

Empowering seaweed farmer-fisher groups through the implementation of polycarbonate- and solar panel-based balla pangalloang on salemo island

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ABSTRACT

Seaweed farming is an important source of livelihood for coastal communities on Salemo Island; however, conventional drying practices remain constrained by limited drying space, contamination from dust and dirt, unpredictable rainfall, strong winds, and animal disturbances. This community service program aimed to empower the Reski Bersama seaweed farmer-fisher group through the application of a polycarbonate- and solar panel-based Balla Pangalloang drying house, accompanied by training in business management, marketing, and financial management. The program was implemented through preparation, socialization, technical training, managerial training, continuous mentoring, and evaluation. The Balla Pangalloang was equipped with a solar power system and supporting components to improve the drying process and product hygiene. The results showed that approximately 450 kg of seaweed could be dried within five days, about two days faster than conventional open-air drying. The drying system also improved product cleanliness by protecting seaweed from dust, dirt, rainfall, and animal interference. In addition, the partners demonstrated improved skills in production, business management, marketing, and financial administration. The program contributed to increased productivity, better product quality, improved business capacity, and higher partner income. In conclusion, the implementation of a polycarbonate- and solar panel-based Balla Pangalloang represents an appropriate community-based technological innovation for strengthening seaweed processing efficiency and supporting the economic empowerment of coastal communities on Salemo Island.

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INTRODUCTION

Seaweed cultivation is one of the main livelihood activities of coastal communities on Salemo Island, Mattiro Bombang Village, North Liukang Tupabbiring District, Pangkajene and Islands Regency, South Sulawesi. Members of the Reski Bersama seaweed farmer-fisher group combine fishing activities with seaweed cultivation, with seaweed farming providing a relatively important contribution to household income. The activity has been practiced for generations and has developed more intensively in recent years. The cultivation area managed by the community reaches approximately 15 hectares, supported by relatively accessible seedlings, simple cultivation techniques, short production cycles, and an established local market in which traders generally purchase dried seaweed directly from farmers (Adam et al., 2023).

Despite this potential, several constraints continue to limit productivity and the economic benefits obtained by the partner group. Seaweed drying is still carried out conventionally along roadsides and on simple platforms near the coast (Amir et al., 2024). This method reduces available public space, interferes with road access, limits drying capacity, and exposes the harvested seaweed to dust, dirt, rainfall, strong winds, and animal disturbance (Anshar et al., 2025). The conventional drying system can accommodate only about 500–600 kg of wet seaweed per drying cycle, equivalent to approximately 250–300 kg of clean dried product. These conditions indicate that the drying process is not only inefficient but also poses risks to product hygiene and quality (Aulia, 2022).

The economic potential of seaweed farming on Salemo Island is nevertheless substantial. Production from one hectare can reach approximately 7.5–8 tons of wet seaweed per month, or about 3.5–4 tons of dried seaweed, and under favorable conditions may reach around 9.5 tons of wet seaweed or 4.5 tons of dried seaweed (Boateng, 2023). However, income remains below its potential because production and post-harvest practices have not yet been managed efficiently. In addition, the partner group still faces weaknesses in organizational management, task distribution, marketing strategies, and financial administration. Product marketing generally depends on traders visiting the production site, limiting farmers' access to price comparisons and broader markets. Business and household finances are also not clearly separated, while systematic bookkeeping has not yet been consistently implemented (Denis et al., 2024; Fatimah & Samsul, 2024).

These conditions reveal a gap between the considerable production potential of seaweed and the limited capacity of the community to manage post-harvest processing and business development. The partner therefore requires an appropriate technology that is technically feasible, environmentally suitable, easy to operate, and capable of improving drying efficiency and product cleanliness (Indriani et al., 2025; Jamaluddin et al., 2022). At the same time, technological intervention alone is insufficient without strengthening managerial capacity, marketing practices, and financial management. The identified needs consequently cover four interrelated aspects: production technology, business management, marketing development, and financial administration (Jemri & Jannah, 2024).

