



DOST Form 3  
**NON-R&D PROJECT PROPOSAL**  
(Technology Transfer, S&T Promotion and Linkages, Policy Advocacy,  
Provision of S&T Services, Human Resource Development and Capacity-Building)

**I. PROJECT PROFILE**

(1) **Program Title:** GIA (Grant in Aid)  
**Project Title:** Un-wasting wastes: recycling of waste plastics, used styrofoam, and used cooking oils into bricks

(2) **Project Leader/Sex:** Ronaldo G. Orpiano/Male  
**Agency** (smallest unit): Occidental Mindoro State College  
**Address/Telephone/Fax/Email:** Labangan, SJOM/09175621793/vprde@omsc.ph.education

(3) **Cooperating Agency/ies:** Occidental Mindoro State College (OMSC)

(4) **Site/s of Implementation (Municipality / District / Province / Region)**  
**Base Station:** OMSC Main, Labangan, San Jose, Occidental Mindoro, MIMAROPA  
**Other Implementation Site (s):** None

(5) **Project Duration** (number of months): 3 Years  
**Project Start Date:** August 2023  
**Project End Date:** August 2026

(6) **Total Project Cost:** Php 1,438,500.00 (indicate Counterpart Funds; use Form 4 for the Line-Item Budget)

Implementing Agency/ies	PS	MOOE	EO	Total
A. DOST-MIMAROPA		115,500.00	790,000.00	905,500.00
B. Occidental Mindoro State College (OMSC)	168,000.00	365,000.00		533,000.00
<b>TOTAL</b>	<b>168,000.00</b>	<b>480,500.00</b>	<b>790,000.00</b>	<b>1,438,500.00</b>

**II. PROJECT SUMMARY**

(7) **Executive Summary** (not to exceed 200 words)  

This 1-year project aims to recycle plastic wastes, used styrofoam, and used cooking oil, and transform these into pavement bricks and other products that can be sold and generate income using the plastic shredder and melter/densifier that will be granted by the Department of Science and Technology. It intends to make the OMSC Campus litter-free, produce useful products by recycling waste materials, and generate income.

(8) **Introduction**  
**Rationale/Significance**  

MENRO-San Jose documented that the municipality of San Jose, Occidental Mindoro has average daily collections of 24 to 25 tons of solid wastes of which, about 4.21 tons are recyclable wastes and 6.04 tons are residual wastes. These include disposable or single-use styrofoam, plastic bags, utensils, cups, straws, and stirrers, which are among the top wastes collected in Mangarin Bay and Pandurucan Rivers - the town's treasured bodies of water (DENR, 2020).

As World Bank study reveals, solid waste generation in the Philippines is in increasing trend and this was associated to increasing population. It is estimated that 10.55% of the wastes are plastics (Sapuay, 2018). With population likewise increasing, San Jose is expected to produce more wastes hence must exert efforts to manage municipal wastes. As per RA 9003, also known as Ecological Solid Waste Management Act 2000, LGU is mandated to have efficient management of residuals and use technologies for the destruction and reuse of solid wastes.

The Occidental Mindoro State College (OMSC) also generates bulks of plastic and residual wastes. With its student population of about 11,000 and workforce of about 500 in its campuses in San Jose, bulk of wastes can be generated in every office and classroom. It is estimated that 30 kgs of plastic wastes and 10 kg used styrofoam can be collected weekly from its three campuses. These wastes will add up to the garbage collections of the LGU. In addition, used cooking oils are also wastes in the households, food stalls, and restaurant. It clogs up the drain pipes, pollute water and food sources, and develop into materials that linger in the environment. These waste materials, however, may be re-used and recycled into useful materials.

Using equipment and good segregation practices and recycling, the wastes may be converted into products with economic value. Plastic and styrofoam shredder and densifier that can process plastic wastes, styrofoam, and used cooking oils into bricks per batch will generate cash. Pavement bricks, traffic cones, and plant boxes will be produced. The products be processed in OMSC Main Campus and will be marketed through the Enhanced Food and Income Production Project (EFIPP).

Waste plastics and styrofoam will be segregated and collected from the offices, classrooms, and canteens. Used cooking oils will be collected from the OMSC canteens and from the faculty and staff. If the supply of wastes is not sufficient, the OMSC will collaborate with other schools and colleges, food stalls and restaurants, as well as the LGU-MENRO.

