Activity 2

Need finding

1. Data and information collection

In order to build the proper user functional and nonfunctional requirements 3 different need finding methods where used.

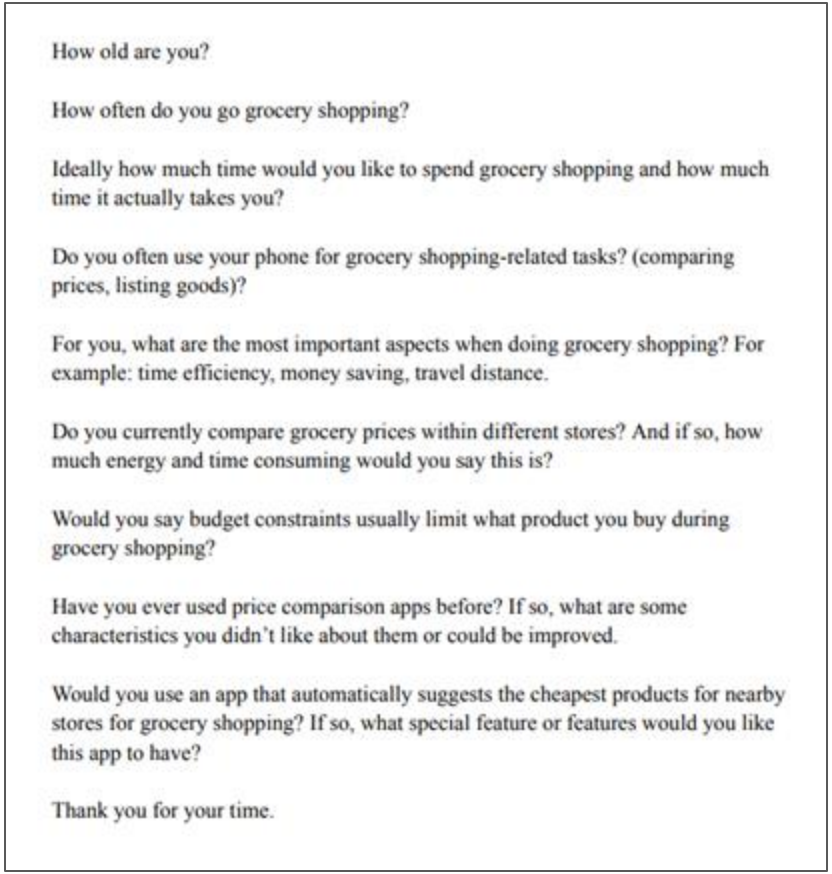
1. Survey Questionnaire

1. Documentation Review

1. Researching similar systems

1.1 Survey Questionnaire

- A questionnaire was made to picture better different user's requirements, and the user's current situation with respect to the problems Cheapify aims to tackle.
- Nineteen people with different age ranges and cultural backgrounds answered the questionnaire (some even lived outside Germany on countries such as Canada or Brazil).
- Answers where revised one by one as well as saved in a spreadsheet to watch the general user panorama.



How old are you?

How often do you go grocery shopping?

Ideally how much time would you like to spend grocery shopping and how much time it actually takes you?

Do you often use your phone for grocery shopping-related tasks? (comparing prices, listing goods)?

For you, what are the most important aspects when doing grocery shopping? For example: time efficiency, money saving, travel distance.

Do you currently compare grocery prices within different stores? And if so, how much energy and time consuming would you say this is?

Would you say budget constraints usually limit what product you buy during grocery shopping?

Have you ever used price comparison apps before? If so, what are some characteristics you didn't like about them or could be improved.

Would you use an app that automatically suggests the cheapest products for nearby stores for grocery shopping? If so, what special feature or features would you like this app to have?

Thank you for your time.

