Using Platform To Reduce The Waste Of Foods

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Abstract. Food play a very important role in human's history, everybody needs to eat for survive. After Industry Revolution, foods production amount is not a problem in most of the country, but at the same time, the waste of foods become a problem that we must to face, many people buy too many foods that they can't eat all of them before the expiration date, and they have no choice but to throw the rest of foods into trash can. This project creates a platform on Internet and can be used on both computers and mobile phones, with this platform, foods can be transport to who really need it, reduce the foods that will be throw away.

Introduction

Food is always a very important and basic element in the human society. In the past, many people need to work in farm, to make sure there is enough foods for all the people, in that time, foods seems to be really valuable thing for the people. After Industry Revolution, machine not only reduce the worker requirement in the farms, and also increase the efficiency, so more and more people can go out to make fortunes, since then, foods seems not that valuable as it used to be. In most of developed countries, people always buy too many foods that they can't eat them all, cause a huge waste of foods, and the overproducing is also one of the reason of global warming.

After 20th century, Computer and Internet is the most popular thing in the world, with the computer, people can do thing in a more efficiency way, and with internet, we can get knowledge and connect with others more easily, and in 21st century, with the popularization of computer, platform become a new popular thing, platform can be used in many different ways, like Facebook and Instagram are platforms that can let users to share their daily life and photos.

Therefore, the aim of this project is to establish an online platform, which could let users to post foods cause of buying too much and they can't eat them all so want to sell before the expiration date, and user also can buy foods they need on the platform in a cheaper price. For the user who post the foods on the platform, we help them to exchange the foods which might will be throw away into money, although the price might be cheaper than the price they buy it, but still better than throw away and get nothing. For the user who buy foods on the platform, we not only help them to buy foods in a cheaper price, but also offer them a new choice, we all know that if we want to buy things in just a little amount, it would be expensive, in the platform, cause the foods is from others buying too much, so user can get small amount and cheap price both.

In chapter 1, we discuss the food waste problem and global warming through news and papers. Chapter 2 illustrates the methodology and the framework of this study. Show

how can users used the platform in Chapter 3. Conclusions and potential research issues for future study are given in Chapter 4.

1. Literature Review

1.1 Food waste and global warming

With millions of households across the country struggling to have enough to eat, and millions of tons of food being tossed in the garbage, food waste is increasingly being seen as a serious environmental and economic issue. According to the New York Times, 60 million metric tons of food is wasted every year in the United States alone. This is worth about $162 billion of food. 32 million metric tons end up in landfills which cost local governments $1.52 billion, and the problem is not limited to the United States. The report estimates that a third of all the food produced in the world is never consumed, and the total cost of that food waste could be as high as $400 billion a year. Reducing food waste from 20 to 50 percent globally could save $120 billion to $300 billion a year by 2030.

The food discarded by retailers and consumers in the most developed countries would be more than enough to feed all of the world's 870 million hungry people, according to the Food and Agriculture Organization of the United Nations. The problem is expected to grow worse as the world's population increases. By 2030, when the global middle class expands, consumer food waste will cost $600 billion a year, unless actions are taken to reduce the waste.

Food waste is not only a social cost, but it contributes to growing environmental problems like climate change, experts say, with the production of food consuming vast quantities of water, fertilizer and land. The fuel that is burned to process, refrigerate and transport it also adds to the environmental cost. Most food waste is thrown away in landfills, where it decomposes and emits methane, a potent greenhouse gas. Globally, it creates 3.3 billion metric tons of greenhouse gases annually, about 7 percent of the total emissions. The United Nations agency points out that methane gas from the world's landfills are surpassed in emissions by only China and the United States.

1.2 Papers about how to reduce food waste

The first paper, "Beyond food sharing: Supporting food waste reduction with ICTs" was published in Smart Cities Conference (ISC2), 2016 IEEE International, was written by Aaron Ciaghi and Adolfo Villafiorita.

The authors mention that after the economic crisis, the number of people living in conditions of food poverty has increased, especially in developed regions, so the reduction of food waste has become an international trending topic. The authors used their five-year experience in developing and experimenting ICT tools to recover food surplus at different stages of the supply chain, and outline the way forward for an integrated set of ICT tools to reduce waste from producers to households.

The second paper, "Waste to Wealth- A Novel Approach for Food Waste Management" was published in 2017 IEEE International Conference on Electrical, Instrumentation and Communication Engineering (ICEICE), was written by K. Jayalakshmi, S. Pavithra and C. Aarthi.