**Objectives:**

The general objective of this 1-year project is to recycle the plastic wastes, used Styrofoam, and used cooking that are collected from the three OMSC campuses in San Jose, Occidental Mindoro.

Specifically, it intends to:

- 1. collect plastic wastes, used styrofoam, and used cooking oil;
- 2. produce bricks and other products (traffic cones, plant box, etc) out of plastic wastes, styrofoam, and used cooking oil; and
- 3. generate income from bricks and other products.

**Methodology:**

The OMSC will implement the project. It will provide a portion of the motor pool in the main campus which will house the recycling facilities, workspace, and production area. It will also shoulder the expenses in electricity, LPG, water, labor, and other materials such as drum and pail. Plastic wastes, used Styrofoam, and used cooking oil will be collected from its three campuses namely, San Jose, Main, and Murtha.

The DOST-MIMAROPA, through its PSTC-Occidental Mindoro, will recommend this project proposal for approval. Once approved, funds will be allocated for the procurement of plastic shredder and plastic melter/densifier including the LPG tank. These machines/facilities will be delivered/turned over to the OMSC.

Pavement bricks will be produced from plastic wastes, used styrofoam, and used cooking oil. The shredder will be used to reduce the size of waste materials. The plastic melter/densifier mixes and densifies the wastes to produce a material that can be molded into different designs of pavement bricks. Traffic cones and plant boxes using the mixture will also be produced. The products will be promoted and sold by the OMSC through its Enhanced Food and Income Production Project (EFIPP).

In its operation for 1 year, the production of bricks will be done monthly, and the target volume of production within the year is 100 batches, producing 2,500 pavement bricks.

After the first year of implementation, the OMSC will continue producing bricks. Production volume will increase, and the students may benefit from the project. Select students who need financial assistance may bring cleaned waste plastics and used styrofoam in exchange of cash.

Process Description

- 1. Waste segregation and collection  
The OMSC will strictly implement waste segregation. The canteen, classrooms, and offices will have separate bins or garbage bags for plastics, styrofoam, biodegradable, and other solid wastes. All these wastes will be collected, and the plastic wastes and styrofoam will be placed in the recycling facilities. Other wastes are for collection by the LGU. Plastics and used styrofoam will be cleaned and then air-dried before shredding. Used cooking oil will also be collected from the school canteen as well as from the faculty and staff.
- 2. Shredding  
The shredder can process waste material at 200-400 kg/hr (1 m<sup>3</sup>/hour). Using the average of 300 kg/hr, one batch can produce shredded plastics good for 15 batches for melting in the densifier. It will also produce shredded styrofoam good for 60 batches for melting. The clean plastics or styrofoam will be placed in the equipment. One batch of shredding for one hour consumes Php37.3 worth of electricity. Plastics and styrofoam will be shredded separately.
- 3. Melting and molding  
A total of 50 kg mixtures will be melted in the melter/densifier. First, 25 kg used cooking oil will be loaded to the machine, heated to boil at 100 °C using burner gas stove, and then mixed by turning on the stirrer. While mixing the oil, 20 kg shredded plastics will be loaded, followed by the 5 kg shredded Styrofoam, and then left to boil and stir for one hour. Excess oil will be drained until the melted plastics flows. The mixture will be placed in molders and then dried for at least 3 hours. Molders are for pavement bricks, traffic cones, and plant boxes.
- 4. Promotion and Marketing  
In first year of operation, the pavement bricks will be promoted and offered to the faculty and staff of the OMSC, and to other potential buyers. At Php30.00 per brick, samples will be displayed in the Marketing Center. The products will be promoted in the social media, and during the extension activities and stakeholders' meetings among others. The Enhanced Food and Income Production Project (EFIPP) will be in-charge of the production and marketing.

The production of bricks depends on the volume of orders. In the succeeding years, other products will be produced such as traffic cones and plant boxes. For Year 1, 100 batches or 2,500 pieces of bricks will be produced.

Value Proposition

Pavement bricks to be produced in this project are landscaping materials that are eco-friendly and made of recycled waste materials. Durable and can be arranged as per preferred landscaping design, the eco-bricks offer a clean environment touch in every home.

