

Hwa Chong Institution
Project Work
Category 3
Inventions Log Book
(Revised for 2021)

Title of Project: Project Bottle: Save the Soap!

Group Name: 3-41

Group Members:

- 1) Benjamin Lee
- 2) Caelen Chang Kai Mun
- 3) Hou Ke Yang
- 4) Yu Yao Quan

1. Problem Finding

(The beginning...)

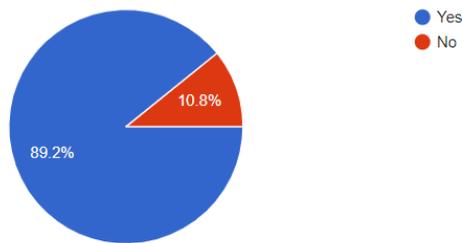
Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches e.g. thematic, survey or general brainstorming etc.

1 A Document a list of problems you have identified. Your documentation should show clearly how your group came up with the problems.

Our group identified a problem with soap bottles. Whenever soap bottles have little soap left in them, it is troublesome to get the soap out of the bottle. We created a Google form and conducted a survey to see if people had this problem. 89.2% out of 102 responses indicated that this problem was relatable, and 94.1% of these 102 responses wished for this inconvenience to disappear. Below are the results of our survey (pertaining to the wasted soap issue):

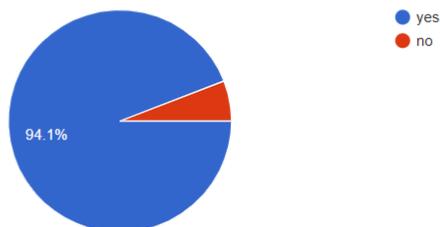
Is this inconvenience relatable?

102 responses



Do you wish for this inconvenience to disappear?

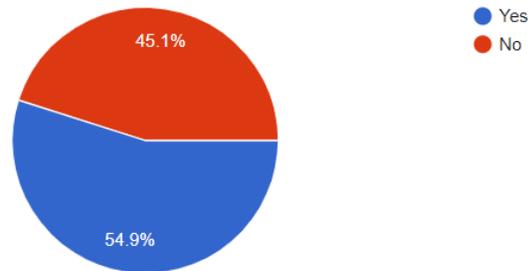
102 responses



Our group identified another problem with camping tents. When setting up tents, the process is often time-consuming and exhausting. We surveyed that 54.9% of the 102 respondents found this problem relatable.

Is this relatable?

102 responses



The last issue our group found was that clothes got dirty very quickly and very easily. However, since this idea was deemed unoriginal by us, we chose not to further pursue this problem.

1 B You should have selected a problem based on some considerations. Identify and justify these considerations.

Some considerations are:

- 1.How common the problem is
- 2.How possible it is to solve the problem
- 3.The scale of the problem and the impact it has on people

The first and third considerations allow us to be able to focus on problems that will be able to help more people and solve actual problems that may trouble them in their day to day lives. The second consideration allows us to judge if a problem is worth focusing on due to the fact that some problems may be too difficult for us to solve with our current knowledge, an example being climate change and world hunger.

1 C List some problems your group would like to solve. List also the considerations for selection of problems in the evaluation grid below. Score the considerations, against the problems, with points 1 (least significant) to 4 (most significant). Sum up the total points for each problem. Identify that problem you would like to solve.

Problem Evaluation Grid

*add more columns and rows where necessary

Considerations for Selection	Problems		
	Difficulty to get soap out of soap bottle	Long time to set up tent	Clothes get dirty
How common this problem is	3	1	2
Possibility(of solving the problem)	3	1	2
Scale (the extent of the problem)	3	2	1
Total Score	9	4	5

2. Define the Problem

(This is one...)

Now that the problem has been identified. It is important to gather information on the extent of the problem and/or evaluate the usefulness of existing solutions based on *some criteria*. You may need to conduct surveys and research on existing solutions.

2 A Extent of problem (Research and discuss the problem and write down the problem statement)

The extent of the problem with the soap bottles seems mild at first. It only causes inconvenience. However, with many occasions of soap wastage occurring, this can be detrimental to the wastage of oil used in soap and the other natural resources and non renewable resources which would be used up in the future if we do not slow down the rate of wastage. Wasted soap has a high chance of being dumped in the sea. With the surfactants in the soap that encourage algae blooms, the ecosystem might be harmed, destroying biodiversity. The soap that goes into the sink would go into the sewers and the contaminated water would be treated through filtration.

The extent of the problem with tents is medium. With longer time setting up the tent, the campers can be exposed to different possible dangers depending on the location. It also creates trouble for people to spend a long time setting up a bulky tent. The extent of the problem with the soap bottles is more severe as not only does it cause inconvenience and wastes soap, but it also has adverse effects on our marine biodiversity. The extent of the problem with tents is less severe as it only causes inconvenience, and instances of danger in legal campsites are rare. Such instances of danger would only occur in illegal campsites as the legal campsites would be already safe enough such that danger would be very rare, further decreasing the point of trying to solve the problem.

