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Utilizing Black Soldier Fly Larvae as Feed Pellet Ingredients through Community Training in Giwangan, Yogyakarta

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A R T I C L E I N F O

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A B S T R A C T

Preparing feed pellets from locally cultivated black soldier fly larvae (BSFL; *Hermetia illucens*) requires practical knowledge of how to handle and process feed ingredients. This programme aimed to strengthen community capacity to prepare supplementary feed pellets from black soldier fly larvae in Giwangan, Yogyakarta. Guided by participatory action research, the team provided a pellet-making machine and delivered demonstrations and supervised practice for 25 participants in July 2026. Evaluation used a 12-item post-training questionnaire and group production records. All participants returned questionnaires, with 88% positive responses on each item, exceeding the 80% target. The group reported producing approximately 100 kg per weekly batch. Limited larval availability and difficulties in milling and pellet formation remained constraints. Continued technical mentoring and production planning are recommended to support sustained equipment use.

INTRODUCTION

Preparing feed pellets from locally cultivated black soldier fly larvae (BSFL; *Hermetia illucens*) requires practical knowledge of how to handle and process feed ingredients. Surendra et al. (2020) identified BSFL biomass as a potential ingredient in fish and poultry diets, while emphasising the importance of appropriate production and processing practices. For community groups, using this resource in pellet form involves a sequence of tasks, from preparing ingredients and mixing the feed to operating the equipment and forming pellets. These tasks provide a practical focus for community training that connects locally available larvae with feed preparation for small-scale animal production.

Academics from several universities in Yogyakarta and Surakarta (Solo) formed the community-service team and worked with the Giwangan administration and local producer groups. Their cooperation was informed by the triple helix model, which describes interactions among universities, industry, and government in the development and application of knowledge (Etzkowitz & Leydesdorff, 2001). In this programme, the model was adapted to community empowerment, with the producer groups participating as local productive actors. The team provided a feed-pellet machine to a maggot-farming group and organised hands-on training using that equipment. Practical instruction was needed to help participants relate ingredient preparation to machine operation and address the difficulties in milling and pellet formation described in the group's production records.

Giwangan already had community activities that could support this training. Sumbodo et al. (2023) and Sumbodo et al. (2024) documented residents' involvement in biopore construction and compost production, while Sumbodo et al. (2025) reported a wider programme linking waste management with longan cultivation, maggot farming, and urban aquaculture. These activities provided a local basis for further training in feed preparation. The maggot-farming groups in RW 08 and RW 10 had experience in using household organic residues to cultivate larvae for fish and poultry. Training in pellet preparation extended the practical use of this experience by introducing processing activities for the harvested larvae.

The processing needs were specific to the materials and equipment used by the groups. Local pellet preparation involved fresh maggots, maize flour, pollard, and rice bran, with attention required at the stages of ingredient preparation, mixing, and pellet formation. Research on hot-extruded aquafeeds containing insect meals shows that ingredient composition and processing moisture can influence physical pellet characteristics (Irungu et al., 2018). The study illustrates why ingredient preparation and processing conditions deserve attention in practical training. The programme therefore treated pellet preparation as a practical learning activity, with the resulting product intended as supplementary feed. The groups' limited larval supply also indicated a need to plan further production according to ingredient availability.

Previous community-service studies offer complementary lessons for organising training in the use of maggots and feed-processing equipment. Ika et al. (2023) documented the provision of feed-making equipment and training for ornamental fish farmers in Yogyakarta. Aslamiah et al. (2024) used lectures, discussion, direct practice, and mentoring to introduce the processing of maggots into cattle-feed concentrate. Setyani et al. (2025) applied participatory action research in BSFL cultivation training and reported improvements in participants' knowledge based on pre-test and post-test assessments. These examples illustrate how instruction and community participation can be organised around cultivation or feed processing. In Giwangan, the training focused on preparing maggot-based pellets using the supplied machine, with representatives of maggot-farming, poultry-raising, and fish-farming groups participating in the processing activities.

This community-service programme aimed to strengthen participants' practical understanding of maggot-based feed pellet preparation through training using the supplied equipment. The article documents the delivery of the training, participants' involvement, and the processing steps practised during the activity. It also examines the technical and ingredient-supply constraints reported by the groups to identify priorities for continued assistance. It contributes a practical account of teaching pellet production within established community groups and identifies the support needed for continued use of the supplied equipment.

