ZHSS Eco-Kepalas Competition 2015

Interactive Recycling Bin for Plastics

Janice
Esther
Omer
Ting Jing
Partnership
So everyone uses plastic in their daily lives.

- Plastic bag
- Plastic utensils
- Plastic Containers
- Plastic bottles
Do you know how long it takes for plastics to degrade?
400 to 1000 years!
Impact on Environment and Natural Habitat

- Plastic is a non-biodegradable material. It may clog our waterways and takes up landfill space.

- Dangers to animals as they may accidentally eat plastics as food.

- Production of new plastics increases greenhouse gas emissions.

Thus recycling of plastic properly is very important in saving our environment and habitats!
Do you know how many plastic bottles are thrown away every day in Singapore?
This is a statistic done in Singapore taken from the National Environmental Agency (NEA)

<table>
<thead>
<tr>
<th>Waste Type</th>
<th>Waste Disposed of (tonnes)</th>
<th>Waste Recycled (tonnes)</th>
<th>Waste Generated (tonnes)</th>
<th>Recycling Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plastics</td>
<td>789,000</td>
<td>80,000</td>
<td>869,000</td>
<td>9%</td>
</tr>
</tbody>
</table>
Benefits of Recycling Plastic Bottles

- Conservation of oil and energy.
- Reduce the Greenhouse Gas emissions.
- Save of Landfill space.
- Recycled plastic bottles can be converted to other new products.
Design Situation:

Siloso Beach Resorts (SBR) provides free mineral bottled drinks to each of its 187 rooms and 7 villas. Visitors would usually bring the mineral bottles along outside their rooms while touring the resort.

One of the problem face by SBR is how to encourage these visitors to have the habit of recycling the empty plastic bottles after consuming. The visitors would usually throw the empty bottles away into the general bins instead of using the recycling bins. This makes the present plastic recycling bins less usable and inefficient.
Design Situations

“The present recycling bin did not attract the visitors for them to use it to throw the empty plastic bottles. Instead they use the general bin even if the recycling bin is just a walking distance away.”

Quoted by Mr Karl Fischer (SBR Communication Manager)
Present Recycling Bins

- The bins are not aesthetically pleasing.
- The colours looks dull and unattractive.
- Visitors may overlook the existence of the bins due to its colour and location.
- There is no sense of appreciation when someone use the recycling bins.

SBR Recycling bins
Survey 1

What do people think of recycling and what are the common things they recycled?
Research : Survey 1

We surveyed 50 people and these are our result.

Do you think plastic recycling is important and saves the environment?

- Yes
- Not sure
Research: Survey 1

How often do you recycle?

- 31% Daily
- 23% Weekly
- 23% Monthly
- 15% All the time
- 8% Others
Which types of materials do you recycle most?
Survey Outcomes 1

What do people think of recycling and what are the common things they recycled?

• Most people agree that recycling is important and saves the environment.

• People do recycle their items. Some recycle more often than others.

• Plastic bottles is the most recyclable/reusable items.
Survey 2

Ways to encourage recycling?
## Survey 2 (20 people)

<table>
<thead>
<tr>
<th>Suggestions</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interesting and colourful bin</td>
<td><strong>10</strong></td>
<td>5</td>
<td>1</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Interactive bins which respond to users.</td>
<td><strong>16</strong></td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Reward those who adhere to recycling</td>
<td><strong>14</strong></td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Fine those who neglect towards recycling</td>
<td>0</td>
<td><strong>3</strong></td>
<td>3</td>
<td>2</td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>
Survey Outcomes 2

Ways to encourage recycling?

• Majority agrees that the recycling bin should be colourful and attractive.

• Majority agrees that using an interactive bin will make it more interesting for people to use it.

• People will be encourage to practice recycling if they are being appreciated.
Design Brief

Design and make a unique interactive plastic recycling bin that will respond to visitors at Siloso Beach Resort when they use the bin. This is to encourage visitors to have good recycling habits and maintain cleanliness of the environment.
Design Specifications

- The bin must be **interactive** (visual and audible in respond to users when using it).

- The bin must **send message of good recycling habits** to educate the users especially the youngsters.

- The bin must be **attractive** and **brightly coloured** to attract users.

- The bin must be able to **appreciate** users to thank them for good recycling habits.
Location of Product

Our product will be placed near the reception area at Siloso Beach Resort.

This will then attract the customers there as it will definitely be seen when they are checking into or checking out of the resort.
IDEATIONS
Ideation 1 (Robot)

- Strobe light
- One opening for throwing plastic bottles.
- Message on recycling at robot’s body.
- Audio sound coming out from robot mouth.
Ideation 2 (Siloso Hut)

- Design board with LEDs.
- One big opening.
- Message on recycling.
- Audio sound from the top cover.
Ideation 3 (Cable Car)

- Merlion with LEDs.
- Two small openings.
- Message on recycling at the sides.
- Audio sound from the top cover.
# Pros And Cons

<table>
<thead>
<tr>
<th>IDEA</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
</table>
| **ROBOT**  | • Interesting design  
             • Will attract children.  
             • Strobe light will attract attention.  
             • Audio Message.          | • Difficult to make.  
             • Only one opening.  
             • Strobe light may be too bright and bulky. |
| **SILOSO HUT** | • Easy to make.  
             • Simple in design  
             • Design board with pictures looks interesting with LEDs. | • Boxy design needs to be improved.  
             • Design board must not be too big and needs to be sturdy. |
| **CABLE CAR** | • Bin shaped as cable car relates to Sentosa.  
             • Merlion represent Singapore.  
             • LEDS lights. | • Difficult to insert the storage bin in the cable car design shape. |
## Pros And Cons

