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.2017 CERTIFICATE Asia Pacific Network for Sustainable Agriculture, Food and Energy and Universiti Teknologi MARA, MALAYSIA Jointly City that, () • ELVIN HASMAN PRESENTER International Conference-Sustainable Agriculture, Food and Energy (SALT 2017);
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August 2224, 2017 (it-oboL Shute or) cvi ov0 5t."3/ -?1,i1 _____Dr. Noviar Nazir
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Rotary Electrical Controlled Drum Dryer for Organic Fertilizer Production Presented by Elvin Hasman on International Seminar Asia Pacific Network for SAFE (Sustainable of Agriculture, Food and Energy) on Kuala Lumpur on August 22-24, 2017. Introduction.

There is one of many unresolved issues in agriculture production and it is the fertilization issue. The long-term non-organic fertilizer availability with reasonable price will determine the national agriculture production sustainability, which it will also guarantee the national food resilience. Since the fertilizer is an essential need for agricultural growth, in the 60s the government gave the subsidized fertilizer.

While in fact, the stocks continue to decline over time. The use of organic fertilizer is increasing along with the rise of organic farming phenomenon. Consequently, there are no other alternative ways to fertilize for the farmers unless they have to use organic fertilizer as well. Meanwhile, the manual production of organic fertilizer is indeed a rough work and takes time to produce until it is ready to be used.

The preliminary research result that it is identified that its production process is time-consuming, particularly the drying stage. This problem is very pronounced when relying the process on conventional drying using sun heat and air circulation on its drying place. Furthermore, using the standard drying machine is still required a large amount of heat, difficult to control the temperature and needs plentiful human resources to process reversing raw materials. Therefore, it does not overcome the current problem on the production process.

The next phase of the study is to engineer the rotary electrical controlled drum dryer for supporting organic fertilizer drying process. On this step, the labour needs and fatigue problems are not yet resolved. However, to control the efficiency of heat source and its precise temperature is still can be solved as well as the high cost of production.

This program is expected to be able to produce a package of organic fertilizer production technology with a high standard, high capacity and efficiency. Nonetheless, it is simple to run by the farmers. This package of technology that is engineered, is so-called a rotary electrical controlled drum dryer machine. Hereinafter, it is also inferred to be able to improve the agricultural production capacity and upgrade the quality of the agricultural products.

Moreover, it will be able to solve the deficiency of the fertilizer stocks. The concept The roadmap of product development and enrichment the organic fertilizer nutrition consist of the materials, research and development, the technology that is used for machine-making process, products and its development, and target its market.

Regarding the program, the first year term provides the rotary electrical controlled drum dryer machine for drying process to achieve an advance organic fertilizer product. This technology is an effective machine that is needed by the farmers to solve the chemical fertilizer deficiency. This roadmap is depicted in Table I. Table I. The roadmap or Rotary Electrical Controlled D Year _First _Second _Third _ _Material _The assorted size of steel for machine making process.

_Rotary electrical drum dryer, organic fertilizer, assorted size of steel _An efficient and economic fertilizer machine maker and organic fertilizer. _ _Research and Development _Development and machine improvement. _Control system development. _Monitorized control system development. _ _

Product _Rotary electrical _Rotary dryer _Monitorized rotary _ _ _controlled drum dryer
_machine for _dryer machine for _ _ _machine and organic _controlling _controlling _ _
_fertilizer. _temperature and humidity. _temperature and humidity. _ _Market _Farmers,
farmers' association, small _Farmers.

plantations, small _Farmers, plantations, small _ _ _enterprises. _workshop enterprises.
_workshop enterprises. _ _ This program is expected to be able to produce a package of
organic fertilizer production technology with a high standard, high capacity and
efficient. Nonetheless, it is simple to run by the farmers. This package of technology that
is engineered, is so-called a **rotary electrical controlled drum dryer** machine.

Hereinafter, it is also inferred to be able to improve the agricultural production capacity
and **upgrade the quality of the** agricultural products. Moreover, it **will be able to** solve
the deficiency of the fertilizer stocks. The development of this machine will support the
evolution of agricultural machinery workshops that will produce agricultural machines,
which are needed by the community.

