

Realizing a bright future where everyone can shine without worrying about their handicaps

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Hello. I am Daisuke Nakajima, a third-year student at Rikkyo Ikebukuro High School. This may be sudden, but when you hear the term "prosthetics and orthotics," do you know what it means? Many of you may not immediately think of it, but it refers to things like prosthetic legs and prosthetic arms.

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My father, who is a prosthetist and orthotist, used to donate used prosthetic and orthotic parts to developing countries for free. Through his activities, I learned that approximately 35 to 40 million people in developing countries are living without access to the prosthetics and orthotics they need. They have lost limbs due to accidents, illnesses, or wars, and for economic reasons, they are unable to obtain the devices they need to go about their daily lives.

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Up until now, I have donated used prosthetic and orthotic parts to Ms. Mami Rudasingwa, who provides them for free in Rwanda, and to Mr. Ahego, a prosthetist and orthotist from Togo, whom I met through an interview. I learned that used parts are not always compatible with the prosthetics and orthotics made in developing countries. Furthermore, support through donations is unstable and has its limits in meeting all the needs. For these reasons, I came to believe that it is essential to build a sustainable supply system as a business.

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Therefore, what I propose is a system for manufacturing and providing prosthetic legs using recycled plastic and 3D printers. In the business I am envisioning, I want to focus on providing prosthetic legs, as there are many amputees in developing countries.

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The inspiration for this idea came from seeing a massive amount of used plastic up close during an observational visit to Thailand.

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Additionally, seeing that there are companies in the prosthetics and orthotics industry that utilize 3D printers in their business, I began to think that manufacturing with recycled plastic and 3D printers would be a good approach. Since making all the parts with a 3D printer would pose strength issues, we will produce the part called the "socket" with the 3D printer.

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The advantages of using a 3D printer are its high reproducibility, low-cost production, and the ability to edit data remotely.

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Previous models have followed a process of production, temporary fitting, and then completion and delivery. However, they have challenges, including insufficient temporary fittings and a lack of adequate aftercare.

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Therefore, I have devised a new process: Production → Temporary Fitting → Completion & Delivery → Rehabilitation → Social Integration. This will reduce risks such as falls by ensuring that patients get a prosthetic leg that fits them perfectly and learn the correct way to walk.

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To explain the process roughly, it flows like this: Plastic → Pellets → Production with a 3D printer → Prosthetic leg assembly → Rehabilitation and Employment → Introduction to job opportunities.

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As for the specific process, we will collect PET bottle caps in collaboration with local schools and hospitals. This will allow us to collect plastic, a process that is generally said to be costly, at a low cost.

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Afterward, we will ask a local contractor to process the collected plastic into "pellets," the material used for 3D printers. The standard price is 60 yen per kg, but since prosthetic legs require strength, we will use glass-fiber-reinforced pellets, which have enhanced strength, at a cost of 250 yen per kg. One socket requires only about 500g, enabling very low-cost production.

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Then, using these pellets, we will print the socket with a 3D printer.

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After that, we will combine the finished socket with the metal parts to assemble the prosthetic leg.

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For those who cannot afford to buy a prosthetic leg, we will have them work temporarily during their 3-to-6-month rehabilitation period, and their wages will cover the cost of the prosthetic.

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The tasks we envision for them include plastic collection, prosthetic assembly, scanning, promotional activities, and other administrative work.

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I will sell the products with a price that includes rehabilitation and social integration support: 60,000 yen for a below-the-knee prosthetic and 110,000 yen for an above-the-knee prosthetic.

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Furthermore, by advancing the business in cooperation with company branches and local organizations, I believe we can make it possible for many more people to obtain prosthetic legs.

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Through this initiative, I believe we can address environmental issues, the shortage of prosthetic and orthotic personnel, employment disparities among the underprivileged, and the current situation where people with disabilities cannot fully participate in society.

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I will genuinely aim for a future where everyone can shine without being held back by their disabilities. Thank you for your attention.