Lab 1 – Product Description

Abdullah Pathan

Old Dominion University

CS411W

Professor Sarah Hosni

12/12/2022

Version 1

Table of Contents

1. Introduction

Environmental pollution is one of the major concerns we face, throughout the decades we have reached an increase of plastics, paper, and glass materials. Because of the increased usage of materials, the focus on recyclable and bio-degradable materials has increased as well. It has been stated the by 2023 the total packaging business can reach $1 trillion; companies are taking responsibility for the processing of packaging and interest has increased for more environmentally friendly packaging. (Source 1) In order to be more environmentally friendly, we have come up with other alternative solutions such as recycling.

The consensus is that if we can re-use the same packaging materials, we can assist in the effort of becoming more environmentally friendly. Unfortunately based on statistics and data, the answer is not so simple. According to ERI, various recyclable goods can only be recycled so much before they are downcycled (recycled into a lesser value than original material). Metal and glass materials in that they can be recycled numerous times without risk of degradation. But plastic and paper have limited number of times to be recycled.

Plastics even though recyclable, can be not a good choice of packaging. Because of various plastic packaging being equipped with many polymers, additives, adhesives, and coatings it may be detrimental to the environment because of how toxic these materials are when broken down. (Source 6) A problem we are facing is how grocery markets are utilizing the same packaging materials in the goods they are selling.

In order to store product and to be as environmentally friendly as possible the same materials are used to store the goods. But as stated before, the amount of packaging being produced and the efforts of recycling, it is not a permanent more ideal solution for the future. An ideal solution would be to ultimately re-use the materials we already own and use them. If we are able to limit the usage of packaging, it can prove to be the ultimate benefactor to the environment.

2. Product Description

For the problem, we are introducing a solution called ReFill.Me. Refill.Me is an application that serves as a information-hub and allows users to find package-free shopping stores, guide them in usage of containers and ultimately aims to assist the environment-friendly efforts through package-free shopping. It will be a convenient solution that carries plenty of information, ease in product/store searching, guiding in container recommendation and even a reward system to boost motivation in this style of shopping. Key features include the Container Guide, Reward.Me system, Store search, product search, shopping-list creation, crowdsourcing and the ability to connect shoppers to advocacy and petition sites for package-free shopping.

The solution will use the popular React Native and Expo framework to consolidate the solution to a singular codebase, whilst allowing the distribution to several platforms: Android, iOS and web application. Because of the nature of a singular codebase, features, the user interface and all functionalities will correspond to each available platform (with minor tweaking for device specific capabilities). In order to house user, product, store and container data, a MySQL database will be utilized alongside Amazon RDS. The solution is broken down into three layers: the Presentation Layer, Application Layer and Data Layer. As stated before, React Native/Expo will be responsible for the UI/UX presentation layer. The Data Layer would be comprised of MySQL and AWS RDS, with routing from Express. And the Application Layer will utilize several API's to enable key functionalities such as the Amazon Maps API, Amazon Data Kinesis, Scrapy, Tesseract 4, Barcode Detection API and Optical Character Recognition.

3. Identification of Case Study

This product is designed for shoppers who would like to reduce their packaging waste, transportation emissions and consume with consciousness. Based on a study, in the USA 87% of Generation Boomers, 79% Generation X, 83% Generation Millennials, and 85% of Generation Z are all concerning with package waste. These are the target groups Refill.Me would like to gear towards in using this solution. From these generations target groups specifically would be mostly women, users in the ages of 18 to 65, who reside on the

east and west coast, come from diverse income levels, are educated and/or are passionate when it comes to environmental change. Based on the features of Refill.Me and its main mission to promote package-free shopping, those who are primarily concerned of the environment waste and future implications, Refill.ME will be an attractive solution for them.

4. Prototype Description

4.1 Prototype Architecture

4.2 Prototype Features and Capabilities

4.3 Prototype Development Challenges

5. Glossary

Biodegrade: to decompose and become incorporated back into the environment

Bulk section: an aisle where products are available in dispensers or bins, and the shoppers can buy the exact amount they desire

BYOC (Bring Your Own Container): an initiative to encourage shoppers to bring their own containers with them to the store in order to avoid creating packaging waste

Compostable: breaks down into organic matter and does not produce any chemicals during that process

Container: tote bags, produce bags, glass or plastic jars, glass or plastic boxes, glass or plastic bottles that can be used for package-free shopping

Container Guide: a small lexicon providing an overview of different types of containers and the types of products that could be stored in them

Container Recommendation Feature: a feature of Refill.Me that suggests specific containers for products based on the type of product such as liquid or solid.

