

Utilizing appropriate technology dry seasoning mixing and sealing machines to increase productivity of cassava chips business

Dino Caesaron, Sheila Amalia Salma, Farell Ardani, Faisal Muhammad Nasution, Murman Dwi Prasetyo

*Department of Industrial Engineering, Faculty of Industrial Engineering, Telkom University
Jl. Telekomunikasi No. 1, Terusan Buah Batu, Bandung, 40257, Indonesia*

ARTICLE INFO:

Received: 2023-02-04
Revised: 2023-03-22
Accepted: 2023-05-18

Keywords:

Appropriate technology, Cassava chips, Community service, Efficiency, Mixing machine, Productivity

ABSTRACT

Sukapura Village, located in Bandung Regency, has a Family Welfare Empowerment (PKK) program that includes various activities, such as the production of cassava chips. Currently, there is a high demand for cassava chips that cannot be met. Through analysis conducted by the community service team, it has been determined that the demand for cassava chips exceeds the production capacity. One of the contributing factors is the manual process involved in making cassava chips, which takes a relatively long time. One specific manual process is the mixing of cassava chips with dry seasoning. The cassava chips are placed in a container, and then dry spices are added. The mixing process is carried out by hand, ensuring that the spices are evenly distributed throughout the cassava chips. This manual process typically takes around 10-14 minutes for every 1.5 kg of cassava chips. To address this issue and improve efficiency, the community service team has designed and constructed a machine specifically for mixing the dry seasoning. With this machine, the mixing process is significantly more efficient, taking less than 5 minutes to achieve optimal results. As a result, the time efficiency and productivity of the mixing process have greatly increased.

©2023 Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang
This is an open access article distributed under the CC BY-SA 4.0 license
(<https://creativecommons.org/licenses/by-sa/4.0/>)

How to cite: Caesaron, D., Salma, S. A., Ardani, F., Nasution, F. M., & Prasetyo, M. D. (2023). Utilizing appropriate technology dry seasoning mixing and sealing machines to increase productivity of cassava chips business. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang*, 8(2), 260-269. <https://doi.org/10.26905/abdimas.v8i2.9993>

1. INTRODUCTION

Sukapura Village is one of the villages located in Bojongsoang Subdistrict. Geographically, the village consists of rice fields, residential areas, industrial areas, and trading areas. The majority of the residents work as farmers, traders, private employees, and state-owned enterprise employees. Currently, Sukapura Village has a program called Family Welfare Empowerment (PKK). Some of the efforts undertaken include farming, where the harvest is utilized for the PKK's activities, catfish cultivation, and the production and processing of cassava into chips.

Utilizing appropriate technology dry seasoning mixing and sealing machines to increase productivity of cassava chips business

Dino Caesaron, Sheila Amalia Salma, Farell Ardani, Faisal Muhammad Nasution, Murman Dwi Prasetyo

The cassava chips production business is currently a relatively better and more successful venture compared to other activities. This can be seen from the higher demand compared to the production capacity. The graph (Figure 1) indicates a production shortage of approximately 200 packs of cassava chips. Figure 1 depicts the production capacity and demand situation in November-December 2022.

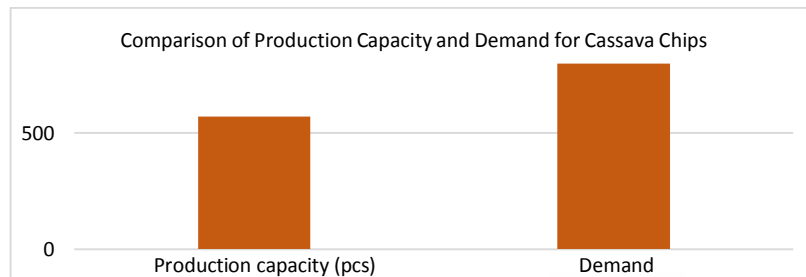


Figure 1. Comparison of production capacity and demand for November-December 2022