The programme is aligned with the 2030 Agenda for Sustainable Development (United Nations, 2015). Training in feed preparation and equipment use relates to SDG 4, particularly Target 4.4 on relevant technical and vocational skills. Using larvae produced through organic-waste bioconversion complements SDG 12, especially Target 12.5 on waste prevention, reduction, recycling, and reuse. Cooperation among universities, local government, and community producer groups also relates to SDG 17, particularly Target 17.17 on public, public–private, and civil-society partnerships.

IMPLEMENTATION AND METHODS

Setting and Participants

The pellet-making training was conducted on 29 July 2026 in Kelurahan Giwangan, Yogyakarta City, Indonesia. The activity involved 25 participants, comprising eight representatives of maggot-farming groups from RW 08 and RW 10 and 17 representatives of poultry-raising and fish-farming groups. Participants represented existing community groups engaged in maggot cultivation or poultry and fish production. The participant group described in this article refers specifically to the pellet-making training. The community-service team consisted of academics collaborating across universities in Yogyakarta and Surakarta (Solo), including Janabadra University, Gadjah Mada University, and Sebelas Maret University. The team worked with the Giwangan administration and community groups to coordinate the activity, provide technical instruction, and support practical work. The training was built on existing maggot cultivation and animal-production activities in the community.

Participatory Approach

The training formed part of a broader community-service programme guided by participatory action research (PAR). The approach connected planning, action, observation, and reflection, with community members contributing their experience of cultivation and feed use. PAR emphasises collaboration with participants and links reflection on local practice to action for improvement (Baum et al., 2006). Within the pellet-making activity, the team facilitated technical learning while group representatives participated in practical implementation and discussion of production constraints. Implementation comprised coordination and preparation, explanation and demonstration, participant practice, and evaluation and reflection. Combining instruction, practical work, and community involvement is consistent with participatory approaches used in maggot-processing and BSFL cultivation programmes reported by Aslamiah et al. (2024) and Setyani et al. (2025).

Materials and Training Procedure

Preparation involved coordination with the local administration and producer groups regarding the activity arrangements, participating representatives, and availability of materials and equipment. The pellet-making machine supplied by the community-service team was the principal equipment used in the practical session. The group's production report stated a machine capacity of 120 kg/h. This was treated as a reported equipment specification, distinct from actual production during the training. The feed materials described in the group's production practice were fresh maggots, maize flour, pollard, and rice bran. The production records also identified milling with a disk mill as part of ingredient preparation. Instruction addressed the preparation of clean ingredients, the role of milling, mixing the feed components, and forming pellets with the supplied machine. The activity focused on demonstrating these processing operations for the preparation of supplementary feed. The trainers explained the processing sequence and demonstrated the use of the pellet-making machine. Participants then took part in ingredient preparation, mixing, and pellet formation under the team's guidance. Practical work provided opportunities to discuss difficulties encountered in preparing ground ingredients and forming pellets. The relationship between larval availability and the feasibility of continued pellet production was also considered in reviewing the group's production conditions.

Documentation and Evaluation

Programme evaluation focused on participants' assessments of the training and documented group production. Attendance records, activity notes, completed post-training questionnaires, and available production records were used as supporting documentation. The evaluation questions and sources of evidence were aligned with the programme objectives (Centers for Disease Control and Prevention, 2026). A 12-item questionnaire in Indonesian language was administered to the 25 participants after the practical session. It covered material clarity, usefulness and relevance, practical instruction, equipment and materials, perceived readiness, and willingness to apply the training. Each statement was rated on a five-point agreement scale, from 1 (strongly disagree)

to 5 (strongly agree). A separate not-assessable option was provided. Three open-ended questions invited participants to identify useful content, remaining difficulties, and further assistance needed.