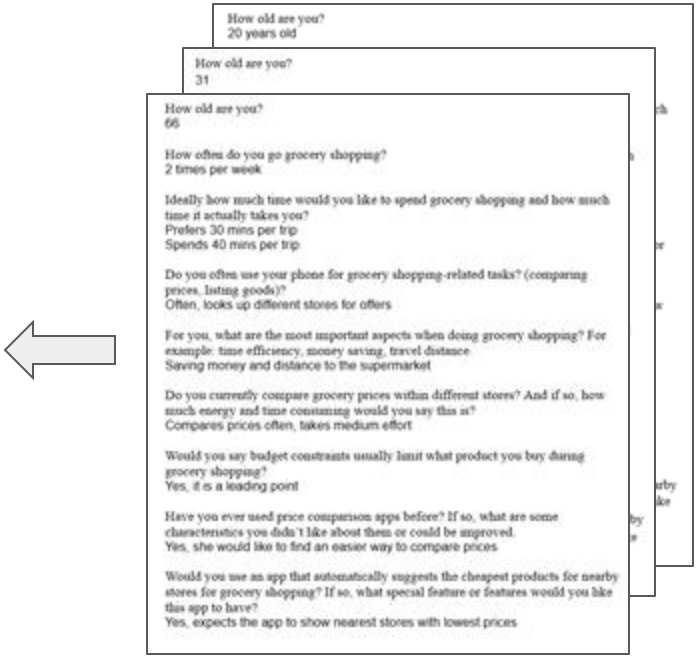
Cheapify Questionnaire

Passing answers into spreadsheet

Interview Answers

	Name/Questions	Age	Age Range	Shopping Frequency / per Week	Prefered Time (mins)	Time Spend (mins)	Phone Use	Important Aspects	Price Comparison	Budget Constraints	Use of App Before	Use of Our App
1	[redacted]	20	Young Adults	3	10	15	Yes	Availability and Distance	No	No	Yes	Yes
2		20	Young Adults	5	5	7	No	Quality of Food	Yes	No	No	Yes
3		18	Young Adults	3	15	35	Yes	Time Efficiency	No	No	Yes	Yes
4		19	Young Adults	7	10	20	Yes	Price	No	Yes	No	Yes
5		74	Elderly	3	30	40	No	Saving Money and Distance	Yes	Sometimes	No	Yes
6		74	Elderly	1	10	15	No	Saving Money and Distance	No	Yes	No	No
7		66	Elderly	2	30	40	Yes	Saving Monay and Distance	Yes	Yes	Yes	Yes
8		45	Adults	1	-	-	No	Distance and Good Quality	No	Sometimes	No	Yes
9		55	Adults	7	15	30	Rarely	Distance and Time Efficiency	No	Sometimes	No	Yes
10		35	Adults	2	20	30	Rarely	Price and Distance	Yes	Sometimes	No	Yes
11		42	Adults	7	15	45	No	Price	Yes	Yes	No	No
12		21	Young Adults	2	20	35	Yes	Distance and Time Efficiency	Sometimes	Yes	No	Yes
13		21	Young Adults	3	10	25	No	Price	Yes	Yes	No	Yes
14		20	Young Adults	1	20	45	No	Price	Yes	Yes	No	Yes
15		21	Young Adults	1	20	40	Rarely	Price and Distance	Yes	Yes	Yes	Yes
16		21	Young Adults	2	15	25	No	Price and Time Efficiency	No	Sometimes	No	Yes
17		31	Adults	2	20	40	Yes	Price and Good Quality	Yes	No	Yes	Yes
18		20	Young Adults	1	10	15	No	Price	Yes	Yes	No	Yes
19		21	Young Adults	2	20	40	Yes	Price, Quality, Efficiency, Distance	Yes	Yes	Yes	Yes

Questionnaire answers spreadsheet



Questionnaire answers

Interview findings

Majority of users care mainly about price, distance, and saving time.

Majority of users have never used a grocery app before, so the app must be easy to learn.

Users benefit from saved lists, reusable baskets, and quick comparisons.

A quality indicator or user rating can help users choose better or cheaper products.

Real-time updates should include:

- Item availability
- Store opening hours
- Track discounts

There should be ways to sort/compare products based on:

- Cheapest
- Best rating
- Closest to user

1.2 Documentation Review

Two studies that focus in user behaviour while using grocery helper mobile apps where analyzed.

