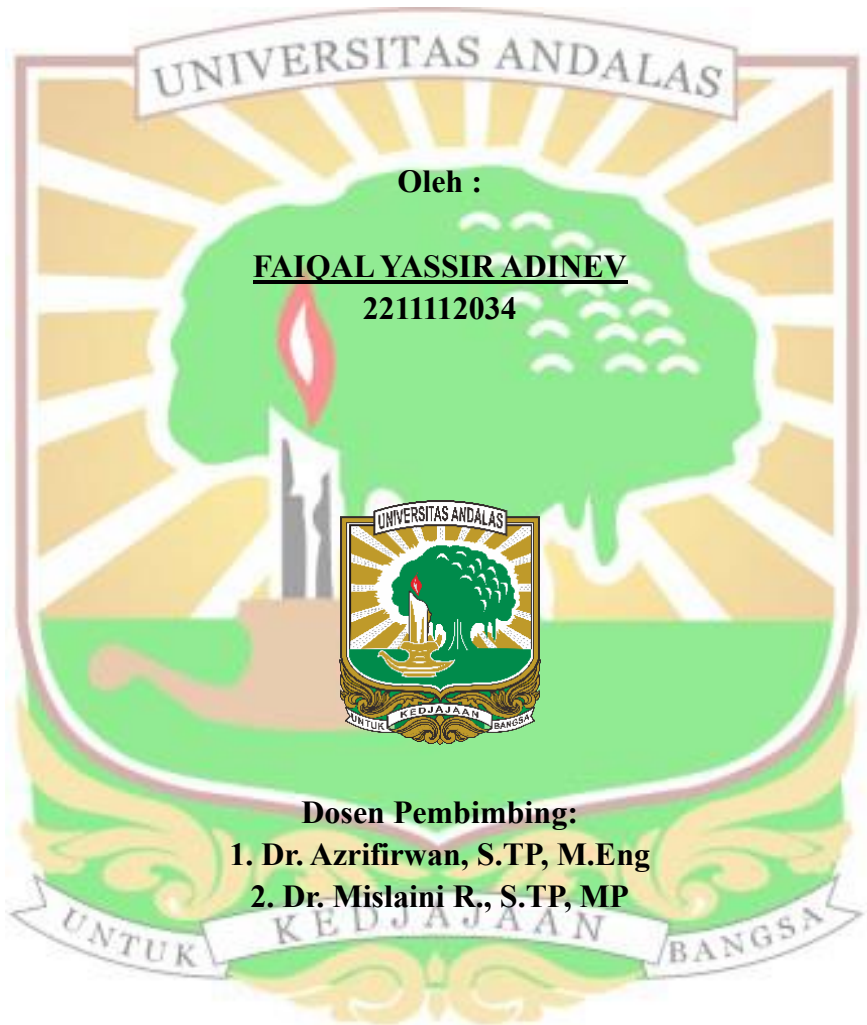


**PENGEMBANGAN SISTEM FABRIKASI KOMPOS
GRANUL SKALA UMKM DAN PERANCANGAN
MESIN *PAN GRANULATOR* MENGGUNAKAN
METODE QFD DAN TRIZ**



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PENGEMBANGAN SISTEM FABRIKASI KOMPOS GRANUL SKALA UMKM DAN PERANCANGAN MESIN *PAN GRANULATOR* MENGUNAKAN METODE QFD DAN TRIZ

