INFORMATICS INSTITUTE OF TECHNOLOGY

Foundation Certificate in Information Technology

Module: DOC330 Designing Innovative Solutions.

Module Leader: Ms. Aniqah Zeezan

Date of submission: 25.03.2021

Group: B5

Project Title: Green-Code.

Group Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 202002

Abstract

The problem of waste generation and management has become a serious issue. According to the present situation a global problem ‘Disposal of garbage ‘has been rapidly emerged worldwide. This problem has caused many harms towards the environment and the society which has created an unhygienic environment. This garbage sector embraces an expansive range of side effects which are basically spread of diseases and various bacterial infections. The vast over production of waste materials have resulted negative impacts to the environment which also leads to various diseases being emerged into the society. When considering besides, environmental enlightenment has changed people’s attitude towards waste generation and management in the area. Irrelevant ways of disposing garbage are Vigorous for the growth and survival of any man kind in today’s world. The presence of poor sanitation leads to an unhygienic environment which causes harm for our livelihood because of the spread of diseases.

3. Acknowledgements

We would like to thank our module leader lecturers Ms.Aniqah Zeezan and Ms. Tharushi Amarasinghe for giving us this opportunity to do this assessment and for the support they have given to complete it.

Table of Contents

6. List of figures

7. List of Acronyms or Abbreviations

1. **CMC- Colombo Municipal Council** 10

2. **SDLC- System Development Lice Cycle** 33

8. Introduction and Description of the Project

8.1 BACKGROUND of the problem

When we are considering the present situation the main problem which the global facing is the "Disposal of garbage". This problem is increasing day by day and there is no way to stop this but the only way is to reduce & reuse the waste, our earth has been filled by a lot of waste. There is a lot of garbage, plastic waste, as we are in the 21st century the technology is everywhere, so e-waste is also increasing. We always produce it and dump it when we need the new one. Our waste are piling up and continuously accumulating. Plastic waste and the e-waste are the biggest problems for us now. And our solution in this problem is recycling. In my opinion, recycling is a way to manage used items into new products. We can reduce, reuse, and recycle (3R) waste management. We can reduce our waste clothes with reuse it. There are some reasons why peoples recycle used or unwanted items, which are, prevent wasting unusable materials that also have usage after recycling, reduce the appliance of raw materials, and reduce energy.

We know that these days plastic is the one material that is widely employed by humans altogether in the country. Most of our goods become from plastic. The bad news is, plastics wastes that come from our unusable goods find yourself within the oceans not only that but also leads to various diseases being emerged into the society. That one example is quite enough to start out recycling our plastic waste. We can start from reduce and reuse first. For reduce example: when we buy something, we should prepare our own bag to put the goods we buy, dispose the waste according to the bin that specially provided for plastic, use a refill bottle for our drink bottle, and like a sack than bag. How about reuse plastic bag? Some of countries have creative company that selling art and use plastic waste because the basic materials or there are some companies like "Tokyo cement" whom buying the plastic wastes and recycling them to produce cement there is another company which buys the e- waste materials and reusing that to make some new devices.

8.2 Problem statement

Garbage can damage to human lifestyle, health, environment, animals, water resources etc. Garbage and other solid waste pose a threat in Biomet municipality and are attributed to the hazards faced by the households living in the town. There is no sewage existing in Biomet town Safe and acceptable solid waste management practices are of serious concern from the public health point of view. The concern comes from both poor policies and solutions proposed by all associated authorities of the government for the management of solid waste and a perception that many solid waste management facilities use poor operating procedures.

At this point, it's not enough to look at waste management and disposal as a problem global leaders and local governments have to deal with. The extreme waste problem we're facing right now started because everyday people like you and me thought one candy wrapper left on the ground or one plastic bottle left on a park bench was not going to make a dent in the amount of waste their area makes. But when hundreds of millions of people share this mindset, it becomes dangerous as the waste starts to accumulate.

Waste management purpose is collection and disposal of waste in the world to keep environment safe and clean Almost 30% of waste is organic waste composted and transformed into nutritious soil. For proper disposal of waste material the activities required to degrade waste easily.

8.3 EXPLAINS HOW the problem affects company operations or costs.

The loss down of income possessed by a state is also caused by the irrelevant garbage disposal. Because states miss out their income to be spent on the job opportunities laborers who are involved in controlling and managing the task of waste management and recycling. The governments are needed to spend most of their main incomes on the garbage disposal services sector if we can overcome it that would help to save our income. On the other hand, the tourism industry can be also affected because anyone does not like to travel and enjoy by spending some time in an unhygienic environment which affects foreign inflow of income country might get a negative remark as they reject traveling into our state due to unlimited garbage disposals. By the cause of this type of health and environmental issues it has become very unpleasant to see and public nuisance. Because everyone needs to live in a hygienic environment which is fresh clean and healthy. So, people may try to migrate from their own country to live in a healthy environment.

8.4 EXPLAINS WHY the problem requires a solution.

Because everyone needs to live in a hygienic environment which is fresh clean and healthy. So, people may try to migrate from their own country to live in a healthy environment and to prevent the harm caused to the society. The vast over production of waste materials have resulted negative impacts to the environment which also leads to various diseases being emerged into the society. The presence of poor sanitation leads to an unhygienic environment which causes harm for our livelihood because of the spread of diseases. And also this garbage sector embraces an expansive range of side effects which are basically spread of diseases and various bacterial infections. It has resulted many side effects to every aspect such as diseases arose which harms the health of citizens. The number of patients who attend to hospitals increase day by day due to the dump of garbage. By the intoxicants people dump into the environment is the main cause which leads to most of deadly diseases such as high rate of cancers, side effects caused during child births and allergies. This kind of unhygienic ways can also lead to pneumonia situation which can cause death for the citizens.

8.5 Clear and appropriate aims and objectives of the project

- One of the main objectives is by the intoxicants people dump into the environment is the main cause which leads to most of deadly diseases such as high rate of cancers, side effects caused during child births and allergies. This kind of unhygienic ways can also lead to pneumonia situation which can cause death for the citizens. It has resulted many side effects to every aspect such as diseases arose which harms the health of citizens. The number of patients who attend to hospitals increase day by day due to the dump of garbage. The vast over production of waste materials have resulted negative impacts to the environment which also leads to various diseases being emerged into the society.
- Growth of bacteria, insects and vermin are the doorways of spreading these diseases. Because around the garbage dispose areas this type of insects and bacteria are being created. They are the major form of transporting the unhealthy disease and bacteria, the insects who contact in with garbage are the ones who visit our regular home environment.
- The way the objectives are accomplished is that green code must engage in awareness programs to get the attention from the related audience for making them to make use of the application.
- Engaging the community of the society to protect the environment through the green code application by giving community dialogues.
- A highly skilled and knowledgeable workforce should be carried out throughout the internal process improvements.
- Regulatory oversight should be provided for the society about preventing irregular garbage disposals.
- Participation in recycling initiatives can also help for making awareness of the application throughout the society.
- By expanding of the types of materials disposed e.g. - Plastic, polythene, rubber.

8.6 Basic findings of the project

Online surveys were conducted with the sole purpose of finding useful data. Data were useful to recognize what people exactly need through this application. Survey results was a huge support to carry out this project and also we take some information from some journals and some personalities who having a vast experience in this field

9. Innovative features incorporated in the project.

1. Nearest Location of IOT bins.

For the first time team Green-Code is introducing IOT bins to Sri Lanka. In this feature these bins' GPS are synced with the application so, user can identify the nearest location of the public IOT bins trough the Green map.

2. Bin Status

In this feature, the application notify filled percentages of the both public and household IOT bins to the user as well as to the CMC

3. Air Filter

This is a new feature in this feature an air filter fixed to the all public IOT bins, this air filter filters all the polluted gasses from the surrounding and releases Oxygen gas.

4. DIY window

This is feature is introduce following a feedback of an individual. As every person knows that we there is a high risk in reducing non- degradable wastes. In this feature the application list down all the plastic wastes in the bin so you can select any of wastes from the list for an example if u select a bottle and two cups the application shows all DIY videos, guidelines and images for kids, teenagers and also to adults some DIY things for kids. This feature might be an innovative approach which forces next generation to be more responsible on waste management and also it helps to improve their critical thinking and creativity.