The Use of Mobile Apps to Facilitate Customers' Choice-Making When Grocery Shopping

Asle Fagerstrøm,[1] Niklas Eriksson,[2] and Valdimar Sigurdsson[3]

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Abstract. This paper aims to expand the knowledge of how mobile apps can be used to establish a smart grocery retail setting. By offering real-time, personalized digital information, mobile apps enable bidirectional interaction with customers in the grocery shopping situation. A conjoint experiment (n = 90) was used to examine the use of mobile apps in a consumer choice situation where participants were choosing fresh salmon in a grocery store. Findings show that, relative to static information given by the mobile app about expiry date, price, offers, and quality indicator, digital information was the most prominent attribute. Among digital information given by the mobile app, quality indicators by other customers were the most prominent, followed by an offer based on a product in the shopping basket, updated expiry date, and real-time price. The results expand our understanding of how mobile apps can be used to design a setting in the grocery store that creates value for customers. Based on this result, we recommend that managers that plan to invest in mobile app technology to improve the electronic commerce ecosystem should include digital information.

Keywords: Retail grocery, Mobile app, Self-service technology, Digital information, Conjoint experiment

Retrieved from: https://www.mytotalretail.com/article/the-power-of-mobile-apps-for-grocery-stores/

Article

Use of Mobile Grocery Shopping Application: Motivation and Decision-Making Process among South Korean Consumers

Hyungjoon Kim

Abstract: With the revitalization of the online grocery trading market, many consumers are using mobile applications to purchase groceries. Although past studies were conducted on online grocery purchases, few measured mobile app users in a conceptual model that combines both motivational needs and behavioral components. Grounded in the uses and gratifications theory and the theory of planned behavior, this study investigated utilitarian motives, hedonic motives, experiential motives, attitudes, subjective norms, perceived behavioral control, purchase intention, and purchase behavior among mobile grocery app users in South Korea. As an additional analysis, a comparison between users and non-users of mobile grocery apps was implemented. The results showed that the utilitarian motives of grocery app users significantly influenced attitudes, attitudes and subjective norms influenced user intention, and user intention influenced grocery purchase behavior. Users showed statistically higher utilitarian motives, hedonic motives, and attitudes than non-users. The results suggest that South Korean consumers hold positive attitudes toward mobile grocery shopping and that the opinions of others may influence the decision to use the services. Mobile groceries in South Korea may have the potential for continued growth if individuals' perceived control of the service improves. Implications and suggestions for future research are discussed.

Keywords: grocery shopping; mobile app; theory of uses and gratifications; theory of planned behavior; user intention; purchase behavior

1. Introduction

In recent years, the landscape of grocery shopping has changed significantly [1]. Online shopping is pervasive, and online grocery shopping has become a growing area in the retail food industry [2]. Online grocery shopping is defined as a form of e-commerce that allows individuals and businesses to purchase food and various household supplies, and the ordering process is generally managed by e-commerce websites or mobile applications (apps) [3].

Online grocery markets are predicted to be the next major retail sector in e-commerce [4]. Recent global surveys found that about one in four consumers currently shops for groceries online, with more than half indicating a willingness to do so in the future [5,6]. Some

Retrieved from: https://www.researchgate.net/publication/343048314_The_Use_of_Mobile_Apps_to_Facilitate_Customers'_Choice-Making_When_Grocery_Shopping

One study proved to me more useful for our Cheapify aim than the other.

Nonetheless both provided useful insight we wouldn't have been able to retrieve from any other requirement gathering method with our current capabilities.

Key information gathered from: “The Use of Mobile Apps to Facilitate Customers’ Choice-Making When Grocery Shopping”

- Offers based on products in the basket and updated expiry dates were among the most salient information given regarding the app. (Including expiry date of shown products would be a nice feature to consider).

- Unfortunately nothing else of use for Cheapify was mentioned.

