

# Hwa Chong Institution

## Project Work

### Category 3 Inventions Log Book

Title of Project: 2 in 1 Hanger
Group Name: 3-27
Group Members:  1)Yeoh Zhi Xin  2)Kek Cheng Xun  3)Poon Kai Hong Zane  4)Tan Yeow Siang Lucas

## 1. Problem Finding

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

We have come out with 4 problems related to a theme of household chores.

- They are: A) cleaning of the floor  
 B) cleaning of the windows  
 C) washing of clothes  
 D) drying of clothes

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

Out of the four problems, we considered the scale of the problems, availability of current solutions and the feasibility of the solutions. Using a decision making matrix as shown below, we found that the scale of the problem of drying of clothes was relatively big compared to the other problems and it was more feasible to come out with a solution for it.

**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 5 (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			
	Cleaning of floor	Cleaning of the windows	Washing of clothes	Drying of clothes
Scale of problems (5-Biggest; 1-Smallest)	4	5	3	4
Availability of solutions (5-Least; 1-Most)	3	2	2	3
Feasibility (5-Most; 1-Least)	2	3	2	4
Total score	9	10	7	11

## 2. Define the Problem

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

We conducted surveys asking people on a scale of 1 to 10, how frequent they faced problems when they were drying their clothes. Approximately 79% of the respondents said that they faced problems when drying their clothes (6 or more out of 10). We also asked them what the main cause of the problem was and 42.1% of the respondents said that the largest problem they faced was the need of too many hangers due to the different sizes of clothes. Another 36.8% said their problem was the inefficiency of drying clothes due to rain and limited space.

## **2 B Compare and contrast the existing or similar solutions.**

The existing solutions for the drying of clothes include the Jall Drying Rack, Electrolux Venting Dryer, Electric-heated Clothes Dryer. However, these products have their disadvantages. The Jall drying rack is that it is ineffective and takes up a lot of space. The Electrolux Venting Dryer is that it is expensive and takes up a lot of space. The Electric-heated Clothes Dryer is actually quite an effective solution to regarding the drying of clothes, however, the disadvantage of it is that it only works on shirts of certain sizes. As for solutions regarding the number of hangers needed for all sizes of clothes, there are the Handy Trends Flexi Dryer and the JORI Adjustable Clothes Hanger. The disadvantage of the Handy Trends Flexi Dryer is that it is ineffective as shirts slip off easily. The disadvantage of the JORI Adjustable Clothes Hanger is that it is ineffective as it only can be adjusted between two sizes.

## **3. Your BIG IDEA**

### **3 A Describe your proposed invention.**

Our invention is a hanger that has adjustable lengths and also has a mini fan hanging on it to blow wind on the shirt for it to dry faster. Penknife mechanics are used to adjust the length of the hanger. The fan can be attached to the hanger using tape. The product has to be cost-effective, small, durable, and waterproof.

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

According to our survey, 73.7% of people will benefit from this invention. Our invention would allow these users to dry clothes effectively indoors. This reduces the amount of plastic used as families can use the same hanger for any size of clothes, therefore not having the need to waste money to buy smaller hangers. With a mini fan, the drying process of clothes would be quickened. This is extremely useful as nowadays, houses are smaller and some do not have balconies to dry their clothes outside. Even those with balconies, rain may still affect them.

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

Our invention has adjustable lengths to hang clothes of many different sizes, which as mentioned earlier after doing the analysis of other solutions, cannot be found in other solutions.

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

It will be difficult for us to find a mini fan of small size that will be effective in drying the clothes. The mini fan must be waterproof and light, therefore preventing it from getting damaged by the shirt and falling off the hanger easily respectively. The shirt may also slip off the hanger if the shape of the hanger is too narrow.

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

We plan to start on our first prototype in June and complete it by the Mid Term evaluation. We would then be given some feedback, carry out some testing of our prototype, and would further improve on it. We aim to complete our final prototype by August, before the End of Year Evaluation.

## 4. Construction Process

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

The materials used for the prototype had to be cheap and easily available. The adjustable lengths of the hanger are made of cardboard in penknife cases which can be found easily in stationery stores and are cheap. However, it was difficult for us to find a mini fan of suitable size and power of wind. Eventually, we settled for a relatively cheap mini fan of \$10 that was usb-charged for our first prototype.

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

Our main goal when building this prototype was to ensure that the materials were cheap and easily available, yet being effective solutions to our given problems. This prevented us from over complicating our ideas and settled for a simple yet effective solution. Here is how our prototype was built.

Firstly, two penknives had their blades replaced with cardboard sheets.

Secondly, the head of a regular hanger was attached to these penknives using masking tape.

Thirdly, a plastic corrugated board is placed as backing to add stability to our prototype.

Lastly, a mini fan was attached directly onto the hanger with the usage of scotch tape.

Modifications to the final prototype would be addressed in 5A.

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

First prototype:



Final Prototype (reasons for modifications will be mentioned in 5A):



## 5. Modification and Evaluation

**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.**

**First prototype:**

Test Iteration:	Tick			Remarks
Test Date: 7/7	Pass	Fail	Potential Failure	
Ability to adjust length	✓			Generally successful. The hanger as a whole however was still slightly unstable and bulky.
Ability to dry clothes faster			✓	Even though it was generally effective, the hanger could still be improved as the fan was could only dry the top part of the shirt.

**Modifications:**

After this test, we felt we had to make a few changes to our first prototype.

Firstly, our product was slightly too bulky due to the protruding fan. Therefore, we decided to place the fan directly underneath the hanger, as seen from the pictures above, so that it would protrude less.

Secondly, since it was only attached to tape, it eventually fell off after a few usages. It was also pretty troublesome when there was a need to charge the fan as we had to take off the tape to charge it and retape it back onto the hanger again when we needed to use it. Therefore, we decided to attach it to the hanger using velcro instead, which easily solved both our problems, making it way more durable and more convenient to charge.

Thirdly, the initial mini fan also ran out of electricity after 40 minutes, which may not be enough for bigger clothes to dry. Therefore, we got a new fan that had a longer life span of 1 hour.

Lastly, the initial hanger could only dry the top part of the shirt. Therefore, we changed the mini fan's position such that it dangles from the hanger and blows air around the middle of the shirt.

Additionally, the new fan was more powerful than the original one and it was also slightly cheaper with the price of \$9.

**Final prototype:**

Test Iteration:	Tick			Remarks
Test Date: 21/7	Pass	Fail	Potential Failure	
Ability to adjust length	✓			Overall successful.
Ability to dry clothes faster	✓			

## 6. 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.)**

1. Meteorological Service Singapore. (2011). Climate of Singapore. [On-Line]. Retrieved from: <http://www.weather.gov.sg/climate-climate-of-singapore/>
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3. racks, D. and JÄLL Drying rack, i. (2019). JÄLL Drying rack, in/outdoor - white - IKEA. [online] Ikea.com. Retrieved from: <https://www.ikea.com/sg/en/p/jaell-drying-rack-in-outdoor-white-00242891/>
4. Electrolux Singapore. (2019). 7.5kg Venting Dryer - EDV7552. [online] Retrieved from: <https://www.electrolux.com.sg/appliances/dryers/edv7552/>
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6. Lbclothesairer.com. (2019). Wholesale Electric Clothes Hanger [online] Retrieved from: [https://www.lbclothesairer.com/electric-clothes-hanger-heated-clothes-airer-drying-rack\\_p31.html](https://www.lbclothesairer.com/electric-clothes-hanger-heated-clothes-airer-drying-rack_p31.html)