Cost and Return Analysis

Below is the initial profitability analysis based on the capacity of the equipment:

1. The collection of waste materials is part of the duties of the janitorial services, hence no expenses. A Job Order will be hired to do the shredding and densifying of wastes and drying of bricks.
2. The one-hour operation of shredder can accommodate 300 kg of shredded waste plastics that can be used in 15 batches for melting, and 300 kg of shredded styrofoam that can be used in 60 batches for melting. The cost of shredding is PhP37.30 each for waste plastics and used styrofoam.
3. The 3-hour melting and densifying can produce 25 pieces of pavement bricks, which can be sold P30 per brick. Hence, 1 batch can generate P750.00.
4. The operation of melter/densifier requires P33.57 worth of electricity and P312.00 worth of LPG and P192 labor cost. With additional P3.11 for the electricity cost and P63.75 labor cost in shredding, the total production cost per batch is estimated at P604.43.
5. Hence, one production batch will generate net income of P145.57.
6. For 100 batches in one year, the estimated net income is P14,557.00.

Risk Analysis

Below are the uncertain events or conditions that may negatively affect the project:

1. Mixed/unsegregated wastes.
2. Insufficient amount of collected plastic wastes, used styrofoam, and used cooking oil that may result to failure to meet the target volume of pavement bricks produced.
3. Poor acceptability of the pavement bricks and other products in the locality due to preference for commercially available materials.

Waste segregation will be strictly implemented. If the collection is insufficient, there are other sources of waste materials. If needed, the OMSC will request supplies from the LGU-MENRO. The OMSC community will also be encouraged to use the eco-bricks and patronize the products. Promotions and awareness campaign would enhance acceptability of the products.

Expected Outputs

This project is expected to produce the following outputs:

1. Product  
  
The pavement bricks out of the plastic wastes, styrofoam, and used cooking oil will be the products of this proposed project. At least 2,500 pieces of pavement bricks produced in 100 batches in Year 1. Traffic cones and plant boxes will also be produced after the first year of operation.
2. Place and partnership  
  
In the succeeding years, the OMSC will involve other schools, restaurant, and fast food chain in the project. At least one Memorandum of Agreement (MOA) will be forged.

Potential Outcomes

This project is expected to have the following outcomes:

1. Zero plastic wastes, used styrofoam, and used cooking oil in OMSC campuses in San Jose.
2. Reduced volume of plastic wastes in the weekly collection of MENRO.
3. Partnerships for waste recycling.
4. Increased popularity of pavement bricks out of recycled waste materials.
5. Enhanced awareness in making money out of wastes.

**Potential Impacts:**

Social Impact

A dirty and untidy surrounding make working unconducive. In contrast, a clean and tidy place can make individuals more productive. Removal of these wastes and conversion to useful products will offer social impact.

1. The administration, faculty, employees, students, and other individuals in the school community will enjoy a clean campus conducive for working, teaching, and learning.
2. There will be increased awareness on making money out of waste materials.
3. Improving preference for products that are made of recycled waste materials.

- 4. Involvement in waste segregation and recycling among stakeholders in the school community.
- 5. Zero waste atmosphere in the OMSC campuses.

Economic impact

Plastic wastes and used styrofoam are eye sores in the surrounding. Piles in the rubbish bins and in the sidewalks make the environment untidy. Used cooking oils in the canteens and households are also being disposed. But with proper segregation and recycling technologies, these materials can be turned into cash and have economic impact as follows:

- 1. Revenue generation from the bricks and other products; this will become one of the income generating projects of OMSC.
- 2. Cheap landscaping materials for the households; the products will be sold at prices lower than the commercially available conventional materials (clay pots, bricks, etc).
- 3. Income generation from selling plastic wastes, used styrofoam, and used cooking oil in the second and third year of implementation; the project will buy materials from the students. This is to have additional supply of materials as the volume of production/recycling is expected to increase.

Target Beneficiaries

The target beneficiaries of this project are the faculty, employees, and students of OMSC in San Jose, Occidental Mindoro. Aside from the clean and conducive environment for working, teaching, and learning, the school community may benefit from the use of cheap and environment-friendly eco-bricks in their offices/buildings and households.