It is expected to be able to solve the labor issues, heating temperature that can be easily
controlled and utilizing its own electrical power as the heat source for drying process.
This machine will ease the work and cost and improve the production capacity and
product quality. Furthermore, it will also decrease the dependency on labour in
agricultural works. Hence, it is expected to fulfil the needs for fertilizer.

Therefore, it will escalate the agricultural production so that Indonesia will genuinely
have its own self-sufficiency on many agricultural commodities. Furthermore, the other
advantages are partners **will be able to** intensify the production capacity and product
quality, and the value of the product could be competitive. Hence, those are raising
incomes and welfare amongst the labors.

For the local government, this program **will be able to** increase the community welfare
and regional income, create job opportunities and reduce the unemployment. For
Politani, this achievement **will be able to** strengthen the function of its agricultural
workshops, as the leading in agricultural machinery expertise and the machines that is
built is potential to achieve intellectual property rights and international publications.
Research method.

The implementation of this research uses several methods, functional and structural
method that depends on each stage of work. In the first year, it was focused on design
and manufacture of the machine, so that it creates a truly efficient and effective
machine. Next, the functional and structural method was used for the selection of the

right components and materials.

It would produce an efficient machine for producing the organic fertilizer. Afterwards, performance test and economic analysis were done. Then, dissemination and socialization were carried out on farmers and local community nearby Politani Negeri Payakumbuh. Finally, the mass production of organic fertilizer will be started.

The prototype will be designed for possessing the main component that consists: cylindrical compartment (i.e. as the channel for drying the raw material and it will be rotating while drying process until the mixture exiting the outlet shaft **at the end of the** channel.). Outside of the outlet will be provided with heating element, completes with the temperature control system and electric fan, as the energy resources and hot air blower to the dried mixture. The machine is moved by the 1411P motor engine to rotate the drum dryer, transmission system and controlled heating system.

The design **is depicted in Figure 1** (autoshape version).

Material entry Figure annotation: Figure I. Design of rotary electrical controlled drum dryer 7. Scrapper 1. Hopper input 8. Hot airflow 2. Airflow 9. Temperature control system 3. Heating element 10. Outlet 4. Inlet Fan 11. Drum rotation direction 5. Drum dryer 12. Frame 6. Dried material 13.

Engine and electric motor The technical evaluation that will be held is intended for: I. Identifying the physical characteristics (segregation) from organic fertilizer before it enters the machine and product at the outlet of the machine. Determining the capacity and drying efficiency. The time needed for drying until the mixture is dried with the determined water content.

Knowing the number of labours, types of work, operational convenience and technical problem that appear while operation. Determining the engine power for production process to determine the optimal engine power for the procedure. Calculating the noise level while production process and give the recommendation for the operator while operating the machine.

Economical analysing on basic cost, BC ratio, IRR and current bank rate interest. Results Technical Description for Rotary dryer The rotary electrical controlled drum dryer machine is a type of dryer that works continuously. This machine consists of five main components, namely: Drying cylinder Heater Driver motor Transmission system

rotary electrical controlled drum dryer machine, which has the following specifications:
Model :Rotary electrical controlled drum dryer Capacity :805.03 kg/hour Height :30cm
Length :720 cm Width :120 cm Diameter :60 cm Driver motor :dieselyanmar I 4Hp Heater
:Electric heater - 700 W Temperature control system : Thermostat AC 240 V - output 9 V
Heating temperature : 142°C Drying Unit The unit is shaped like elongated cylinder that
is rotating during the drying process.

The

specification as follows: Length Width Height Diameter Driver motor RPM cylinder _:600
cm :120 Cm :130 Cm :60 Cm :Dieselycmmar 14 Hp : 7 RPM

The drying unit can be seen in Figure 2 below,

Heater While the drying process, the machine uses two elements of heaters with power source comes from electricity. It has power of 700W, Includes with thermostat for maintaining the temperature.

Heat that comes from the sources will be transported by the blower to enter drying unit. Moreover, the powerful fire comes from the heater is transported by the power of the blower and is moved by the 1/2 hp dynamo. With its powerful blast, it can reach the end of the drying unit inlet. Therefore, the drying process can be done perfectly.

The heater unit is depicted in Figure 3. / Figure 3. Heater Drying Process of Organic Fertilizer The drying process of organic fertilizer was started with loading the material and rotating the cylinder at 7.0 RPM and air temperature entering the drying unit is 142.20 °C. The time needed for drying process is 15.43 minutes to lessen the water content to 13%.

