

Hwa Chong Institution

Project Work

Category 3 Inventions Log Book

Title of Project: Clothes Shield
Group Name: 3 - 21
Group Members: 1) Chua Bing Heng 2) Lau Tat Hong 3) Tan Jun An 4) Wang Zejia

1. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want to brainstorm for problems using different approaches eg 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 decided to focus on the theme of household problems. We thought of a few problems through our observations.

1. It is hard for people to dry their clothes during the rainy season, and people are worried when it rains and their outdoors
2. People slip and fall while mopping the floor due to the residue and water left on the floor after mopping
3. People often spill their food on the table or onto the floor

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

In the end we selected the problem #1, people find it hard to dry their clothes during the rainy season and worry when they are outdoors.

We based our decision on these considerations

1. Extent of the problem
2. Feasibility
3. If existing solutions are able to solve it

There were existing products to solve problems #2 and #3, and the extent of the problem is not too great. Problem #1 had **existing but expensive products** to solve it.

Problems #1 and #2 were **feasible** but problem #3 was very hard to solve due to bowls and plates varying in sizes shapes and design.

Thus we chose problem #1 to solve

1 C List some problems your group would like to solve. List also the considerations for selection of problem 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

Considerations for Selection	Problems		
	#1	#2	#3
Feasibility	4	4	1
Extent of Problem	4	4	2
If existing solutions are able to solve the problem well	3	1	1
Total Score	11	9	6

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)

Drying outdoors:

1. Clothes can get wet during rain, and people have to rewash
2. People worry when they go outside
3. Strong winds can blow clothes away
4. Birds or other animals can dirty your clothes
5. Exposed to allergens (pollen etc.)

Drying indoors:

1. The moisture resulting from drying clothes indoors increases mold and bacteria growth in house
2. Walls filled with mold, air filled with bacteria
3. Mold can cause allergic reactions in some cases
4. Bacteria causes family to get sick more easily

2 B Compare and contrast the existing or similar solutions.

Rotaire Dryline - Classic Square

Advantages:

1. Acts as tentage to block rain

Disadvantages:

1. Unable to dry clothing due to opaque tentage
2. Sides are not covered allowing wind blown rain to wet clothes

Lennon - All Weather Clothes Line

Advantages:

1. Blocks clothes from rain
2. Clothes can dry out even in rain (transparent)

Disadvantages:

1. Very costly

Clothesline Canopy

Advantages:

1. Blocks rain
2. Clothes dry out even in rain

Disadvantages:

1. Affected by strong wind
2. Costly
3. Still affected by pollens and other allergens

Clothes Shield (Our product)

1. Blocks rain, blocks allergens
2. Is suitable for use in Singapore, where majority of people live in high rise buildings

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.

The invention would be an aluminium body with a plastic sheet covering the top and sides. There would be clips/hooks at the bottom of the body to attach to the drying poles to prevent it from falling

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

The purpose is to block the rain and prevent it from drenching the clothes. People would not need to worry about their clothes getting drenched by the rain when they are outside. They would also not need to dry their clothes indoors, which can cause increased bacteria and mould growth.

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

Drying Rack - Drying Racks are placed indoors and although they do not get exposed to the rain, they increase the moisture levels of the house and can cause increased bacteria and mould growth. Our product is able to prevent rain from drenching it and not cause bacteria and mould growth in your house.

Tumble Dryers - Tumble Dryers require a lot of energy to run and is very costly. It also requires maintenance. A Tumble Dryer can also damage your clothes if it is not suited for tumble drying. Our product is cost and energy efficient and is also able to

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

The clothes may not dry as fast as the plastic would retain the moisture

The wind may not be able to blow on the clothes because of the plastic and cause the clothes to dry slower

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

After Proposal Evaluation

Collecting materials done by 1/6/2019

Building our 1st prototype:

1. Body done by 12/6/2019
2. Cover done by 26/6/2019
3. 1st prototype done by 1/7/2019

Mid-Term Evaluation

Building 2nd prototype:

1. Roof done by 6/8/2019
2. 2nd prototype done by 6/8/2019

Testing done by 6/8/2019

Final Evaluation

4. 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

The materials chosen for our model is based on the materials' weight, durability, water resistance and other factors that makes the overall user experience better for people using our invention.

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

Is the invention user friendly?

Is the invention and the materials durable?

Is this the best we can do?

Is water going to be blocked no matter which direction the rain may be blown by the wind?

Is the material the lightest we can get within our budget?

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

1st Prototype:

1. Basic frame built using PVC pipes and connectors
2. Plastic cover using PVC sheets



2nd Prototype:

1. Better frame (arrowhead shape to deter rain)
2. Pivoted roof for easy collection and placement of laundry



5. Modification and Evaluation

Upon the completion of your prototype/ product, you would need to see if it is working the way you want it to work. Check if your product has met the identified purpose and the user's need; and implement necessary modifications and improvements. This process may take several rounds.

5 A Write down your prototype/ product test criteria and check against it if it works. Identify areas of weakness for modification. Indicate the test iteration and date of test.

Test Iteration: 1	Tick			Remarks
Test Date: 1/8/2019	Pass	Fail	Potential Failure	
Waterproof	(Tick)			The cloth did not get wet after water was poured onto the shield at the same time. (splashed from different directions that rain might hit the clothes from)
Durability/Stability	(Tick)			The pole used to hang is very steady as it is supported by the two poles at the ends which distributes the weight of wet laundry
Efficiency			(Tick)	The efficiency of drying was a little slower than if the clothes were just left out under the sun (See table below for details)

Test iteration: 2	Time taken to dry clothing (wet cloth put on dry clothing for 10 seconds before testing) (3pm-3.40pm)	Remarks
Control set up	~5min 30seconds	Normal circumstances
Test 1	~6min	Efficiency ~91%
Test 2	~5min 40seconds	Efficiency ~96%
Test 3	~6min 20seconds	Efficiency ~87%
Average	~6min	Efficiency ~90%

6. 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, magazines, websites, journal articles, interviews, photographs, product brochure, reviews etc.)

<https://thefrugalgirls.com/2011/07/benefits-of-drying-clothes-outside.html>

<https://www.thespruce.com/reasons-not-to-line-dry-clothes-2146726>

We conducted a survey to ask people on their opinions on the issue:

https://docs.google.com/forms/d/1pgNGIIdmYOuMx6W-Fi-q_giD2mnD_vOHVrrtVGWNCE

—