

EXERCISE: MARSHMALLOW TOWER**AUTHOR: BRADLEY GEORGE****Description**

Groups of students compete to see who can build the tallest freestanding structure supporting a marshmallow on top out of 20 pieces of spaghetti, three feet of tape and three feet of string. This exercise is used to illustrate that under conditions of uncertainty, entrepreneurs rely on experimentation and iterative learning as a means to discover information about their environment. Students are often taught and are familiar with traditional methods of planning and analysis, which work well in stable environments where the future is likely to be similar to the present. In these cases the future is fairly well known and understood. While some uncertainty exists, it can be categorized as risk. However, if the future is unknowable, the only way to learn what may work is through experimentation. Typically many of the students spend a large portion of their time designing and planning the structure and only start to build it at the end to find out at the last moment that it cannot support the weight of the marshmallow, and they then go into "crisis" mode. The teams that perform the best are usually those that just start experimenting, learning what works and then modifying their tower based on what they learn. If you are using lean start-up concepts it is also a good way to illustrate the value of market tests.

Usage Suggestions

This exercise works for all audiences, undergraduate, graduate, executive, or practitioner. It is appropriate for new venture creation courses, entrepreneurship bootcamps, or workshops. The session is best positioned early in the course for discussions around planning versus action.

Learning Objectives

- Practice and learn the concepts of effectual versus causal logic.
- Illustrate when planning is appropriate versus action.
- Employ experimentation techniques.

Materials List

- Create a kit for each team (about four people per team), with each kit containing 20 sticks of spaghetti, one yard of masking tape, one yard of string, and one marshmallow. These ingredients should be placed into a paper lunch bag or manila envelope (excluding the masking tape), which simplifies distribution and hides the contents, maximizing the element of surprise. The masking tape should be hung on the desks or on the wall for distribution, as putting it in the bags generally causes problems.
- Ensure that you use uncooked spaghetti. Avoid spaghetti, as it is too thin and breaks easily. Fettuccine is too thick.
- Include string that can be easily broken by hand. If the string is thick, include scissors in your kit.
- Use standard-size marshmallows that measure about 1.5 inches across. Avoid mini or jumbo marshmallows. Also avoid stale marshmallows – you want squishy marshmallows that give the impression of lightness.
- You will also need a measuring tape and a stopwatch or countdown application.
- Having a countdown application projected on the screen where they can see the time counting down is preferred (use an online stopwatch on your computer if convenient).

Pre-Work Required by Students

None.

Theoretical Foundations

- Kiefer, C.F., and Schlesinger, L.A. 2010. *Action Trumps Everything: Creating What You Want in an Uncertain World*. Duxbury, MA: Black Ink Press.
- Ries, E. 2011. *The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses*. New York: Crown Business.
- Sarasvathy, S.D. 2001. Causation and effectuation: Towards a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, 26(2), 243–88.

Time Plan (45 minutes)

0:00–0:05 (5 minutes)

Step 1

Hand out the kits to each of the teams. Introduce the challenge. Be clear about the goals and rules of the Marshmallow Challenge. It is

also helpful to tell them that this has been done by tens of thousands of people around the world from children to CEOs. The rules and goals are as follows.

Goal Build the tallest *freestanding* structure: The winning team is the one that has the tallest structure measured from the table top surface to the top of the marshmallow. That means the structure cannot be suspended from a higher structure, like a chair, ceiling, or chandelier.

Rules

- The *entire* marshmallow must be on top: The entire marshmallow needs to be on the top of the structure. Cutting or eating part of the marshmallow disqualifies the team.
- Use as much or as little of the kit as you choose: The team can use as many or as few of the 20 spaghetti sticks, and as much or as little of the string or tape, as they choose. The team cannot use the paper bag as part of their structure.
- Break up the spaghetti, string, or tape if you choose: Teams are free to break the spaghetti or cut up the tape and string to create new structures.
- The challenge lasts 18 minutes: Teams cannot hold on to the structure when the time runs out. Those touching or supporting the structure at the end of the exercise will be disqualified.

Ensure everyone understands the rules: Don't worry about repeating the rules too many times. Repeat them at least three times. Ask if anyone has any questions before starting; a good idea is to provide a handout with the instructions in the kit.

Step 2

0:05–0:25 (20 minutes)

Begin the challenge by starting the clock.

- Walk around the room and note the process that different teams are using.
- Remind the teams of the time: Increase the reminders as time gets shorter (for example, you might remind them at 9 minutes, 5 minutes, 3 minutes, 2 minutes, 1 minute, 30 seconds and then a 10-second countdown).
- Call out how the teams are doing: Let the entire group know how teams are progressing. Build a friendly rivalry and encourage people to look around.

- Remind the teams that holders will be disqualified: Several teams will have the powerful desire to hold on to their structure at the end, usually because the marshmallow, which they just placed on to their structure moments before, is causing the structure to buckle. The winning structure needs to be stable.

0:25–0:30 (5 minutes)

Step 3

After the clock runs out, ask everyone in the room to sit down so everyone can see the structures. Usually only about half the teams will have a standing structure.

- Measure the structures: From the shortest standing structure to the tallest, measure and call out the heights. If you're documenting the challenge, have someone record the heights.
- Identify the winning team: Ensure they get a standing ovation and a prize (if you've offered one).

0:30–0:45 (15 minutes)

Step 4

Start by asking some of the teams about the process they used to go about building their structures. You can choose based on what you observed during the challenge. You will generally notice as you go around the room that teams that spend most of their time planning will fail to have a standing structure in the end. Those who experiment and learn through trial and error tend to do much better. It is usually best to start with some of the teams whose structures collapsed.

- What process did you use in building your structure?
 - Focus on whether they spent a lot of time planning and drawing their structure or trial and error.
- What went wrong?
 - This often highlights issues around unknown factors such as how much weight the spaghetti could support or how much the marshmallow weighed relative to the structure.
- How did you deal with that?
 - This will often point out the fact that extensive planning leaves little time for adjusting and learning from experience and results in a "crisis."

Repeat this with one or more of the more successful groups and try to capture differences and commonalities between them.

You can draw comparisons to various other groups who have done this challenge. The creator of the challenge, Tom Wujec, has performed this

challenge numerous times with a variety of different groups and has found the following:

- The best performers tend to be engineers (good thing). They understand structures and stresses, so this is a more certain environment for them.
- The worst performers tend to be recent business school graduates. They are in a very uncertain environment given limited knowledge about structures. However, they have typically been taught to plan, plan, plan. They spend most of their time planning and then try to build the structure at the last minute. When they put the marshmallow on top it weighs much more than they anticipated and the structure collapses, creating a crisis.
- After engineers, the best performers are recent kindergarten graduates. They are also in an uncertain environment, but they tend to experiment to see what works, learn from that, and build off it to create much more interesting structures.

Emphasize the importance of market tests and experimentation when entering a new, unknown environment. If your students are already working on business ideas, this can be a good place to have them try to think about low-cost ways they could experiment with their concept before making large investments.

As an alternative debrief, you can show the TED talk by the creator of this exercise by going to www.marshmallowchallenge.com.

Key Takeaways

- In an unknown environment, it is better to take action than to plan.
- Learning from small experiments and trials can produce more unique solutions – particularly if the future cannot be predicted.
- Failure can provide important insights to improving products or services.

Teaching Tips

Be very clear about the goals and rules of the challenge. Generally, you'll want to repeat them three times and reinforce them visually. In almost every challenge, there is at least one team who will want to cheat or bend the rules in their favor. The clearer you are about the rules the better the results.