Questionnaire responses were analysed descriptively. The return rate was calculated by dividing the number of returned questionnaires by the number of training participants and multiplying by 100. For each item, the percentage of positive responses was calculated as the number of responses scored 4 or 5 divided by the number of valid scored responses, multiplied by 100. Blank and not-assessable responses were excluded from the item-level scoring denominator. The findings were compared with programme benchmarks of at least 20 returned questionnaires, at least 20 valid scored responses per item, and at least 80% positive responses on each item. Practical application was examined through the recipient group's available pellet-production records, with a benchmark of at least one documented production activity. The records were reviewed for machine availability, stated capacity, batch output, and production frequency. Four-week and annual figures were treated as projections based on four and 48 weekly batches, respectively. Participant feedback and group production were interpreted separately from measured changes in individual knowledge or skills (Centers for Disease Control and Prevention, 2024).

RESULTS AND DISCUSSION

Participation and Collaborative Implementation

The programme delivered practical training in maggot-based feed pellet preparation to 25 participants in Giwangan on 29 July 2026 (Table 1). Eight participants represented maggot-farming groups in RW 08 and RW 10, while 17 represented poultry-raising and fish-farming groups. Bringing these groups together connected larval producers with potential feed users and provided a shared setting for practising the processing sequence.

Table 1. Composition of Training Participants

Participant group	Number	Coverage
Maggot-farming representatives	8	RW 08 and RW 10
Poultry-raising and fish-farming representatives	17	Community producer groups
Total	25	Pellet-making training

Source: training participant information recorded in the activity documentation.

The community-service team comprised academics from collaborating universities in Yogyakarta and Surakarta, working with the Giwangan administration and community producer groups. Academics provided technical instruction and the pellet-making machine, the local administration facilitated coordination, and the groups participated in implementation. This arrangement can be interpreted as a community-level adaptation of university–industry–government collaboration in the triple helix model (Etzkowitz & Leydesdorff, 2001), with the producer groups acting as local productive partners. The activity demonstrates cooperation in delivering training; its longer-term effects on group autonomy require further observation.

Practical Processing and Training Outputs

Training addressed ingredient preparation, mixing, machine operation, and pellet formation. The materials identified in the group's production practice were fresh maggots, maize flour, pollard, and rice bran. Group records also identified disk milling as part of ingredient preparation. The trainers explained and demonstrated the processing sequence, after which participants undertook practical work using the supplied pellet-making machine under guidance. The documented outputs were the delivery of training using the supplied equipment and participation in supervised processing practice. The records also identified continuing difficulties in milling ingredients and forming pellets. These observations give the training a specific technical focus: participants need to understand how the condition of the ingredients affects the subsequent processing steps. A pellet-shaped product alone does not establish nutritional completeness or suitability as a complete ration; the activity concerned the preparation of supplementary feed.

The combination of explanation, discussion, and direct practice is consistent with Aslamiah et al. (2024), who introduced maggot processing for cattle-feed concentrate through a participatory programme involving practical work and mentoring. The relevant comparison concerns the organization of community learning. Feed ingredients, formulations, and intended animals differ between the two activities, so their products and nutritional outcomes cannot be treated as equivalent.

Technical Constraints and Production Feasibility

The production records indicated that ingredient milling and pellet formation were not yet optimal. These difficulties suggest that continued assistance should examine ingredient preparation and the consistency of the mixture alongside machine operation. However, the records contain no measurements of particle size or mixture moisture from which the causes of the processing difficulties could be established.

Irungu et al. (2018) showed that formulation and processing moisture influenced several physical characteristics of hot-extruded aquafeed pellets containing insect meals. Their findings support attention to processing conditions during training. Their experiment used insect meals and controlled extrusion conditions, whereas the Giwangan activity involved fresh larvae and the available pellet-making equipment. Accordingly, their operating parameters cannot be adopted directly as a validated recipe for the community's process. The group's operational report stated a machine capacity of 120 kg/h and described production in RW 10 of approximately 100 kg per batch, conducted about once a week. It attributed the limited production frequency to larval availability and also noted unresolved processing difficulties. These figures describe the group's operating context. They do not represent the quantity produced during the training or demonstrate a production increase resulting from it.

The reported supply constraint also indicates a need to coordinate pellet preparation with existing uses of fresh larvae for fish and poultry. Production planning should therefore consider the quantity of larvae actually available, the

additional ingredients required, and the group's ability to complete the processing sequence. Machine capacity by itself is insufficient to determine a feasible production schedule.

