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Increasing Awareness and Efficacy Regarding Farmer Occupational Safety and Food Safety in the Coconut Sugar Production Process at the Gendis Asri Farmer Group, Pernasidi Village

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ABSTRACT

Coconut sugar production is one of the leading commodities in Kabupaten Banyumas that has great potential to improve the regional economy. However, the coconut sugar production process in Pernasidi Village, especially at the Gendis Asri Farmer Group, faces several issues related to work safety and food safety. This community service program aims to increase farmers' awareness and efficacy of work safety and food safety in the coconut sugar production process. The methods used include the provision of Personal Protective Equipment (PPE), occupational risk management training, and food safety training based on Hazard Analysis Critical Control Points (HACCP) principles. The results of the program showed an increase in farmers' knowledge and awareness of work safety and food safety. In addition, the replacement of production equipment with stainless steel pans successfully reduced metal contamination in coconut sugar products. Overall, this program has had a positive impact on improving the quality and safety of coconut sugar products, which is expected to improve the welfare of farmers in Pernasidi Village.

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INTRODUCTION

Coconut sugar is a leading product of Banyumas Regency with very large potential, Banyumas Regency can produce up to 51,400 tons of coconut sugar per year through 28,265 household business units classified as rural agro-industrial businesses that can absorb approximately 50,000 workers ranging from tappers to "pengindel". This commodity has driven the economic growth of Banyumas Regency by contributing an income of 300 billion per year (LPPSLH, 2017; Suwanto & Chalid, 2023). Coconut sugar is a sugar product produced from dehydrated and boiled coconut sap (Mela et al., 2020). In detail, the coconut sugar production process begins with the process of taking sap from coconut trees, or commonly called "menderes", then the sap liquid will be boiled for a long time to remove water content and crystallize the sugar, the last process is drying the coconut sugar crystals to maintain its quality and shelf life (Mazaya et al., 2021; Mela & Ahsan, 2019).

FIGURE 1. Coconut Sugar Product

Coconut sugar is a type of sugar that is considered healthier because it is a natural vegetable sweetener. Coconut sugar contains potassium, vitamin C, calcium, potassium, phosphorus, and magnesium, as well as a little phytonutrient. such as flavonoids, polyvenols, and anthocyanins (NatureVia, 2024). Coconut sugar with all its benefits is one of a very promising commodity as a source of income for the people of Banyumas Regency (Hanny Purnomo & Sugiarti, 2024; Indarwati, 2009). According to data from the Bappedalitbang of Banyumas Regency, in 2017 there were 23 out of 27 sub-districts in Banyumas Regency that produced coconut sugar, one of the largest was Cilongok Sub-district, with a production volume of 48,963.36 kg of palm sugar per day, this production value was produced by 6,604 tappers with resources of 136,011 coconut trees. One of the villages in Cilongok Sub-district that has a fairly large coconut sugar production is Pernasidi Village, where the production value of coconut sugar in this village averages 2,355.84 kg per day, this amount is produced collectively by 142 tappers from 6,544 coconut trees in Pernasidi Village. Based on the results of field observations that have been carried out, the coconut sugar commodity in Pernasidi Village is managed by several stakeholders involved from upstream to downstream processes. The whole process starts with the farmers taking coconut sap directly from the farmers' coconut trees, after which the coconut sap is crystallized by the farmers in the production kitchen owned by each farmer.

Coconut sugar in crystal form is then sold to a farmer group to be collected in a cooperative, one village generally has several farmer groups which will deposit the results of coconut sugar in crystal form in a cooperative that houses several farmer groups in one sub-district. From a product perspective, cooperatives have a role to carry out quality control on crystal coconut sugar products that have been collected from several farmer groups, to then be sent to a company which will then carry out final processAndfinal check on the coconut sugar product before it is later processed packing to be sold in local

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or export markets. From all over stakeholders involved in the production process to the downstreaming of coconut sugar, one of which is in Pernasidi Village, it was found that all the potential and benefits that arise from the coconut sugar commodity are not always positive, especially in the production process carried out in this village has several obstacles and problems at the level of tappers and pengindel. Based on the results of interviews that have been conducted with one of the farmer groups in Pernasidi Village called the Gendis Asri Group, there are problems from two main aspects that arise, the first problem comes from the aspect of the safety of the tappers and the second problem comes from the production process, especially in the process of "ngindel" or cooking sap water until it becomes sugar crystals.

