

ACHIEVING SUSTAINABLE DESIGN:
BAMBOO BOATS



Justine Abbo

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Introduction

Efforts to eliminate single-use plastic have become a trend nationally. Chicago put a 25 cent tax on each plastic bag used to bag groceries. San Francisco banned the use of plastic straws, requiring restaurants to only offer paper or natural fiber straws. At the University of Michigan, compostable cups, lids and straws are supplied at concessions instead of single-use plastic products. It might seem as though we are improving the system, but the revisions made aren't that much more beneficial. More breakthroughs with sustainable products are being made, but lifestyle changes are remaining apathetic. Part of the reason recycling has such a high participation rate is because people feel good when they think they're helping a greater cause, in this case it's the environment. To use biodegradable plastics has the same effect on people, making them feel accomplished for using sustainable products, but individual actions don't line up with the overall benefits of sustainable actions due to throwaway culture: the lack of accessibility to composting bins and overall recycling education, the meticulously engineered biodegradable papers and plastics get tossed away, only to end up in a landfill. At this point, compostability of all biodegradable plastic is not feasible due to the harsh environments in landfills; compostables cannot decompose in landfill environments due to a lack of oxygen and natural materials that help break down plastics.

In order to combat the consequences of large material footprints and throwaway culture, I will be making luxury serveware out of bamboo. The purpose of my project is to search for the fine line that mitigates throwaway culture within fast consumerism while expecting products to be thrown away by mindless consumers anyway. I will examine what makes products valuable, so that consumers will cherish their possessions more, and are less likely to

throw them away. I will define means of sustainability within a product based on material choice. In a commercial setting, my bamboo serveware is not made for the environmentalist. It's made for the person who compulsively buys products with a large ecological footprint. Sustainability is an underlying benefit to purchasing this product. With its biophilic form and space-efficient features, my goal is for this product to be enticing enough to buy on a whim, and it just so happens that the ecological footprint is significantly less than usual designer serveware.

Contextual Discussion

Avoiding Jevons Paradox

From the start of the industrial revolution, innovations in technology have been motivated by increased efficiency so products will become better for users. As a result, they have additionally become more energy efficient and cheaper, inclining people to consume more because they cost less. For the most part, this hasn't been a net negative. But economists and efficiency experts notice an increase in consumption when a product becomes more energy efficient, known as Jevons Paradox, or the Efficiency Dilemma. There are numerous examples of Jevons Paradox occurring due to technological advancements in recent history: automobiles, LED lights, air conditioners and refrigerators. From 2010, the average refrigerator in the US used 75% less energy than in 1975. It was also 20% larger and 60% cheaper. Since 1975, the per-capita food waste in the U.S. has increased by half, meaning that we throw away 40% of all edible food produced. We fill refrigerators with things we end up throwing away, because we have the capacity to do so. Wasted food wastes fertilizer, pesticides, irrigation water, packaging and

landfill capacity. More than 25% of US freshwater use goes into producing food that is later discarded.¹

The reason Jevons Paradox is so relevant today is because we're designing things to have a better impact on the environment. In reality, low prices attract people to consume more, and the environmental backfire is concerning. All arrows point toward the same story when it comes to manufacturing with efficient materials to improve environmental impact. The lower the ecological footprint, the less people will feel bad about their purchases, making them purchase more. My serveware aims to redefine short-term ownership of products, and builds rapport with eco-friendly bamboo. This will require me to examine how humans define value within the objects they own.

Finding the value in things we own

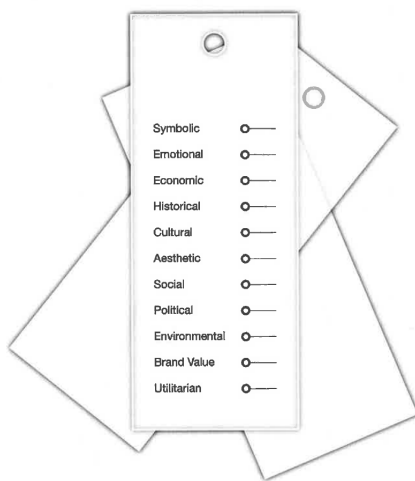


Figure 1. Boradkar, Prasad.