Participant Feedback and Practical Competence

The evaluation framework distinguishes participants' views about the training from their demonstrated practical performance. The 12 questionnaire items cover material clarity (E01–E02), usefulness and relevance (E03–E04), practical instruction (E05–E06), equipment and materials (E07–E08), perceived readiness (E09–E10), and willingness to apply the training (E11–E12) see appendix for details. Table 2 shows strong participation and positive feedback from the training participants. All 25 participants returned their questionnaires, giving a response rate of 100% and exceeding the minimum target of 20 returned forms. Each questionnaire item received 88% positive responses, defined as scores of 4 (agree) or 5 (strongly agree). This exceeded the programme's target of 80%, indicating that participants generally viewed the training favourably.

The production records presented in Table 3 complement these questionnaire findings by providing evidence for assessing practical application after training. While the questionnaire captures participants' views of the learning experience, the production records help assess how the group used the training in its pellet-making activities. The 100% questionnaire return rate provided feedback from all 25 participants, while the 88% positive responses on each item exceeded the programme's target by eight percentage points. This favourable reception is broadly consistent with Aslamiah et al. (2024), who reported active participation in a community programme on processing maggots into cattle-feed concentrate. Their programme combined lectures, discussion, practical activities, and mentoring. Similarly, the Giwangan training allowed participants to practise pellet preparation using the supplied machine. Its relevance to the groups' existing feed-production activities may have contributed to the positive responses, although the evaluation did not directly test this explanation.

Setyani et al. (2025) also demonstrated the educational value of participatory BSFL training, reporting improvements in knowledge following instruction on cultivation using agricultural residues. However, their evaluation used pre-tests and post-tests, whereas the present questionnaire assessed participants' views after training. The findings therefore provide different types of evidence. Setyani et al. documented changes in knowledge, while the Giwangan results indicate favourable assessments of the training's clarity, usefulness, and practical delivery. The 88% positive response rate should consequently be interpreted as evidence of participant acceptance rather than a measured increase in knowledge or skill.

Table 2. Programme Indicators and Current Evidence

Indicator	Proposed target	Documented result
Training participation	Record attendance and group representation	25 participants (Table 1)
Questionnaire coverage	At least 20 forms and 20 scorable responses per item	25 questionnaires were returned, so the response rate is 100 percent
Positive participant feedback	At least 80% score 4 or 5 on each item	All the questionnaire items received at least an 'agree' response (score 4) at 88 percent.
Application after training	At least one documented production activity	Table 3

The Giwangan programme contributes a practical account of training existing producer groups to process harvested larvae into supplementary-feed pellets using supplied equipment. Production records can complement questionnaire findings by documenting how the group applies the processing activities. Follow-up assessment of machine operation and continued pellet production would strengthen this evidence. This approach follows the distinction between participants' reactions, demonstrated learning, and subsequent application outlined by the work Centers for Disease Control and Prevention (2024).

Pellet Production Practice and Technical Constraints

Practical instruction covered selecting larvae for processing, preparing ingredients, mixing, operating the supplied machine, and forming pellets. The materials identified in the production records were fresh maggots, maize flour, pollard, and rice bran. Ingredient preparation included checking cleanliness and milling with a disk mill where required. Participants then practised the processing sequence under guidance. The recipient group in RW 10 reported using one pellet-making machine, with a stated capacity of 120 kg/h, to produce approximately 100 kg per batch about once a week. This operational result demonstrates that pellet preparation had been undertaken within the group's production system. Table 3 distinguishes reported batch production from projections over longer periods. The operational figures relate to the broader programme reporting period and do not constitute before-and-after measurements of the training.

Table 3. Reported Pellet Production and Calculated Projections

Indicator	Quantity	Interpretation
Pellet-making machines	1	Equipment used by the RW 10 group
Stated machine capacity	120 kg/h	Reported specification
Reported batch output	About 100 kg	One production batch
Production frequency	About once a week	Reported operating schedule
Four-week projection	400 kg	Four batches of 100 kg
Annual projection	4,800 kg	48 batches of 100 kg

Source: group production records and calculations. Monthly and annual figures assume four production weeks per month and 12 such months per year.

Table 3 shows that the RW 10 group used one pellet-making machine with a stated capacity of 120 kg/h and reported producing approximately 100 kg per batch, about once a week. At this frequency, four production batches would yield approximately 400 kg over four weeks. The annual projection of 4,800 kg assumes 48 batches of 100 kg. These figures describe projected production under the reported schedule; the machine's stated capacity does not represent its measured operating performance.