In the succeeding years, the immediate communities may also benefit from the project. They may also be involved in the waste segregation and recycling.

Sustainability Plan:

- 1. To ensure the sustainability of the project, the OMSC will implement the continuous waste segregation, collection, and recycling. The bricks will be produced monthly and will increase based on requests/orders.
- 2. The primary sources of waste plastics, used styrofoam, and used cooking oil will be the three OMSC campuses (Main, San Jose, and Murtha). Rubbish bins for plastics and styrofoam will be provided in every classroom and office. These will be collected by the janitorial services and placed in the Material Recovery Facilities. Pail with strainer and cover will be placed in the school canteens for the used cooking oil.
- 3. Other schools (DEPED, DWC, PCIC) may also be sources of materials if the collection in the OMSC is not sufficient.
- 4. Job Orders will be hired for the Material Recovery Facilities, and one of their duties will be the production of bricks and other products.
- 5. Used cooking oil will be collected from other restaurants and fastfood chains. A MOA will be forged to make sure the continuous supply to produce bricks. Other Fastfood Chain may also be involved if the need arises.
- 6. Because the products will be sold, the project will become self-sustaining. Income from sales will be used in the operation of the project.

Gender and Development (GAD) Score: 15.67 (Gender-Sensitive)

(9) Workplan (See Form 5)

(10) Project Management (not to exceed one page)

The project will be supervised by the Office of the Campus Director in the Main Campus and the Enhanced Food and Income Production Project (EFIPP). The janitorial services of the Campus Director will be in-charge of the waste collection, while those in the Material Recovery Facilities (MRF) will be in-charge of shredding and melting, and the production of bricks. The EFIPP will be in-charge of the marketing of products. Monitoring and evaluation of the project will be under the Office of the Vice President for Research, Development, and Extension (OVPRDE).

## GAD Checklists 2: For the Project Identification and Design Stages

**Note: Put 'X' mark on appropriate box**

Element and items/question (col.1)	Done? (col.2)			Score for an item/ element (col.3)	Comments/ gender issues identified (col.4)
	No (2a)	Partly (2b)	Yes (2c)		
1.0 Involvement of women and men (max score: 2; for each item, 1)				<b>2</b>	
1.1 Participation of women and men in beneficiary groups in the identification of the problem (possible scores: 0, 0.5, 1.0)			x	1	
1.2 Participation of women and men in beneficiary groups in project design (possible scores: 0, 0.5, 1.0)			x	1	
2.0 Collection of sex-disaggregated data and gender-related information (possible scores: 0, 1.0, 2.0)			x	<b>2</b>	
3.0 Conduct of gender analysis and identification of gender issues (max score: 2; for each item, 1)				<b>1</b>	
3.1 Analysis of gender gaps and inequalities related to gender roles, perspectives and needs, or access to and control of resources (possible scores: 0, 0.5, 1.0)		x		0.5	
3.2 Analysis of constraints and opportunities related to women's and men's participation in the project (possible scores: 0, 0.5, 1.0)		x		0.5	
4.0 Gender equality goals, outcomes, and outputs (possible scores: 0, 1.0, 2.0) Does the project have clearly stated gender equality goals, objectives, outcomes or outputs?			x	<b>2</b>	
5.0 Matching of strategies with gender issues (possible scores: 0, 1.0, 2.0) Do the strategies and activities match the gender issues and gender equality goals identified?			x	<b>2</b>	
6.0 Gender analysis of the likely impacts of the project (max score: 2, for each item, 0.67)				<b>2</b>	
6.1 Are women and girl children among the direct or indirect beneficiaries? (possible scores: 0, 0.33, 0.67)			x	0.67	
6.2 Has the project considered its long-term impact on women's socioeconomic status and Empowerment? (possible scores: 0, 0.33, 0.67)			x	0.67	
6.3 Has the project included strategies for avoiding or minimizing negative impacts on women's status and welfare? (possible scores: 0, 0.33, 0.66)			x	0.66	
7.0 Monitoring targets and indicators (possible scores: 0, 1.0, 2.0) Does the project include gender equality targets and indicators to measure gender equality outputs and outcomes?		x		<b>1</b>	
8.0 Sex-disaggregated database requirements (possible scores: 0, 1.0, 2.0) Does the project M&E system require the collection of sex-disaggregated data?		x		<b>1</b>	
9.0 Resources (max score: 2; for each item, 1)				<b>1</b>	
9.1 Is the budget allotted by the project sufficient					

for gender equality promotion or integration? OR, will the project tap counterpart funds from LGUs/ partners for its GAD efforts? (possible scores: 0, 0.5, 1.0)		x		0.5	
9.2 Does the project have the expertise to promote gender equality and women's empowerment? OR, is the project committed to investing project staff time in building capacities within the project to integrate GAD or promote gender equality? (possible scores: 0, 0.5, 1.0)		x		0.5	
10.0 Relationship with the agency's GAD efforts (max score: 2; for each item, 0.67)				<b>1.67</b>	
10.1 Will the project build on or strengthen the agency/ PCW/ government's commitment to the empowerment of women? (possible scores: 0, 0.33, 0.67) IF THE AGENCY HAS NO GAD PLAN: Will the project help in formulating the implementing agency's GAD plan?			x	0.67	
10.2 Will the project build on the initiatives or actions of other organization in the area? (possible scores: 0, 0.33, 0.67)			x	0.67	
10.3 Does the project have an exit plan that will ensure the sustainability of GAD efforts and benefits? (possible scores: 0, 0.33, 0.67)		x		0.33	
<b>TOTAL GAD SCORE FOR THE PROJECT IDENTIFICATION AND DESIGN STAGES</b>				<b>15.67</b>	

### Interpretation of the GAD score

0 - 3.9 GAD is invisible in the project (proposal is retured).

4.0 - 7.9 Proposed project has promising GAD prospects (proposal earns a "conditional pass," pending identification of gender issues and strategies and activities to address these and inclusion of the collection of sex-disaggregated data in the monitoring and evaluation plan).

8.0 - 14.9 Proposed project is gender-sensitive (proposal passes the GAD test)

15.0 - 20.0 Proposed project is gender-responsive (proponent is commended).

**DOST Form 5**  
**A – PROJECT WORKPLAN**

## DOST Form 5

### B – EXPECTED OUTPUTS

**(1) Program Title:** GIA (Grants-in-Aid)

**(2) Project Title:** Un-wasting wastes: recycling of waste plastics, used styrofoam, and used cooking oils into bricks

**(3) Project Duration (number of months):** 36 months

**(4) Project Start Date:** August 2023

**(5) Project End Date:** August 2026

[illegible]



DOST Form 5  
**C – RISKS AND ASSUMPTIONS**

(1) **Program Title:** GIA (Grants-in-Aid)

(2) **Project Title:** Un-wasting wastes: recycling of waste plastics, used styrofoam, and used cooking oils into bricks

(3) **Project Duration (number of months):** 36 months

(4) **Project Start Date:** August 2023

(5) **Project End Date:** August 2026

OBJECTIVES	(11) RISKS AND ASSUMPTIONS	(12) ACTION PLAN (use separate sheet if necessary)
1. Collect plastic wastes, used styrofoam, and used cooking oil	<p><b>Risk:</b> Mixed/unsegregated wastes</p> <p><b>Assumption:</b> Waste segregation policy</p>	Policy on waste management (segregation, collection, recycling) will be strictly implemented in every classroom, office, and building.
2. Produce bricks and other products (traffic cones, plant box, etc) out of plastic wastes, styrofoam, and used cooking oil	<p><b>Risk:</b> The collection of plastic wastes, used styrofoam, and used cooking oil in the OMSC Campuses may be insufficient to meet the target volume of pavement bricks produced.</p> <p><b>Assumption:</b> There are other sources of waste materials</p>	The OMSC will request supplies of plastic wastes and used styrofoam from the LGU-MENRO and other schools. Used cooking oils may be requested from food stalls, restaurants, and food chain.
3. Generate income from bricks and other products	<p><b>Risk:</b> The pavement bricks and other products may be poorly accepted in the locality due to preference for commercially available materials.</p> <p><b>Assumption:</b> Promotions and awareness campaign would enhance acceptability among people.</p>	Social media will be used to promote the products. Faculty and employees will be encouraged to buy the products, used these in their offices, gardens, and homes.