

Lab 1 – Refill.Me: Package-Free-Shopper Product Description

Kira Maximova

Old Dominion University

CS411 – Spring 2023

Professor Sarah Hosni

March 6, 2022

Version 2

Table of Contents

1	Introduction.....	4
2	Refill.Me Product Description.....	6
	2.1 Key Product Features and Capabilities.....	7
	2.2 Major Components (Hardware/Software)	11
3	Identification of Case Study.....	12
4	Refill.Me Prototype Description.....	13
	4.1 Prototype Architecture.....	15
	4.2 Prototype Features and Capabilities.....	16
	4.3 Prototype Development Challenges	16
5	Glossary	18
6.	References.....	23

List of Figures

Figure 1: Major Functional Components Diagram	3
-----------------------------------------------------	---

List of Tables

Table 1: Refill.Me Real World Product vs. Prototype Features for Shoppers.....	.14
Table 2: Refill.Me Real World Product vs. Prototype Features for Shoppers (cont).....	15

1 Introduction

Grocery shopping is only possible with its eye-catching packaging to keep air and microbes away. Packaging is everywhere, from bulk items to a single or loose items: plastic stickers to a wire that attaches the product with its description tag as an example of a pineapple. Customers experience the market pressure when shopping to purchase primarily packaged goods. According to the article “The Environmental Impact of Food Packaging”, “almost all food that we buy, especially processed food comes packaged” (EPA, 2018). Even the weekly adds focus on packaged goods, so its makes extremely difficult for stores and customers to find alternative to prepackaged shopping experiences.

The FDA set the rules, but the guidelines are not revised as often as it should. According to the EPA resources the USA accounts for 28.1% of global trash waste generated for 2018. (EPA, *Containers and packaging: Product-Specific Data*, 2022). The United States, apart from other countries, does not emphasize the mounting trash as a problem with its vast land and water resources. As a result, “In January of 2016, the Washington Post published an article..., by 2050, there will be more plastic than fish in the world’s oceans.” (VanRemoortel, 2018). According to (Shen, 2020) microplastics and nano plastics damage the ecosystem “evidence has emerged that microplastics not only accumulate in the environment, but also in our food ... and water supplies... even our bodies.” Furthermore, packaging creates the chemicals leak into the food supply (Groh, 2019) such as Forever’ chemicals that comes from nonstick cookware and food packaging. Recycling can be a partial solution for the problem; however, it is not (EPA, *National Overview: Facts and Figures on Materials, Wasted and Recycling*, 2022). Furthermore,

recycling is not an ultimate resource for removing items from the landfill as it only can be done a limited number of times depending on the material. (Sinai, 2017).

Many customers aware of alternative methods of shopping, in “Zero waste packaging is hailed as a fresh industrial revolution” (Precedence Research, 2022). As Katie Denis lists in her poll with the sample of 1530 adults aged 18+ (Denis, 2021), ‘The Future is Bright for American Recycling’ poll that “consumers are increasingly taking matters into their own hands to make conscientious choices. If given the option to buy products with recyclable or compostable packaging where 47% of Americans opt for recyclable products as their first choice, and 20% prefer compostable products” (Denis, 2021).

Before the pandemic, many started to realize that the packaging was overused. In 2021, a Consumer Brands poll surveyed adults in the USA and found that “Boomers have the highest level of concern about packaging waste with 87% reporting concern, compared to Generation X (79%), Millennials (83%) and Gen Z (85%)” (Denis, 2021). In (Precedence Research, 2022) the target audience consists of predominantly women between the ages 18 and 65 and their plus one ‘+1’. According to (Kim, 2018), “older population are generally more engaged with ethical consumption, given that ethical purchases involve the knowledge and the bandwidth to purchase more expensive things.”

While big stores rely heavily on digital marketing, smaller or specialty stores rely on word of mouth for clientele as many unable to publish their store information online which prevents customers from the ability to search online for the type of produce the store carry. On the other hand, while big retail businesses continue to rely on what work before strategies, while other entities as LIDL, ALDI began to alter shopping options by providing loose products without introducing unnecessary package materials. However, even in that case customers get

disappointed when faced with ‘out of the stock’ item or when the price is inaccurate from the weekly advertisement. Consequently, published, and digital advertising might work for some but it is not as accurate as it would like to be.