The Use of Mobile Apps to Facilitate Customers' Choice-Making When Grocery Shopping

Asle Fagerstrøm,[1] Niklas Eriksson,[2] and Valdimar Sigurdsson[3]

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Abstract. This paper aims to expand the knowledge of how mobile apps can be used to establish a smart grocery retail setting. By offering real-time, personalized digital information, mobile apps enable bidirectional interaction with customers in the grocery shopping situation. A conjoint experiment (n = 90) was used to examine the use of mobile apps in a consumer choice situation where participants were choosing fresh salmon in a grocery store. Findings show that, relative to static information given by the mobile app about expiry date, price, offers, and quality indicator, digital information was the most prominent attribute. Among digital information given by the mobile app, quality indicators by other customers were the most prominent, followed by an offer based on a product in the shopping basket, updated expiry date, and real-time price. The results expand our understanding of how mobile apps can be used to design a setting in the grocery store that creates value for customers. Based on this result, we recommend that managers that plan to invest in mobile app technology to improve the electronic commerce ecosystem should include digital information.

Keywords: Retail grocery, Mobile app, Self-service technology, Digital information, Conjoint experiment

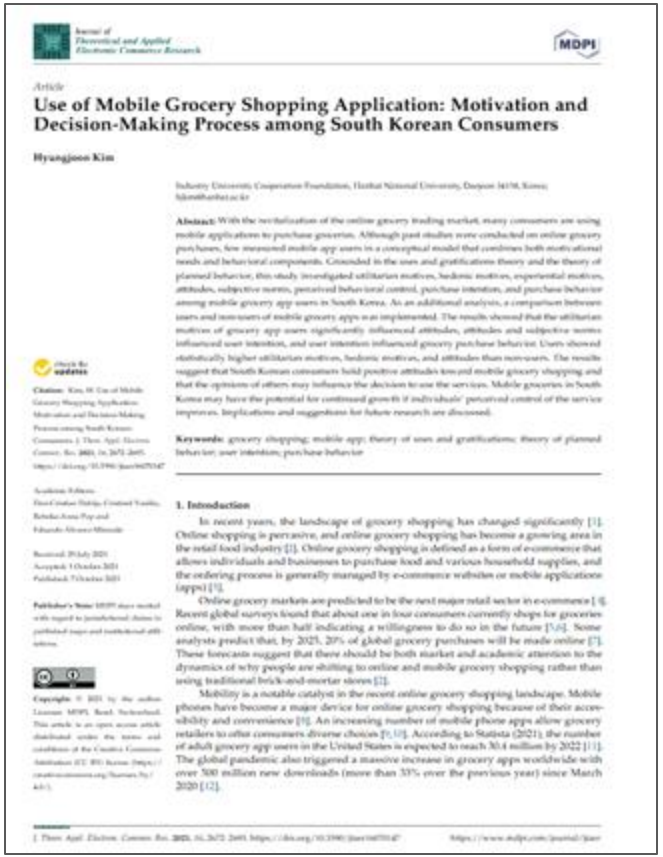
1 Introduction

The establishment in 1859 of the Great Atlantic & Pacific Tea Company, with its focus mostly on dry grocery items, marked the birth of the modern grocery store. The Piggly Wiggly stores (established in 1916) created the self-service concept. Suddenly, packaging and brand names were crucial for manufacturers. Since then, four major periods characterize the development of the retail grocery business [1]: the establishing of the grocery chain store, the introduction of the grocery supermarket format, the rise of computerization and the explosion in grocery product variety, and the development of national grocery chains. According to Desai, Potia [2], the retail grocery businesses are now in a new major period of digital and omnichannel retailing. Digitalization is driving

Retrieved from: https://www.mytotalretail.com/article/the-power-of-mobile-apps-for-grocery-stores/

Key information gathered from: “Use of Mobile Grocery Shopping Application: Motivation and Decision-Making Process among South Korean Consumers”

- Mentions that apps can reduce consumers “decision-making”, making choices easier. (very important as it links to our next bullet point and support the evidence from the questionnaires)
- Features like price comparisons and product quality are examples of tools that help simplify decisions (user rating would be of use Cheapify).
- Summarized information instead of raw data is greatly appreciated by users (So a scroll-like prototype would be of use, as cheaper/better/closer products can appear first, simplifying the user decision-making complexity)
- By consequence, decision support systems rely heavily on data accuracy; outdated data reduces trust and engagement.



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1.3 Researching similar systems

A variety of mobile apps where tried to take out the good features and Lacking/Bothering might be of use to include or avoid on Cheapify.