Experienced package-free shopper: a shopper who has experience, and thus, knowledge of package-free shopping

Farmers' market: a market where local farmers sell their products directly to consumers.

Greenhouse gas emissions: gasses that trap heat in the earth's atmosphere such as carbon dioxide and methane, and thus directly contributing to climate change, predominantly emitted through human activities

Loose product: product sold without any packaging

Mainstream grocery shopping: grocery shopping that does not follow sustainable practices, thus, it entails buying packaged items, using plastic, not considering environmental aspects

Microplastics: tiny plastic particles that are less than five millimeters long and are created when larger plastic pieces breaks down

Novice package-free shopper: a shopper who has no experience, and thus, no knowledge of package-free shopping

Package-free: without any packaging materials such as plastic, paper, cardboard, aluminum, or glass

Package-free store (in the context of our application): supermarkets with a bulk section, stores exclusively selling loose products, and vendors at farmers' markets.

Package-free shopper: a shopper who prefers to buy loose products by filling them into their own containers

Package-free shopping: shopping using one's own containers, thus, shopping without creating packaging waste

Packaging: material used to protect a product from any damage during transportation

Produce bag: a reusable bag usually with a window and tare weight label that is used for buying fruits / vegetables

Single-use: designed to be used only once, and then to be discarded

Tare weight: the weight of an empty container that should not be included when the price of the product is calculated

Tote bag: a large bag, often made of cotton, used to carry many items

6. References

Carvalho, J. S, et al. (2022). Consumers' knowledge, practices, and perceptions about

conventional and sustainable food packaging, Food Science and Technology,

https://www.scielo.br/j/cta/a/RcjxMbZXFTTtgfjrpCvjvtB/?format=pdf&lang=en

Denis, K. (2021, August 7). The Future Is Bright for American Recycling, Consumer Brands

Association,

https://consumerbrandsassociation.org/blog/the-future-is-bright-for-american-recycling/

EPA. (2022, March 8). Containers and packaging: Product-Specific Data, United States

Environmental Protection Agency,

https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-an

d-packaging-product-specific#:~:text=Containers%20and%20packaging%20make%20up

,beverages%2C%20medications%20and%20cosmetic%20products

EPA. (2022, July 31). National Overview: Facts and Figures on Materials, Wastes and

Recycling,

United States Environmental Protection Agency,

https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-over

view-facts-and-figures-materials#NationalPicture

Groh, K. J. et al. (2019, February 15). Overview of known plastic packaging-associated

chemicals and their hazards, Science of The Total Environment, Volume 651, Part 2,

https://www.sciencedirect.com/science/article/pii/S0048969718338828

Hoover, A. (2022, June 10). These influencers live trash-free in a garbage world, Morning

Brew,

https://www.morningbrew.com/daily/stories/2022/06/10/influencers-live-trash-free-in-a-g

arbage-world

Kim, L. Incentives, Demographics, and Biases of Ethical Consumption: Observation of

Modern

Ethical Consumers, University of California,

https://www.econ.berkeley.edu/sites/default/files/Kim_Laura_F18%20Honors%20Thesis.

pdf

Shen, M. et al. (2020, May 1). (Micro)plastic crisis: Un-ignorable contribution to global

greenhouse gas emissions and climate change, Journal of Cleaner Production, Vol. 254,

https://www.sciencedirect.com/science/article/abs/pii/S0959652620301852?casa_token=

U8PV0S4NpoAAAAAA:7XiABOjdLWumEZeQDV6XHsiGVwlopPMLtaBUIrG-IUehw

szg7wlX-Lm0VIcgrQ-4aBVxHwTHa4w

Sinai, M. (2017, June 27). How Many Times Can Recyclables Be Recycled?, Recycle

Nation,

https://recyclenation.com/2017/06/how-many-times-can-recyclables-be-recycled/

The Environmental Impact of Food Packaging. (2018, October 08). FoodPrint,

https://foodprint.org/issues/the-environmental-impact-of-food-packaging/

VanRemoortel, A. (2018, May). Cultural Capital Among Zero Waste Consumers, Wheaton

College,

https://digitalrepository.wheatoncollege.edu/bitstream/handle/11040/24562/Anna_VanRe

moortel_HonorsThesis.pdf?sequence=2&isAllowed=y

Zero Waste Packaging Market Size, Share, Report 2022-2030. Precedence Research,

https://www.precedenceresearch.com/zero-waste-packaging-markethttps://www.preceden

ceresearch.com/zero-waste-packaging-market