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Implementing Research for Community Outreach Needs as the Responsibilities of Every Higher Education Institution in Indonesia Case Study: Sustainable product development of organic vegetable waste crushing machine for community outreach needs in Surabaya Willyanto Anggono^{1,2,3}, Yopi Yusup Tanoto^{1,3}, Fandi D. Suprianto^{1,2,3}, Juliana Anggono ^{1,2,3}, Resmana Lim¹, Yohanes Budi Cahyono¹, Poedi Soenarjo Wartono¹ ¹Institute of Research and Community Outreach, Petra Christian university, Surabaya 60236, Indonesia ²Centre for Sustainable Energy Studies, Petra Christian university, Surabaya 60236, Indonesia ³Mechanical Engineering Department, Petra Christian university, Surabaya 60236, Indonesia Email: willy@petra.ac.id

Abstract Household wastes in the form of organic vegetables will cause serious problems if they are not handled properly. In the other hand, these wastes are easily utilized by processing them into compost. Based on those conditions, the community around Petra Christian University have produced compost from organic vegetables using household wastes although these wastes were not utilized optimally due to the low capacity of crushing machine. The crushing machine used had 10 kg/hour capacity while its minimum required capacity is 75 kg/hour. Because of this condition, the head of the community has requested aid from Petra Christian University to solve this issue. One of the Tridharma Perguruan Tinggi states the responsibility of institution of higher education toward community service. As an institute of higher education, Petra Christian University provides aids through the Institute of Research and Community Outreach, Centre for Sustainable Energy Studies and Mechanical Engineering Department. The team has solved the problem by considering several alternatives based on the research. The team has successfully designed and built the machine to be suitable with the request using the method of sustainable product development and Pugh's concept selection. The resulted machine works by crushing the organic wastes with blades which rotate manually using man power using bicycle principle. Additionally, gasoline motor is also used as source of energy. Organic wastes are put into the machine from the top and come out into small crushed pieces by utilizing gravity force. The machines were tested and found capable to produce crushed organic wastes more than 75 kg/ hour as the minimum requirement from the community. By performing these activities as part of research for community outreach needs, Petra Christian University has performed its responsibility as an institute of higher education in Indonesia.