From the aspect of occupational safety, the coconut sap tapping process has several problems that occur, starting from the lack of knowledge of the tappers regarding risk management, the lack of availability of Personal Protective Equipment (PPE), and risky behavior. Risk management is important in reducing the rate of work accidents. With risk management, workers can take preventive steps to avoid work accidents, implement appropriate work safety measures, and ultimately reduce losses due to work accidents (Robert et al., 2014). In addition, the use of appropriate PPE also plays an important role in reducing the rate of work accidents, where PPE can reduceseverityfrom accidentthat occurs in workers (Dahyar, 2018). And finally, risky behavior, such as not using Personal Protective Equipment (PPE) properly, not following safety procedures, or taking shortcuts in carrying out tasks, can increase the risk of work accidents (Perdini, 2012).Regarding the work safety issues that occur in coconut sap tappers in Pernasidi Village, the local village government stated that every year on average there is 1 farmer who dies or is seriously injured due to falling from a coconut tree while tapping coconut sap and on average every month there are tappers who suffer minor injuries due to work accidents, this case also occurred in the Gendis Asri Farmers Group. The number is quite large because the risks that arise from the coconut sap tapping process are also quite high, where the tappers must climb dozens of coconut trees with a height of 12-14 meters without PPE every day.

FIGURE 2. Coconut Sugar Tappers in Pernasidi Village

Furthermore, problems also arise from aspects of the production process, especially in the "ngindel" process, "ngindel" is the process of cooking filtered coconut sap to reduce the water content and change its form into sugar crystals.It was found that in this process, the principles of food safety were not followed. Some important aspects of food safety are hygiene, sanitation, and food-based management (Rahmah et al., 2018). Hazard Analysis Critical Control Points (HACCP) (Lukman & Kusnandar, 2015) is not met in the process "ngindel" which is carried out in the Gendis Asri Farmers Group, Pernasidi Village, where the process is still carried out traditionally in a kitchen that can be said to be inadequate. Food safety in general aims to ensure that processed food is free from contamination and biological, chemical, and physical hazards to ensure that the food produced and consumed is safe and does not endanger health (Handoyo

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& Maharani, 2021). So this is very important to pay attention to in order to be improved so that the quality and safety of Pernasidi Village coconut sugar products are better maintained.

FIGURE 3. Coconut Sugar "Pengindel" in Pernasidi Village

Based on the conditions that occur in the coconut sugar production process in Pernasidi Village, especially in the Gendis Asri Group, a community service program in partnership with the Gendis Asri Group as one of the farmer groups will be carried out to increase farmers' awareness of work safety and food safety in order to reduce the level of work accidents and improve the quality of coconut sugar products in Pernasidi Village as a superior commodity, which will have an impact on the welfare of the community, especially coconut sugar farmers.

METHOD

The implementation of this community service program will technically be carried out with a method that includes activities to provide solutions to the problems that have been described, namely problems related to work safety aspects and food safety aspects. Regarding the work safety problems that occur in coconut sap tappers, especially in the Gendis Asri Farmers Group, Pernasidi Village, the local village government and farmer groups stated that every year on average there is 1 farmer who dies or is seriously injured due to falling from a coconut tree while tapping coconut sap and on average every month there are tappers who are slightly injured due to work accidents. And related to the food safety aspect, it was found that the process carried out did not follow the principles of food safety. Some important aspects in food safety are hygiene, sanitation, and management based on Hazard Analysis Critical Control Points (HACCP) is not met in the process "ngindel" conducted in Pernasidi Village, where the process is still carried out traditionally in a kitchen that can be said to be inadequate. Based on the description of the problem, a solution is needed to solve the existing problems. This community service will have an impact on the community level, especially coconut sugar farmers by partnering with the Gendis Asri Farmers Group with the aim of providing knowledge related to work risk management, increasing farmer efficacy for work safety, and providing PPE to solve problems in the work safety aspect. As well as providing food safety training, and providing frying pans stainless steel to solve problems in the aspect of food safety. This program is ultimately targeted to improve farmers' knowledge regarding risk management, improve farmers' efficacy, provide PPE for farmers' work safety, improve knowledge regarding food safety, and reduce metal contamination due to inappropriate production tools.