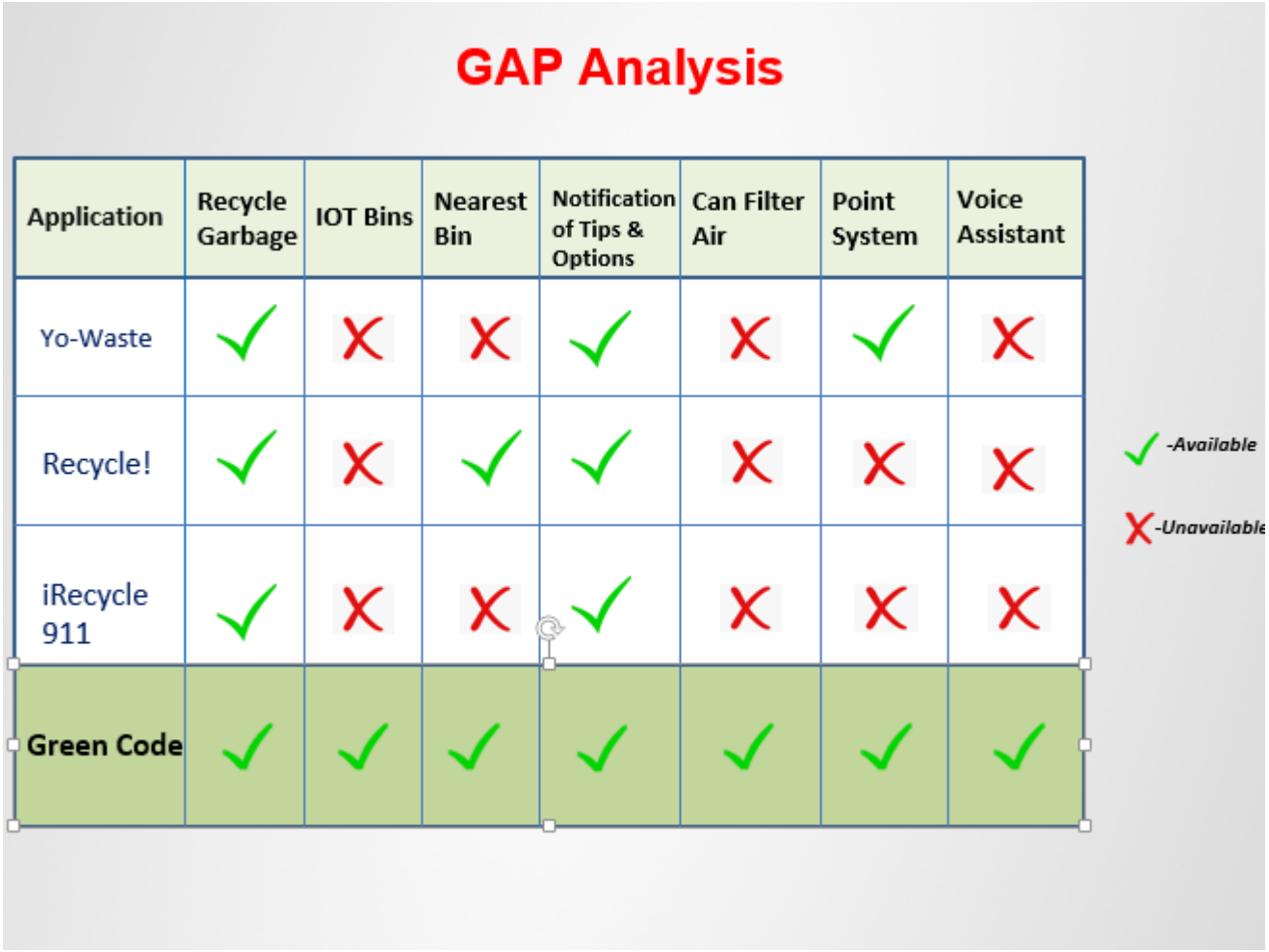
GAP Analysis
Application
Recycle Garbage
IOT Bins
Nearest Bin
Notification of Tips & Options
Can Filter Air
Point System
Voice Assistant
Yo-Waste
Recycle!
iRecycle 911
Green Code
-Available
-Unavailable

Figure 1

10. Methodology

10.1 Software development life cycle model and justify your selection

SPIRAL MODEL

The design method used in this study is spiral model, which is an evolutionary software model that compiles the iterative nature of the prototype by means of control and systematic aspects of the linear sequential model. The spiral model has the potential to develop additional versions of the software quickly. Based on the spiral model, there are six phase that will be carried out in this project.

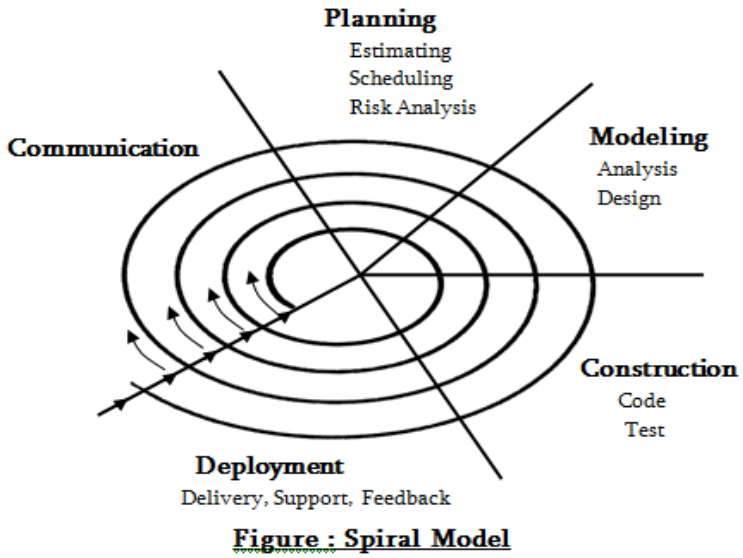

Figure 2

a. Planning Phase

Planning phase is to define resources, accuracy and performance in the form of information about the global waste management systems.

b. Requirement and Analysis Phase

The requirement phase is carried out to determine the needs of the government and the community. Analysis will be carried out to trace and search for information on Sri Lanka and collect the necessary data such as the daily wastage amount by city, the number of garbage disposal areas and public garbage bins. The data was obtained from online articles and field surveys.

c. Design Phase

Design phase, is the phase of developing a system model that will be made based on analyzed data in an effort to manage waste in the surrounding premises. The design uses context diagrams, flowchart and system interfaces.

d. Construction Phase

Construction phase or the construction phase, to build a development of waste disposition through information service distribution and waste processing. The application will be created using the programming language, and the MySQL database.

e. Testing Phase

Testing phase is carried out to test the system to look for loopholes whether in the form of coding, design or database. As well as testing the system and is connected with the main system.

f. Deployment and Acceptance Phase

This phase will try the results of the development of that is carried out at the construction phase, whether the mapping and waste reporting program that has been made in accordance with what is needed such as features and program user interfaces.

11. Requirements and Analysis

11.1 Detailed and specific requirements of the project.

1. Nearest Location of IOT bins.

For the first time team Green-Code is introducing IOT bins to Sri Lanka. In this feature these bins' GPS are synced with the application so, user can identify the nearest location of the public IOT bins trough the Green map.

2. Bin Status

In this feature, the application notify filled percentages of the both public and household IOT bins to the user as well as to the CMC. So the user and the CMC will be aware about it.

3. Air Filter

This is a new feature in this feature an air filter fixed to the all public IOT bins, this air filter filters all the polluted gasses from the surrounding and releases Oxygen gas.

4. DIY window

This is feature is introduce following a feedback of an individual. As every person knows that we there is a high risk in reducing non- degradable wastes. In this feature the application list down all the plastic wastes in the bin so you can select any of wastes from the list for an example if u select a bottle and two cups the application shows all DIY videos, guidelines and images for kids, teenagers and also to adults some DIY things for kids. This feature might be an innovative approach which forces next generation to be more responsible on waste management and also it helps to improve their critical thinking and creativity.

5. Voice Assistant

Accessing everything with the voice command without using the application.

6. Live location of the truck

Green map shows the live tracking of the truck.

7. Garbage collecting schedule.

The application displays a schedule which refers the user when which type of garbage is collected.

8. Daily Updates.

The application displays the daily updates to the user which consist the updates of the household bin, public bin, garbage collecting schedule and etc…..

9. Live Help Support.

This is a live customer service line which gives the right solution to the user on that time.

10. Customized Settings.

In this feature customer can customize the bin settings.