2 B Compare and contrast the existing or similar solutions.

There is a method currently used for detergent bottles that can be used for soap bottles but is not worth the trouble to get that last few drops of soap. The method is to cut a “V” shape in the bottle and open the flap. This is not very convenient for the user as they will use many soap bottles over a period of time, and cutting the aforementioned “V” shape on every one would be a long and unnecessary process, thus it is less troublesome for the user if the soap bottle were to be changed. There is also an instant tent that is light but not heavy enough to weigh down the tent, thus it is unfeasible.

3. Your BIG IDEA[#]

(Developing the idea....)

Write down your proposed invention and why you want to do it. State also how you think your proposed invention is better.

3 A Describe your proposed invention.

Our invention for the soap bottle is simple. As shown in the diagram, there is a dent at the bottom of the soap bottle. We will also use advanced pump mechanisms to fully optimise the purpose of the bottle.

3 B Explain the purpose of your proposed invention and the potential benefits to users.

The dent is to allow gravity to pull the soap towards the soap pumper for all the soap left to be pumped up. This saves the soap from being wasted and thus saves a few cents for the users and also saves soap which saves natural resources and reduces the amount of wasted soap entering the ocean to prevent more algae blooms which damage the biodiversity and ecosystem of the ocean. A few cents per bottle may seem like a small amount, but over time, the amount of soap (and by extension, money) saved will increase the more soap bottles used.

3 C In what ways would your proposed invention be different and/or better than existing solutions, if any?

Our proposed invention is better than cutting a hole in the soap bottle as it provides users zero hassle. The aforementioned method of cutting a hole in the soap bottle is also not very effective as different brands of soap have different viscosities, and some brands of soap may not flow out by cutting a hole in the soap bottle. Our bottle uses gravity just to pull down the soap to the base of the dentition for the soap to be pumped out by the advanced mechanism of the pump. In the case of gravity fed bottles (also known as airless bottles), our proposed product is less expensive to manufacture on a commercial basis and will be easier to pump, and the pump will also have a higher texture consistency compared to gravity fed bottles. Gravity fed bottles also are bulky because they use a lot of material in making them, but our bottles will be very lightweight and easy to carry around.

3 D What are some problems you expect in the course of your proposed invention?

We expect to find difficulty in getting a 3D printer to print out our bottles as 3D printers are not yet commonplace in our homes, so they would be on the expensive side. Soap companies might reject it as they want users to buy more of their soap to make more money, and our bottle might be less cost-efficient as the slope at the bottom decreases the capacity of our bottle. Most people might stick with more well-known brands of soap such as “Dettol” or “Lifebuoy”, and may be reluctant to change where they buy soap from.

3 E What and when are the major milestone (project timeline) in your invention?

Originally, we had planned to create the prototype model in April, purchase the materials for the prototype construction at the start of the June holidays, print it out in the middle of the June Holidays, and it near the end of the June holidays and Post-June holidays. However, because of COVID-19 restrictions, we were unable to gather together to do this project, and thus we were only able to create a softcopy of the 3D model of our product.

#must be able to be constructed based on current / emerging technologies, must not violate the laws of Science or go against the laws of nature.

4. Proposed Construction or Modelling Process*

(This first... then that...)

You are now onto the fabrication of your prototype/ product. You need to select material and understand how to put them together so that your prototype/ product can perform its function.

4 A Explain how and why the materials were chosen for the prototype/ product of your invention

Plastic. It is cheap and easy to construct with a 3D printer, which makes it more scalable, thus we can pump out such bottles at a very fast rate. Also, it is lightweight, making it more mobile.