In the process of making cassava chips, Sukapura Village still uses manual labor, such as simple cassava cutting tools, cassava chip mixers with dry spices, which are fully driven by human power. The problem that often arises is the inconsistency of the processing results of cassava chips and the relatively small quantity. In 2021, the Community Service Team (Pengabdian kepada masyarakat) provides an automatic cassava cutting tool which aims to overcome the problem of inconsistency and quantity of cassava cut results (Salma et al., 2021). This machine is quite usable as can be seen from the quantity of cassava pieces which increases a lot compared to the manual method. Innovation on the sleeve (input) on the cutting machine which makes the quantity of pieces increase. Figure 2 is a cassava cutting tool that was donated to the Sukapura Village PKK team.



Figure 2. Cassava cutter and its operation

Therefore, a preliminary analysis was carried out with a focus on the existing production process. Figure 3 shows the flow of the cassava chips production process starting from raw cassava raw materials, the process of peeling and washing raw cassava, cooking, the process of mixing with spices, to the packing process.

The process that the service team focused on this time was the process of mixing dry spices with cassava chips before the packaging process. This process was carried out in the work area of the PKK team (Sukapura village office). The dedication team made observations on the process of mixing these dry spices. The process starts with preparing a clean container to accommodate the cassava chips, then sprinkling the dry seasonings, followed by the process of mixing/mixing the cassava chips by hand. This stirring process takes an average of 12 minutes for 1.5 kg of cassava chips. So that the manual capacity

of the seasoning mixing process is 7.5 kg/hour. Analysis of the service team that this process causes time inefficiencies so that in general it causes production capacity to be unfulfilled. Figure 4 is the flow of the process of mixing cassava chips.

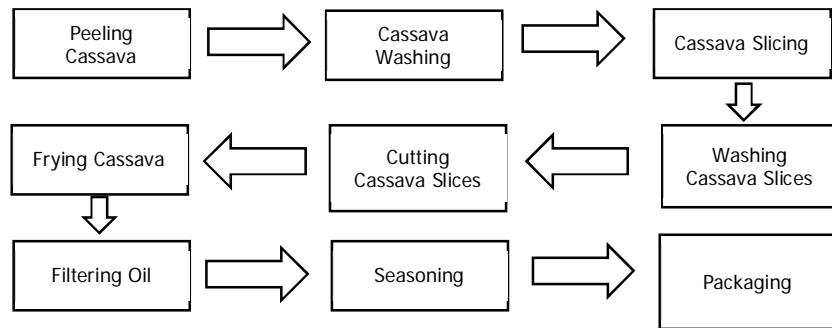


Figure 3. Cassava chips production process flow



Figure 4. Process flow of mixing cassava chips with dry spices

To eliminate manual processes, especially in the process of mixing spices with cassava chips, the dedicated team has designed an automatic dry seasoning mixing machine. This machine helps the PKK team, especially in the mixing process so that time efficiency will be achieved. In line with this machine design, Table 1 reflects the benefits of machine design from several scientific articles in order to streamline production time.

Table 1. Benefits of machine design in order to streamline production time

Authors	Designed machine	Benefits of machine design
Ansar et al. (2019)	Dodol mixer machine	Dodol production capacity changed from 10 kg/day to 20 kg/day
Firdaus & Intyas (2020)	Fish cracker dough kneading machine	The production time for making 10 kg of cracker dough changed from 4 hours to 30 minutes
Pujihadi et al. (2020)	Spice mixer machine	The mixing time for 10 kg of bali spices changed from 45 minutes to 25 minutes
Affandi et al. (2020)	Potato chips seasoning mixer machine	The production capacity of sweet potato chips changed from 20 kg/day to 100 kg/day
Siregar et al. (2022)	Srikaya mixer machine	Manual mixing time for 10 kg of srikaya takes 10 hours, whereas with a machine it can stir 30 kg of srikaya in 8 hours
Kriswanto et al. (2019)	Cookie dough mixer machine	The cake dough production capacity for 1.5 hours changed from 12 kg to 108 kg