To address these problems, the community service program introduced Balla Pangalloang, a seaweed drying house constructed using polycarbonate material and supported by a solar photovoltaic system. The drying facility integrates solar energy, a blower, DC lighting, structural framing, and drying racks to create a more protected drying environment (K, 2023; Khan et al., 2025). Its use is intended to accelerate moisture reduction while reducing direct exposure to rain, airborne contaminants, and other environmental disturbances. The technological intervention was

complemented by training and mentoring in business management, marketing, and financial administration to strengthen the sustainability of the partner's enterprise.

Accordingly, this community service activity aimed to empower the Reski Bersama seaweed farmer-fisher group on Salemo Island through the implementation of a polycarbonate- and solar panel-based Balla Pangalloang. Specifically, the program sought to improve drying efficiency, product hygiene and quality, production capacity, business management, marketing practices, and financial administration. Through the integration of appropriate technology and capacity-building activities, the program was expected to strengthen productivity, expand economic opportunities, and support greater business independence among coastal seaweed farming communities.

METHOD

Implementation Method

This community service program was conducted on Salemo Island, Mattiro Bombang Village, North Liukang Tupabbiring District, Pangkajene and Islands Regency, South Sulawesi, Indonesia. The main partner was the Reski Bersama seaweed farmer-fisher group, with additional involvement of the Mandiri PKK women's group in selected training and product-development activities. The source manuscript does not specify the exact month or duration of implementation; therefore, the implementation period should be added according to the official activity schedule.

The program adopted a participatory community empowerment approach that combined the application of appropriate technology with technical training, managerial capacity building, mentoring, and evaluation. The intervention focused on four priority areas identified from the partner's needs: improving production and post-harvest processing, strengthening business management, improving marketing practices, and developing better financial management. The core technological intervention was the construction and application of a *Balla Pangalloang*, a seaweed drying house supported by solar photovoltaic energy.

The *Balla Pangalloang* was constructed using solar photovoltaic components, blowers, DC lighting, C-channel structural frames, hollow steel for the door frame, polycarbonate or ultraviolet-resistant plastic for the walls and roof, and bamboo for the drying racks. The drying house was designed to provide a more protected drying environment and had a maximum capacity of approximately 3 tons. The blower was used to assist air circulation and remove excess moisture when the internal temperature increased.

The methods of delivery consisted of direct socialization, demonstration, hands-on practice, discussion, managerial training, and continuous mentoring. Technical training focused on the operation and maintenance of the *Balla Pangalloang* and its supporting equipment. Managerial training covered organizational management, division of responsibilities, business administration, marketing strategies, and financial management. Marketing training introduced the basic marketing mix, including product, price, distribution, and promotion, while financial training emphasized the separation of business and household finances, cash-flow management, bookkeeping, assets, receivables, and investment management.

The learning and implementation media included the *Balla Pangalloang* drying unit, solar photovoltaic equipment, blowers, DC lighting, drying racks, technical demonstrations, training materials, and direct practice sessions. The partner members were actively involved in the construction and implementation process, including providing labor and available equipment.

This participatory strategy was intended to increase ownership of the introduced technology and strengthen the sustainability of its use after the formal program ended.

Program evaluation was conducted by comparing partner conditions before and after the intervention. Evaluation indicators included the operation and maintenance of the *Balla Pangalloang*, drying performance, production capacity, partner skills, business management, marketing practices, financial management, and partner income. Technical evaluation also included drying duration and final moisture content. Trial results showed that approximately 450 kg of seaweed could be dried within five days, with a moisture content of approximately 33.5%, compared with approximately seven days under conventional open-air drying conditions. The evaluation instruments consisted of observation of partner practices, interviews and discussions with partner members, monitoring records, documentation of drying performance, assessment of participant skills before and after training, and records of production and income changes. Data were analyzed descriptively by comparing conditions and indicators before and after program implementation. Changes in skills, production, drying efficiency, and income were expressed using frequencies, absolute differences, and percentage increases. The manuscript reports that the number of individuals skilled in operating *Balla Pangalloang* and related seaweed production equipment increased from 2 to 18, while skills related to induction cooking equipment and seaweed-based food processing increased from 1 to 19 participants. Partner I recorded an income increase of approximately 80%, while Partner II recorded an increase of approximately 87%.