The resolution of the problems that arise are then described in several stages of activity which can be seen in Figure 4 as follows:

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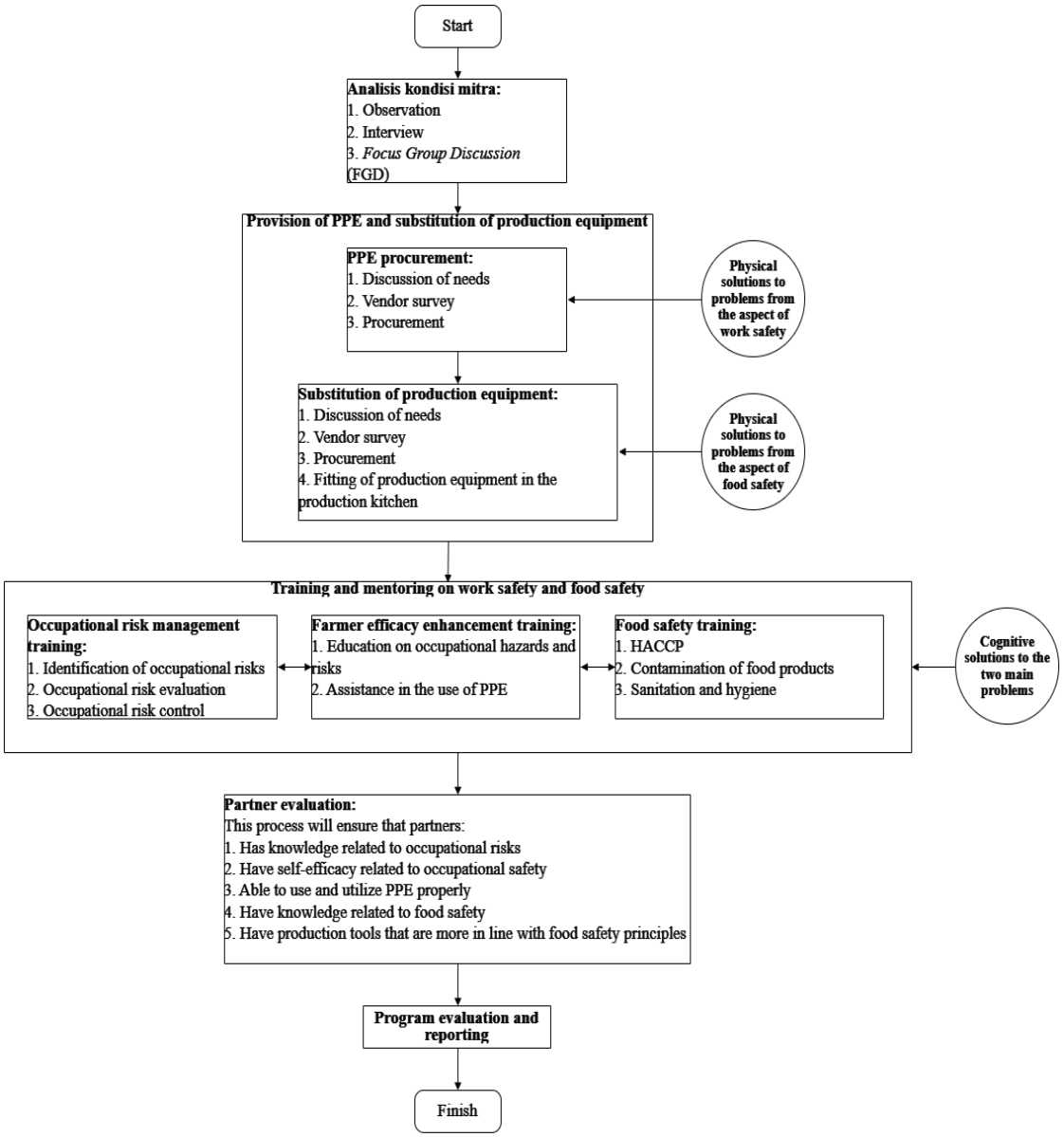