2 Refill.Me Product Description

Refill.Me is an environmentally friendly shopper platform that brings closer the vendors: stores, farmers markets with eco conscious clientele, and shoppers interested in package-free shopping. The app removes the frustration and ambiguity for unit prices and container recommendations that without Refill.Me would be very challenging. The mobile application, Refill.Me focuses on the providing an option for package-free shopping. It is a hub that provides up-to-date information on package-free goods in the local information where the users reside. The app attracts as novice and experienced shoppers with a new, more organized method of shopping that will alleviate numerous frustrations that customers currently experience: transparency on availability, price, container’ choice. If, in the past, the user had to browse the website, look at the weekly ads, create a manual shopping list, prepare containers/bags inquiry, and once in the store to find out that the item is sold out. Refill.Me eliminates most of the chaotic experience with the endless hours of package-free shopping and providing preparations by connecting the stores with the shoppers and provide an option to create a shopping list. Lastly the app provides the shoppers with the customizable recommendation container guide based on the shopping list to alleviate the shopper tasks.

For vendors there is an option to access Refill.Me on a tablet with the bigger screen to provide more user-friendly experience. App is a network for people with the similar customer’

interests. To keep shoppers engaged in the app, Reward.Me option is available that collects points that can be converted to discounts and rewards for the customers.

Refill.Me will come with the free trial period and a premium choice of either individual or family user access upon expiration of the free trial. The stakeholders provide the resources for the network of the supermarkets to forms.

The app is benefits not only customers but also provides transparency to supermarkets, the ability to track which items are more desirable for package-free shopping as well as the ability to track seasonal demands changes such as religious and holiday' shopping. Refill.Me is an app for anyone, from the DoorDash to BlueApron service. Refill.Me provides an open-door access when an ingredient is needed on the fly. The app is first-of-its-kind that assist and benefits daily package-free shopping experience by connecting customers to stand alone stores, to mega supermarkets to farmers markets. "Everybody can strive for zero waste. It is whether or not you try or you want to try" (Hoover, 2022).

2.1 Key Product Features and Capabilities

Refill.Me is a mobile application available on Android and iOS smartphones as well as tablets or computers. User interaction with Refill.Me is performed through GUI (Graphical User Interface) on the user's smartphone for the majority of the content: user profile, map display and the option for search, customized container recommendation list, container guide, information about the stores, available product information. Refill.Me includes the ability to integrate to a larger screen for an extra features that are available to the vendors.

The app allows the user to select the items sold in their areas by comparing the unit price and adding the desired item to the shopping list. The list then automatically adjusts with the

container recommendation for the specific item in mind—a Reward.Me reward system created to keep shoppers’ enthusiasm going for package-free shopping and, in return, rewards them with the points that shoppers accumulate by uploading the receipts and that could be converted into discounts or certain benefits depending on the store. To clarify, Refill.Me has two container guides: one is static – basic information on containers as specific for the item assistance and another one is dynamically populated depending on the item selection.

Regardless of if the user connection to Refill.Me using their phone or tablet, the app supports four roles: administrators, package-free shoppers (later shoppers), store owners or employees (later store owners), and guests. The assumption is that shoppers are more susceptible to mobile app access than the tablet. The roles on the app allow overlap so the same user can have a store owner and the shopper accounts but not at the same time; consequently, two accounts for the same user. The main customers for Refill.Me application will be for supermarkets offering bulk sections, package-free stores, and farmers markets - the core of the app that provides, informs and markets their products to potential shoppers through the app. To encourage the adoption to Refill.Me a free introductory period is offered to the supermarkets, stores, and farmers markets. However, after a specific time, the application is forces the users to log in using premium, paid subscription.

Application attracts the hidden-in-the-dark target audience for shops and farmers markets. The goal is that the shoppers is able with using just one app the entire planning for package-free shopping: locate the store, find the product, its price, compare with the prices of nearby stores that carry same product and lastly place on the shopping list as a reminder not to forget.

Package-free shopping is “sustainable consumption” that introduces the idea that the shopper has to bring their container for purchasing products that they intend to purchase. The

containers can be anything from tote bags to glass or plastic bottles or boxes to reusable produce bags. It even can be something spontaneous and creative, ex.: a cone out of weekly ads paper for the sunflower seeds, a seeping cup for the fresh berries.

