

Hwa Chong Institution
Project Work
Category 3 Inventions Log Book

Title of Project: Community Compost Bin

Group Name: R.K.P.R

Group Members:

1) Pierson Loh (23): Leader

2) Regis Ong (20): Member

3) Reynard Toh (30): Member

4) Kun Yuan (34): Member

01. Problem Finding

(The beginning...)

Identify a problem you would like to solve. You may want 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.

Before coming up with some problems faced by people, we first decided on the target audience, which is the gardeners as there are not many inventions targeted at them. We then came out with some problems that the gardeners faced.

Problems that gardeners faced:

1. Overexertion
2. Accidental injuries
3. Composting (because of great amount of dead and unused leaves)
4. Loud noises

Firstly, we came up with 2 aspects of the problems, namely, environmental problems and problems that elderly face. We then chose to work on environmental problems. We then came up with a few environmental issues that are faced around the world, ranging from a huge to small scale. After creating a criteria table to weigh the problems, we decided on solving the problem of great amount of dead and unused leaves in areas such as parks.

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

We selected this problem after a few considerations. These considerations include current solutions available, availability on the market and feasibility. If there are many current solutions available be it self-made or products, there is no point in doing it since there are already solutions available. What we aim to do is to solve problems that are barely have any solutions hence it is a key criteria. Availability of solutions means the amount of current solutions existing to tackle the problem we are planning to solve. If there are many solutions, it is not really a smart idea to create another thing to solve it as there are many problems created such as the other products that could be better than our own product, and the people will then question why should they use ours instead of other products and so on. Feasibility is whether the problem that we are trying to solve is realistic or not. For example, trying to create a solution to solve global warming which is a global issue is not very feasible, as it requires a lot of effort and time to come up with a solution. Therefore, we feel that these considerations are very important and key in choosing the problem we are focusing on.

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

Criteria/Problems	Overexertion (esp. In hot, sunny weather)	Accidental injuries (e.g cuts, scrapes)	Composting (in all aspects)	Loud noises (e.g Lawnmower)
Current solutions available	3	2	4	2
Availability on the market	2	2	3	1
Feasibility of us working on it	2	4	5	3
Total:	7/15	8/15	12/15	6/15

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)

There is great amount of dead and unused leaves left around in many different places, especially in areas such as parks or community gardens. Despite having very good uses for it, it is barely used for its purposes, one of which we are focusing on is creating compost. Hence, we would like to use it to its full potential of creating compost (fertilizer), unlike other products which only focuses on creating a product to just clear up the leaves etc on the ground.

2 B Compare and contrast the existing or similar solutions

1. Brinly STS-427LXH 20 Cubic Feet Tow Behind Lawn Sweeper

Pros:

- Large capacity hamper
- High build quality

Cons

- Not easily assembled

- Only works on flat land and dry weather
- Very expensive at an average of \$458 SGD
- Does not have any other purpose other than clearing up waste

2. Ohio Steel 50SWP26 Pro Sweeper

Pros

- Makes leaf cleaning fast and more efficient
- Well built/heavy duty

Cons

- Ridiculous price
- Got warped, bent and broken very quickly
- Bottom bag broke in two bends
- Low ground clearance causes bag to catch on uneven terrain and spill leaves and also created holes in the bag
- Heavy

3. Mantis Compact ComposTumbler CT02001

Pros

- Easy to turn the composter
- Quick and efficient

Cons

- Metal on the sides rusted quickly
- Large amount of assembly required
- Manual labour was sometimes overwhelming

***After mid-term evaluation, we listened to the judges and completely removed the sweeper. So the 1st and 2nd comparisons were made during project evaluation and mid-term**

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 proposed invention is about a compost bin. The compost bin consists of different compartments namely, collection and bedding module, mixing module, maturing module, water collection module as well as mobility module. For each module, it has its own functions. For example for the water module contains water so as to speed up the process of composting.

(It will also be linked to another item, a floor sweeper with rotating brushes so as to transfer the dirt from on the ground into the compost bin so as to allow composition to take place.) ---

Redundant (due to above reason)

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

This is to benefit the community gardeners and the cleaners. After the dead leaves and dirt has been cleared up, they always get thrown away and then given to the garbage company, which then uses it to make compost, which is then sold again back to the gardeners/cleaners etc. This

is an endless cycle, and the people who are “suffering” a loss are the gardeners and cleaners themselves. Hence, we would like to break the cycle and allow target audience to be able to save some money as well as create more convenience for them.