FIGURE 4. Program Flowchart

Where each stage in Figure 3 is explained in a description and the role of each stakeholders in detail, as follows:

1. Analysis of partner condition
   At this stage, the implementer conducts direct observation at the partner's location to obtain the current real condition of the partner. The output of this direct observation can be in the form of production, marketing, and organizational data. In addition, the implementer also conducts interviews and FGDs with partners to identify the main problems felt by partners as well as internal and external conditions. The results of the interviews and FGDs will be the main reference in providing improvement strategies to improve the quality and capacity of partners.

2. Provision of PPE and substitution of production equipment
   At this stage, the provision of PPE will be carried out, starting with identifying the need for PPE that does not interfere with the work habits and productivity of the tappers, after obtaining detailed needs. Regarding these needs, the proposer will conduct a vendor survey and conduct procurement. Based on the initial observations that have been made, the PPE that will be provided is safety harness which

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is equipped safety rope with carabiner hook, this tool is used to support the body of the tapper when slipping or falling during the process of climbing a coconut tree. In addition, the substitution of production equipment is also carried out at this stage, the production equipment that will be given to the Gendis Asri Farmers Group, Pernasidi Village is a frying pan made of stainless steel with a diameter of 75 cm, the size of the pan is adjusted to the equipment commonly used by coconut sugar tappers, while stainless steel is chosen because this material is more resistant to corrosion and more durable, where the pans that are generally used in the coconut sugar processing process at the Gendis Asri Farmers Group, Pernasidi Village use iron pans which are more susceptible to corrosion. Substitution of pans with stainless steel pans is expected to reduce contamination in order to improve food safety in the coconut sugar processing process at the Gendis Asri Farmers Group, Pernasidi Village.

3. Work safety and food safety training and assistance
   Training and mentoring were conducted at the Gendis Asri Farmers Group, Pernasidi Village by providing knowledge related to work risk management which began with providing a basic understanding of the benefits and objectives of a risk-based approach, conducting work risk evaluations, and controlling work risks. Furthermore, increasing farmer efficacy related to work safety was also carried out by providing education related to work hazards and risks, which was continued by providing mentoring on the use of PPE for tappers. And finally, food safety training which includes an introduction to HACCP, food contamination, sanitation, and hygiene will also be carried out. In food safety training and mentoring, food contamination testing will also be carried out on existing coconut sugar samples microbiologically.
4. Partner evaluation
   This stage is the evaluation stage of increasing partner capacity after implementing solutions provided by the implementer for the conditions and problems of the partner. Where partners are targeted to have more skills in improving work safety and food safety in coconut sugar production in the Gendis Asri Farmer Group, Pernasidi Village.
5. Program evaluation and reporting
   The evaluation and reporting stage is the final stage in the series of community service activities, where all previous stages will be evaluated, all promised outputs and all activity accountability will be reported.

In all the activities carried out, sustainability is also expected to occur in order to continue to build and increase the capacity of partners both in terms of work safety and food safety aspects that are directly related to the coconut sugar production process, especially in the Gendis Asri Farmers Group, Pernasidi Village.Sustainability potential which is possible to achieve one of them is the legalization. This will further mature the results of the efforts carried out in this community service activity to encourage coconut sugar products from the Gendis Asri Farmers Group, Pernasidi Village to become safe products for farmers safe in terms of production process.