Rotary Electrical Controlled Drum Dryer Machine Performance After having the functional test on the machine. henceforth the machine performance test. The results is shown on Table 2. Table 2. Result of Machine Performance Test

Parameter Rotation of driver motor without average load Rotation of driver motor with average load Rotation of drying cylinder without average load Rotation of drying cylinder with average load Air temperature enters drying cylinder Air temperature exits drying cylinder Drying time _Test results Unit 960.80 RPM 935.60 RPM 8.0 RPM 7.0 RPM 142.20 °C 101.73 °C 15.43 Minute

Average capacity based on initial weight (input) 805.03 kg/hour Initial water content 20.37 %/ (f) / Fined water 1.0,111. Pit 11 32 Drying rate 27.40 %/hour Noise level without load 80 86 dB .\n.se level ti ith load 81.54 (Iii A Id wit i rw price 95. 993. 700 Rp Fixed cast 25.150 349 Rp/year I "(triable COs! II 4.349.81 Rp/year Basic cost 155.06 Rp/kg Break Even Point (REP) 159.219.73 kg/year From the result of technical and performance tests can be seen that; machine's performance is proper.

where: drying capacity is 805.03kg/hour with initial water content from 20.37% to 13.32%; noise level while operating is 81.54 dB. It means that it is still in a safe range for the operator. While on the economic analysis. the basic cost is Rp /55. 06/kg and BEI' is 159.219,73kg/year. Research Chacomes The outcomes that have achieved include: I.

The research has been presented as a speaker on International Seminar Asia Pacific Network for SAFE (Sustainable of Agriculture, Food and Energy) on Kuala Lumpur on August 22-24, 2017. Proof of certificate and Letter of Acceptance are shown in Figure 4. HOME FOR CONNECTING PEOPLE 1 Figure 4. Proof of seruficate and LoA of International Seminar on SAFE 2017 in Kuala Lumpur. August 22-24, 2017. _ _ 2.

International Journal LIASFIT Me outcome for scientific publications is the _scientific article has been submitted to 6 the International Journal IJASKjI indexed by scopus. The proof of submission is _ _

shown in Figure 5. International Journal on Advanced Science, Engineering and Information Technology . wpm. • ••••• _ _ Active Submissions aleTiVe -47•1 V ass Ira 410111113 1791 to is MT NA,,,v;I 1 - I oi t Items _NOTARY MCI 11,11 CfINT g5ATt UM1041,0 _ _ Start a Now Submission to pc to um C., of 1,1e Is, story 1,Ornnidon process r t 'U •II • cr, Figure 5. Proof of submitted article of1JASEIT journal 3.

Teaching module The other outcomes from this research are the teaching module for teaching material's. improvement which Buku Panduan Kerja Praktek Mahasiswa (Student Practice Workbook), especially for AutoCAD Engineering Drawing course on study program of Agricultural Machinery and Agricultural Water Management.

Conclusion and Recommendation From the program execution, can be concluded as follows: The rotary electrical controlled drum dryer machine is operated well. The machine .specifications are 720cm length, 130cm height and 120cm width. The performance is capacity for 805.03 kg/hour, drying rate is 27.40%/hour, noise level is 81.54 dB. Economic analysis is found that: basic cost is Rp155,06/kg, Break Even Point for 159.219,73 kg/year.

The machine can be developed and applied to the community for a large-scale fertilizer production in farmers' community. The research outcomes are paper presentation on International Seminar SAFE 2017 in Kuala Lumpur August 22-24, 2017 and have been submitted as a scientific article on International Journal IJASEIT.

I. The weight of the machine needs to be decreased so that it would be easier to be transported to the farmers' community.

Further **research and development is needed** and improvement on the system control for the water content and fertilizer's moisture while it is being dried. Further development on the drying machine is needed to produce smart rotary electrical. A test on fertilizer applications on plants is needed to see the effect of the temperature on the loss of micromaterials in crop cultivation.

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Rekayasa **Alat Pencacah dan Pengaduk BahanBaku Pada Proses Pembuatan Pupuk Organik Dalam Upaya Meningkatkan** Kapasitas dan Mutu Produksi.

Appendix I. Documentation Figure 6, Drying unit

/ Figure 7.

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