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

Our invention is cheap and easily made. We used materials can be found extremely easy such as metal file holders. We also made it in such a way that barely any manual work is needed to allow the composting to take place. In addition, our composting also makes compost extremely fast and simple, with compost already being made within 2 weeks! Furthermore, we have a mobility module which allow people to easily push the bin around for their convenience. In the case that they want to bring it for long distances, it can also be attached to the trolley.

3 D What are some problems you expect in the course of your proposed invention? (Some problems included the device not being able to sweep up bigger objects or the cleaner might get stuck by other objects like pine nuts from trees.) --- Redundant as there is no more sweeper (removed)

There were some problems faced in making the compost bin. We had to figure out how to make it so that the leaves could drop into the other module without any manual work. We also had to figure what to use to attach them to each other. At the start, we were also having some troubles in finding the materials needed for the projects as we were completely clueless on what to use. Another problem we expected was how does the worms survive if there isn't any dead leaves for the worms to feed on. After some research, we realised that the worms would double their population every month.

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

There were a few major milestones in our project timeline. Firstly, we were stuck with coming up with an idea. So when we came up with an idea, it was 1 of our milestones. Another major milestone was when we thought of some prototypes and tested them out. A final major milestone was when we created the invention itself, which was not an easy task and we had help from people such as Regis' father who helped us buy the materials to build our invention. We took quite a while get the materials, the process of making it, but it finally worked out in the end.

#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. 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

Firstly, we had a sweeper with rotating brushes, to sweep in the dead leaves on the floor for compost. Secondly, we had a plastic bag and a plastic and cardboard container, so as to contain the waste collected and to manually put it inside the compost bin. (Removed from the invention) We had metal file holders as the modules for the compost bin and a few other things such as garden waste inlet, water inlet, temperature and humid monitor, mixing device, worm, slide tray and castor wheels, all of which play a very important role. We used masking tape to tape them together, as it was cheap but durable.

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

1. How to attach the modules together?
2. What materials and items are needed so as to allow the dead organic matter to naturally become compost without much manual work?
3. What processes are needed to make compost faster?
4. How do we install the wheels for extra convenience?
5. How do we implement the items such as environmental control devices?

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





These are the prototypes made for the sweeper. It is in according from left to right, up to down. As for the compost bin, we only had a rough sketch but we lost it. We quickly created another one and here it is. After we drew up the model, we immediately tried to make it and after a few tries we succeeded hence we do not have other physical models.

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.

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

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. 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:	Tick			Remarks
Test Date:	Pass	Fail	Potential Failure	
Sweeping up of leaves			✓	Odd shaped leaves, like long leaves which are uncommon might hinder the process of leaf sweeping. (eventually removed)
Composting system	✓			Works as intended

*Add more rows for more criteria

** Repeat table for next test iteration

OR if you are creating an animation / video to show how your invention will work, write down the different possibilities / outcomes [success or failure) if a full-scale prototype is to be constructed.

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, magazine, websites, journal articles, interview, photographs, product brochure, reviews etc.)

Heads with lightbulb brains (No author). Retrieved from:

https://www.timeshighereducation.com/sites/default/files/styles/the_breaking_news_image_style/public/heads-with-lightbulb-brains-illustration.jpg?itok=agSPU0EP

https://www.google.com.sg/url?sa=i&source=images&cd=&cad=rja&uact=8&ved=2ahUKewidyOeKxJfcAhVTOisKHZB9B2sQjRx6BAgBEAU&url=https%3A%2F%2Faminoapps.com%2F%2Fcomics%2Fpage%2Fblog%2Fthe-endless-cycle-of-influences%2F7YiP_u4o1VQmgE3GkalgpR0YYIBXbr&psig=AOvVaw2r6CJpr6MXzjinBdwA1MPp&ust=1531414992972096

Good Cooker, (2016, March 19) Mantis Compact ComposTumbler CT02001 - Engineered to Make Compost Fast - Holds 88 Gallons - Low Cost per Gallon - Easy-to-Load, Empty with No Bending.