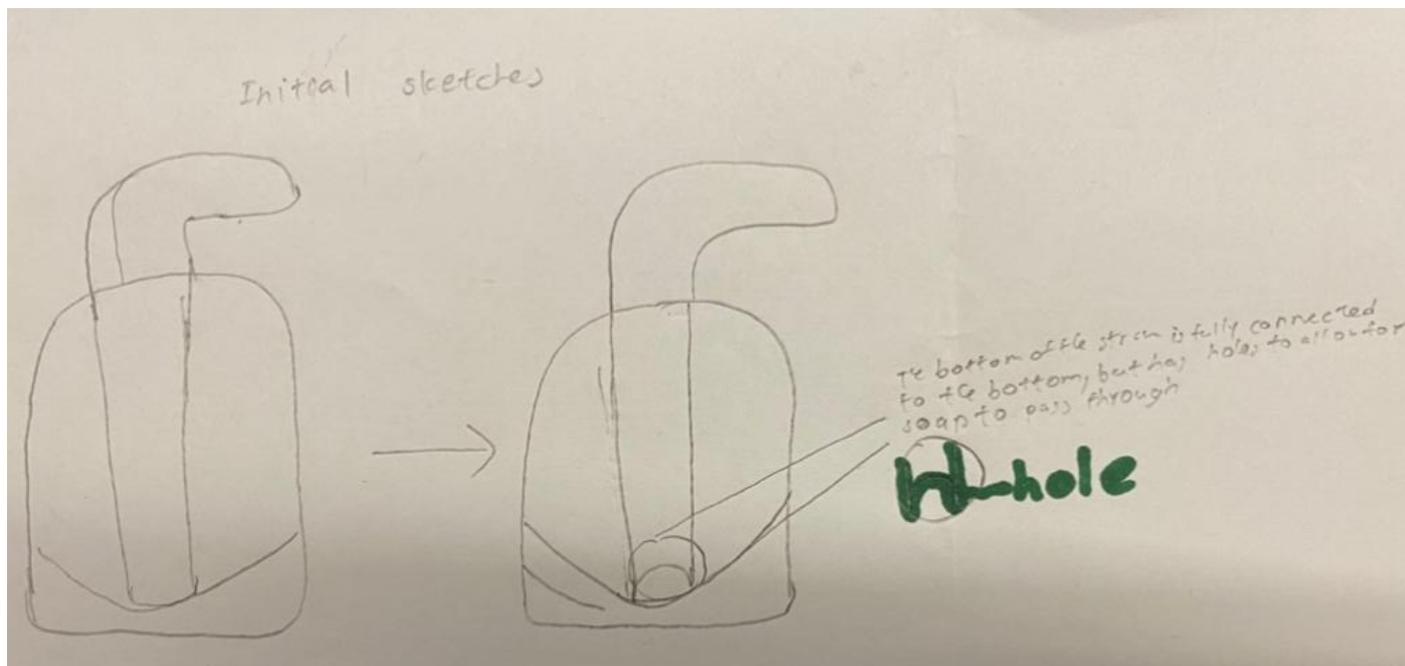
4 B Explore these considerations that may guide the construction of your prototype/ product.

How do we improve the existing designs in the market?

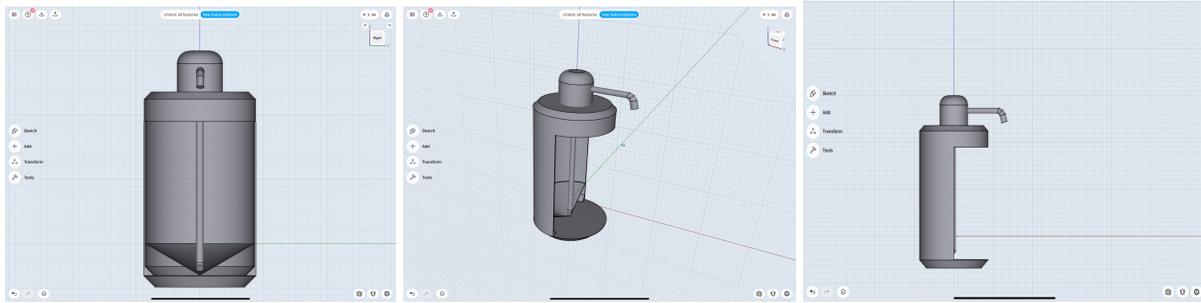
How do we keep the cost low but the quality of the product high?

How can we improve the current flawed design of the lotion pump?

4 C Document the prototype/ product development stages. You may use drawings, photographs or videos.



Above is the initial sketch of our new product.



Above are the completed 3D models of our product.

OR

If construction of the prototype is not possible, then you have to create an animation / as a proof of concept that it can be applied in a bigger scale.

4A Explain why construction of a prototype is not possible and the proof of concept is needed in your case.

We could not construct a real life prototype due to time constraints as COVID-19 restrictions ramped up around the June holidays, and we could not physically meet up to buy/borrow a 3D printer for the construction of our prototype. However, we have prepared a softcopy of our prototype to be constructed in the future.

4B Briefly explain how the video / animation can effectively show how your invention will work and the different considerations.

The longitudinal section of the soap bottle represented by the animated 3D model of our design of the bottle shown above in the pictures show that any residual soap along the sides of the bottle would be pulled down by gravity into the dentition of the bottle where the straw of the pump is, allowing maximum efficiency for soap to be pumped out of the bottle.

Warning:

- *Video / animated simulation only if prototyping is absolutely no possible.*
- *Video / animated simulation must be logical and convincing that the invention works.*
- *Constraints must be clearly included in the logbook or the project will be heavily penalized.*

5. References

Read <http://www.bibme.org/citation-guide/apa/> on how to cite references.

6 A Cite the references you have used for your project work. Your source of reference should come from different types (eg books, magazine, websites, journal articles, interview, photographs, product brochure, reviews etc.)

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