These production records complement the participant evaluation presented in Table 2. The 100% questionnaire return rate and 88% positive responses indicate favourable participant assessments, while Table 3 documents pellet production within the recipient group. Together, the tables provide evidence about participants' reception of the training and the group's processing activities. The production records are relevant to assessing the application target, although they do not independently establish improvements in individual skills or increases in output attributable to training.

The reported limitations in larval availability, ingredient milling, and pellet formation help explain the need for continued assistance. Further support should address ingredient preparation, mixing, and machine operation alongside production scheduling. This emphasis is supported by Irungu et al. (2018), who demonstrated that formulation and processing moisture influenced several physical characteristics of extruded aquafeed pellets containing insect meals. Their findings reinforce the importance of processing knowledge, although their experimental conditions differ from the fresh-larvae mixture and equipment used in Giwangan.

Follow Up and Priorities for Continued Assistance

The documented constraints identify priorities for continued assistance in milling, pellet formation, and production scheduling according to larval availability. These priorities should be reviewed with the recipient group to determine which tasks require further demonstration and which can be managed through routine group practice. This use of practical observations to guide further action is consistent with the reflective orientation of participatory action research described by Baum et al. (2006).

Future assistance should also address drying and storage where pellets are to be kept for later use. Kamau et al. (2018) demonstrated that moisture, packaging, and temperature affected the predicted storage stability of dried insect powders. Although their findings do not establish the shelf life of the fresh-larvae pellets made in Giwangan, they support including moisture management and storage practices in subsequent technical guidance.

Follow-up documentation should record the visit date, machine condition, production dates, participants involved, ingredients and quantities used, and batch weight where measured. Recording practical difficulties and the assistance provided would help explain whether the supplied equipment is being used and which constraints remain. A production activity dated after the training would provide evidence relevant to the proposed application target. Further evaluation of nutritional quality, costs, or animal performance would require additional measurements beyond the training indicators.

Contribution to Community Empowerment and Sustainable Production

Sumbodo et al. (2025) documented a broader waste-management programme in Giwangan. The present activity addresses a specific processing task within that local setting: using harvested larvae as an ingredient in supplementary feed pellets. Its contribution lies in documenting training using supplied equipment, participation by producer and feed-user groups, and the technical constraints that need to be addressed for continued practice.

The programme's activities relate to SDG 4, particularly Target 4.4 on technical and vocational skills, through practical instruction in feed preparation and equipment operation. The use of larval biomass from organic-waste bioconversion also complements the resource-recovery aims of SDG 12, particularly Target 12.5, while cooperation among universities, local government, and producer groups relates to the partnership objectives of SDG 17, particularly Target 17.17 (United Nations, 2015). These are alignments between programme activities and the SDGs; changes in waste quantities, livelihoods, or environmental conditions were not measured in the pellet-training evaluation.



Figure 1. Pellet Making Machine

CONCLUSIONS AND RECOMMENDATIONS

The programme provided practical training in maggot-based supplementary-feed pellet preparation through collaboration among universities, the Giwangan administration, and community producer groups. All 25 participants returned their questionnaires, and each item received 88% positive responses, exceeding the 80% benchmark. The participant-feedback target was therefore achieved. Group production records reported approximately 100 kg of pellets per weekly batch, documenting processing activity using the supplied equipment. The evidence supports favourable participant assessments and group-level production, while improvements in individual skills or output attributable to the training were not established. Limited larval availability and difficulties in milling and pellet formation remained priorities for continued assistance.

Continued mentoring should focus on ingredient preparation, mixing, machine operation, drying, storage, and routine equipment maintenance. The recipient group should coordinate batch production with larval availability and existing demand for fresh larvae. Production records should document dates, ingredient quantities and proportions, operating time, batch weights, costs, and technical difficulties. Follow-up observation should assess participants' ability to complete key processing tasks independently and the continuity of machine use. Future programmes should include assessments before and after training to measure learning gains, while nutritional analysis and storage evaluation would strengthen the basis for recommendations on pellet use.