Reward.Me allows users to create user profile when signing up in the application. Profile information includes name, email, creates password, enters date of birth to validate that the user is older than eighteen years old, address is entered through the GUI. For the store' owners an extra level of details is needed: store information, address, contact information, hours of operations. For guest/public user no account creation is needed. User verification is performed by the user. Upon login an email and a password required to authenticate the user. Regardless of the user access, the session is timed out after 1 hr. of inactivity if left open. Upon first login to the app, a message will appear to enable the Location for an accurate store search.

Shoppers have a vast access on the app: such as 'Store Search' with three options for search, 'Product Search' with three options for search, 'Shopping List', and 'Profile' with Reward.Me feature. Some features might not be available during the presentation session. A search will only work accurately if Location is enabled. When turned on, it will provide a detailed listing of nearby stores: supermarkets with bulk sections and farmers markets locations. The results for search for stores are limited to five stores due to mobile display limitations.

The home tab has quick navigation to speed up the familiarization time so shoppers will start using the app sooner. The profile provides the user with the option to update profile information; preview shopping lists history, and store list history, as well as keep track of the accumulated points and rewards. Note: the points do not expire on the app, but discounts do; thus, shoppers need to be cautious on when to transfer points into discounts. The 'Reward.Me' will require shoppers to scan their receipts, and it will scan and assign a preselected number of

points for each receipt that shoppers upload. ‘Reward.Me’ feature is unavailable to guests, store owners, and farmers markets.

The web or table version will have an additional feature that is hidden from shoppers; it has ‘products & prices’, ‘reward point conversion,’ ‘coupons,’ and ‘store analytics’ features. In ‘products & prices,’ store owners/farmers markets could update/delete their inventory records of the items they carry and are available for package-free shopping. The ‘reward point conversion’ allows farmers markets, store owners, and the maintenance team to set/update parameters on how the points are converted to discounts. Again, the points that shoppers accumulate have no expiration date, but the discount has an expiration date. All roles except for guests and shoppers will have access to personal ‘store ratings’ where they can review and track the rating for the store. In ‘store analytics’, store owners can generate data for desired store/inventory analyses – for example, based on search product searches found the item that the shoppers was searching for, product availability in the store. Store owners can contact administrative staff for a specific report, but it will require admin assistance.

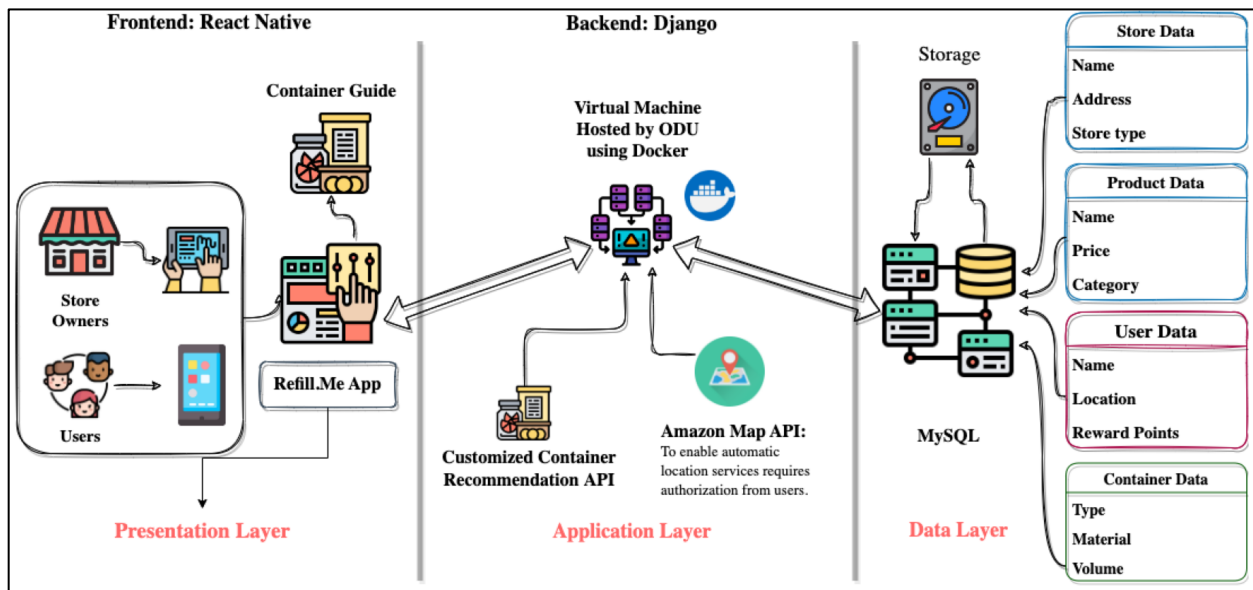
Features that team is expecting to release in the next year, the milestone-release crowdsourcing information, would keep shoppers motivated with the app, from store’ ratings to advertisements of hot items is also with assist with shopper’ networking. For shopper input and support, Refill.Me is going to have Reward.Me options, where shoppers could upload their receipt for points. Once a lump sum of points is accumulated, the shoppers can exchange it to a discount based on the vendor. The app is going to provide limited analytical records that would assist store owners in the long run by reducing waste more in-depth analysis can still be gathered upon request using the Support/Contact Us page.