<table>
<thead>
<tr>
<th>IDEA</th>
<th>PROS</th>
<th>CONS</th>
</tr>
</thead>
</table>
| 1. ROBOT | • Interesting design  
• Will attract children.  
• Strobe light will attract attention.  
• Audio Message. | • Difficult to make.  
• Only one opening.  
• Strobe light may be too bright and bulky. |
| 2. SILOSO HUT | • Easy to make.  
• Simple in design  
• Design board with pictures looks interesting with LEDS. | • Boxy design needs to be improved.  
• Design board must not be too big and needs to be sturdy. |
| 3. CABLE CAR | • Bin shaped as cable car relates to Sentosa.  
• Merlion represent Singapore.  
• LEDS lights. | • Difficult to insert the storage bin in the cable car design shape. |
Design Concept

Combined Features

• Improved box shape as easy to construct.
• Design board is to display places of interest in Singapore (cable car, Merlion, etc.).
• Bin must be colourful and informative to highlight on the importance of recycling.

Interactive

• Visual (LEDs Lights)
• Audio (Thank you Message)
Initial Design

Design Board
- Places of interest in Singapore.
- LED

Audio
Play “Thank You” message..

Proposed message board on the importance of recycling
Final Design

- Speaker
- Design Board
- Openings
- Message board
Exploded View

<table>
<thead>
<tr>
<th>ITEM NO.</th>
<th>PART NUMBER</th>
<th>Material</th>
<th>QTY.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>base</td>
<td>wood</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>side</td>
<td>wood</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>front</td>
<td>wood</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>front top</td>
<td>acrylic</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>top</td>
<td>wood</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>board</td>
<td>foam board</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>cover</td>
<td>acrylic</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>MESSAGE BOARD</td>
<td>foam board</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>SPEAKER cover</td>
<td>acrylic</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>coaster</td>
<td>metal</td>
<td>4</td>
</tr>
<tr>
<td>11</td>
<td>drum</td>
<td>hard board</td>
<td>2</td>
</tr>
</tbody>
</table>
# Three Key Features

<table>
<thead>
<tr>
<th>Interactive Design board</th>
<th><img src="image1.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Displays places of interest of Singapore.</td>
<td></td>
</tr>
<tr>
<td>• Installed with LEDs.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Interactive Speaker</th>
<th><img src="image2.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Send out “Thank You” message and a short song to appreciate users on recycling.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Message board</th>
<th><img src="image3.png" alt="Image" /></th>
</tr>
</thead>
<tbody>
<tr>
<td>Send out educational message on the importance of recycling.</td>
<td></td>
</tr>
</tbody>
</table>
Making the bin in the Workshop
When users open either one of the doors:

1. The LEDs on the design board will start to light up.

2. The speaker will play a message of “Thank You” and a short song on recycling.

How it works?

- The speaker will continue to play the thank you message and the song as long as either one of the door is open.
Problems we may face with the bin.

- Patrons might throw other items other than plastic bottles.
- People might meddle with the electronic parts example the micro-switches located at the openings.
Creativity and originality of solutions

- The recycling bin not only served as a point of recycling but also for visitors to take group photos with.
- Make use of visual and audio interactions to attract users and promote recycling.
- Encourage and educate children to have the habit of recycling.
- Users are entertain in using the recycling bin.
- It is a simple yet unique way to acknowledge users for their effort in recycling.
Sustainability

- If used for the right purpose, the product would last up to 2 to 3 years.

- However, there might be faults in the product due to mishandling especially the electrical components that might need to repair within the 2 to 3 years period.
Cost (Tangible)

- No. of rooms: 184 rooms
- No of bottles in each room: 2
- Total No. of bottles consumed: $184 \times 2 = 368 \text{ (1 Day)}$
  
  12 months: $365 \times 368 = 134\,320 \text{ bottles.}$

- If these bottles are to be reused and converted into other uses, the cost save in manufacturing:

  Cost to manufacture 1 plastic bottle (500ml) = $0.29.

  Save in cost to manufacture 134, 320 bottles:
  
  $0.29 \times 134\,320 = $38,953.$
Usage: SBR Near the Reception Area
Usage: SBR Cafe Area
Usage: Group Photos
School staffs and students trying out the interactive recycling bin.
Outreach

Public trying out the interactive recycling bin outside school compound.
Recommended Improvements:

A recommended improvement suggest by a member of the public is to includes:

- LED display panel. This is to cater for the hearing-impaired person to be able to read the “Thank You for Recycling” message.
- To make one of the bin to throw general waste and the other for plastic bottles.

LED display panel will be activated when the bin door is opened.

Make one of the bin to throw general waste while the other to throw plastic bottles.
Conclusion

We feel that the interactive part does attract the users to use the bin as this can be seen by the reactions from the school staffs and the public.

We hope with this interactive bin it will encourage visitors at SBR to recycle their plastic bottles.
The End

THANK YOU FOR THE KIND ATTENTION. WE HOPE YOU ENJOYED OUR PRESENTATION.