In this paper the authors mention how serious the food waste problem is by the data from Food and Agriculture Organization (FAO), it said that almost half of all produced food will never be consumed, which is worse than the data from New York Times. And the authors also mention that cause of the waste of food, we also waste the "time and energy" that we have used to produce the food and as well our "natural resources" and the "limited available agricultural land" will be used up which could be handled in a much better and sustainable way. Additionally, waste has a strong financial impact and affects the environment including the overall greenhouse gas emission. A the authors implement IOT Based Smart Garbage and Waste Collection bins (SGWC), and used it to awareness about the food waste to the people.

1.3 Summary

There are plenty of reports and researches showing how important it is of the food waste problem, not only mention that how much money it cost for the government, but also talking about the climate problem of global warming. Although we all know that food waste is a serious problem to solve, but there is still don't have a proper solution for it. The aim of this project is to create a website platform and use it to reduce the food waste that cause of buying too many foods.

2. Method

The aim of this project is to establish a platform, which could ley user post food they no need, and buy the food they need on it.

The methodology in this project is divided into two parts. Phase I establishes a database system, which can storage the user's account, the product have been post and the orders.

Phase II establishes the website by using html to create the website, css to let the outlook be more pleasant, php to let the website connect to the database and have many different funtctions.

2.1 Phase I: Create database

We choose to use MySQL to be the database system, and under the database, we create four tables(as **Figure 1.** show below) to storage the data we expect will come from the website.

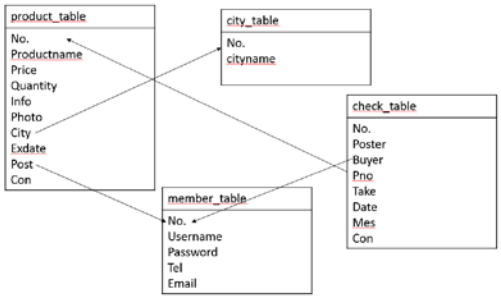

Figure 1. Data structure in the database

Table1. member_table:

In this table we storage user's information, including their username and password(which they use to login the website), their telephone number and e-mail address, which let us can connect the user when there is some problems.

Table2. product_table:

In this table we storage the products' information users have been post, including the product name, price, quantity, information for details, photo, city, expiration date, who post the product and the condition, column "post" is reference from member_table, and "city" is reference from city_table and is used to storage where the product is, the column "con" is used to record that the product is already sold or not.

Table3. city_table:

In this table we storage the city name and the number it connect to, we set 15 cities and the connect number as Table 1.

No.	Cityname
1	台北
2	桃園
3	新竹
4	苗栗
5	台中
6	彰化
7	雲林
8	嘉義
9	台南
10	高雄
11	屏東
12	台東
13	花蓮
14	宜蘭
15	南投

Table 1. City name and number

Table4. check_table:

In this table we storage the information of the bill, including poster, buyer, pno, take, date, mes, and con, "poster" and "buyer" these two column storage who sell the product and who buy the product, "pno" is reference from product_table and storage which product have been sold, column "take" storage how the buyer want the product been delivery, column "con" storage the condition of the order, like whether the order have been accept or not.

2.2. Phase II: Create the website

After creating the database, we use html, css, php to create the website which can let user use to trading their foods on. We create the website in a special way called "Responsive web design", in this way, when user open the website with a mobile phone on an APP, it can adjust the size by itself, let the surface be suit to the mobile phone, and we will show the website in the next chapter.

3. Case Study

3.1 Homepage, Sign up and login

Figure 2 is the homepage of the website, and you can rolling down to get some more information about this website. (**Figure 3**)

Figure 2. Homepage

Figure 3. Information

On the right site there is a menu you can click, you can choose to see products, sign up and login. (**Figure 4**)

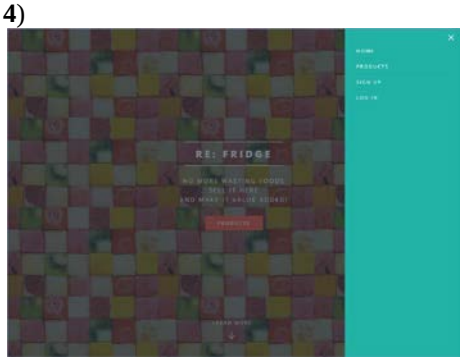

Figure 4. Menu

And if you click sign up you will see the page like **Figure 5**, fill in the form and click sign up, if succeed, you will see the text as **Figure 6** show.