Stages of Activities

The implementation process was organized sequentially as follows:

Stages of Activities



Figure 1. Stages of the community service program implementation: problem identification, partner coordination, preparation, implementation, mentoring, evaluation, and follow-up.

Problem identification was conducted through field observation, interviews, and discussions with the partner group to identify constraints related to conventional drying, product hygiene, production capacity, business organization, marketing, and financial administration. This stage established the priority problems that would be addressed through the program. Partner coordination was then undertaken to agree on the intervention plan, division of responsibilities, technology to be introduced, and partner participation. The Reski Bersama group expressed willingness to contribute labor, locally available equipment, and active participation in constructing and operating the *Balla Pangalloang*.

The preparation stage included preparing materials and equipment, developing the technical design of the drying house, arranging the training materials, and preparing supporting solar photovoltaic components. This was followed by the implementation stage, which included construction and installation of the *Balla Pangalloang*, installation of the solar energy system and

blower, technical demonstrations, practical training, business management training, marketing training, and financial management training.

Mentoring was provided continuously to assist the partners in operating and maintaining the drying facility and applying the managerial practices introduced during training. Evaluation was subsequently carried out by comparing pre-program and post-program conditions, particularly in terms of drying performance, technical skills, productivity, business management, marketing, financial administration, and income. The follow-up stage focused on program sustainability. Monitoring was planned to continue after completion of the main activities, particularly regarding the operation and maintenance of the *Balla Pangalloang*, production performance, business management, market expansion, and financial management. This follow-up mechanism was intended to ensure that the technology and managerial improvements could be maintained independently by the partner group.

RESULT

Results of Activities

The community service program was implemented through a series of coordinated activities involving the Reski Bersama seaweed farmer-fisher group on Salemo Island and the Mandiri PKK women's group. The activities included introduction of the **Balla Pangalloang** technology, installation and operational testing of the solar-powered drying system, technical training, business management training, marketing assistance, financial management training, and continuous mentoring. Community members were directly involved in the implementation process, including preparation of materials, construction support, equipment operation, and evaluation of the introduced technology.



Figure 2. The condition of the seaweed drying process of the reski bersama seaweed farmer-fisher group

The target participants consisted primarily of seaweed farmer-fishers and members of the Mandiri PKK women's group. Based on the manuscript, participant involvement increased substantially during the program. The number of participants capable of operating the *Balla Pangalloang* and motorized seaweed carts increased from 2 people before the intervention to 18 people after the program. In addition, participants capable of operating induction stoves, automatic cooking equipment, and processing seaweed into value-added products increased from

1 person to 19 people. However, the manuscript does not explicitly report the total number of registered participants or detailed demographic characteristics such as age, sex distribution, education level, or duration of participation. Therefore, these characteristics should not be inferred beyond the information available in the source manuscript.

Program achievement was demonstrated by improvements in technical performance, participant skills, production management, and economic outcomes. Testing of the Balla Pangalloang showed that approximately 450 kg of seaweed could be dried within five days. This duration was about two days shorter than conventional open-air drying, which generally required approximately seven days. The final moisture content reached approximately 33.5%, within the range reported in the manuscript for dried seaweed suitable for storage and sale. The enclosed drying system also provided better protection against dust, dirt, rainfall, and animal interference, thereby improving hygiene and product quality. The program also produced measurable improvements among both partner groups. The manuscript reports an increase of 16.9% for Partner I and 62.6% for Partner II in the assessed program outcomes. Economic benefits were also observed, with Partner I experiencing an approximately 80% increase in income and Partner II an approximately 87% increase. These changes indicate that the intervention was not limited to technical improvements in seaweed drying but also contributed to strengthening production capacity, business performance, and household economic opportunities.