RESULT AND DISCUSSION

Based on observations that have been made of partner conditions, this program is carried out through several activities to solve problems in partners. The program begins with a general socialization that discusses all the activities that will be carried out, from the general socialization that has been carried out, the community has a basic understanding of work safety and food safety, besides that this activity also raises community support for this program.

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FIGURE 5. General Socialization of the Program

Furthermore, to increase community awareness regarding work safety, the provision of PPE is carried out by adjusting the work habits of coconut sugar penderes in Pernasidi Village. This was done by providing several PPE options to the penderes, from a test conducted on one of the penderes it was found that the most appropriate PPE to use without disrupting the usual work process was in the form of half body harness, carabiner, safety webbing, and safety hook.

FIGURE 6. PPE Trials

FIGURE 7. PPE Device

FIGURE 8. PPE Device Handover

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In addition to providing tested PPE for use by the penderes of the Gendis Asri Farmer Group, training related to work safety was also provided to increase farmers' knowledge and self-awareness regarding the importance of work safety. Based on the Pre Test and Post Test conducted during the work safety training, it can be seen that there is an increase in community knowledge on several aspects related to work safety, as shown in the graph below:

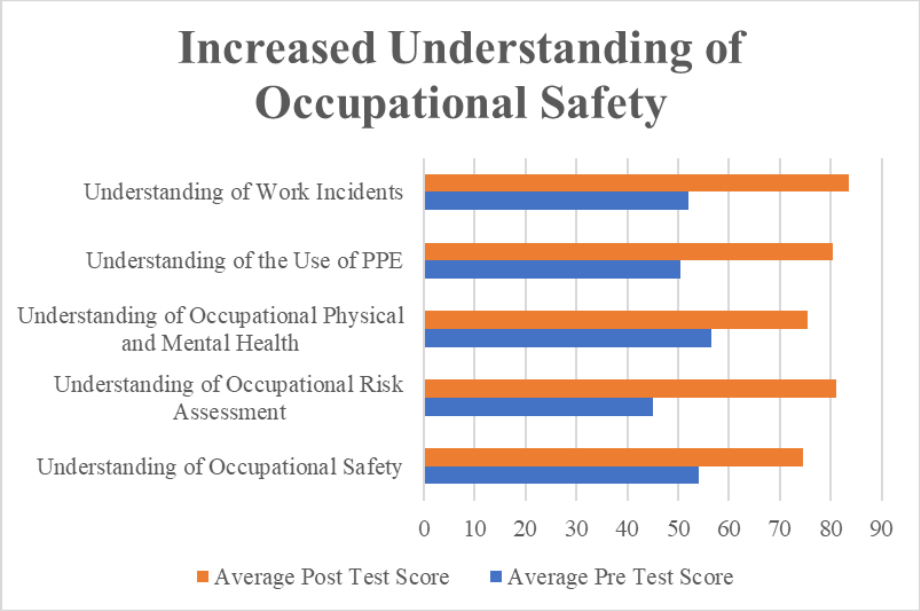

FIGURE 9. Increased Understanding of Occupational Safety

Based on the results of the training and the provision of PPE to the penderes of the Gendis Asri Farmer Group, it can be seen that there is an increase in community knowledge capacity related to work safety. The next activity is to provide training to members of the Gendis Asri Farmer Group related to food safety, this activity is intended to provide insight to the coconut sugar craftsmen community in Pernasidi Village, especially the Gendis Asri Group to be able to implement a safe food production process, in this activity the program team also took coconut sugar samples from several members of the Gendis Asri Group for further microbiological contamination testing.