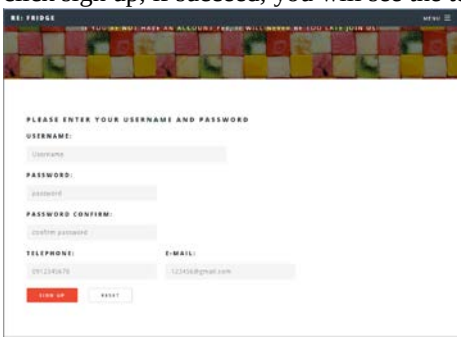

Figure 5. Sign up page

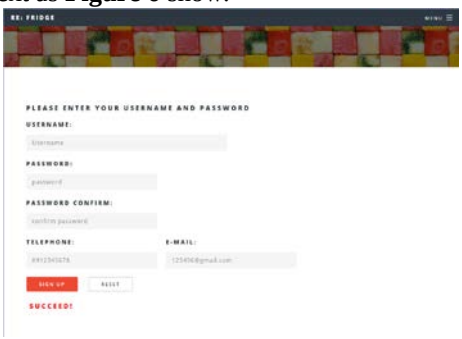

Figure 6. Sign up succeed

After sign up you can login, you can go to the login page with the menu, then you will see the page like **Figure 7**, fill in the form and click login, if succeed, you will go back to the homepage and the menu will change as **Figure 8** show.

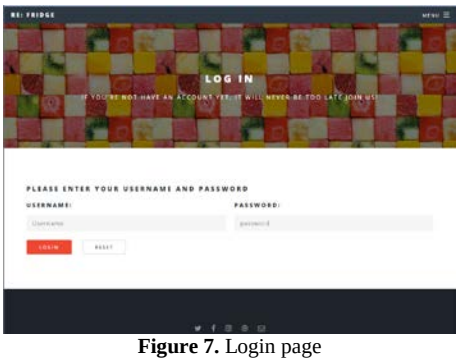

Figure 7. Login page

Figure 8. Login succeed

3.2 Upload products and buy products

After login you can click “upload” in the menu to go to the upload page(**Figure 9**) to post the product you want to sell, fill in the form, choose the picture of the product in your computer and click “upload” to post the product, if succeed, you will see text as **Figure 10**.

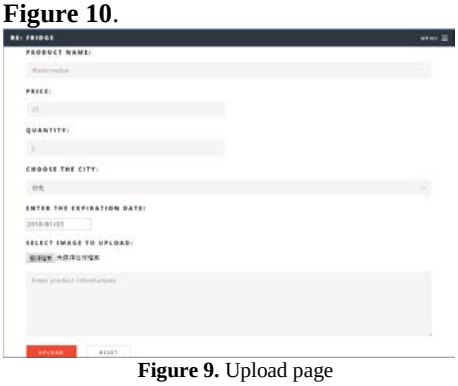

Figure 9. Upload page

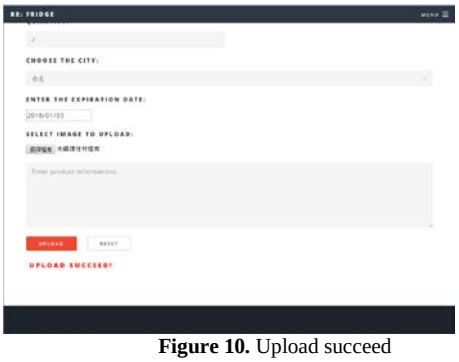

Figure 10. Upload succeed

Click “Products” in the menu, and then you will go to a page that list all of the products(**Figure 11**), you also can choose which city you want the product at to filter the products, and if you are interested in a product, just click on the it for more information(**Figure 12**), here you can see more details of the product and also the information of who post the product.

Figure 11. Product page

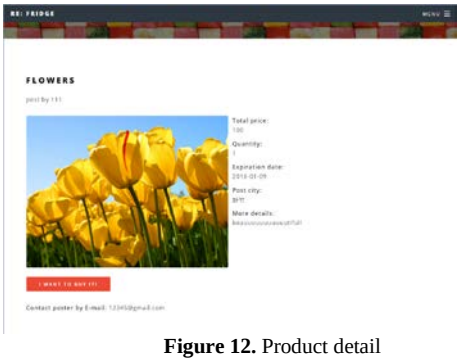

Figure 12. Product detail

If you are sure to buy the product click the button “I want to buy it!”, and you will go to a page ask you to choose the way you want product be delivery, and if you have

some message want to give to who post the product. (**Figure 13**) After finish the form you can click “I’m sure to buy it!” to buy the product, if the order success, you will see a success page will automatically go to homepage after two second. (**Figure 14**)

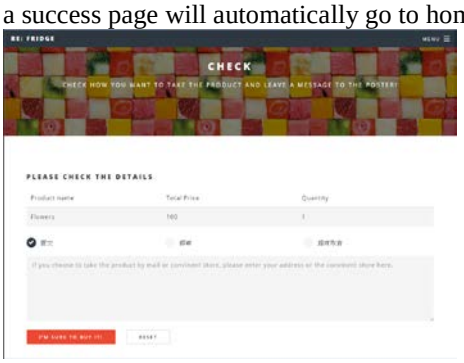

Figure 13. Order page

Figure 14. Order succeed

3.3 Manage products and orders

You can manage the product you have upload in the page “My products”(**Figure 15**), and if the product have been order other user, you can choose the condition of the product, whether it is delivery or not, you can also reject the order if you want to, and you can edit the product that is still selling, or delete it, if you want to edit your product, click the edit button and you will see a page like **Figure 16**, edit the things you want to change and click “Update” to edit the product.