11.2 Requirement modelling

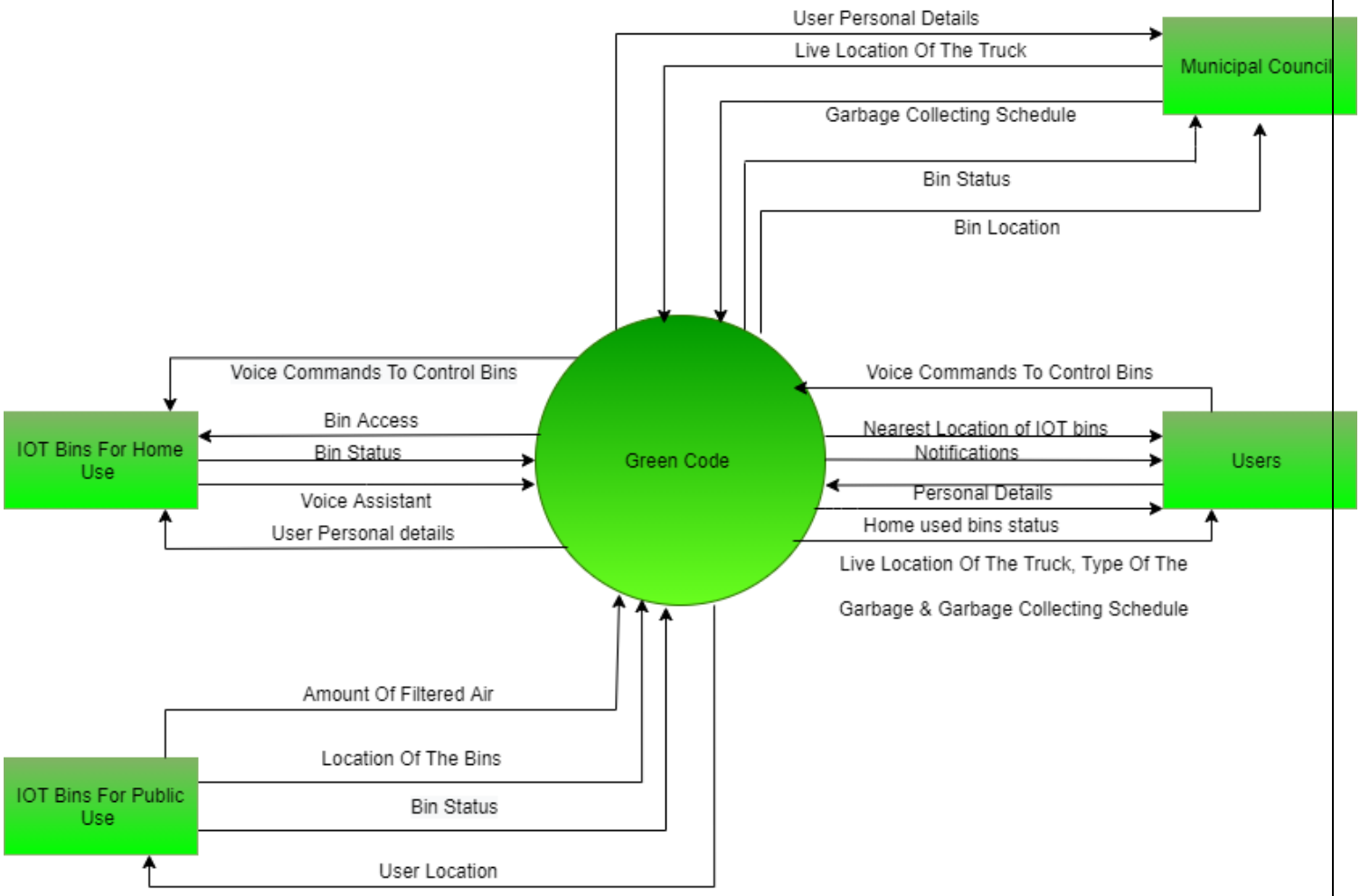

Figure 3

12. Solution Outline

12.1. Solution and the Architecture Diagram

A solution is worked out where a smart phone application is developed to manage waste in the day to day life with the help of IOT bins (an e-bin which is capable of measuring, sorting and compressing the recyclables automatically.) This would allow us to keep track on how much garbage we dispose in a given day and give us a sense of proper waste management. Basically, when you dispose garbage into the IOT bin, the person whose phone is compatible with this app and uses it, will receive notifications including frequent reminders of proper garbage disposition and the wastage data of you, as well as of the people around who use this app, sort of making a competitive atmosphere. Additionally, you would earn points each time you use the IOT bin in which they would be calculated eventually for you to be rewarded/acknowledged for your effort. The ultimate goal would be to render a feasible system to dispose and recycle waste effectively while making the society aware of ways and means of recycling and the adversity of litter.

- Smart Bin (*for home use*)

This is an IOT based smart bin. This bin has more features than other bins we can see, this helps us reduce garbage wastage and will help recycle the garbage. This bin can identify the garbage type, garbage quantity and the user's smartphone. Also this bin has its own smart voice assistance that helps us give tips and options about recycling and reusing trash and reduce your daily wastage, you can access this bin through your voice and this bin is sort of a fully automated device.

- Smart Bin (*for public use*)

The above bin is for home use and this bin is for public use. Thus you can see a number of these bins in public premises. Though these might not work at times as expected. For that the vision is to rectify that glitch and make improvements to the bins. These are as same as the above bin specifications, therefore we are working out a way to supply power by a solar system. Through this bin the user gets to find the nearest garbage bin at outdoors. He/she can earn points when they dispose garbage through this public bins, eventually being able to withdraw points and claim rewards, money or something useful as they use it.

- Recycling App

Green-Code connects each and every bin and informs and updates the users as well. Thus the main purpose of this is to manage garbage wastage and provide tips and options to users regarding waste recycling, reusing and reducing. This app allows you to check your home bin whether it's full or not, reminds you when your garbage is full via a notification. It checks your daily wastage and reminds you of how you can dispose trash more effectively than usual. Green–Code gives points when the user has managed to dispose waste successfully. User can see other user's bins too. If he/she is up to the standards, then a certain number of points will be given to your profile and marked you as green in the map. Otherwise, if the user has not really been productive with waste management, Green - Code will mark you as red and show other users your status through the map.

High level Architecture Diagram of Green-Code

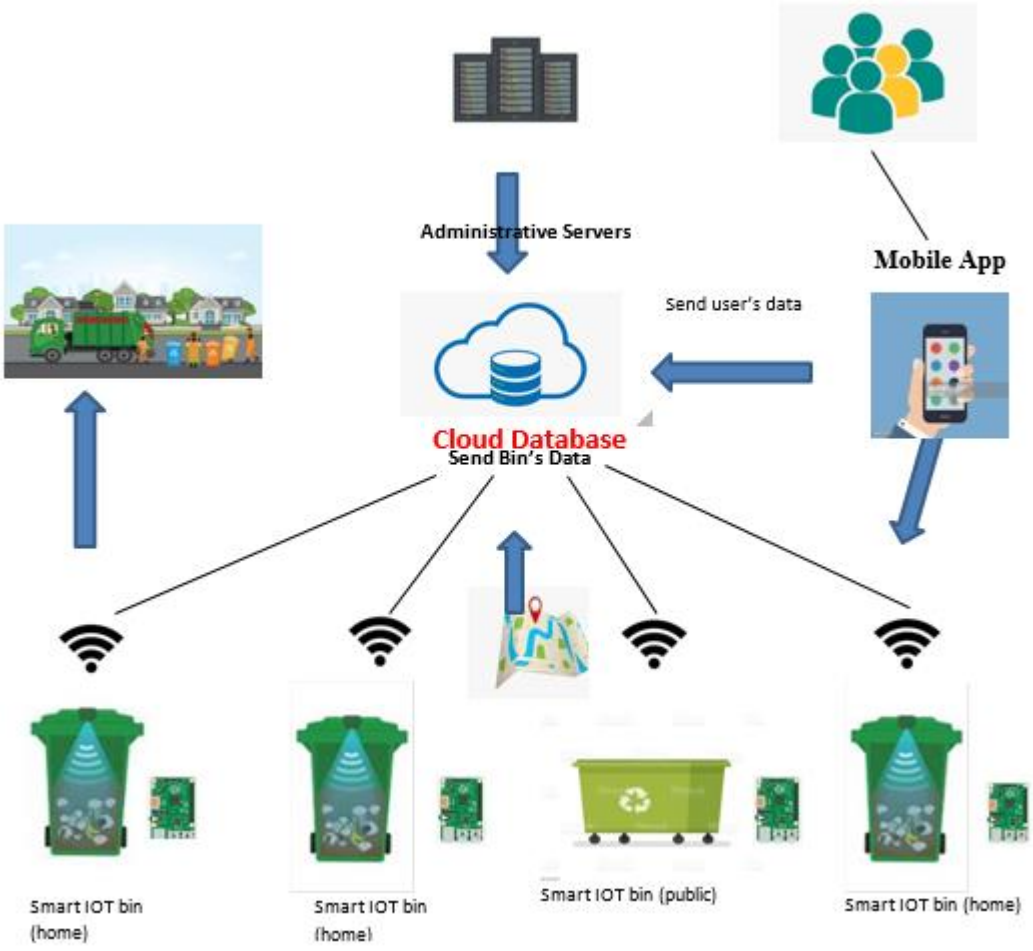

Figure 4

12.2. Key Benefits

i. Waste reduction by creating a system in which an average smartphone user is capable of taking responsibility in disposing garbage in an innovative manner through a mere simple, user-friendly application. This allows the user to contribute to the global hygiene effectively, thus providing a gratification as a whole.

ii. Since Green-Code is directly connected to the IOT bins, the user will be able to accurately sort out the waste they dumped in the bin. In result, the user will have a logical sense of what they are throwing out into the nature hence being able to figure out what's hazardous to the surrounding environment and what's not.

iii. As one of the main purposes of this is being able to help recycle and reuse garbage in the big picture, the user will be reminded of the positive outcomes of recycling waste on a daily basis. Furthermore, the app sends you effective/quick tips on how you can positively reuse trash that you think that aren't of any use no more.

iv. Moreover, making you aware of adverse, negative effects of littering and dumping waste to the open vicinity. The app will often send you reminders and notifications regarding what's mentioned above. Which in return, the user might get a sense of guilt whenever they are about to litter and end up hesitating the stated malpractices and prevent from doing it.

v. Interestingly, Green-Code uses a point rewarding system where the user can gain points whenever they are using the IOT bins, encouraging more people to contribute and take part in this system. Once the user has gained enough points, they will be acknowledged and admired for their cooperation, providing an instant satisfaction and a sense of good will.

vi. Since it is connected with each and every IOT bin like a network, every user is able to identify

where the IOT bins are located in a map, making it convenient for the user to find the nearest bin. The bins will be available both in public and private premises like homes, schools etc.

vii. As the user locates other bins, it shows the waste percentage of the bins that belong to the people around you who use this app, making people compete against each other to reduce more hazardous waste eventually leading to the prevention of litter, creating a clean, hygienic and healthy environment.

viii. Ultimately, providing a general knowledge/sense of proper waste management, how to identify organic, inorganic and toxic waste, how each type of waste affects the global system, how to reduce, reuse and recycle garbage allowing the average person to become more civilized, earn a higher waste literacy, take part of making the nature a better place for every living-being and take another step forward as a citizen of a developing country.