Retrieved from:

https://www.amazon.com/dp/B00IZXUCOS/ref=sspa_dk_detail_1?psc=1&pd_rd_i=B00IZXUCOS&pf_rd_m=ATVPDKIKX0DER&pf_rd_p=1713835751726239774&pf_rd_r=Y28T1BS61NFABXS7DNJA&pd_rd_wg=emZ30&pf_rd_s=desktop-dp-sims&pf_rd_t=40701&pd_rd_w=i3IUy&pf_rd_i=desktop-dp-sims&pd_rd_r=6c644b6e-8520-11e8-ae49-d7f1b6fa8ade

Jumpstart your compost (2015, October 24) Retrieved from:

<https://www.gardeners.com/how-to/jumpstart-your-compost/5380.html>

Meetings:

<u>No.</u>	<u>Date</u>	<u>Type of Entry</u>	<u>Names of members/people involved</u>	<u>Remarks by Mentor</u>
1.	19/3/18	Meeting with mentor for first time	All members + Ms Ang	Improving proposed design
2.	2/4/18	Meeting with mentor	All the members + Ms Ang	Making ideation process clearer
3.	8/6/18	Meeting with mentor	Regis, Reynard, Kun Yuan + Ms Ang	Discuss feasibility of conveyor belt
4.	21/6/18	Meeting with mentor	Regis, Reynard, Kun Yuan + Ms Ang	Discuss storage prototype
5.	26/6/18	Meeting with group members	All group members	

Meeting no.1:

Our group Kun Yuan, Regis, Reynard and I went to meet Ms Ang as a group for the first time. We then introduced to her our intended idea and discussed the feasibility of our project. After our discussion with Ms Ang, she gave us valuable feedback on improving the proposed design of the prototype, and she gave us a specific direction to walk towards for our project evaluation. She asked us to have a sketch of our design, so as to allow everyone to understand more and better about our invention. Her main focusing point was to improve the user-friendliness of product. After summing up the final points, we left and started on the sketch before calling it a day.

Written by:

Pierson Loh

Meeting no. 2:

We met Ms Ang at the fish tank at around 2.05pm and discussed how we would improve and refurbish our slides. Ms Ang gave us many pointers on how we could improve on many different aspects, from the slides to the sketch. Some improvements were including more pointers on how we came up with the idea and how we wanted to improve the problem of the slides as well as many other pointers. While Ms Ang was giving the pointers, we had Kun Yuan to take it down, so as to make changes accordingly. When all of us headed home, we altered and improved everything we needed to, including our scripts and slides.

Written by:

Pierson Loh

Meeting no. 3:

We met Ms Ang on 8 June to discuss our product. Pierson was absent from the meeting as he was on a holiday. We raised concerns about the implementation of a conveyor belt, such as how hard it would be and how much it would cost to actually make it to which Ms Ang also acknowledged. We then decided that we had to replace the conveyor belt with a sweeper

that had a manual depositing system. Nothing much was discussed other than this and we ended the short meeting.

Written by:

Zhu Kun Yuan

Meeting no. 4

This was quite a productive meeting. We met Ms Ang during the holidays on 21 June in the school's fish tank to talk about how to transport the leaves from the sweeper to the compost bin. Ms Ang gave us an idea, version 1 prototype, and we build it on the spot and tested it with some dead leaves we found on the floor and it works. However, Ms Ang told us that we have to make different versions of the container to transport the leaves, so as to compare which was the best. Ms Ang, also talked about how we could improve our slides, but elaborating a bit more on our idea process so it could be clearer to others as well as other aspects. After we went back home, we came up with some alternatives for the container and Kunyuan made a few prototypes at home to see which was the best. We then decided to meet at one of the members house so as to test it out and make the final decision.

Written by:

Reynard Toh

Meeting no. 5

We met up privately at Pierson's home, to bring together all our ideas. We tested the sweeper using dead leaves. We had multiple prototypes, after which we came to the conclusion of having a cardboard holder with aluminium inside to keep the container from getting wet, which fulfilled all of our criteria. We then proceeded to continuing the logbook. After which, we made some alterations to our slides, before heading back home.

Written by:

Regis Ong

Note: There was no official meeting, we just communicated with each other via online platform as it was much easier and convenient for us as we live very far from one another.

Our mentor, Ms Ang is not present in school until September so we are also unable to meet her.