TRUST THE BANANA TRUSS

CONCEPT

Strength in Shapes

Triangles, which are considered the strongest shapes, make up the structure of the banana stand. From the base, the triangulation of the structural elements starts with a pyramidal support that effectively distributes the weight of the main structure. The rest are made up of tetrahedron-shaped modules (with the consideration of the tetrahedron as the strongest three-dimensional shape). These modules are strategically connected to form a projected shape that will serve as the carrier of the load.

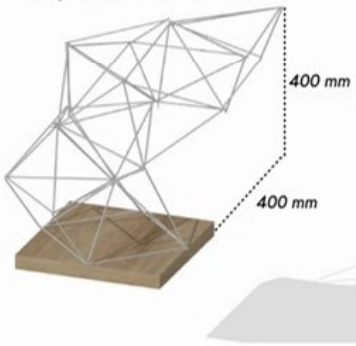
Efficient Material Use

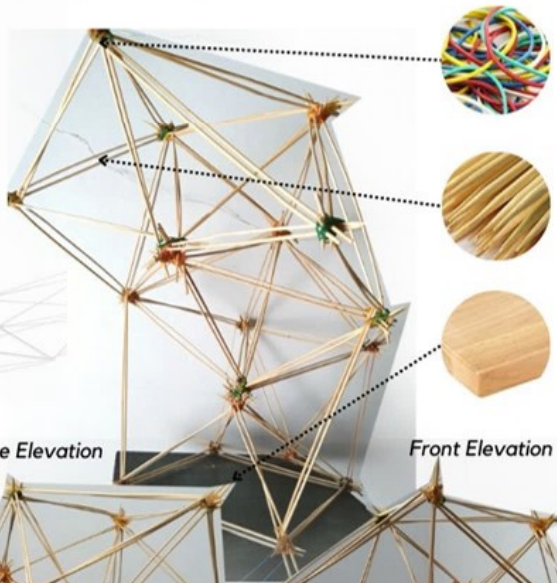
Aside from the base, there are only two materials used in the structure: barbeque sticks and rubber bands. Because of the limited length of the barbeque sticks, a truss-like system was utilized instead of the common beam-column system. This also allowed for a lighter structure while minimizing the number of materials used. Similarly, instead of using more complex and time-consuming connecting materials, rubber bands were chosen to provide a more flexible and lighter alternative. In terms of cost, less than fifty pesos were spent on the whole structure.

Sculptural Design

The triangulation of structural elements allowed the conception of a sculpture-like design. The modules also were carefully arranged with one another to form a diamond-like structure when seen from the rear (please see rear elevation). Additional bracing (rubber bands and sticks) was also placed at the sides to make the structure more cohesive.

Important Dimensions





MATERIALS

Rubber Bands

The bands served as the connecting joints of the structure. Two to four bands were used for each joint.

Barbeque Sticks

The bands served as the connecting joints of the structure. Two to four bands were used for each joint.

Wooden Base

The base served as the main stabilizing element of the structure. It also added weight to balance the loads.

Right Side Elevation

Left Side Elevation

Front Elevation

Rear Elevation

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LOAD TESTING

PROTOTYPE AND LOAD WEIGHING

Prototype

A hand of banana

Six additional bananas

hand of banana plus the additional bananas

book

Load	Weight (Kg)
Prototype	1.15
Hand of banana (8 bananas)	0.675
Additional 6 bananas	0.5 (approx. 0.083 per pc.)
Book	0.35

The prototype and all the loads used were weighed using a typical weighing scale. The prototype weighed a little over a kilogram while the minimum load required (a hand of banana) weighed a little over half a kilogram. Nevertheless, the minimum load and the additional load would weigh more than the weight of the prototype.

LOAD TESTING

A hand of banana (video)

Although the structure showed some movement when the load was placed, the banana stand was able to fully support a hand of banana.

One additional banana (video)

Two additional banana (video)

Three additional banana (video)

Four additional banana (video)

Five additional banana (video)

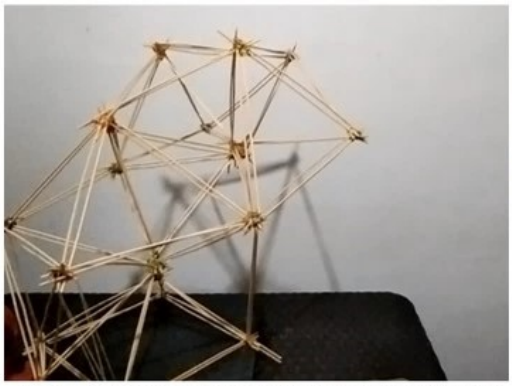
Six additional banana (video)

To check the capacity of the structure, more load was gradually applied through the addition of more bananas (one banana at a time). The six videos exhibit the reaction of the structure after the addition of one, two, three, four, five, and six additional fruits. As the number of loads increases, the deflection of the upper part of the structure becomes more evident. During the addition of four bananas, the displacement was estimated to be an inch.

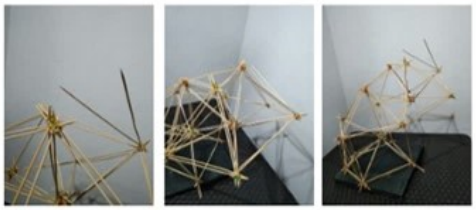
Nevertheless, no physical damage or rupture was recorded.

Additionally, the structure bounces back to its original form once the loads were removed. This movement or deflection was assumed to be the consequence of using rubber bands as the tension-bracing material at the back of the structure. The use of sticks or other rigid materials might help prevent this.

PHYSICAL DAMAGE



A hand of banana, six additional banana, and a book (video)



	Weight (Kg)
Instability/ Deflection/ Buckling	0.675
Physical Damage/ Slight Rupture	1.475
Complete Collapse/ Damage	None

Finally, another load (a book) was added to check the limit of the structure. Right after placing the book after the original and additional bananas, one of the connecting joints where the loads were hooked collapsed. The sticks connecting to the main hooking joint slipped from the rubber band connection which prompted the fall of the loads. Nevertheless, the rest of the structure was unaffected and bounced back to its original position. However, no more loads can be placed since the hooking joint lost one of its major supports from the main structure.

To prevent this from happening, a stronger connection should be used especially near the hooking joint.