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ABSTRAK

Penelitian ini bertujuan mengembangkan rancangan sistem fabrikasi kompos granul dari limbah pertanian untuk kapasitas produksi skala UMKM. Metode penelitian meliputi pengumpulan data potensi limbah pertanian di Sumatera Barat, perhitungan neraca massa, spesifikasi teknis mesin, perancangan desain virtual menggunakan *software SolidWorks 2024*, pengembangan mesin *pan granulator* dengan metode *Quality Function Deployment (QFD)* dan *Teorija Rezhenija Izobretatelskih Zadach (TRIZ)*, serta analisis ekonomi. Hasil penelitian menunjukkan potensi limbah pertanian bahan baku kompos granul di Kabupaten Pesisir Selatan mencapai 373.000 ton/tahun, meliputi jerami padi, sekam padi, batang dan daun jagung, klobot jagung, serta kotoran sapi. Target produksi ditetapkan 100 kg/hari dengan *input* bahan baku 250 kg/hari. Rancangan sistem fabrikasi terdiri dari 8 unit mesin dan fasilitas produksi: *chopper* (4,5 kW), rumah kompos, *rotary dryer* (0,25 kW), *hammer mill* (0,56 kW), *mixer* (0,187 kW), *pan granulator* (0,25 kW), *rotary cooler* (0,09 kW), dan *rotary screen* (0,187 kW). Penyusutan bahan baku kumulatif sebesar 58,64%. Mesin *pan granulator* sebagai inti proses granulasi dirancang khusus menggunakan QFD untuk menerjemahkan kebutuhan konsumen menjadi karakteristik teknis, dan TRIZ untuk menyelesaikan kontradiksi antar karakteristik teknis. Analisis QFD menghasilkan prioritas perbaikan pada dimensi mesin, daya motor, dan kecepatan putaran, sedangkan TRIZ memberikan solusi inventif berupa desain motor dan transmisi dalam satu *sub-frame*, pengoptimalan kecepatan putaran, dan sistem pengatur sudut kemiringan pan. Simulasi statis

menunjukkan seluruh komponen memiliki *factor of safety* (FoS) di atas 2. Analisis ekonomi menghasilkan HPP Rp 9.016,38/kg, R/C rasio 1,33, dan BEP 7.949 kg/tahun, menandakan usaha layak dan menguntungkan.

Kata kunci - **kompos granul, limbah pertanian, QFD dan TRIZ, SolidWorks, UMKM.**



DEVELOPMENT OF GRANULATED COMPOST FABRICATION SYSTEM FOR MSME SCALE AND DESIGN OF PAN GRANULATOR MACHINE USING QFD AND TRIZ METHODS

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ABSTRACT

This research aims to develop a granulated compost fabrication system from agricultural waste for MSME-scale production capacity. The research methods included collecting data on agricultural waste potential in West Sumatra, mass balance calculations, technical specifications of machinery, virtual design using SolidWorks 2024 software, development of a pan granulator machine using Quality Function Deployment (QFD) and Teorija Rezhenija Izobretatelskih Zadach (TRIZ) methods, as well as economic analysis. The results showed that the potential of agricultural waste as raw material for granulated compost in Pesisir Selatan Regency reached 373,000 tons/year, consisting of rice straw, rice husks, corn stalks and leaves, corn husks, and cow manure. The production target was set at 100 kg/day with raw material input of 250 kg/day. The fabrication system design consisted of 8 units of machinery and production facilities: chopper (4.5 kW), composter house, rotary dryer (0.25 kW), hammer mill (0.56 kW), mixer (0.187 kW), pan granulator (0.25 kW), rotary cooler (0.09 kW), and rotary screen (0.187 kW). The cumulative raw material shrinkage was 58,64%. The pan granulator machine, as the core of the granulation process, was specifically designed using QFD to translate consumer needs into technical characteristics, and TRIZ to resolve contradictions among technical characteristics. QFD analysis identified priorities for improvement in machine dimensions, motor power, and rotational speed, while TRIZ provided inventive solutions including motor and transmission design in a single sub-frame, rotational speed optimization, and pan tilt angle adjustment

system. Static simulation showed that all components had a factor of safety (FoS) above 2. Economic analysis resulted in a production cost of Rp 9.016,38/kg, an R/C ratio of 1.33, and a BEP of 7.949 kg/year, indicating that the business is feasible and profitable.

Keywords - granulated compost, agricultural waste, QFD and TRIZ, SolidWorks, MSME.