13. Screenshots of the prototype

Figure 5

Figure 7

Figure 6

Figure 10

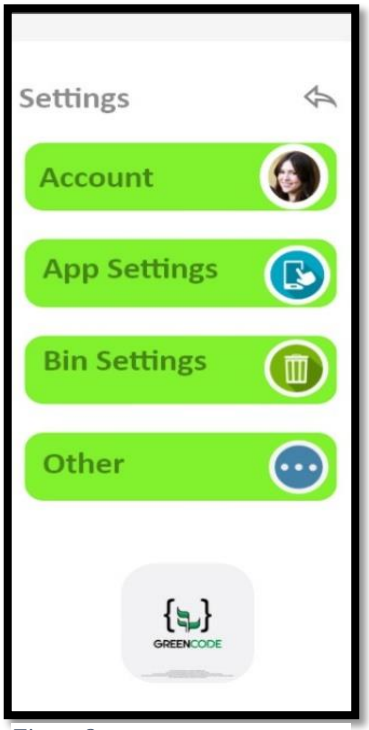

Figure 8

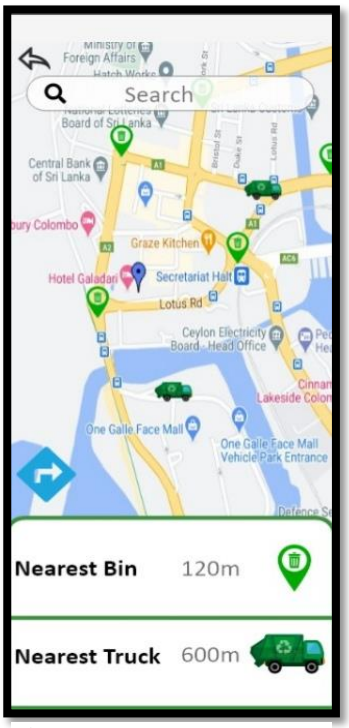

Figure 9

Figure 13

Figure 11

Figure 12

Figure 15

Figure 14

\

14. Evaluation

14.1. Detailed Analysis of Green–Code

Test case ID	Test Scenario	Test Steps	Test Data	Expected Results	Actual Result	Pass/ Fail
01	Login in to Green-Code	1. Open the app. 2. Enter the sign in details 3. Tap sign in	User name or user e-mail, password	Successfully Login to the account	As expected	Pass
02	Nearest Location of IOT bins	1. Open the app. 2. Sign in 3. Tap on the map	GPS	Identifying the nearest location of the public bin	As expected	Pass
03	Bin Status	1. Open the app. 2. Sign in 3. Click on my bin	Percentage of bin filled	Identifying the percentages of the both public and household bin	As expected	Pass
04	Voice Assistant	1. Open the app. 2. Sign in 3. Tap on the mic	Voice command	Accessing everything without using the application.	As expected	Pass
05	Garbage Collecting Schedule	1. Open the app. 2. Sign in 3. Click on schedule	Database of CMC	Refers the user when which type of garbage is collected.	As expected	Pass
06	Daily Updates	1. Open the app. 2. Sign in 3. Click on updates	System updates	Displaying the daily updates of the user	As expected	Pass
07	Live location of the truck	1. Open the app. 2. Sign in 3. Tap on the map	GPS	Live tracking of the truck	As expected	Pass
08	Live Help Support	1. Open the app. 2. Sign in 3. Tap on menu bar 4. Click on the help support	Contact Details Database of Green-Code	Giving the right solutions to the users.	As expected	Pass
09	DIY	1. Open the app. 2. Sign in 3. Tap on DIY	Videos, Pictures	Uploading some DIY videos, pictures for kids. It might be an innovative approach which forces next generation to be more responsible on waste management.	As expected	Pass
10	Settings	1. Open the app. 2. Sign in 3. Tap on menu bar 4. Click on the help support	System settings	User can customize the setting of the IOT bins.	As expected	Pass

14.2. Techniques used to analyze data

1. Literature sources

This involved the gathering data from already published texts available in the public domain. Literature sources included: government or private companies' reports, magazines, online published papers and articles.

2. Survey

Information and feedback are gathered through a questionnaire, mostly based on individual experiences regarding waste management.

3. Observations

Collected data by monitoring participants in a specific situation or environment at a given time and day.

- ❖ Results of the questionnaire is provided in the appendices section.

14.3. Lessons learned

Transparent Information

Having access to real-time information could be very helpful as you have access to information immediately allowing you to quickly make necessary adjustments. Understanding user behaviors is critical to improve the software, so the transparency of the information available is invaluable.

Utilizing Analysis to Make Improvements

The data you collect can help you analyze how well a certain product can work, what users are demanding and what alterations need to be made for improvement. This information is valuable because it allows you to identify the source of the issue and work out a solution without having to exhaust a significant amount of time and resources. Take advantage and make an improvement or enhancement in your product any time you have the opportunity. Having access to a significant amount of data can ensure you use your resources in the right areas to maximize those changes.

Pre-questionnaire

Carrying out surveys prior to designing and prototyping of an application makes it far more publication ready than surveying afterwards..

14.4. Recommendations

- Pay-as-you-throw Policies: consumers pay for volume of garbage that they generate and nothing or a minimal fee for recycling. The goal is to provide a financial incentive for recycling while reducing waste.
- Extended Responsibility: insures that manufacturers are responsible for the safe disposal and recycling of their products post-consumption.
- Buying recycled: buying products made from recycled or recyclable materials to insure the continuum of the recycling process by creating sustainable markets for goods.

15. Conclusion.

One of the main objectives is by the intoxicants people dump into the environment is the main cause which leads to most of deadly diseases such as high rate of cancers, side effects caused during child births and allergies. This kind of unhygienic ways can also lead to pneumonia situation which can cause death for the citizens. It has resulted many side effects to every aspect such as diseases arose which harms the health of citizens. The number of patients who attend to hospitals increase day by day due to the dump of garbage. The vast over production of waste materials have resulted negative impacts to the environment which also leads to various diseases being emerged into the society. Growth of bacteria, insects and vermin are the doorways of spreading these diseases. Because around the garbage dispose areas this type of insects and bacteria are being created. They are the major form of transporting the unhealthy disease and bacteria, the insects who contact in with garbage are the ones who visit our regular home environment.

The way the objectives are accomplished is that green code must engage in awareness programs to get the attention from the related audience for making them to make use of the application.

Engaging the community of the society to protect the environment through the green code application by giving community dialogues.

To deal with this massive problem we researched a lot of protocols and finally came to a solution, as we all know that the technology is so vast every human being is interrupting with all kind of smart devices like mobile phones, computers, laptops, and etc...
We worked out a solution where we would develop a smartphone application to manage waste in the day-to-day life with the help of IOT bins (an e-bin which is capable of measuring, sorting and compressing the recyclables automatically.) This would allow us to keep track of how much garbage we dispose of in a given day and give us a sense of proper waste management. Basically, when you dispose of garbage into the IOT bin, the person whose phone is compatible with this app and uses it, will receive notifications including frequent reminders of proper garbage disposition and the wastage data of you, as well as of the people around who use this app, sort of making a competitive atmosphere. Additionally, you would earn points each time you use the IOT bin in which they would be calculated eventually for you to be rewarded/acknowledged for your cooperation. The ultimate goal would be to render a feasible system to dispose and recycle waste effectively while making the society aware of ways and means of recycling and the adversity of litter.

16. References:

- Omniatags.com. 2021. *waste-management*. [online] Available at: <https://www.omniatags.com/application-details/waste-management> [Accessed 25 March 2021].
- US EPA. 2021. *Recycling Basics | US EPA*. [online] Available at: <https://www.epa.gov/recycle/recycling-basics> [Accessed 25 March 2021].
- 2021. [online] Available at: <https://www.instructables.com/Smart- Garbage-Monitoring-System-Using-Internet-of-/> [Accessed 25 March 2021].
- Cbethai.com. 2021. [online] Available at: <https://www.cbethai.com/?gclid=Cj0KCQiA7NKBBhDBARIsAHbXCB5Vd2g3XinsI-BnkFLOFwOt0ZQeY4XXMZucnz0MCGWkIYrDJUCY-Z4aAmNAEALw_wcB> [Accessed 25 March 2021].
- 2021. [online] Available at: <https://www.instructables.com/Smart- Garbage-Monitoring-System-Using-Internet-of-/> [Accessed 25 March 2021].