Important thing to notice, registering on each of this apps was fast and simple since only an email and postcode was needed to access to most of its features (For other apps like, ALDI SHOP&GO a full address plus phone number was required).

The tested apps where:

- REWE (German app)
- Mercadona (Spanish app)
- Instacart (American app)

REWE

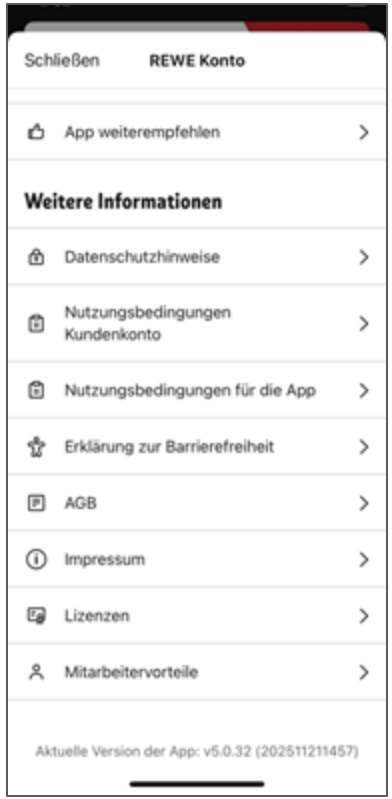
Good features:

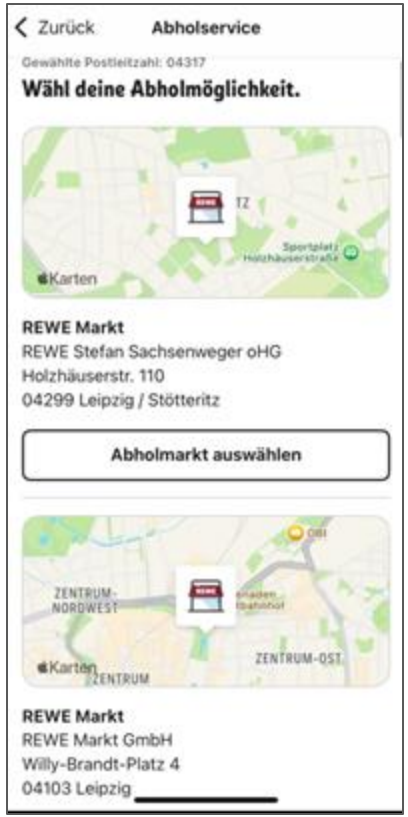
- The products layout is pretty intuitive, well organized and features a search bar that does adapt to type error mistakes.
- Lets you build your with the required products for the selected store (more of this in the next slide).
- Let’s you filter appropriately once you are in your product window. (By price from cheapest to most expensive and vice versa).
- It will show you the nearest stores to the postal code you introduced when registering.

REWE

Lacking/Bothering features:

- You are not asked for a preferred language the first time you use the app. And in account settings there is no option of changing the app language.
- The closest stores to your post REWE stores to your post code are shown. But since it guides from your postal code and not current location, you won't be able to know if it’s actually the closest to YOUR current location.

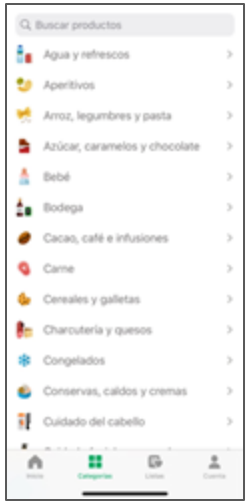




Mercadona

Good features:

- Same as REWE has an intuitive layout to search the products.
- Latest promotions in products will show up in the home menu.
- Also lets you build a shopping cart for different products, and from different stores.



Lacking/Bothering features:

- Similar to REWE you are not asked for a preferred language the first time you use the app. And in account settings there is no option of changing the app language. (Default is spanish).
- Doesn't let you filter once you are in the window of the desired product, which proved to be a bothering feature as there are so many variants for a product such as “chicken” (“pollo” in the screen).
- Does not include a near store feature.