The machine design process has been proven to streamline production time so that it can have a positive impact on the business. [Firdaus & Intyas \(2020\)](#) stated that the machine was designed to minimize operator labor and time in the process of mixing raw materials, so as to reduce production costs and increase product quantity. [Wafiroh et al. \(2023\)](#) stated that business capital is very important, but production costs have a very influential role in MSME income. [Hariyanto et al. \(2019\)](#) in his research in the form of designing coffee roasting machines, succeeded in increasing UKM income from Rp. 65,000,- per day to Rp. 200.000,- per day. Machine design is not only useful in the food sector. [Nursalim et al. \(2021\)](#) has designed a furniture machine for the furniture business and managed to increase the average monthly income in October-September 2018/2019 by Rp. 17,777,000,- to Rp. 31,815,416,- in October-September 2019/2020. Thus, MSMEs need to streamline their production processes, one of which is by optimally utilizing machines so that they can increase income.

The manual production process also affects the operator's workload. [Dewi \(2021\)](#), has conducted research on operators who carry out manual production processes and use machines. These results indicate that the heart rate of operators who use the machine is more stable than before using the machine. The operator's pulse before using the machine tends to increase in each job. So, using the machine can also reduce work accidents because the operator can make the business suffer losses

Apart from the process of mixing the spices, another problem lies in the packaging section. The process of adjusting the plastic on the existing sealer machine must be done as precisely as possible so that it will take time. The results of the sealer are also not good because operators often do the patching process again on the plastic. After carrying out the sealing process, the operator must cut off the remaining plastic packaging because there are no cutting parts on the existing sealer machine. For the sealing process from the start to get good packing results it takes approximately 3 minutes. From these conditions, it is necessary to procure a sealer machine. The condition of the existing sealer machine is shown in Figure 5.



Figure 5. Existing sealer

The design of this machine is in line with the context of Industry 4.0 which can be applied in all fields, because one of the characteristics of Industry 4.0 is the use of machine/robot technology that can collaborate with humans. One of the essence of utilizing this machine technology is to facilitate the work of operators/humans. Industry 4.0 provides improved production time, created mass product customization (by-demand), and production time efficiency (utilization of waiting/idle time)

The Indonesian government also supports Industry 4.0 by implementing the Making Indonesia 4.0 strategy, one of the priorities of which is the micro, small and medium business sector. However, at this time there are still many businesses that carry out their production activities in the traditional way. The problem in this business sector lies in ignorance and inability to apply technology ([Sari & Santoso, 2019](#)). Micro, small and medium enterprises have the potential to be the foundation of economic growth if

they are given the support and use of the right facilities and equipment, but the success of this depends on the business implementing it or not (Issa et al., 2017). Through this community service activity, it has helped the cassava chip business in Sukapura Village in implementing technology in its production process.

2. METHODS

This community service activity is a continuation of the previous 2021 program, while remaining focused on increasing the production of cassava chips by the Sukapura Village PKK team. In general, the method of implementing Community Service activities is divided into three stages.

Pre-Activities

The pre-activity stage begins with identifying customer needs. This activity was carried out using a Focus Group Discussion (FGD) with village officials and the Sukapura Village PKK team to obtain the latest information needed by partners. From the results of these discussions, partners needed a mixer machine and a sealer machine. Then a discussion was held regarding the participation of partners in providing a place for holding demonstrations on the use of the tools as well as land for storing the given machines.



Figure 6. Focus Group Discussion (FGD)

Implementation of Community Service Activities

The next stage is the implementation, which begins with the observation of the manual seasoning mixing process using hands. Based on the observation results, an automatic dry seasoning mixing machine design will be created to eliminate the manual mixing process. Once completed, the design will be turned into a prototype, which will then be demonstrated for actual usage and handed over to the partner. Overall, this activity combines education and socialization. Education is necessary to inform participants about the benefits of cassava (from leaves to tubers), including the importance of efficiency/productivity, while socialization aims to promote the proper use of the prototype (Caesaron et al., 2021).