2.2 Major Components (Hardware/Software)

Refill.Me requires an Android or iOS smartphone for use. Smartphones are encouraged for shopper usage, and tablet usage for the store owners. The major Functional Component Diagram (MFCD) presented in Figure 1 is set in three-tier architectural system layers: Presentation Layer (front-end or GUI), application layer (the integrations, “logical”, linked to APIs components), and Data Layer (back-end and DB access). Google Map is used for user mapping. Data is stored in a MySQL database. Communication action are performed through the messaging. React Native is used to develop GUI. The application is developed using Python language using Django. Git is used for version control and Git Issues is sued for issue tracking. Data encryption is performed through MySQL as well as Amazon processes.

Figure 1

Refill.Me Major Functional Component Diagram



MFCD Presents its own challenges: a user interface where users interact with Refill.Me application. The logical tier is where the brain of the application resides, as it houses the design and algorithms: customizable container recommendation API, Amazon Map API. Lastly, the

data tier, where the data associated with the application is stored and managed using a relational MySQL database. The reasoning behind going with a three-tier architecture is scalability concerns. If the data infrastructure needs to be upgraded, then the logic tier and users interface will not be affected. The presentation layer includes the user interface of the app which is designed to operate on both mobile and web to accommodate for shoppers and store owners needs respectively.

3 Identification of Case Study

The prototype case study will involve mostly women from four different age groups, from baby boomers to generation Z, that mainly reside in urban cities on the east and west coasts of the United States. These women-clientele come from diverse income levels, are typically highly educated, and, most importantly, are passionate about the environment.

The app will be used by the facilities that sell bulk, loose, or package-free items and farmers markets.

Refill.Me is a digital advertisement where stores come to the platform to update the products and their prices (unit prices) for conscious shoppers to decide without guessing if the item is available today to is this is the right place to buy the type of produce. Refill.Me removes the mystery and ambiguity out of the process – brings transparency to shoppers and lucrative investment opportunities for vendors. Refill.Me creates a symbiotic relationship between the stores and their customers.

The sealed meat packages intend for the meat to stay fresher longer but it means that the plastic leaks to the food. Sealed sausages and dried cheeses can stay sealed for years. Fruits on the other hands in often times have more packaging content: example with the Asian pears which

typically come in a padded box with an individual plastic wrapper to prevents bruising, and then the fruit is also wrapped in foil.

As defined, the primary key previously for the app’s success is to have supermarkets, stores, and farmers markets facilities willing to sell loose or package-free items. The users of this platform will be shoppers, women, ages from baby boomers to generation Z. These women not only purchase goods for daily necessities but also try to make a change in their communities. The ‘driven for change’ customers also tend to inspire and share the tips with others so that they could also join the package-free movement.

4 Refill.Me Prototype Description

The purpose of Refill.Me is to provide a platform through which guests, registered shoppers and store owners could assist package-free shopping. The Refill.Me product prototype is demonstrating the key features and functionality of the Refill.Me as summarized for shoppers in Table 1 and for store owners in Table 2. All feature indicated by ‘fully implemented’ are going to be presented during the demonstrated in the Prototype Demo. The differences between the prototype and the real-world product are the prototype is presented in simulated environment with an occasion of a fake or static dataset. The development is performed in Visual Studio Code; the database used MySQL which is stored remotely on university’ Linux server.