Instacart

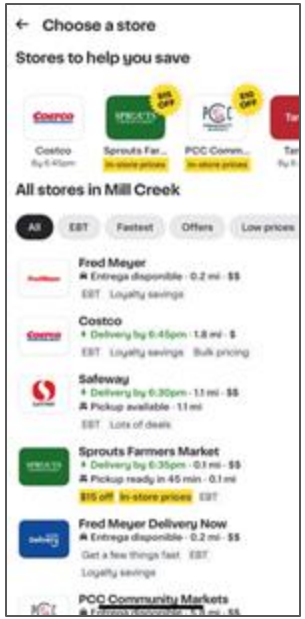
Good features:

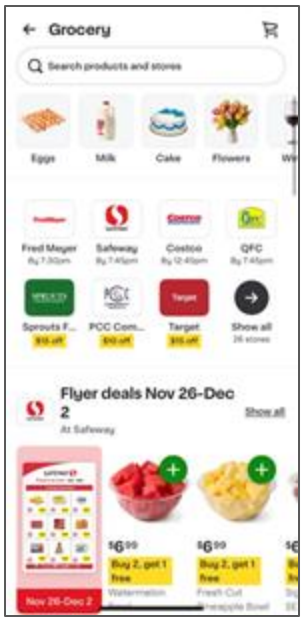
- It shows you all available stores in your area, not just from one branch. (Does not know you exact location tho, similar to REWE).

- Once you use the search bar, the desired product is shown in a nice layout and lets you sort it by many options (branch, price, etc.)

Lacking/Bothering:

- Unlike the other two, the product layout it is not so intuitive, you have to depend on the search bar when looking for a product. There are many things on the screen to the point you don’t know where to look.
- Default non changeable language is present if all 3 tested apps.





2. Complete list of functional, non-functional, and usability/user experience requirements (based on the information acquired)

Functional requirements (FR1-FR4):

FR1: Product search

FR1.1 The system shall allow users to search for grocery products by name.

FR1.2 The system's search engine should tolerate minor spelling errors (typos).

FR2: Comparing and Sorting options

FR2.1 The system shall compare stores based on: product price, user ratings, distance from the user.

FR2.2 The system shall be able to apply a filter on the stores based on the selected comparison conditions.

FR2.3 The system shall allow users to sort results by: lowest price, highest price, nearest distance, highest user rated.

FR2.4 The system should allow multi-criteria sorting.

FR3: Discount Visibility

FR3.1 The system shall display product discounts when available.

Functional requirements (FR4-FR7):

FR4: Product Information

FR4.1 The system shall show clear product information (branch, price, rating, available stock).

FR4.3 The system shall allow users to report prices in case there are no available prices in the database.

FR5: Location Store Display

FR5.1 The system shall show the nearest stores distance using the user's current location.

FR5.2 The location of this stores shall shown in a map.

FR5.3 The system should show the stores closing and opening hours.

FR5.4 The system shall show the path the user must take in the map to get to the selected store or stores.

FR6: Basket feature

FR6.1 The system should allow users to save items in a temporary list for easy comparison.

FR6.2 The system shall keep track of the accumulative price of the basket.

FR7: Language Handling

FR7.1 The system should allow users to choose their preferred display language.

Non-functional requirements (NFR1-NFR4):

NFR1: Performance

NFR1.1 The system shall load comparison results in no more than 2 seconds under normal network conditions.

NFR1.2 The system shall load the map display in no more than 3 seconds under normal network conditions.

NFR2: Compatibility

NFR2.1 The system shall support modern mobile operating systems.

NFR2.2 The system shall display correctly on smaller or bigger screens.

NFR3: Data Reliability

NFR3.1 The system database shall be updated to the latest product prices, ratings and locations.

NFR4: Maintainability

NFR4.1 The system should allow new stores/products to be added without rewriting the app.

NFR5: Data Protection and Privacy

NFR5.1 The system shall request explicit user consent before accessing any location data, in compliance with GDPR.

NFR5.2 The system shall only collect the minimum personal data required any for operation, in compliance with GPR.

NFR5.3 The system shall provide a short, clear privacy and terms of use notice before using the app

Usability / User Experience (UX) Requirements (UX1-UX2):

UX1: Simplicity and Responsiveness

UX1.1 The system shall avoid screen clutter.

UX1.2 The system should keep key actions visible without hidden menus.