Post-Activities

The final stage is the post-activity, which involves distributing questionnaires. The distribution of questionnaires is conducted to obtain feedback from partners regarding the implemented activities. The questionnaires are distributed using a Likert scale, which is used to measure an individual's opinion

about the given situation. Five statements will be provided, and respondents are asked to choose from "strongly disagree," "disagree," "agree," and "strongly agree" as their response options. These responses will serve as an evaluation of the current activities and serve as a reference for improving future initiatives.

3. RESULTS AND DISCUSSION

One of the problems experienced by partners is the process of mixing spices which is still done manually. For the prototype design, the service team took the idea of a manual mini mixer machine for mixing cement with sand and gravel. Sand and gravel materials will be put into the stirrer tube to be mixed. The stir tube will rotate at a certain speed, the stir tube has fins to help mix the material evenly.

The service team made a prototype of a simple mixing machine using food grade materials so that it is safe when in contact/interaction with cassava chips/dry seasonings. The stirring tube which is in direct contact with food is made of food grade plastic material and the framework is made of iron material. Figure 7 is a prototype of a spice mixer machine.



Figure 7. Prototype of seasoning mixer machine

The machine facilitates the operator in its operation. Operators only need to press the power button when they want to turn on and turn off the machine. The rotation of the machine is also made not too tight so that the cassava chips are not crushed. In brief, here is how to operate the machine.

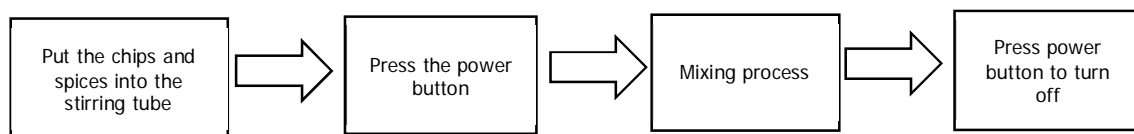


Figure 8. How to operate mixer machine

Prototype results are shown directly to partners. Demonstration processes and direct training were also carried out using chips and seasonings. The mentoring process is carried out directly at this stage. Figure 9 is a demonstration process for a spice mixer prototype in Sukapura Village.

The results obtained after using this tool are relatively faster compared to stirring manually. For 1.5 kg of cassava chips it only takes about 2 minutes to get flat cassava chips with spices. Production capacity changed significantly from 7.5 kg/hour to 450 kg/hour. So that it can be said that time efficiency increases by up to 80%. However, there are still quite a lot of dry spices attached to the plastic material of the stirrer tube. This causes the mixing of the spices to be uneven. Therefore, it is necessary to make a prototype again using a different material. The recommended material is to use stainless steels. By

using plastic material, there are still many spices attached to the plastic. Figure 10 shows some of the remaining spices sticking to the stirring tube (post-stirring).



Figure 9. Prototype demo

Meanwhile, the sealing process itself is faster, the sealing process and cutting the remaining plastic can be done in about 1 minute. So that it can be said that the sealing time efficiency increases by up to 30%. The sealer machine is shown in Figure 11.



Figure 10. Mixed seasoning results

Figure 11. Sealer machine as well as plastic packaging cutter

After the demo, the new automatic spice mixer machine and sealer machine were handed over to partners. Based on the feedback after the machine demonstration, the partners felt helped because they had succeeded in handling the problem of mixing spices manually. Feedback was obtained from distributing questionnaires directly to partners after handing over the machines (represented by 10 PKK members) which is presented in Table 2.

With these two machines, the business of making chips has played a role in the government's strategy, namely Making Indonesia 4.0. The ability to adapt to this business can be monitored from the use of technology, the better the use of technology, the more prepared the business will be with the times that demand it with the use of technology (Ningsih et al., 2020).