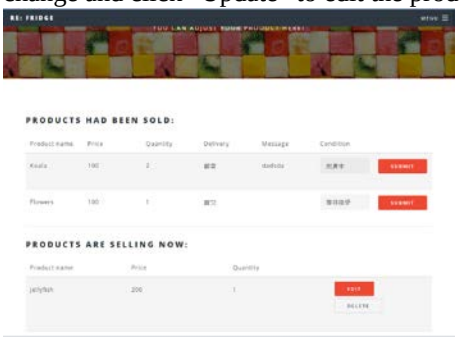

Figure 15. My products page

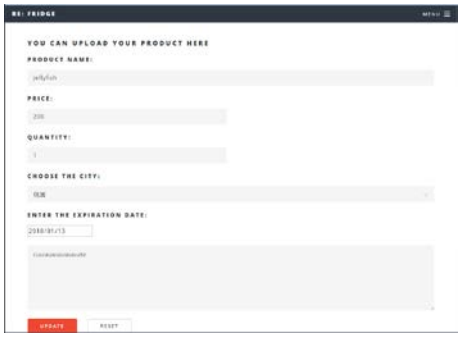

Figure 16. Edit product

You can see the order you made in the page “My orders” (Figure 17), you can check the condition of your order here.

Figure 17. My order page

4. Conclusions

In this project we create platform to let user can post and sell foods they no need, and also let user to buy products, in this way. We can conclude the change of the process as follow. We use two person A and B to be example, assume that they need the same food, and A buy the foods early than B, and they all buy too much.

As-is(Figure 18):

In the As-is model, A and B both buy the food, and after the expiration date, both of them have no choice but to throw the foods away.

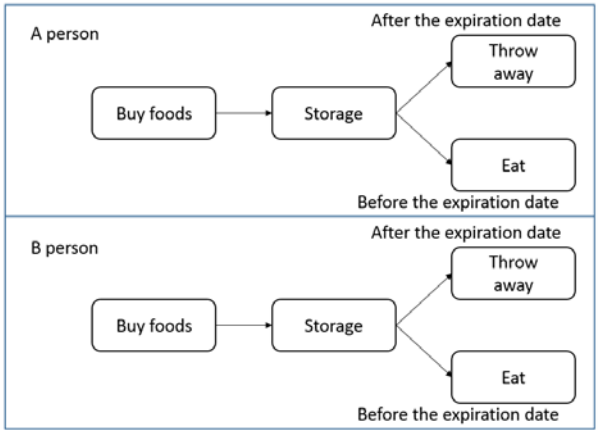

Figure 18. As-is model

To-be(Figure 19):

In the To-be model, after A buy the foods, and figure out he buy too much, he can post the amount he don't need on the website, and B can buy it, so that none of the foods will be throw away.

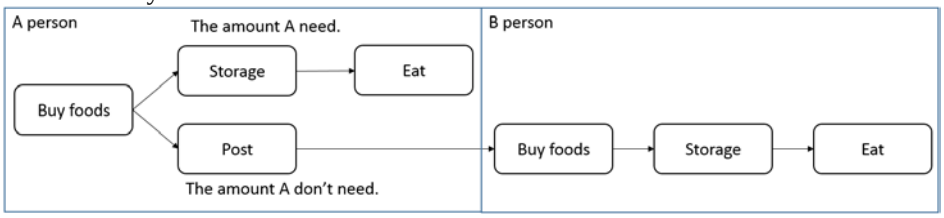

Figure 19. To-be model

So we can expect if almost everyone is using this platform, according to the data from New York Times, the report estimates that a third of all the food produced in the world is never consumed, we can save at least half of them, which is 1/6 of all the food produce in the world.

References

[1] https://www.nytimes.com/2015/02/26/us/food-waste-is-becoming-serious-economic-and-environmental-issue-report-says.html

[2] K. Jayalakshmi, S.Pavithra, C. Aarthi, "Waste to Wealth- A Novel Approach for Food Waste Management", 2017 International Conference on Electrical, Instrumentation and Communication Engineering (ICEICE2017)

[3] Aaron Ciaghi and Adolfo Villafiorita, "Beyond Food Sharing: Supporting Food Waste Reduction with ICTs", Smart Cities Conference (ISC2), 2016 IEEE International