A formal pretest-posttest instrument with numerical knowledge scores is not reported in the manuscript. Therefore, program effectiveness is more appropriately presented as a before-and-after comparison of observable skills and performance indicators. Before the intervention, only two participants were skilled in operating the seaweed drying and transportation equipment, whereas 18 participants demonstrated this capability after training and mentoring. Similarly, skills related to seaweed-based culinary processing increased from one participant before the activity to 19 participants afterward. These findings demonstrate substantial practical skill transfer and indicate that hands-on training and mentoring were effective in improving participant competence. The skills acquired by participants included operating and maintaining the Balla Pangalloang, using solar-powered supporting equipment, managing the seaweed drying process, applying safer and more hygienic post-harvest handling, using induction and automatic cooking equipment, and processing seaweed into diversified products such as seaweed brownies, fresh noodles, agar-based products, and seaweed jam. Participants also received capacity-building support in business organization, marketing, bookkeeping, and financial management.

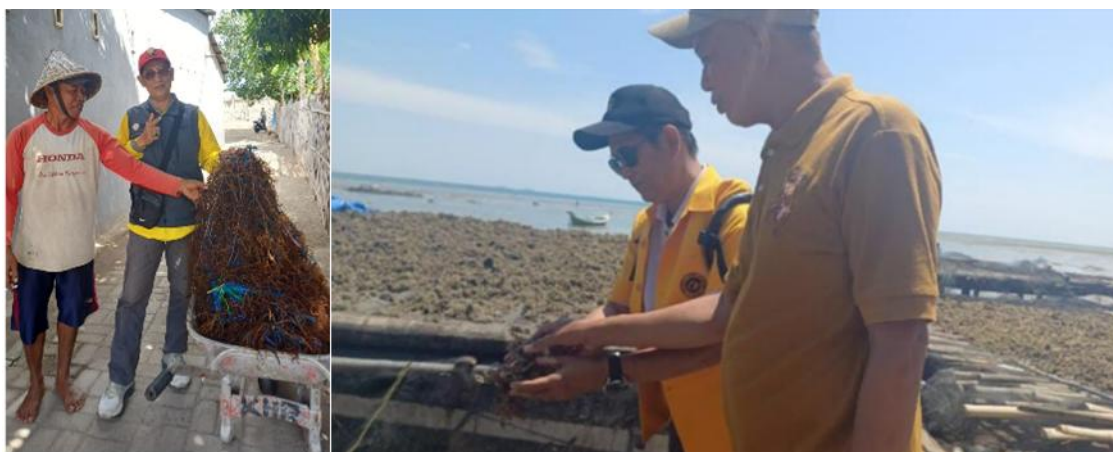


Figure 3. Improvement in participants' technical skills before and after the community service program.

Documentation of the activity presented in the manuscript includes the initial conditions of conventional seaweed drying, interviews and discussions with partner representatives, the construction and application of the Balla Pangalloang, and the implementation of the solar-powered drying system. Figure 1 illustrates the initial interaction with the partner and the seaweed farming context, Figure 2 shows the conventional drying conditions before the intervention, and Figure 3 presents the applied Balla Pangalloang technology equipped with a solar photovoltaic system. These visual records support the observed transformation from traditional open-air drying toward a more controlled, hygienic, and technology-assisted drying process. Overall, the activity achieved its principal objectives by improving drying efficiency, participant competence, production quality, management practices, and economic performance. The combination of appropriate technology and community-based mentoring created practical benefits for the partner groups and strengthened their capacity to manage seaweed production more independently and sustainably.

DISCUSSION

The implementation of the polycarbonate- and solar panel-based *Balla Pangalloang* demonstrated that appropriate technology can address several post-harvest problems experienced by seaweed farmers on Salemo Island. The most evident technical improvement was the reduction in drying time. Approximately 450 kg of seaweed could be dried within five days, whereas conventional open-air drying generally required about seven days. The final moisture content reached approximately 33.5%, indicating that the dried seaweed had reached a condition suitable for storage and marketing according to the criteria applied in the program. In addition to shortening the drying period, the enclosed structure reduced direct exposure to dust, dirt, rainfall, and animal disturbance, thereby supporting cleaner and more controlled post-harvest handling (Khasiya et al., 2025).