4. CONCLUSION AND RECOMMENDATIONS

The goal in this community service is to increase the productivity of cassava production by the Sukapura Village PKK team, especially in the mixing of seasonings and sealing. Through this activity, problems in the process of manually mixing the spices and the sealing process were resolved. Automatic seasoning mixer machine is a solution offered so that the cassava mixing process becomes more

Utilizing appropriate technology dry seasoning mixing and sealing machines to increase productivity of cassava chips business

Dino Caesaron, Sheila Amalia Salma, Farell Ardani, Faisal Muhammad Nasution, Murman Dwi Prasetyo

practical. Production capacity changed significantly from 7.5 kg/hour to 450 kg/hour. In addition, the mixing process becomes faster and does not need to use human power. Procurement of the latest sealer machine has also overcome the problem of the existing sealer machine. Partners feel satisfied after carrying out this community service activity, as evidenced by the feedback that has been obtained which has positive results. The feedback stated that 98% of the partners felt very much in agreement if this activity was in accordance with the goals and needs of the target community, then the implementation time was relatively appropriate, and the local community accepted and expected similar activities in the present and the future.

Table 2. Feedback

Statements	Strongly Disagree	Disagree	Agree	Strongly Agree
This activity is in accordance with the purpose of the activity itself				10
This activity is in accordance with the needs of the target community				10
The time for carrying out this activity was relatively sufficient as needed			1	9
Telkom University lecturers and students are friendly, fast and responsive to help during activities				10
The local community accepts and expects the current and future activities of Telkom University.				10
Total			1	49
Percentage			2%	98%

The technical limitations of using mixing and sealing machines are the main limitations in this activity. For this reason, periodic assistance is needed after the handover of the tool. Next, the limited PKK personnel is also an obstacle in the use of mixing and sealing machines. It is hoped that in the future the Sukapura Village Government will be able to add PKK personnel to be involved in developing the cassava chips business. There needs to be ongoing collaboration with Sukapura Village partners to ensure the development of this business. In the next program, it is hoped that activities can target further development, including designing furnaces, fryers and spinners to further support the production process. There will also be revitalization of cassava chips production and sales sites. If everything has been implemented, preparations for Halal and BPOM certification will be carried out. Therefore, all related parties must be able to support this activity so that the PKK program carried out by Sukapura Village, namely processing cassava into chips, can be carried out optimally in the coming period.

ACKNOWLEDGEMENTS

This community service activity was carried out in collaboration with several parties including the Sukapura Village Head and his staff, the Sukapura Village PKK team, the Telkom University Research and Community Service Institute as the funder of the Community Service Engagement (CSE) phase 2 scheme, as well as representatives of Telkom University students who participated role in writing this article.