17. Appendices

17.1 Workload Matrix

Tasks	Assignee and Number	Due date	Date Completed
Allocation of tasks, Writing the introduction and the description of the project, requirements and analysis, conclusion, appendices, making the title page and acknowledgment, proof reading, compiling and editing.	S. Sivakumar 20200273	24.02.2021	24.02.2021
Writing the solution outline, evaluation, methodology and the abstract of the project, proof reading,	M.D. Pathirana 20200278	24.02.2021	24.02.2021
Writing the introduction and the description of the project, requirements and analysis, conclusion, meeting agenda	I.P.D. Gunasekara 20200268	24.02.2021	24.02.2021
Writing the Innovative features, Screenshots of the prototype, meeting minutes, proof reading, table of contents	M.D.S. Fernando 20200219	24.02.2021	24.02.2021

17.2 Meeting Agenda

Meeting 01

Discussion of Tutorial 02

1. The meeting was held on Saturday, 30th January 2021 via Zoom.
2. Discussion about the topic
3. Dividing the tasks to each member
4. Setting a deadline for the task submission
5. Date for the next meeting.
6. Apologies for absence.

Meeting 02

Discussion of Tutorial 03

The meeting was held on Friday, 05th February 2021 via Zoom.

1. Discussion about the topic
2. Dividing the tasks to each member
3. Setting a deadline for the task submission
4. Date for the next meeting.
5. Apologies for absence.

Meeting 03

Discussion of Tutorial 04

The meeting was held on Thursday, 11th February 2021 via Zoom.

1. **Discussion about the topic**
2. **Dividing the tasks to each member**
3. **Setting a deadline for the task submission**
4. **Date for the next meeting.**
5. **Apologies for absence.**

Meeting 04

Discussion of Tutorial 05

The meeting was held on Saturday, 20th February 2021 via Zoom.

1. Discussion about the SDLC Model
2. Dividing the tasks to each member
3. Setting a deadline for the task submission
4. Date for the next meeting.
5. Apologies for absence.

Meeting 05

Discussion of Tutorial 07

The meeting was held on Friday, 04th March 2021 via Zoom.

1. Discussion about the context diagram.
2. Dividing the tasks to each member
3. Setting a deadline for the task submission
4. Date for the next meeting.
5. Apologies for absence.

Meeting 06

Discussion of Tutorial 09 & the Final Report.

The meeting was held on Thursday, 18th March 2021 via Zoom.

1. Discussion about the tutorial & the final report.
2. Dividing the tasks to each member.
3. Setting a deadline for the task submission.
4. Date for the next meeting.
5. Apologies for absence.

Meeting 07

The meeting was held on Thursday, 24th March 2021 via Zoom.

1. Formatting the errors in the report.
2. Finalizing the report and concluding the meeting.

17. Meeting Minutes.

Meeting 01

Discussion of Tutorial 02

The meeting was held on Saturday, 30th January 2021 via Google meet at 07.30 PM to 08.30 PM.

Present Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 20200219

- Discussion about the topic.
- Dividing the tasks to each member.
- Setting a deadline for the task submission.

Meeting 02

Discussion of Tutorial 03

The meeting was held on 05th February 2021 via Zoom at 09.00 PM to 10.30 PM.

Present Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 20200219

- Discussion about the topic.
- Dividing the tasks to each member.
- Setting a deadline for the task submission.

Meeting 03

Discussion of Tutorial 04

The meeting was held on 11th February 2021 via Zoom at 09.00 PM to 10.30 PM.

Present Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 20200219

- Discussion about the topic.
- Dividing the tasks to each member.
- Setting a deadline for the task submission.
-

Meeting 04

Discussion of Tutorial 05

The meeting was held on 20th February 2021 via Zoom at 09.00 PM to 10.30 PM.

Present Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 20200219

- Discussion about the topic.
- Dividing the tasks to each member.
- Setting a deadline for the task submission.

Meeting 05

Discussion of Tutorial 07

The meeting was held on 04th March 2021 via Zoom at 09.00 PM to 10.30 PM.

Present Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 20200219

- Discussion about the Context Diagram.
- Dividing the tasks to each member.
- Setting a deadline for the task submission.

.

Meeting 06

Discussion of Tutorial 09 & Final Report

The meeting was held on 18th March 2021 via Zoom at 09.00 PM to 10.30 PM.

Present Members:

1. S.Sivakumar: 20200273
2. M.D.Pathirana: 20200278
3. I.P.D.Gunasekara: 20200268
4. M.D.S.Fernando: 20200219

- Discussion about the Tutorial 09 & Final Report.
- Dividing the tasks to each member.
- Setting a deadline for the task submission.

17.4 Idea Validation Survey Questions Results.

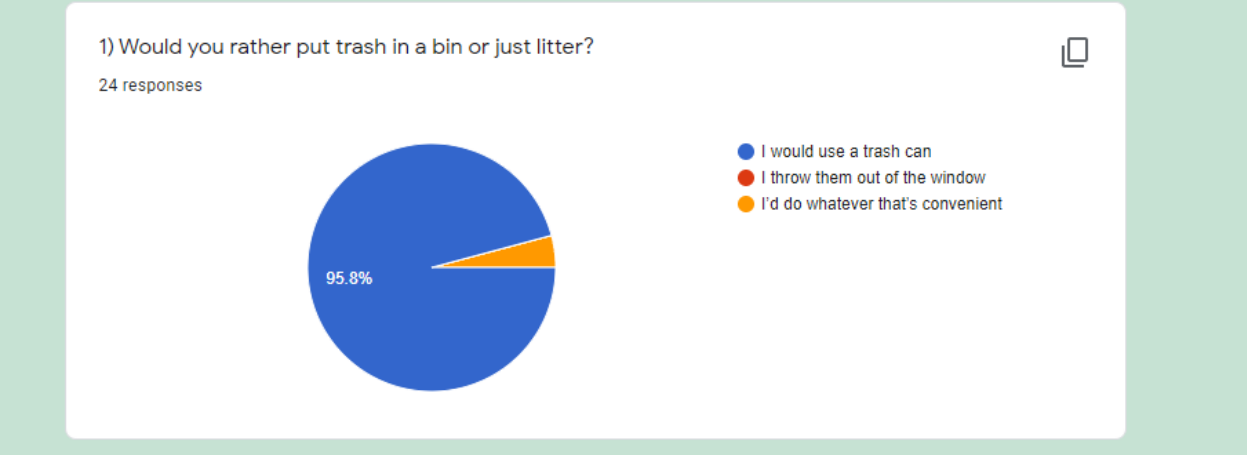

Figure 16

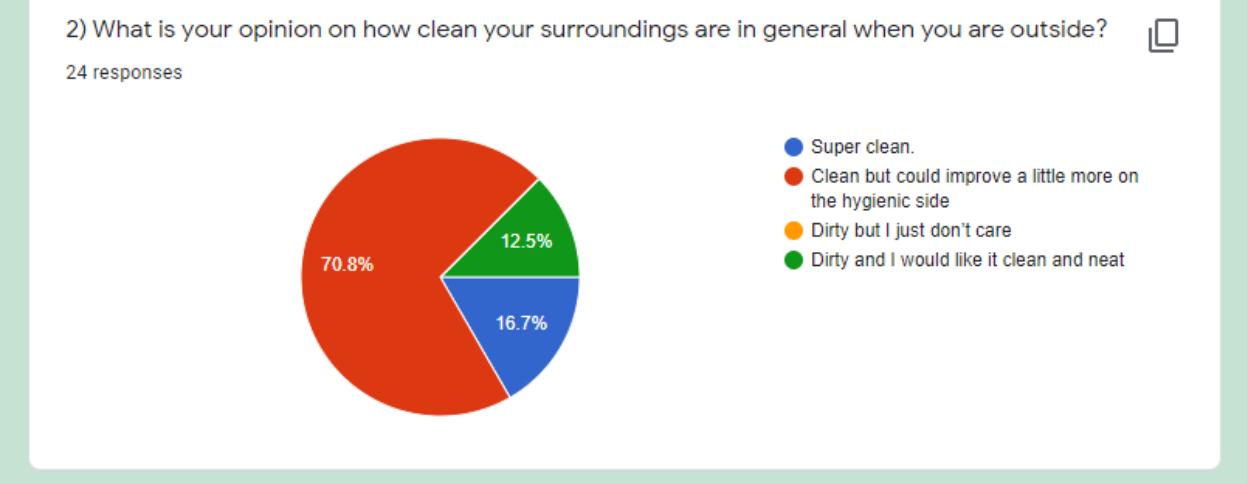

Figure 17

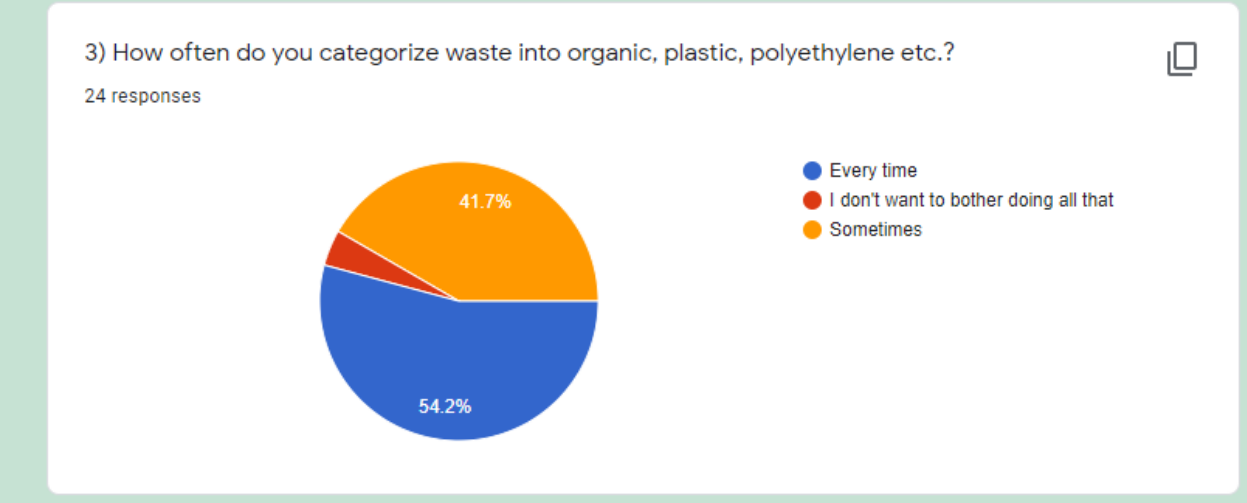
3) How often do you categorize waste into organic, plastic, polyethylene etc.?
24 responses
41.7%
54.2%
Every time
I don't want to bother doing all that
Sometimes