How can we define value in bamboo serveware? The literature I chose to reference is *Designing Things* by Prasad Boradkar. By understanding the things Americans value, he establishes a list of categories that discusses how value can be created, then ranks them in order of importance based on the object at hand. I thought of Boradkar's list of value categories from the perspective of a commercial designer. How do I use contemporary market trends to understand product value for my potential audience? If a product is priced at a higher value,

¹ Owen, David. "The Efficiency Dilemma." *Annals of Environmentalism*, The New Yorker, 13 Dec. 2010, www.newyorker.com/magazine/2010/12/20/the-efficiency-dilemma.

people will take better care of it. With Bamboo Boats, value is established once a user decides to use a significant amount of their money to own the product, also known as buyer's choice.

People want what's trendiest on the market. Think about the valuable designer serveware one might see in Nordstrom or Neiman Marcus. What value categories are present in the product? (Fig. 1). Most people buy dishware because of its functional value- they simply want to put it to use- but expensive dishware might only be used for special occasions or simply put on display.² Does a high-end product have a functional value to it? Or is it simply aesthetic? Does owning expensive products indicate high income, giving the designer bowl social value? Or does this explain overall culture? The value categories relevant for serveware are economic, functional, social and aesthetic, not ranked in any order. Analyzing the value preferences of kitchen serveware gives me criteria to work with, and the ability to implement new ones. To be congruent with new trends and promote sustainable materials, my project will incorporate biophilia, a love of nature as a value category to entice consumers to purchase my bowls.

Biophilia in Commercial Design

I will attempt to win consumers over by adding biophilia as a value which instills a nostalgic love for nature. Two reputable designers who make luxury serveware are Michael Aram and Zaha Hadid (her design firm). Their designs are different from each other, but both emulate themes of nature. Above (Fig. 2) is an image of Zaha Hadid's dishware,



Figure 2 Hadid, Zaha. *Serenity Platters*

² "Valued Possessions: The Worth of Things." *Designing Things: a Critical Introduction to the Culture of Objects*, by Prasad Boradkar, Bloomsbury Academic, 2014, pp. 45-59.

costing over 200 euros. Apart from the sleek, metallic look, the first thing one notices is the ripple that spreads across the plate. When I see this, I think of water, and I also think it's too delicate to touch. Hadid's organic forms are calm and sleek, whispering accents of nature to bring inside the home.



Figure 3. Michael Aram. *Black Orchid Pitcher*.

Michael Aram approaches biophilic design differently. He gives his serveware a more literal glance at nature. In this piece, called Orchid Pitcher, Aram creates a delicate handle to look like a vine (Fig. 3), the functional part of the piece users come into contact with. Both Aram and Hadid's designs are delicate, dynamic, and highlight aspects of nature in a way that serveware neglects.

Fractals in Nature and Design

What happens when biophilic designs are brought into the home? Numerous reports show that people prefer natural environments over the built one.³ Filling a home with biophilia will decrease mental stress and anxiety, and has been shown to decrease heart rates and make people more productive.⁴ A study by the University of Michigan even claims that spending an hour

³ Hägerhäll, Caroline & Laike, Thorbjörn & Taylor, Richard & Küller, Marianne & Küller, Rikard & Martin, Theodore. (2008). Investigation of human EEG response to viewing fractal patterns. *Perception*. 37. 1488-94. 10.1068/p5918.

⁴ "Biophilia & Healing Environments: Healthy Principles for Designing the Built World." *Biophilia & Healing Environments: Healthy Principles for Designing the Built World*, by Nikos Angelos Salingaros, Terrapin Bright Green, 2015.

outside will make one 25% more productive when returning to work.⁵ Filling a home with biophilia can include any items such as houseplants, wooden furniture and organic forms.

Repetition and pattern is used to create intriguing textures and forms that are biophilic. Fractals are a type of repeating form that gets smaller and smaller, and can be found in nature. The human brain finds fractals in nature biophilic, and can spark a certain type of delight in the human brain that traces back to ancestral times before *homo sapiens* were domesticated. Fractals in design have the same psychological benefits on a person as being in nature.⁶



Figure 4. More Fractal Leaves.