These results indicate that the success of the program was not determined solely by the availability of technology, but also by the suitability of the intervention to the partner's actual needs. Before the program, seaweed was dried along roadsides and on open platforms near the coast, creating limitations in drying capacity, hygiene, and protection from changing weather conditions (Kreetachat et al., 2023; Lestari & Aras, 2024). The introduction of *Balla Pangalloang* directly addressed these problems by providing a protected drying space supported by solar energy and a blower system. The use of locally applicable construction materials, including polycarbonate, structural frames, bamboo drying racks, and photovoltaic components, also increased the practical feasibility of the technology for coastal communities (Lestari et al., 2024).

Another important factor supporting program achievement was active partner participation. Members of the Reski Bersama group were involved in the preparation, construction, operation, and maintenance of the drying facility. The partner also contributed labor and available equipment during implementation (Novitasari et al., 2024). Such participation strengthened community ownership of the technology and reduced the risk that the equipment would remain unused after the formal program ended. The combination of direct demonstration, hands-on practice, managerial training, and continuous mentoring further facilitated the transfer of practical skills (Rauf et al., 2023).

The findings are consistent with the technological direction of previous studies cited in the manuscript, which have developed solar, hybrid solar, and biomass-based drying systems for seaweed and other agricultural or fishery commodities. These studies generally emphasize the

potential of controlled drying technologies to improve drying efficiency and reduce dependence on conventional open-air methods (Rayuddin et al., 2025). The present program extends this technological approach into a community empowerment setting by combining the drying technology with business management, marketing, financial management, and direct partner mentoring.

The program also addressed non-technical factors that previously limited business development. Before the intervention, the partner group still relied on relatively informal organizational arrangements, lacked clear division of responsibilities, depended largely on visiting traders for product sales, and did not consistently separate household finances from business finances (Rostini et al., 2025). Training in organizational management, marketing, and financial administration was therefore relevant to the sustainability of the technological intervention. This approach is in line with the references cited in the manuscript concerning the importance of business management, marketing strategy, and financial bookkeeping for strengthening micro and small enterprises.

The program nevertheless faced several potential constraints. The operation of a solar-powered drying system remains dependent on appropriate maintenance of the photovoltaic components, blower, structural materials, and drying racks. In an island setting, replacement components and technical support may also be less accessible than in urban areas (Salam et al., 2022). Moreover, changes in business management and financial practices require continuous behavioral reinforcement and cannot be expected to become fully institutionalized after a single training period (Sekarjati et al., 2024). The manuscript therefore appropriately emphasizes continued monitoring of equipment use, maintenance, production, marketing, and financial management after program completion (Siraj et al., 2024).

Overall, the findings suggest that integrating appropriate post-harvest technology with managerial and economic capacity building provides a more comprehensive form of community empowerment than technology transfer alone. The *Balla Pangalloang* improved the efficiency and cleanliness of the drying process, while complementary training strengthened the partners' ability to manage production and business activities. This integrated approach is particularly relevant for small-scale seaweed farming communities whose economic performance depends not only on production volume but also on product quality, market access, and organizational capacity.

Impact of the Community Service

The community service program generated measurable changes in the technical and economic capacity of the participating partners. The most visible change was the increase in practical competence. The number of participants capable of operating the *Balla Pangalloang* and related seaweed equipment increased from 2 to 18 people. Likewise, the number of participants able to use induction and automatic cooking equipment and process seaweed into diversified products increased from 1 to 19 people. These changes indicate that the program strengthened participants' practical skills and reduced dependence on a small number of individuals with technical competence.

At the production level, the intervention improved drying efficiency by shortening the drying period from approximately seven days under conventional conditions to five days using the *Balla Pangalloang*. The protected drying environment also improved hygiene by reducing exposure to dust, dirt, rainfall, and animals. These improvements are important because cleaner and more consistent drying can increase product quality and may strengthen the bargaining position of farmers during marketing.