UX1.3 The system shall present comparison results in a simple, visual list.

UX1.4 The system shall avoid dense data presentation for the user.

UX1.5 The system shall use good metaphors for icons of price, distance, and rating.

UX1.6 The system shall maintain consistent icon placements across screens.

UX1.7 The layout shall adapt seamlessly to the user's device.

UX1.8 The system shall provide instant feedback when the user interacts with a button or sorting option

UX1.9 The system should ignore accidental double-taps.

UX1.10 The system shall prevent accidental re-triggering of actions.

UX1.11 The system shall tell users which location is being used to calculate distance from stores.

UX2: Accessibility

UX2.1 The system should provide clear visual feedback when an action is taken.

UX2.2 The system shall use simple, plain language.

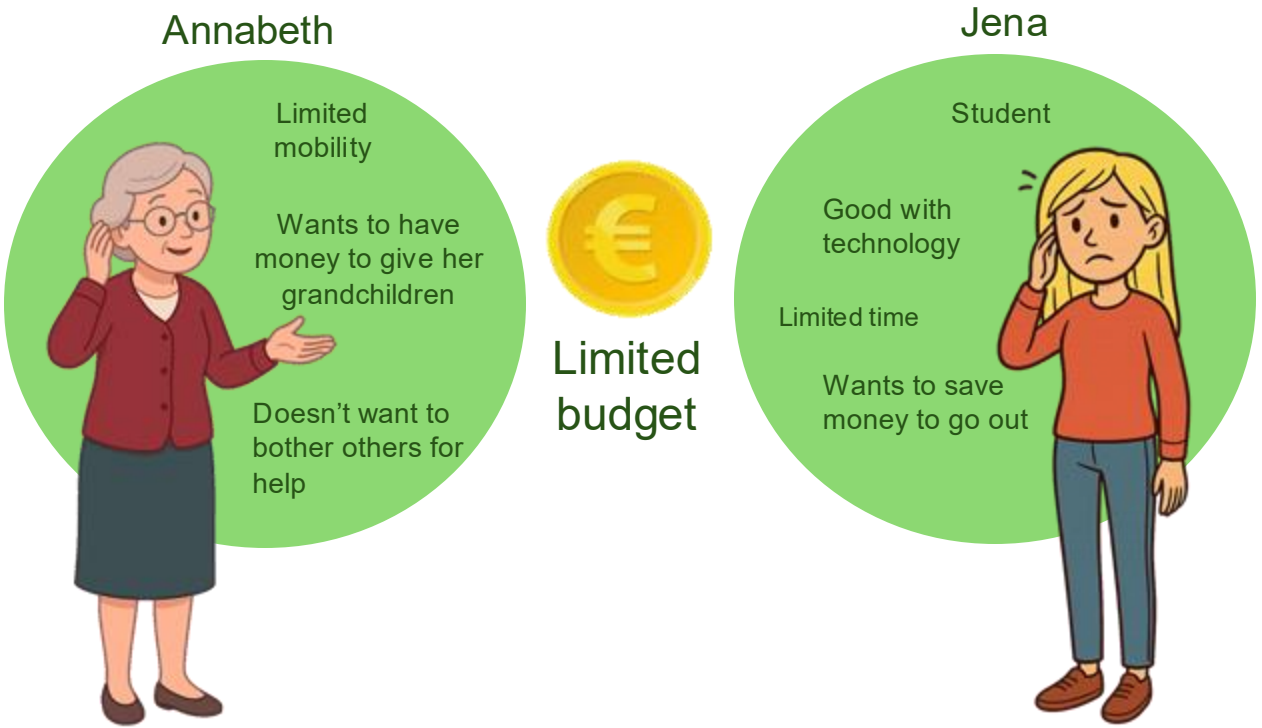
UX2.3 The system shall provide large tap targets.

UX2.4 Shall use readable font sizes and high-contrast text.

UX2.5 The system should let users switch languages easily.

3. Analysis of the collected requirements

Personas:



Personas details

Annabeth Characteristics:	**Jena characteristics:**
● Age: 67 (Elder) ● Tech-level: Low (Basic smartphone mastery) ● