[Wayoprint]
(30. HGHarmonies)

Introduction:

Plastic waste is a global issue, with Europe consuming over 150 kg per person annually [1] and the U.S. projected to generate 140 metric tons of waste by 2060 [2]. Japan, despite claiming an 86% recycling rate, 56% is incinerated, releasing emissions [3]. Single-use plastics threaten ecosystems, yet the lack of a sustainable recycling system worsens the problem. Our product *Wayoprint* converts plastic waste into 3D printing filament. At the Osaka Expo, attendees can discard plastic waste, which *Wayoprint* converts into filament to print a massive stationary windmill sculpture –reflecting our collective effort of recycling.

Product Explanation:

Wayoprint works upon the combination of 4 distinct systems: 1. Plastic Sorting AI system, 2. Plastic Shredding System, 3. Plastic Storage System, and 4. Plastic Filament Extrusion System. First, the user places their plastic waste into the can, where the AI camera system captures and identifies the type of plastic that was disposed of, shutting down the storage system of any other type of plastic. Secondly, the plastic shredding system, using energy from a motor, converts plastic waste into small granules of plastic for easier melting. Then, the granules are stored by type to be ready for future use. Lastly, the granules are released into the extrusion system, where the plastic granules are melted, shaped, cooled, and finally released as plastic filament that is 100% recycled. The released plastic filament will be connected to an external 3D printer, for advanced 3D printing. For every kilogram of disposed plastic waste, it is estimated to create 950 grams of plastic filament, which is equivalent to one roll of conventional PLA plastic filament.

Expo Station:

Our exhibition is a combination of a real-time-manufacturing windmill and *Wayoprint* that collects plastic waste. As the audience disposes of their plastic waste over the course of the Osaka Expo, such waste becomes material for the windmill, which will be crafted real-time. By the end of the expo, the windmill is expected to complete, resulting in a 10m 3D printed plastic model reflecting the collaborative efforts of the audience. This booth will be set up in general areas where traffic is expected, with plastic disposing cans around the booth, so that anyone can contribute to such recycling and manufacturing.

In our designated booth which will be placed close to the windmill, we can get into the details of our exhibition. First, an explanation of the problems that *Wayoprint* tackles is shown. Next, visitors will receive a product explanation that shows the process of plastic conversion to filament. Afterward, they are able to directly observe the process, the process in which your waste is converted to the filament, and to a part of the windmill. Such a cycle, and the windmill itself symbolizes the unlimited possibilities of innovative creation in tech through our product.

Target Market:

After the Osaka Expo, the product will target high schools and universities strong in STEM education such as the Institute of Science Tokyo and Osaka University. Japanese schools are considered late to the new trend led by the United States, in which 3D printers are incorporated into educational use to foster creativity and problem-solving skills. The Japanese government has recognized the delay and is developing the curriculum. The government plans to subsidize two-thirds of the machinery purchased by technology universities (around 60 schools) and technical high schools (around 520 schools). With these schools investing in 3D printers, filaments are inevitably needed to sustain the usage. As filaments must be bought as soon as they run out, costs can't be calculated beforehand and are financially unsustainable.

In addition, with the progression of inquiry-based learning, the Ministry of Education plans to invest over 66 million dollars into the use of ICT. With new opportunities to solve and expand on individualized interests and problems, students are more interested in creating prototypes for new innovative products. Even though the school provides the machines, many do not give the filaments to the students as costs may fluctuate more than expected, as mentioned before. As a result, many struggle to make financial leverage to produce what they want.

With our product, students will have access to unlimited amounts of filaments which will increase the level of education that the school provides. Investment in *Wayoprint* will contribute to a more sustainable experience-based curriculum that would profit the school.

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Since the EXPO is open to international potential consumers, even though our main target will be Japanese schools, we expect that our product will also be available overseas from the first year for schools. The market for 3D printing in the education sector from 2024-2028 is set to increase by 1.11 billion USD, making it a profitable business model[8]

Marketing:

Wayoprint's marketing will start with a pilot program in select Japanese high schools and universities, providing demonstration units and training workshops. With our product and the subsidies given by the government, the first few schools would only have to invest 800 dollars. Comparing it to traditional filaments, these schools can receive a positive ROI by the first year if they use an average of more than 3 rolls per month. This will help students and educators understand *Wayoprint* while proving our concept and data. Users will experience how it reduces plastic waste, lowers 3D printing costs, and enhances sustainable STEM education. We will develop teacher-friendly lesson plans and case studies from early adopters that will support expansion into broader markets like the U.S. Additionally, we will collaborate with MEXT and local education boards to explore grants and funding for schools.

Finance:

Wayoprint will be sold at 2,400 dollars in the first year and 3,000 dollars in the second. The variable cost per unit is about 957 dollars and the overall cost per unit starts around 5700 in the first year, but the cost will go down to around 2400 dollars at the end of 4th year as the fixed cost gets distributed with the increased units sold, which will grant us an overall positive company balance.

COST PER UNIT BREAKDOWN (DOLLARS)

VARIABLE COSTS

	Item	Quantity	Cost per Unit	Total Cost	Source
AI Camera System	Raspberry Pi 4 Model B	1	$35.00	$35.00	raspberrypi.com
	Camera Modle v2 (3g)	1	$25.00	$25.00	raspberrypi.com
	AI Model (Custom)	1	FREE	FREE	Develop Within Company
Shredder System	Plastic Shredder	1	$220.00	$220.00	community.preciousplastic.
	Bodine 42A5BEPM Motor	1	$200.00	$200.00	ebay.com
Extrusion System	Extrusion	1	$220.00	$220.00	community.preciousplastic.
	Bodine 42A5BEPM Motor	1	$200.00	FREE	
Other Components	Storage System (PLA Plastic, g)	400	$0.0003/g	$0.01	plasticker.de
	Plastic Container (PLA Plastic, 68x41.5x46cm)	2000	$0.0003/g	$0.60	plasticker.de
	Electrical Wiring (ft)	10	$0.10/ft	$1.00	homeguide.com.
Factory Production Fee	Production cost to produce one unit	1	$256.00	$256.00	Kurimoto Co.
Total Material Cost per Unit				**$957.61**	

FIXED COSTS

Year	2026	2027	2028	2029
Factors Of Production				
Marketing	137284	110000	110000	$110,000.00
Truck maintenance	5000	5000	5000	$5,000.00
Tokyo Office Rent	20088	20088	20088	$20,088.00
AI Subscription	100	150	175	$225.00
Research and Development	93750	133936	167420	$164,388.00
Staff Salary	216,105	316125	366345	$366,345.00
Quality Assurance	9000	9000	10000	$11,000.00
Total Fixed Cost per Year	**$481,327.00**	**$594,299.00**	**$679,028.00**	**$677,046.00**

INITIAL COSTS

Factors Of Production		Quantity	Cost per Unit	Total Cost	
Tokyo Office Utilities	-	1	-	$3,348.00	
Truck	-	1	$4,285.00	$4,285.00	
Certification & Regulatory Compliance	-	1	$25,507.00	$25,507.00	
Pattent	-	1	$1,138.00	$1,138.00	
Designing	-	1 year	-	$93,750.00	
INITIAL COSTS				**$128,028.00**	

CASH FLOW

Year	2026	2027	2028	2029
Units sold	100	250	400	500
Unit Price	$2,400.00	$3,000.00	$3,000.00	$3,000.00
Total Revenue	$240,000.00	$750,000.00	$1,200,000.00	$1,500,000.00
Total Costs	$577,088.20	$833,702.00	$1,062,072.80	$1,155,852.00
Investments	$128,028.00		0	
Profit With In The Year	-$337,088.20	-$83,702.00	$137,927.20	$344,148.00
Overall Company Balance	-$209,060.20	-$292,762.20	-$154,835.00	$189,313.00

Conclusion:

Wayoprint is a groundbreaking innovation that transforms plastic waste into alternative structures. By turning unneeded plastic into high-quality creations, *Wayoprint* not only reduces environmental harm, but it also gives each user a better visualization of their contribution to recycling and encourages them to rethink their consumption habits. With the ability to turn waste into value, *Wayoprint* is a powerful step toward a cleaner, greener future, and shows the world that technology can turn unwanted plastic waste into anything you can possibly imagine.

Resources:

[1]https://www.eea.europa.eu/en/topics/in-depth/plastics[2]https://www.oecd.org/en/about/news/press-releases[3]https://www.breakfreefromplastic.org[6]https://japantoday.com/category[7]https://www.expo2025.or.jp[8]https://www.technavio.com/report/3d-printing-market-in-education-sector-industry-analysis