The program also contributed to economic improvement. The manuscript reports an approximately 80% increase in income for Partner I and 87% for Partner II. In addition, the program outcomes increased by 16.9% for Partner I and 62.6% for Partner II. Although the manuscript does not provide the detailed calculation basis for all of these percentages, the reported changes indicate positive economic and capacity-building effects following the intervention.

Beyond measurable outcomes, the program encouraged changes in business behavior by introducing more structured management, marketing, and financial administration. Participants were encouraged to separate household and business finances, improve bookkeeping, apply broader marketing strategies, and strengthen organizational roles. Thus, the impact of the program extended from individual technical skills to broader group capacity, productivity, and business independence.

Program Sustainability

Program sustainability is planned through continued mentoring and periodic monitoring of both technical and managerial components. The primary follow-up activity is regular monitoring of the use and maintenance of the *Balla Pangalloang*, including the solar photovoltaic system, blower, drying racks, and supporting equipment. Monitoring should also assess drying performance, production capacity, and product quality to ensure that the technology continues to function effectively after the formal community service activities are completed. Managerial mentoring should continue alongside technical monitoring. The partner group needs periodic assistance in maintaining bookkeeping practices, separating business and household finances, applying marketing strategies, and expanding market access. Monitoring of business performance and income can be used to identify whether the improvements achieved during the program are sustained over time. The manuscript specifically identifies continued monitoring of production, business management, market expansion, and financial management as components of the follow-up plan.

Sustainability can also be strengthened by assigning trained members as internal facilitators responsible for transferring operational knowledge to other group members. Although the manuscript does not explicitly report the establishment of formal community cadres, the increase in the number of participants capable of operating the technology provides a practical basis for developing peer-based mentoring within the group. The trained members can support routine maintenance, supervise drying procedures, and provide basic guidance to new members. Further development should prioritize stronger cooperation between the Reski Bersama group, village government, universities, and other relevant stakeholders. Such collaboration can support access to technical assistance, equipment maintenance, market development, and future product diversification. The establishment of routine monitoring records for drying performance, production volume, product sales, maintenance costs, and income would also strengthen evidence-based evaluation of long-term program outcomes.

Overall, the sustainability strategy should maintain the integration of technology, human resource capacity, business management, and market development. Continuous mentoring, local technical responsibility, routine monitoring, and institutional collaboration are essential to ensure that the benefits of the *Balla Pangalloang* are maintained and that the technology continues to contribute to productivity, income, and the economic independence of the seaweed farming community on Salemo Island.

CONCLUSION

The community service program successfully empowered the Reski Bersama seaweed farmer-fisher group through the implementation of a polycarbonate- and solar panel-based *Balla Pangalloang*. The technology improved the seaweed drying process by reducing drying time from approximately seven days to five days, increasing protection from dust, dirt, rainfall, and animal disturbance, and supporting better product hygiene and quality. The program also strengthened participants' technical skills, business management, marketing practices, and financial administration. Practical competence increased substantially, with the number of participants skilled in operating the drying and supporting equipment rising from 2 to 18 people, while seaweed processing skills increased from 1 to 19 people. Economic benefits were also reported, including increased partner income. The main benefit for the partners was the integration of appropriate technology with capacity building, enabling a more efficient, hygienic, and economically productive seaweed business. Further program development is recommended through periodic mentoring, routine maintenance of the *Balla Pangalloang* and solar photovoltaic system, continuous monitoring of production and income, strengthening of bookkeeping and marketing practices, expansion of market networks, and replication of the technology for other seaweed farming groups in similar coastal areas.

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Conflict of Interest

The authors declare that they have no conflicts of interest related to the implementation, evaluation, or publication of this community engagement activity.