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REFERENCES

Aslamiah, L., Ramadhan, M. A., & Amanda, D., Sadiyah, H. Asyahidda, F. N. (2024). Pemberdayaan Masyarakat Kampung Pasir Angling Melalui Pengolahan Maggot Menjadi Konsentrat Pakan Ternak Sapi. Kumawula: Jurnal Pengabdian Kepada Masyarakat, 7(1), 248–254. https://doi.org/https://doi.org/10.24198/kumawula.v7i1.52805.

Baum, F., MacDougall, C., & Smith, D. (2006). Participatory action research. Journal of Epidemiology and Community Health, 60(10), 854–857. https://doi.org/10.1136/jech.2004.028662.

Centers for Disease Control and Prevention. (2024). Evaluate training: Measuring effectiveness. https://www.cdc.gov/training-development/php/about/evaluate-training-measuring-effectiveness.html.

Centers for Disease Control and Prevention. (2026). Evaluate training: Building an evaluation plan. https://www.cdc.gov/training-

development/php/about/evaluate-training-building-an-evaluation-plan.html.

Etzkowitz, H., & Leydesdorff, L. (2001). The transformation of university-industry-government relations. Electronic Journal of Sociology.

Ika, S. R., Mulyono, A., Syamsiro, M., & Widagdo, A. K. (2023). Ornamental fish farmers empowerment through feed making technology: A study in Yogyakarta city, Indonesia. IOP Conference Series: Earth and Environmental Science, 1246(1). https://doi.org/10.1088/1755-1315/1246/1/012017.

Irungu, F. G., Mutungi, C. M., Faraj, A. K., Affognon, H., Kibet, N., Tanga, C., Ekesi, S., Nakimbugwe, D., & Fiaboe, K. K. M. (2018). Physico-chemical properties of extruded aquafeed pellets containing black soldier fly (Hermetia illucens) larvae and adult cricket (Acheta domesticus) meals. Journal of Insects as Food and Feed, 4(1), 19–30. https://doi.org/https://doi.org/10.3920/JIFF2017.0008.

Setyani, N. M. P., Pradana, I. P. Y. B., Sabat, D. M., & Ruliati, L. P. (2025). Pelatihan Budidaya Maggot Black Soldier Fly menggunakan Limbah Pertanian kepada Karang Taruna Desa Ponain. Kumawula: Jurnal Pengabdian Kepada Masyarakat, 8(1), 153–159. https://doi.org/https://doi.org/10.24198/kumawula.v8i1.56463.

Sumbodo, B. T., Ika, S. R., Sardi, S., & Nuryanti, F. (2025). Economic Circular through Waste Management Programs : A study in Giwangan Village , Yogyakarta. E3S Web of Conferences, 652, 02001. https://doi.org/https://doi.org/10.1051/e3sconf/202565202001.

Sumbodo, B. T., Ika, S. R., Sardi, S., Kamboja, Y., Hasanah, M. D. I., Sudrajat, I. S., Suranta, S., Murni, S., & Widagdo, A. K. (2024). Pengelolaan sampah organik dengan biopori dan pelatihan pembuatan kompos untuk mendukung pengurangan sampah di Kelurahan Giwangan Kota Yogyakarta. KACANEGARA Jurnal Pengabdian Pada Masyarakat, 7(3), 335. https://doi.org/10.28989/kacanegara.v7i3.2235.

Sumbodo, B. T., Ma'rifah, A. N., Sardi, S., Setiawan, P., Sudrajat, I. S., Widagdo, A. K., Salsabila, A. N., & Ika, S. R. (2023). Waste Management in an Urban Village through Biopore Organic Waste and Composting Education: A Lesson from Giwangan Village, Yogyakarta. International Conference on Management and Muamalah (ICoMM).

Surendra, K. C., Tomberlin, J. K., van Huis, A., Cammack, J. A., Heckmann, L.-H. L., & Khanal, S. K. (2020). Rethinking organic wastes bioconversion: Evaluating the potential of the black soldier fly (Hermetia illucens (L.)) (Diptera: Stratiomyidae) (BSF). Waste Management, 117, 58–80. https://doi.org/https://doi.org/10.1016/j.wasman.2020.07.050.

United Nations. (2015). Transforming our world: The 2030 Agenda for Sustainable Development. United Nations.