Ikea Introduces Eco-friendly Products



Ikea's collection from summer 2019 introduces environmentally-friendly practices and products. As IKEA announced this line, they vowed to use all renewable and recycled materials by 2030, and their first step in this direction was to introduce the summer 2019 collection. This lamp, KNIXHULT, was seen in IKEA as part of the 2019 summer collection. On the price tag

⁵ Nrhoads. "Going Outside-Even in the Cold-Improves Memory, Attention." *University of Michigan News*, 16 Dec. 2008, news.umich.edu/going-outsideeven-in-the-coldimproves-memory-attention/.

⁶ "Biophilia & Healing Environments: Healthy Principles for Designing the Built World." *Biophilia & Healing Environments: Healthy Principles for Designing the Built World*, by Nikos Angelos Salingaros, Terrapin Bright Green, 2015.

details, the lamp describes itself as “a soft glowing light that gives your house a warm and welcoming atmosphere”. More importantly, the rest of the description continues to explain “a unique product since it is made of bamboo with natural color variations and is hand-woven by skilled craftspeople.” Even with the social benefits the product claims to make, does KNIXHULT fit the description of good contemporary design?

KNIXHULT (Fig. 6) has interwoven bamboo crosshatches that fill the inner dimension of the form with light, and lets a little bit spill out into the room. The whole piece is overwhelming with a noisy texture. The form sits bottom heavy and masculine. KNIXHULT looks sturdy, it looks confident, and wants attention. But that’s not what millennial-environmentalists want. KNIXHULT is environmentally friendly and sets new stakes for revaluing labor on a commercial scale like no other. As the people who care the most about the social problems KNIXHULT begins to improve, it’s a hard compromise for millennial environmentalists to purchase a KNIXHULT when it doesn’t replicate aesthetic features of contemporary design. IKEA’s ultimate goal is to tailor their products to the social values of their customers. IKEA will continue to commission material scientists and sustainable designers to reinforce their sustainability vision of using all sustainable and recycled materials by 2030, but they might need more guidance regarding the official steps to take.

Bamboo as a reliable material

Most bamboo products are relatively cheap because of how efficiently bamboo grows. To grow and harvest bamboo takes a lot less time than to grow and harvest pine, oak, and any other wood used as a building material today. As far as material procurement goes, bamboo is a better option

because of its fast growth rate, durability, strength and light weight. Bamboo is not in the tree family, rather it's a perennial grass. Farmers will tend to a brand new bamboo garden for 5 years before the plants begin to grow, watering flat soil day after day. But after five years, some plants can grow three feet in a 24-hour period. Most take six weeks to easily become nine feet tall, and the garden flourishes for years and years to come.⁷

Bamboo is used to build scaffolds, houses, furniture, and sculptures. Some types of bamboo are more durable than steel, and is often used for scaffolding in construction in developing countries. Bamboo is a common building material to use in Asia, but isn't as common in America. Recent trends in the U.S. show lightweight bicycles made out of bamboo. I chose to substitute bamboo for other materials for this project. A 2015 report publishes a life cycle assessment that compares bamboo products to wood products.⁸ The findings show that bamboo is the best material option (without factoring in the transportation of goods). If bamboo products are incinerated as biofuel at the end of its use, they even have a carbon negative life cycle. The perennial grass not only wins in strength and sustainability, but the antifungal properties make it ideal to be natural dishware. It's a great material to use for kitchen products. Users don't have to worry about their bamboo bowl shattering on the floor like glass does, or melting like a plastic spatula in a hot pan. Product durability is another value feature to be taken into consideration. Bamboo is a responsible material choice when it comes to mastering environmental sustainability.

⁷ Pyzyk, Katie. "5 Of the World's Most Eco-Friendly Building Materials." Smart Cities Dive, July 2, 2018.

⁸ "Biophilia & Healing Environments: Healthy Principles for Designing the Built World."

Methodology

Accessibility and Opportunity with Bamboo

Purchasing bamboo for small-scale production in the United States is difficult to do. 6-foot bamboo stalks are available in bulk from Home Depot, but the stalks have to be cut down, dried out and planed to an equal length, which wasn't feasible to do. My best option was to buy sticks of bamboo used for craft; 15.5 x 0.6 x 0.25 inches. These sticks of bamboo were all I could find, and I played along with means of accessibility as one of my constraints. I purchased these sticks on Amazon for a decent price. At first, I wasn't sure what to do with the large craft sticks I purchased. I planned to edge-laminate them with glue to create a board, then soak it to increase



Figure 5. DYWISHKEY.

flexibility, and mold into the shape of a plate or bowl.