Figure 18

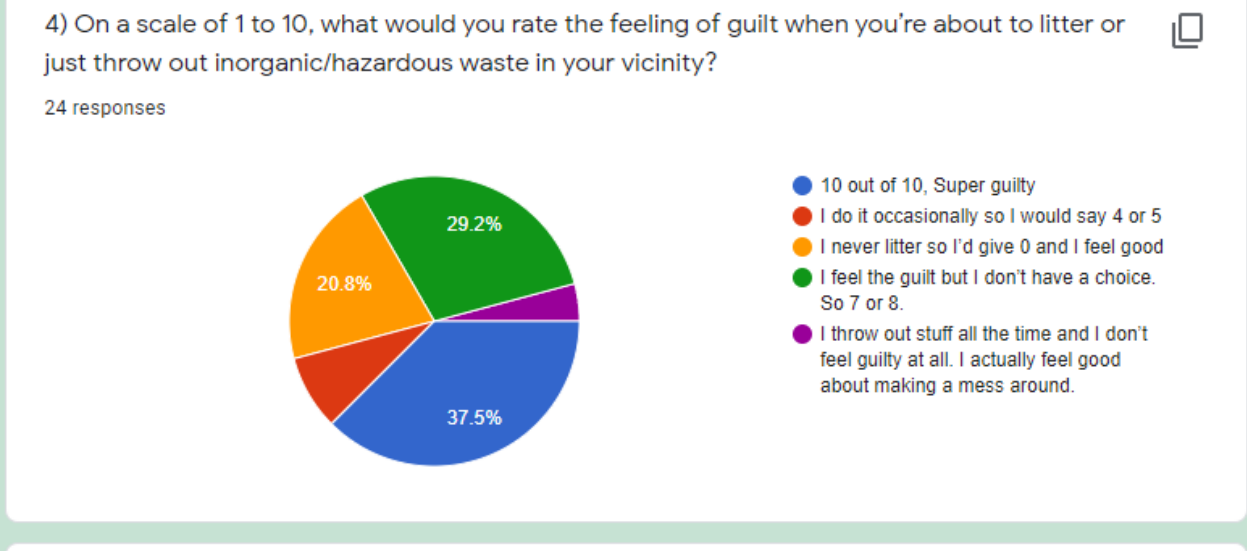

Figure 19

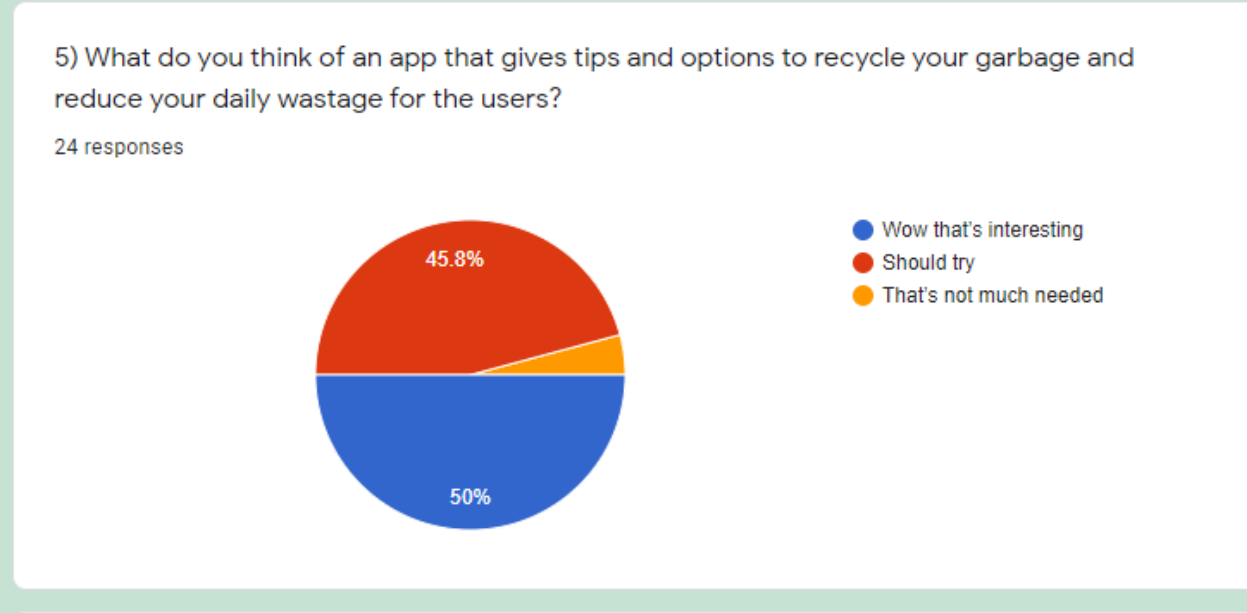

Figure 20

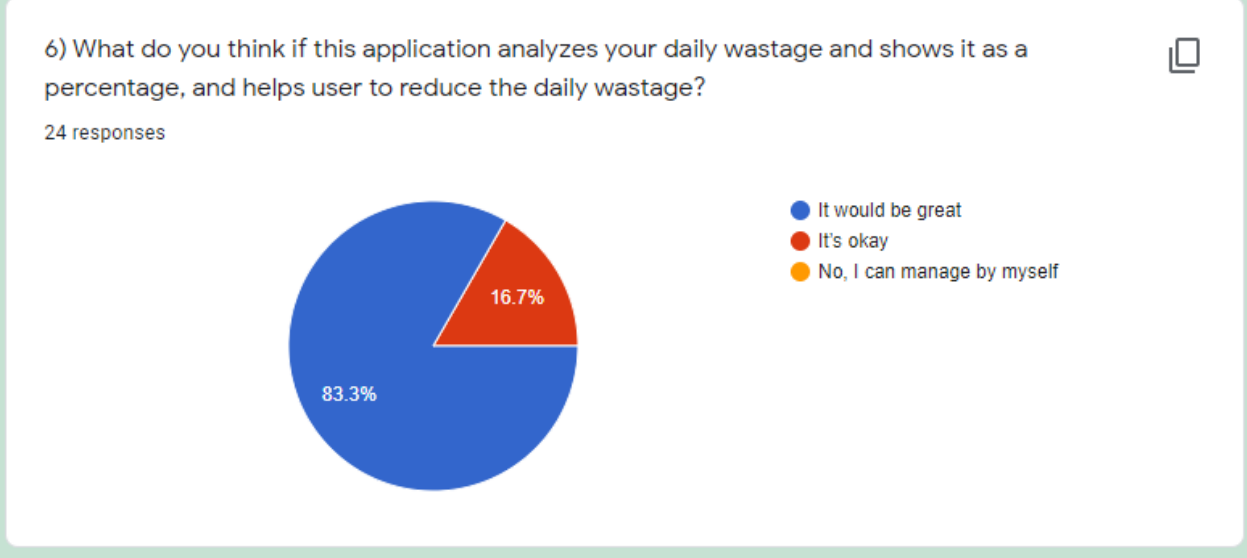

Figure 21

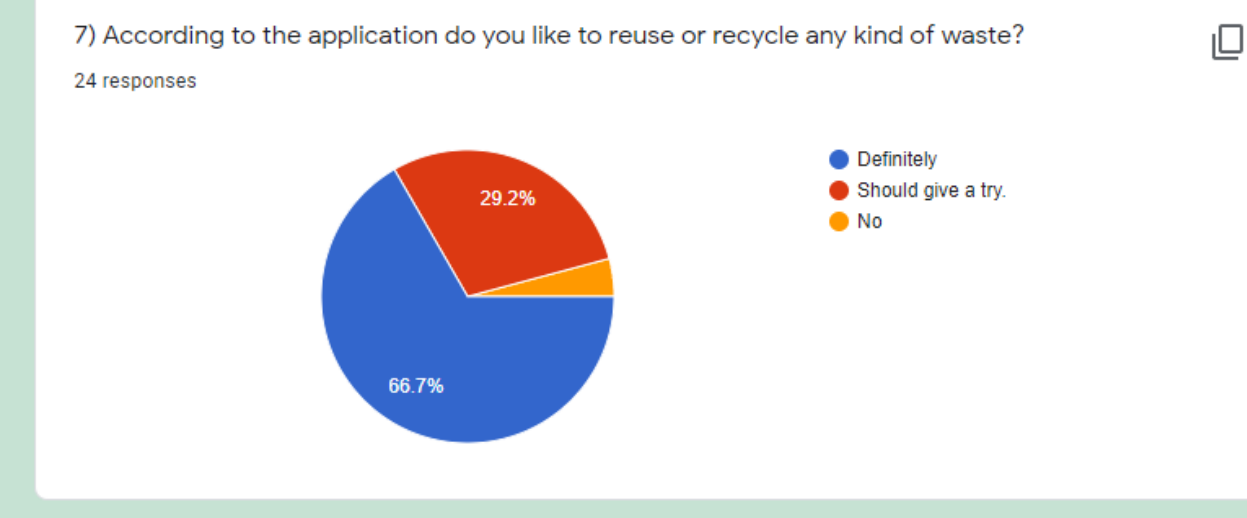

Figure 22

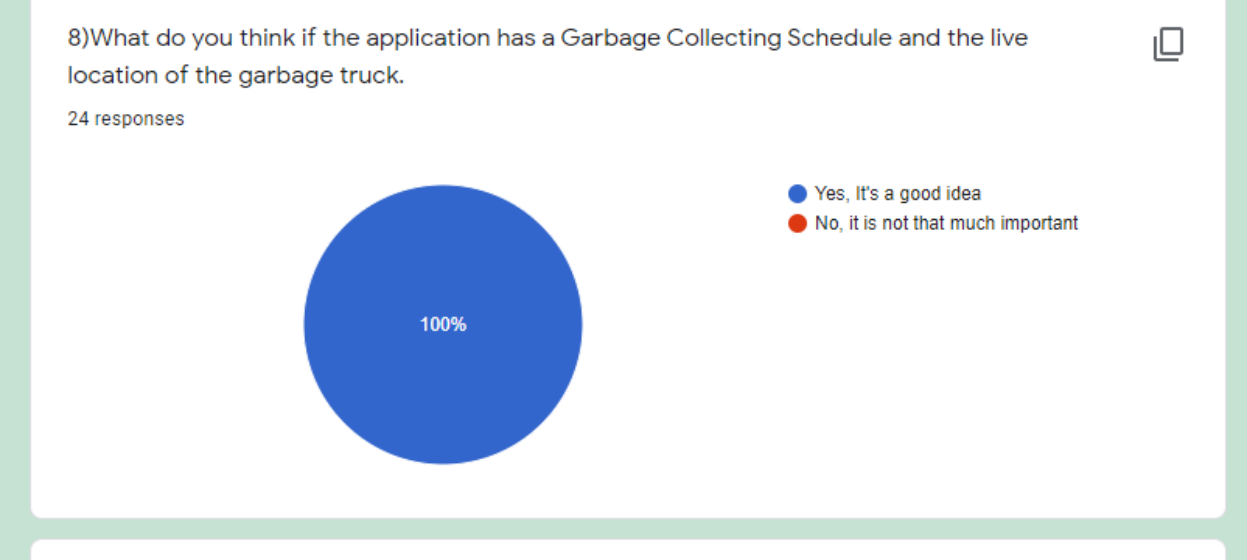

Figure 23