FIGURE 10. Food Safety Training

From the training related to food safety, it can be seen that there is an increase in community knowledge on several aspects related to food safety, where the community's basic understanding of Hazard Analysis Critical Control Point (HACCP) and other important aspects related to good production processes in food production has increased significantly, as shown in the graph below:

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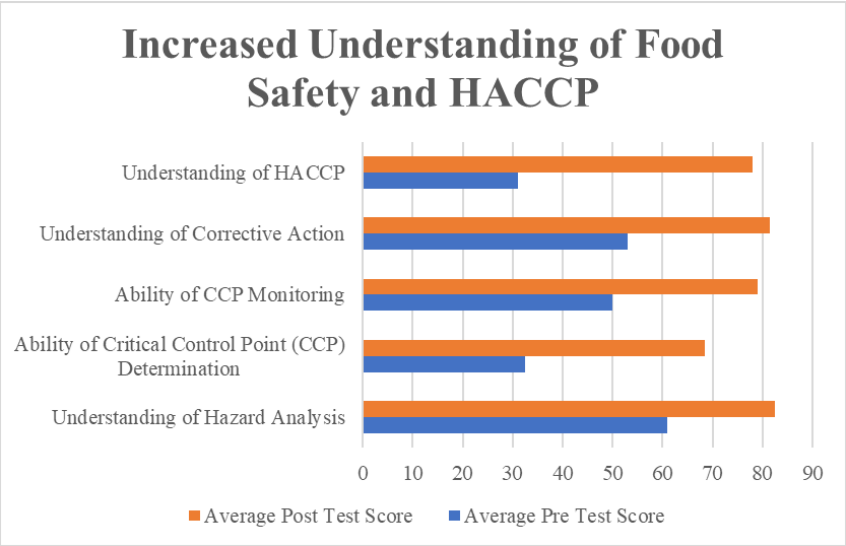

FIGURE 11. Increased Understanding of Food Safety and HACCP

Based on microbiological contamination testing conducted on several coconut sugar samples obtained from several coconut sugar craftsmen from the Gendis Asri Farmer Group, it was found that the bacterial contamination content of all coconut sugar samples was quite high with a range between 8.5×10^5 CFU/1ml to 194×10^8 CFU/1ml. From the analysis conducted, the contamination arose from natural microbes, microbes from production equipment, and microbes from the environment.

FIGURE 12. Microbiological Testing

And finally, to support the ability of the artisan community from the Gendis Asri Farmer Group to maintain food safety, substitution of production equipment is also carried out by providing stainless steel pans to replace the steel pans that are usually used by the community to produce coconut sugar in order to reduce metal contamination in coconut sugar products produced by the Gendis Asri Farmer Group.

FIGURE 13. Stainless Steel Wok Handover

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Based on the overall activities that have been carried out in this program, the coconut sugar craftsmen in the Gendis Asri Village Farmer Group have increased their knowledge and skills related to work safety and food safety.

CONCLUSION AND RECOMENDATION

The program started with a general socialization on work safety and food safety, which improved the community's basic understanding and gained their support. To increase the community's awareness of work safety, PPE appropriate to the work habits of coconut sugar tappers in Pernasidi Village was provided, including half body harnesses, carabiners, safety webbing, and safety hooks. Safety-related training was also conducted, which showed an increase in the community's knowledge of safety aspects based on pre- and post-training tests. Furthermore, food safety-related training was provided to the Gendis Asri farmer group to help them implement safe food production processes. The results of the training showed an increase in community knowledge on HACCP and good food production processes. Microbiological contamination testing of coconut sugar samples found high levels of bacteria, originating from natural microbes, production equipment and the environment. To support food safety, substitution of production equipment with stainless steel pans was carried out to reduce metal contamination in coconut sugar products. Overall, this program had a positive impact on coconut sugar craftsmen in the Gendis Asri Farmers Group, Pernasidi Village, Cilongok, Banyumas. In the future, it is hoped that the community of Pernasidi Village, Cilongok, Banyumas can continue and develop the knowledge and tools that have been given related to work safety and food safety to improve product quality which will have an impact on improving the community's economy.