References

- Adam, A. M. T., Ilsan, M., & Nontji, M. (2023). Pemberdayaan Perempuan Pengikat Rumput Laut Melalui Pembuatan Stik Rumput Laut. *ABDIMAS UNWAHAS*, 8(2). <https://doi.org/10.31942/abd.v8i2.10019>
- Amir, N., Imron Mustajib, M., Gozan, M., & Chan, C. (2024). Development of a novel tray solar dryer for aquaculture product: Experimental study on drying kinetics and product quality in *Eucheuma cottonii* seaweed. *Solar Energy*, 273, 112503. <https://doi.org/10.1016/j.solener.2024.112503>
- Anshar, M., Hamid, A., Wirawan, T. S., Saeni, M., Susanto, T. A., & Makhrani. (2025). Penerapan rumah pengering rumput laut system hybrid pada kelompok tani usaha rumput laut. *Seminar Nasional Hasil Penelitian & Pengabdian Kepada Masyarakat (SNP2M)*, 8.
- Aulia, A. I. J. (2022). Pemberdayaan Limbah Makroalga (Rumput Laut) untuk meningkatkan Perekonomian Masyarakat Desa Malang Rapat Kabupaten Bintan. *Jurnal Pengabdian UntukMu NegeRI*, 6(1), 152–158. <https://doi.org/10.37859/jpumri.v6i1.3299>
- Boateng, I. D. (2023). A review of solar and solar-assisted drying of fresh produce: state of the art, drying kinetics, and product qualities. *Journal of the Science of Food and Agriculture*, 103(13), 6137–6149. <https://doi.org/10.1002/jsfa.12660>
- Denis, D., Windarta, J., Prihantoko, K. E., Miraj, F. R., & Rahman, G. (2024). Penerapan Pembangkit Listrik Tenaga Surya pada Kelompok Usaha Bersama Rumput Laut di Desa Kemujan Karimunjawa. *Jurnal Energi Baru Dan Terbarukan*, 5(1), 1–13. <https://doi.org/10.14710/jebt.2024.20515>
- Fatimah, S., & Samsul, P. (2024). Pemberdayaan Berbasis Masyarakat Kelompok Pembudidaya Rumput Laut *Eucheuma Cottonii* Untuk Meningkatkan Perekonomian Desa Tirowali Kecamatan Ponrang