REFERENCES

- Affandi, A., Umurani, K., & Siregar, C. A. P. (2020). Perancangan mesin pengaduk bumbu kripik ubi untuk peningkatan produksi industri rumah tangga di Desa Sidodadi Ramunia Kecamatan Beringin. *Ihsan: Jurnal Pengabdian Masyarakat*, 2(2). <https://doi.org/10.30596/ihsan.v2i2.5324>
- Ansar, A., Sabani, R., & Kurniawan, H. (2019). Penerapan mesin pengaduk dodol otomatis guna meningkatkan produktivitas dan kualitas dodol nangka di Desa Suranadi Lombok Barat. *Jurnal Ilmiah Abdi Mas TPB Unram*, 1(1). <https://doi.org/10.29303/amtph.v1i1.2>
- Caesaron, D., Salma, S. A., Prasetyo, M. D., & Rifai, M. H. (2021). Edukasi dan sosialisasi pencegahan dan pengendalian COVID-19 melalui media poster di Desa Bojongsoang, Kabupaten Bandung. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang*, 6(2). <https://doi.org/10.26905/abdimas.v6i2.5354>
- Dewi, D. C. (2021). Analisis beban kerja operator mesin pengaduk adonan kerupuk sebagai upaya meningkatkan produktivitas. *Journal of Industrial View*, 3(2). <https://doi.org/10.26905/jiv.v3i2.6662>
- Firdaus, M., & Intyas, C. A. (2020). Efisiensi kapasitas dan biaya produksi kerupuk ikan melalui penggunaan mesin pengadonan pada UKM Maharani. *PengabdianMu: Jurnal Ilmiah Pengabdian Kepada Masyarakat*, 5(2). <https://doi.org/10.33084/pengabdianmu.v5i2.1079>
- Hariyanto, S., Yuniawan, D., & Putra, A. F. P. (2019). Implementasi mesin sangrai kopi pada UKM kopi bubuk "Bias Kahyangan" di Desa Arjowinangun – Kota Malang. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang*, 4(1). <https://doi.org/10.26905/abdimas.v4i1.3231>
- Issa, A., Lucke, D., & Bauernhansl, T. (2017). Mobilizing SMEs towards industrie 4.0-enabled smart products. *Procedia CIRP*, 63. <https://doi.org/10.1016/j.procir.2017.03.346>
- Kriswanto, K., Aryadi, W., Hadikawuryan, D. S., Pamungkas, I. W., Briantoro, O. Y., & Hasyim, F. (2019). Penerapan mesin pengaduk adonan kue pada usaha bakpia di Kelurahan Pakintelan. *Rekayasa : Jurnal Penerapan Teknologi Dan Pembelajaran*, 17(2).
- Ningsih, H. R., Arini, A., & Kurniawan, B. (2020). Kemampuan adaptasi umkm di era revolusi industri 4.0. *SEGMENT Jurnal Manajemen Dan Bisnis*, 16(2).
- Nursalim, N., Sampeallo, A. S., Wahid, A., & Meok, N. J. (2021). Pendampingan dan penerapan teknologi tepat guna untuk peningkatan produktivitas usaha mebel Kota Kupang. *Abdimas: Jurnal Pengabdian Masyarakat Universitas Merdeka Malang*, 6(1).
- Pujihadi, I. G. O., Arsawan, I. M., Negara, I. P. S., & Bangse, K. (2020). Rancang bangun mesin pengaduk bumbu yang tepat guna untuk meningkatkan produktifitas kerja perajin bumbu Bali. *Prosiding Seminar Nasional Terapan Riset Inovatif (SENTRINOV)*, 6(1).
- Salma, S. A., Caesaron, D., Prasetyo, M. D., & Nugraha, A. P. (2021). Edukasi dan sosialisasi alat pemotong singkong menjadi keripik singkong untuk peningkatan kualitas dan produktivitas di Desa Sukapura, Kabupaten Bandung. *JMM (Jurnal Masyarakat Mandiri)*, 5(4).

Utilizing appropriate technology dry seasoning mixing and sealing machines to increase productivity of cassava chips business

Dino Caesaron, Sheila Amalia Salma, Farell Ardani, Faisal Muhammad Nasution, Murman Dwi Prasetyo

- Sari, R. P., & Santoso, D. T. (2019). Pengembangan model kesiapan UMKM di era revolusi industri 4.0. *Jurnal Media Teknik & Sistem Industri*, 3(1).
- Siregar, A. M., Siregar, C. A., Umurani, K., & Surbakti, C. A. G. (2022). Desain dan pembuatan mesin pengaduk srikaya guna membantu meningkatkan produktivitas usaha toko roti di Kota Berastagi Sumatera Utara. *IHSAN : Jurnal Pengabdian Masyarakat*, 4(1).
<https://doi.org/10.30596/ihsan.v4i1.9970>
- Wafiroh, H., Lailatul, I. N., & Evhin, A. (2023). Analisis pengaruh modal dan biaya produksi terhadap pendapatan UMKM. *EMBISS: Jurnal Ekonomi, Manajemen, Bisnis, dan Sosial*, 3(2).
-