[This space is left intentionally blank]

Table 1

Feature Table for shopper

Feature	Real World Product	Prototype
Account Creation	Fully implemented	Fully implemented
Store Search	Fully implemented	Fully implemented
Product Search		
Search by Icon	Fully implemented	Partially implemented
Scan product's barcode	Fully implemented	
Enter product's name	Fully implemented	Fully implemented
Container Guide	Fully implemented	Fully implemented
Container Recommendation	Fully implemented	Fully implemented
Shopping List	Fully implemented	Fully implemented
Reward.Me		
Collect reward points	Fully implemented	Fully implemented
Receive coupons	Fully implemented	
Crowdsourcing		
Suggested edits for products and prices	Fully implemented	Fully implemented
Store rating	Fully implemented	Partially implemented
Connect shoppers to advocacy and petition sites	Fully implemented	Fully implemented

Table 2*Refill.Me Real World Product vs. Prototype Features for Shoppers (contd.)*

Feature	Real World Product	Prototype
Product and Price Dashboard	Fully implemented	Fully implemented
Reward Point Conversion Dashboard	Fully implemented	Fully implemented
Coupon Dashboard	Fully implemented	
Store Rating Dashboard	Fully implemented	Partially implemented
Search Information Dashboard	Fully implemented	Partially implemented

4.1 Prototype Architecture

The Refill.Me prototype is utilize various hardware and software components to achieve the functionality. The prototype is focused on the development of the application, mimicking the mobile platform using the React Native environment. The prototype is deployed and emulated on ODU virtual machine using docker for demonstration of the functionality. The emulation will be on virtual machine that is running on Ubuntu 20.04.5 LTS through the VMware Virtual Platform. Docker images are going to be used for MySQL, Django, React Native that will be integrated in each tier architecture. The logic for the Refill.Me will be for most part set in python language except for the front-end will be in JavaScript language. The algorithm upon retrieving the requests from MySQL requests transferred to JavaScript

Development of the Refill.Me prototype will occur in the React Native environment using Python language with GitHub used for version control and Git for build management. The prototype database will be MySQL with the store and product simulated data. The prototype's displayed map will be created using Google map and will include icons based on user location with the up to five stores listed. The language used in the prototype will be for most part Python,

with some minor JavaScript with the React Native. Django will incorporate the API functionalities for Map, container recommendations. React Native will be used for GUI interface where the application will allow for the user to register and to create an account.

4.2 Prototype Features and Capabilities

The majority of Refill.Me features is going to be implemented in the prototype. Guests, shoppers are the primary focus for the prototype; one or two screen is going to be displayed for store owners. To support Refill.Me login/sign-up screens will be developed with the limited access to profile, store search to particular team DC/VA/MD location. Shopper path is going to be emulated for search the product, find an item(s), put the product into the shopping list as well as preview the recommended container guide page. Limited store' owner features will be emulated: to add product and the prices with static pages. The database for the stores and the product is going to be fake bank or in some cases hard coded for the display purposes as well as the actual data records.

4.3 Prototype Development Challenges

The development of the Refill.Me prototype has many challenges ranging from: from lack of the development skills in the team to the configuration's setup in the virtual machine. In addition, to understand how all the tools integration with one another. The setup and configurations for docker would be quicker if the information was presented in the appropriate format before the winter break – so that the team members could study over the winter break better. Even after the setting up the image on docker and connecting to webserver – there are still

many issues to go through from configuring APIs to VM to fixing the repo issues when the team would run into the code merge errors.

Yet, the Refill.Me' team is optimistic on overcoming evident and still hidden challenges. With the mentor and professor and a little bit of reading and researching, Refill.Me is going to be ready for Demo by presenting the planned features of the prototype.

5 Glossary

Amazon Relational Database Services (Amazon RDS): a web service to set up, maintain, and scale a relational database in the cloud.

Android: an open-source mobile phone operating system used on mobile devices such as smartphones and tablets.

Application Programming Interface (API): a set of rules for two different programs to communicate with each other.

Amazon Web Services (AWS): a cloud computing platform.

Amazon Maps API: a programming interface that allows developers to add mapping capabilities like interactive maps and custom overlays to android applications.

Application Layer: a layer where an application can effectively communicate with other applications on different computer systems and networks.

Backend: a computer system or application that is not directly accessed by the users but rather responsible for storing and manipulating data.

Bauxite: a naturally occurring mineral.

