain itu, nilai *sensitivity index* menunjukkan NPV, IRR, dan PBP sebagai indikator yang paling sensitif terhadap fluktuasi. Sedangkan, biaya produksi dan penerimaan menjadi faktor paling dominan yang memengaruhi kelayakan ekonomi.

Kata kunci: Pertanian Presisi, Hidroponik, Kelayakan Ekonomi, Sensitivitas Ekonomi

**ECONOMIC ANALYSIS OF LOW-COST SMART GREENHOUSE
TECHNOLOGY IMPLEMENTATION IN TARUNA TANI HIJAUNYA
CINTA, SRIHARJO VILLAGE, BANTUL**

ABSTRACT

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Conventional agriculture faces the challenge of climate change in increasing productivity. This is despite global food demand continuing to increase along with the growing population. Smart greenhouses are a precision agriculture technology that can maintain and increase agricultural productivity amidst climate change by controlling the indoor microclimate to suit optimal plant conditions and needs. However, this technology has high investment and production costs. Therefore, a simplified technological innovation of smart greenhouses called the Low-Cost Smart Greenhouse (LSGH) has emerged. LSGH technology focuses on optimizing and automating plant nutrient management, which is a crucial element in hydroponic cultivation. This study analyzes the implementation of LSGH technology in vegetable cultivation using a hydroponic system at Taruna Tani Hijaunya Cinta, Sriharjo Village, Bantul. This study aims to analyze the feasibility and sensitivity of LSGH farming using an engineering economics approach. The engineering economic analysis is conducted by determining the initial investment costs and production costs, as well as the farm's revenue and income. These values are used for feasibility and economic sensitivity analysis using the net present value (NPV), benefit-cost ratio (BCR), internal rate of return (IRR), payback period (PBP), and break-even point (BEP) methods. Through data collection and analysis, the initial investment cost was Rp89,116,358 and the total production cost was Rp49,605,080. Based on the economic feasibility analysis, the use of LSGH in farming was declared feasible for the next 10 years. The NPV value was Rp60,816,353; the average annual BCR was 1.57; the IRR was 21.8%; the PBP for 4 years 1 month 15 days, and the BEP was Rp35,101,255. Based on the results of the sensitivity analysis, the switching value of farming to production costs was 23%; revenue was (-13.8%); initial investment increased by 52%, and production capacity changed (-3.2%). Furthermore, the sensitivity index values indicate that NPV, IRR, and PBP are the most sensitive indicators to fluctuations. Meanwhile, production costs and revenue are the most dominant factors influencing economic feasibility.

Keywords: Precision Agriculture, Hydroponics, Economic Feasibility, Economic Sensitivity