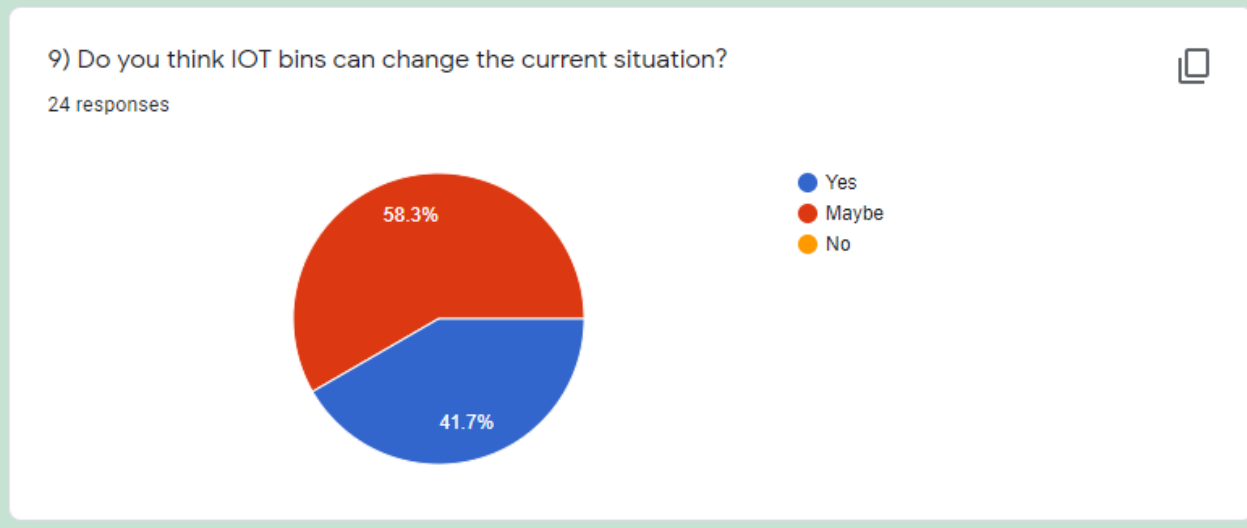

Figure 24

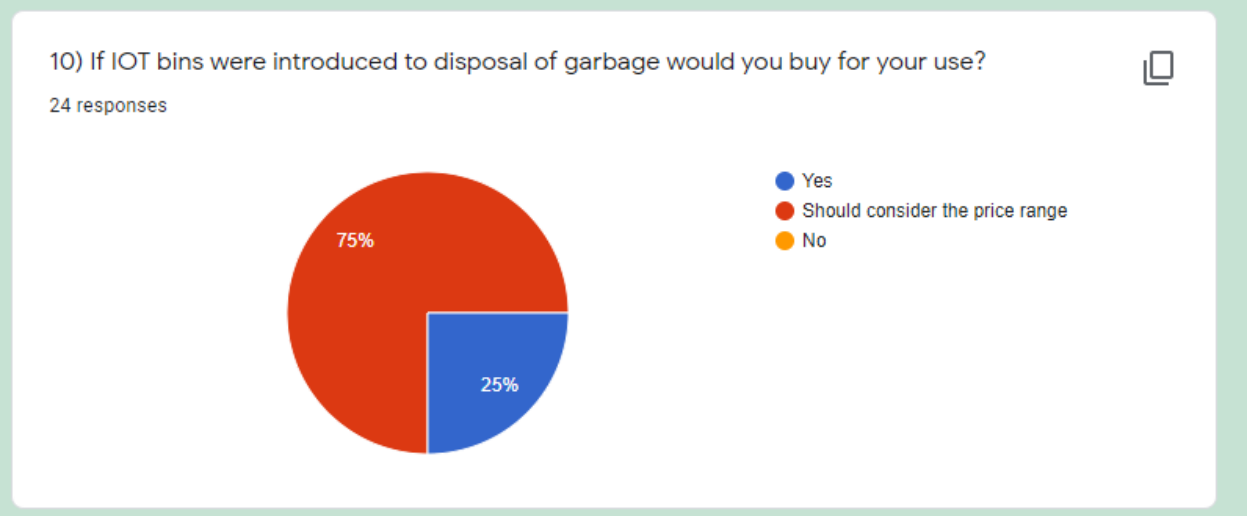

Figure 25

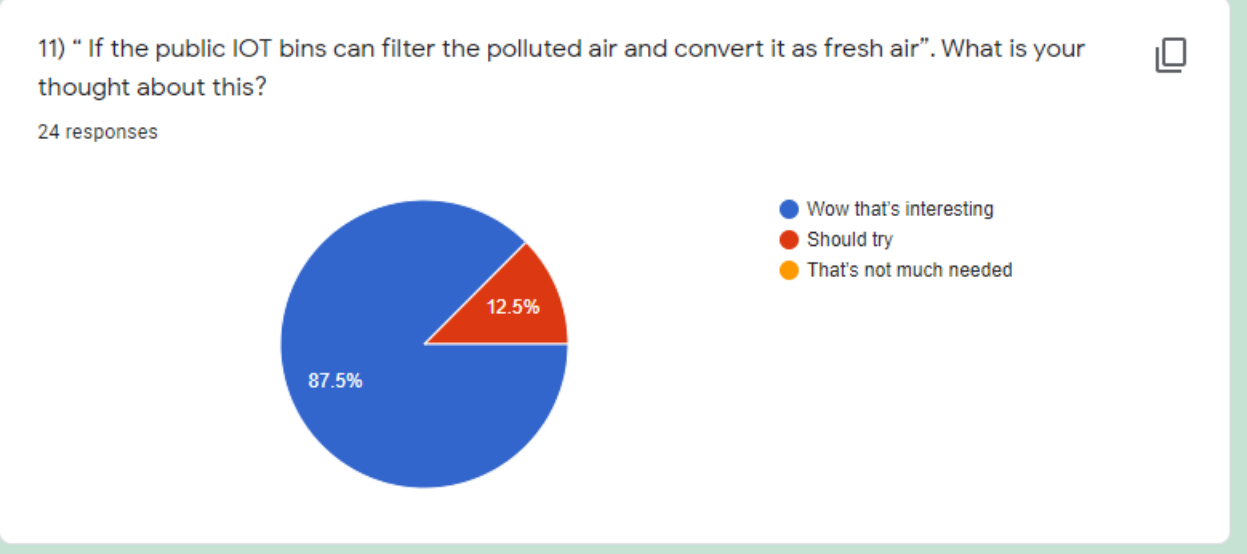

Figure 26

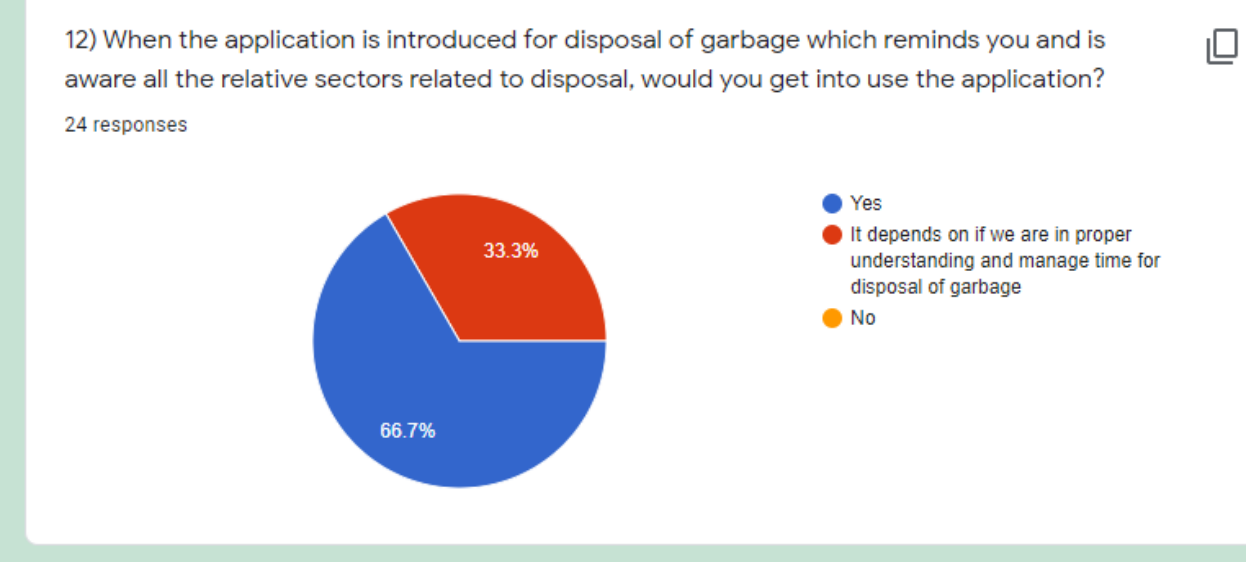

Figure 27

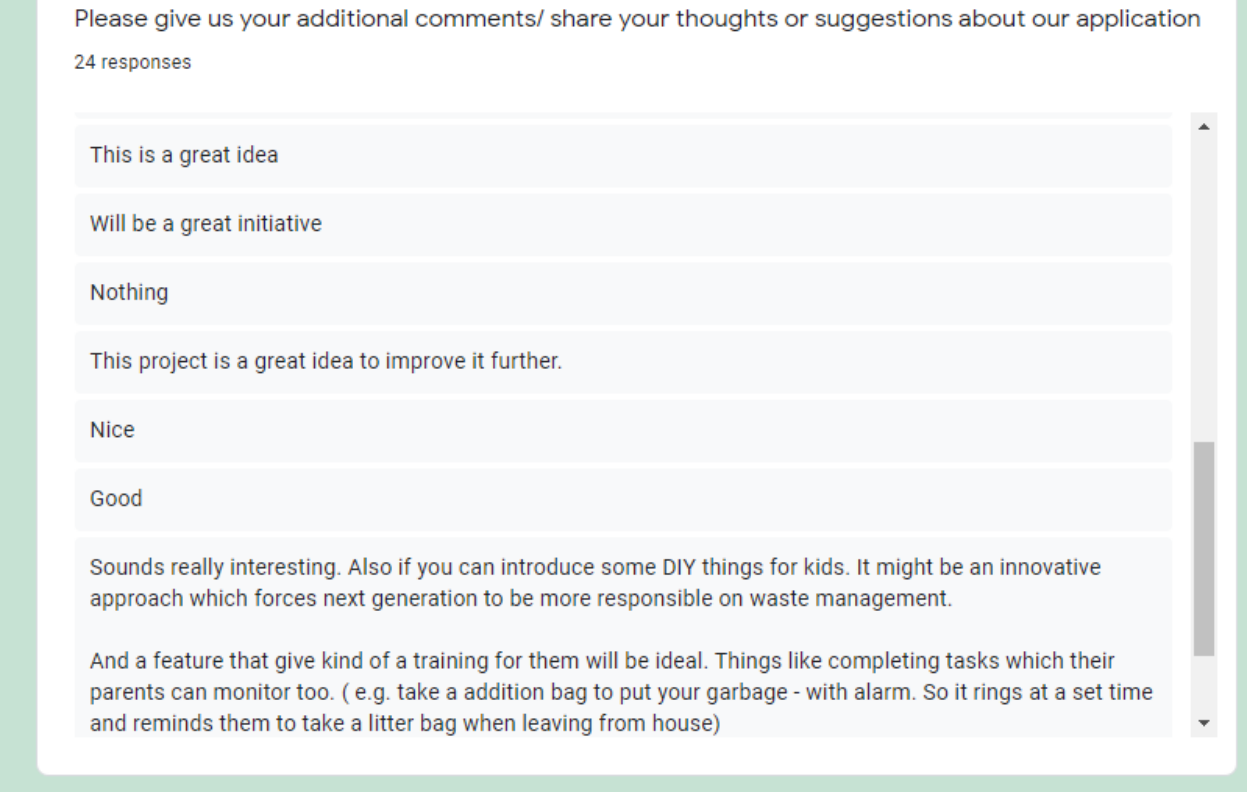

Figure 28

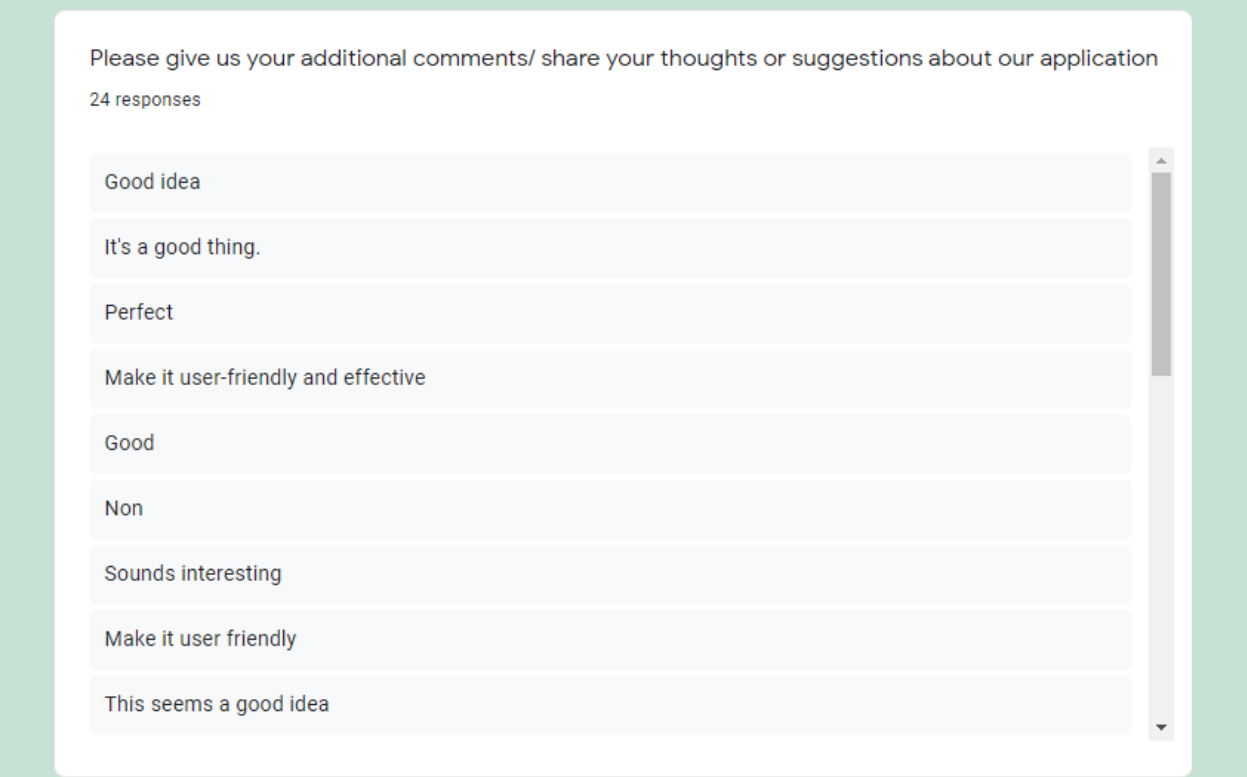
Please give us your additional comments/ share your thoughts or suggestions about our application
24 responses
Good idea
It's a good thing.
Perfect
Make it user-friendly and effective
Good
Non
Sounds interesting
Make it user friendly
This seems a good idea

Figure 29