Needless to say, the glue was waterproof, but not as durable as I had hoped. Any alternative processes I had in mind couldn't involve gluing the pieces together before soaking them. The $\frac{5}{8}$ inch-wide craft sticks were too small of surfaces to clamp and glue to make a larger plane. During one of my critiques with

sculpture artist Michael McGillis, I was told to let my material do the decision making, manipulate it as much as I can, but in the end, the material speaks for itself in how it will hold its form.

As I continued to play along with themes of accessibility, I got creative with what restrictions I had. For my material exploration, I focused on the technical abilities the bamboo sticks hold. I edge-laminated, soaked, planed, steam-bent, molded, sanded, and stained the strips

of bamboo to create shapes I like. I began to use my at-home rice cooker as my vessel to steam the wood in, and it worked wonders.

Market Research

Once I began prototyping and sketching what my bamboo bowl would look like, I wanted to know what else was on the market regarding luxury serveware by understanding what the average adult is attracted to. I infiltrated the platform most housewives are comfortable with: Facebook. I introduced myself to my mother's Facebook friends and groups of middle-class women in the Metro Detroit area. I introduced myself and my intentions as a design student to learn about their favorite silverware and asked non-biased questions. Soon, men and women from the metro Detroit area sent pictures justifying their favorite serveware. To visualize my research, I pieced together keywords they used. Some words I documented were: minimal, contemporary, modular and simple. One person deemed himself a culinary artist. His submission consisted of a white ceramic plate with the edges tinted beige. His only words: "I am a culinary artist and this is my canvas." It's clear people want their serveware to inspire creativity, and simple palettes do that best. Given the limitations of my bamboo material, I set out to implement biophilic elements for aesthetic purposes as much as I could to create inspiring serveware.



Element of Play

I visited a design shop in Wynwood, Miami February 2020. I saw designs by Zaha Hadid and Michael Aram, whom I had mentioned earlier. There I saw another piece for sale. The product started as a metal sheet with little triangular holes punched out. It was a jewelry holder. When a consumer purchases the product, there is an element of play when they first receive it. The user presses the copper sheet into a bowl, deciding the form and how they want to interact with it.



With my bamboo sticks, I was able to create a form that incorporates elements of play, giving the user the ability to choose how big or small they want their bowl to be, and to store it efficiently when needed.





Creative Work

I went to work with new goals set out for me from my marketing research. I wanted to create something modular yet simple and made from bamboo. I let the material tell me how to manipulate it, and I ended with a 2-dimensional curve made of steam-bent sticks of bamboo layered on top of each other. The user fans out the individual sticks of bamboo to swing up and around, creating a bowl while all the ends of the sticks stay connected with a dowel rod. With this project being a material exploration for a functional object, sacrifices were made in order to use the best material choice possible with the best manufacturing narrative.

Bamboo Boats is a space-efficient, minimalist, interactive piece of serveware meant to enhance the user's space with trendy dishware and innovative hospitality. A Bamboo Boat establishes a close relationship with natural materials; users open the bowl by fanning out the sticks, and close it at the end of its use. This incorporates aspects of biophilia: contact with natural materials and incorporating themes of repetition, similar to fractals found in nature. Bamboo Boats calls us to expand our ideologies of sustainability beyond single-use plastic, and understand that sustainable materials can be used to create luxury products as well.

Conclusion

Today, we see more and more bamboo being used to make cheap products: toothbrushes, water bottles and even bicycles. My project, Bamboo Boats suggests that we redefine the way the Western world uses bamboo. Instead of seeing bamboo as cheap, Bamboo Boats encourages consumers to consider the value of this material because it's trendy, space-efficient and better for the environment. The material restrictions I confronted were unfortunate, but I hope to have

inspired newfound creativity when approaching problems regarding sustainability for future designers so that they will choose eco-friendly materials without losing sight of contemporary design expectations.

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