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.

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

Cascading Style Sheets (CSS): a stylesheet language used to create the design (fonts, colors, borders, etc.) of webpages.

Compostable: breaking down into organic matter and not producing any harmful chemicals during that process.

Container: tote bag, produce bag, glass or plastic jar, glass or plastic box, glass or plastic bottle 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.

Continuous Integration and Delivery (CI/CD): a method for automatically merging contributions and deploying new stable software to a production environment.

Customized Container Recommendation Feature: a feature of Refill.Me that suggests all needed containers for a particular shopping list based on the items added to the list by the shopper.

Crowdsourcing: a way to solicit user feedback using surveys (either paper based or online).

Database: an organized collection of structured information, typically stored electronically in a computer system.

Data Layer: a layer of the application/website which contains all of the data that is generated by users engaging with the application/website.

Django: a high-level Python web framework that enables rapid development of secure and maintainable websites.

Docker: a platform designed to help developers build, share, and run development processes.

EPA: United States Environmental Protection Agency.

Experienced package-free shopper: a shopper who has knowledge of package-free shopping.

Expo: an open source framework for creating mobile apps.

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

Frontend: a computer system of the website/application which is exposed to users for direct interaction.

GitHub: a hosting service for version control and development of software.

GitHub Issues: a GitHub repository feature that tracks issues, team-members' work, and development process of an application.

Google Maps: a web mapping platform and application that provides street maps, satellite imagery, and real-time traffic information.

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

Hyper Text Markup Language (HTML): a programming language used to create websites.

Integrated Development Environment (IDE): an advanced code editor with syntax highlighting, built-in debugger, and compiler.

iOS: a closed source mobile operating system used in iPhones and iPads from Apple Inc.

JavaScript: a high-level client-side scripting language to implement functionality on websites.

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, and not considering environmental aspects.

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

MySQL: a relational database that uses SQL as its database language.

Node Package Manager (npm): a software-sharing repository for software and packages that are used for software development, especially software written in JavaScript.

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

Optical Character Recognition (OCR): a software that recognizes and converts text from images to machine-readable format.

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

Package-free store (in the context of Refill.Me): a supermarket with a bulk section, a store exclusively selling loose products, and a vendor 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.

Package Manager: a set of software tools that automates the installation, updating, configuration, and deletion of programs in a systematic way.

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

Presentation Layer: a layer where functions like data conversion, data encryption and decryption as well as data translation take place.

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

Python: a high-level programming language that supports multiple programming paradigms, including structured, and functional programming.

React Native: a framework that allows for the building of native mobile apps using the programming language React.

Relational Database: a type of database that stores and provides access to data points that are related to one another.

Rest Framework(s): an application programming interface that conforms to the constraints of REST architecture.


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

Structured Query Language (SQL): a widely used database language used for inserting, querying, and retrieving data from relational databases.

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.

Virtual Machine (VM): a digital version of a physical computer.

Visual Studio Code (VS Code): a source-code editor that can be used with a variety of programming languages. 

Webpack: a software tool that bundles JavaScript files to be used in a web browser.

Web Server: computer software and hardware that stores content for a website such as images, videos, and other data, and it operates on HTTP and other protocols to deliver the files for a website to clients who request it.

[This space is left intentionally blank]

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/>
- Environmental Protection Agency (EPA). (2022, March 8). Containers and packaging: Product-Specific Data, *EPA*, <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific#:~:text=Containers%20and%20packaging%20make%20up,beverages%2C%20medications%20and%20cosmetic%20products>
- Environmental Protection Agency (EPA). (2022, July 31). National Overview: Facts and Figures on Materials, Wastes and Recycling, *EPA* <https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/national-overview-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-garbage-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*,

254(120138), 120138 <https://doi.org/10.1016/j.jclepro.2020.120138>

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 (undergraduate Wheaton Thesis 1556)

https://digitalrepository.wheatoncollege.edu/bitstream/handle/11040/24562/Anna_VanRemoortel_HonorsThesis.pdf?sequence=2&isAllowed=y

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

[https://www.precedenceresearch.com/zero-waste-packaging-](https://www.precedenceresearch.com/zero-waste-packaging-market)

[markethttps://www.precedenceresearch.com/zero-waste-packaging-market](https://www.precedenceresearch.com/zero-waste-packaging-market)