- Kabupaten Luwu. *Madaniya*, 5(1), 17–26. <https://doi.org/10.53696/27214834.572>
- Indriani, A. M., Prihandoyo, C., Nurhandayani, K., Akmal, M. A., & Azmi, M. Q. (2025). IoT-based seaweed dryer house for food security in IKN Nusantara. *Community Empowerment*, 10(1), 36–43. <https://doi.org/10.31603/ce.12574>
- Jamaluddin, Yahya, M., Rauf, R. F., & Rivai, A. A. (2022). Drying kinetics and quality characteristics of *Eucheuma cottonii* seaweed in various drying methods. *Journal of Food Processing and Preservation*, 46(2), e16258. <https://doi.org/10.1111/jfpp.16258>
- Jemri, J., & Jannah, H. (2024). Comparison of *Eucheuma Cottonii* Seaweed Drying Methods on the Quality of Dried Seaweed in the Tanjung Area, West Nunukan District, Nunukan Regency. In *Proceedings of the International Conference on Applied Science and Technology on Engineering Science* (pp. 385–395). Atlantis Press. https://doi.org/10.2991/978-94-6463-364-1_37
- K, E. S. (2023). Seaweed Farmer Income and Family Socioeconomic Life. *Pinisi Journal of Social Science*, 2(1), 1. <https://doi.org/10.26858/pjss.v2i1.46403>
- Khan, N., Sudhakar, K., & Mamat, R. (2025). Seaweed processing: efficiency, kinetics, and quality attributes under solar drying. *Food Chemistry Advances*, 6, 100859. <https://doi.org/10.1016/j.focha.2024.100859>
- Khasiya, K., Jasani, S., Markam, B. K., & Veeragurunathan, V. (2025). Feasibility of the mixed-mode solar dryer for sustainable seaweed drying. *ACS Sustainable Resource Management*, 2(11), 2314–2326. <https://doi.org/10.1021/acssusresmg.5c00385>
- Kreetachat, T., Imman, S., Suwannahong, K., Wongcharee, S., & Suriyachai, N. (2023). Response surface optimization and social impact evaluation of Houttuynia cordata Thunb solar drying technology for community enterprise in Chiangrai, Thailand. *International Journal of Renewable Energy Development*, 12(3), 581–589. <https://doi.org/10.14710/ijred.2023.52402>
- Lestari, M. F., & Aras, N. R. M. (2024). Relationship analysis of shrinkage level, moisture content, and drying rate of *Eucheuma cottonii* seaweed in various drying time and methods. *Indonesian Journal of Fundamental Sciences*, 10(1). <https://doi.org/10.26858/ijfs.v10i1.60737>
- Lestari, M. F., Yusra, S., Fuady, M. I. N., & Rahim, H. (2024). Analysis of carrageenan quality of *Eucheuma cottonii* and *Eucheuma spinosum* seaweed from Bantaeng Regency and its export permit regulations in Indonesia. *IOP Conference Series: Earth and Environmental Science*, 1314, 12002. <https://doi.org/10.1088/1755-1315/1314/1/012002>
- Novitasari, N., Haris, H., Siraj, M. L., Aslinda, A., & Saleh, S. (2024). Strategi Pemasaran Budidaya Rumput Laut di Desa Bontosunggu Kecamatan Tamalatea Kabupaten Jeneponto. *Jurnal Administrasi Bisnis*, 3(4), 35. <https://doi.org/10.26858/jab.v3i4.61118>
- Rauf, R. F., Rivai, A. A., Jamaluddin, Ibandong, & Rivai, A. M. (2023). Manajemen Pascapanen Rumput Laut Sebagai Upaya Peningkatan Ekonomi Petani Di Desa Sanrobone Kabupaten Takalar. *Haga : Jurnal Pengabdian Kepada Masyarakat*, 2(1), 56–62. <https://doi.org/10.57094/haga.v2i1.924>
- Rayuddin, Mustam, Nur, M., & Dahliana, B. (2025). Pemberdayaan Petani Rumput Laut melalui WEB Penyuluhan dalam Meningkatkan Pendapatan Masyarakat Lokal Konawe Selatan. *Jurnal Penyuluhan*, 21(02), 311–320. <https://doi.org/10.25015/21202546365>
- Rostini, R., Mardia, M., Atrianingsih, A., Aselda, N., Ikbal, M., & Satriani, S. (2025). Pemberdayaan Masyarakat Pesisir Melalui Hilirisasi Rumput Laut Menjadi Pangan Fungsional Dan Energi Hijau Berbasis Teknologi Tepat Guna Solar Tech Dryer. *BAKIRA: Jurnal Pengabdian Kepada Masyarakat*, 6(2), 290–299. <https://doi.org/10.30598/bakira.2025.6.2.290-299>
- Salam, S., Fitryah, A. T., & Ahmad, A. (2022). The role of post-harvest technology on the income level of seaweed farmers in Sapolohe Village, Bonto Bahari District, Bulukumba Regency. *Agrikan: Jurnal Agribisnis Perikanan*, 15(2), 662–667. <https://doi.org/10.52046/agrikan.v15i2.1351>
- Sekarjati, K. A., Asih, E. W., Rif ah, M. I., Sulistyaningsih, E., Emaputra, A., & Prasetyo, A. B. (2024). Pemberdayaan Usaha Mikro Produk Rumput Laut. *Jurnal Sains Teknologi Dalam Pemberdayaan Masyarakat*, 3(1), 49–54. <https://doi.org/10.31599/22mf8h39>
- Siraj, M. L., Al Faisal, A. A. F., Ridhazahrattunnur, R., Afiat, M. F., Putri, D. U., & Patandean, S. S. (2024). Rumah Entrepreneur Nelayan: Pemberdayaan Perempuan melalui Diversifikasi Rumput Laut untuk Mewujudkan Kemandirian Ekonomi Kelurahan Bonto Sunggu. *Jurnal Lamellong: Pengabdian Kepada Masyarakat (JLPM)*, 60–65. <https://doi.org/10.70188/g4m9v159>