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REFERENCES

Dahyar, C. P. (2018). Faktor Perilaku Penggunaan Alat Pelindung Diri (Apd) Pada Pekerja Pt. X. *Jurnal PROMKES*, *6*(2), 178. https://doi.org/10.20473/jpk.v6.i2.2018.178-187

Handoyo, H., & Maharani, D. I. (2021). Workload Identification Using the National Aeronautics and Space Administration Task Load Index (NASA-TLX) Method of Rolling Mill Operators in the Production Department at PT Jaya Pari Steel Surabaya. *Journal of Physics: Conference Series*, *1899*(1). https://doi.org/10.1088/1742-6596/1899/1/012083

Hanny Purnomo, & Sugiarti, Y. (2024). Acccounting Information System and Digital Marketing Assitance for MSMEs in Rungkut Surabaya. *ABDIMAS: Jurnal Pengabdian Masyarakat*, *7*(2), 550–555. https://doi.org/10.35568/abdimas.v7i2.4619

Indarwati, I. (2009). Efisiensi Produksi Pada Agroindustri Gula Kelapa Di Kecamatan Cilongok Kabupaten Banyumas. *Majalah Ilmiah Ekonomika*, *12*(3), 128–137.

LPPSLH. (2017). *Pemberdayaan Gula Kelapa, Sektor Penting di Banyumas*. https://www.lppslh.or.id/news/pemberdayaan-gula-kelapa-sektor-penting-di-banyumas/

Lukman, A. S., & Kusnandar, F. (2015). Keamanan Pangan untuk Semua Food Safety for All. *Jurnal Mutu Pangan*, *2*(2), 159–164.

Mazaya, G., Karseno, & Yanto, T. (2021). Aplikasi Pengawet Alami Larutan Kapur Dan Ekstrak Tempurung Kelapa Terhadap Sensoris Gula Kelapa Cetak. *Journal of Agroindustrial Technology*, *15*(1), 1–14.

https://doi.org/10.35568/abdimas.v7i4.5502
©LPPM Universitas Muhammadiyah Tasikmalaya

http://journal.ipb.ac.id/index.php/jurnaltin/article/view/2126

Mela, E., & Ahsan, A. (2019). Produk Potensial Nira Kelapa Untuk Dikembangkan Pada Skala Umkm Di Banyumas. *Agrin*, *23*(2), 85. https://doi.org/10.20884/1.agrin.2019.23.2.491

Mela, E., Wijonarko, G., Maksum, A., & Fadhillah, N. (2020). Teknologi Pengolahan Produk Umkm Berbasis Gula Kelapa Kristal Yang Menjadi Prioritas Pengembangan Di Kabupaten Banyumas. *Jurnal Sosioteknologi*, *19*(3), 412–425. https://doi.org/10.5614/sostek.itbj.2020.19.3.9

NatureVia. (2024). *Gula kelapa: apa itu, manfaat, kontraindikasi dan penggunaan*. https://id.nature-via.com/coconut-sugar-what-it-is-benefits-contraindications-and-uses

Perdini, M. (2012). Hubungan Pengetahuan Dan Perilaku Berisiko Dengan Kejadian Kecelakaan Kerja. *Unnes Journal of Public Health*, *1*(1).

Rahmah, L., Indah Permata Sari, N., Yeremia Iskandar, R., Vercelli, J., & Amalia Putri, N. (2018). *Abdimas Umtas: Jurnal Pengabdian Kepada Masyarakat LPPM-Universitas Muhammadiyah Tasikmalaya Healthy Food Counseling with Media Posters and Fun Cooking at The Pondok Harapan Surabaya Orphanage*.

Robert, M. M. J., Bonny, S. F., & Gabby, S. M. . . (2014). Manajemen Risiko Kesehatan Dan Keselamatan Kerja (K3) (Study Kasus Pada Pembangunan Gedung Sma Eben Haezar). *Jurnal Ilmiah Media Engineering*, *4*(4), 229–238.

Suwanto, B. L., & Chalid, D. A. (2023). Improving the SME's Value Proposition's Delivery: The Case of PT Abdi Property Indonesia. *ABDIMAS: Jurnal Pengabdian Masyarakat*, *6*(3), 4035–4046. https://doi.org/10.35568/abdimas.v6i3.3408

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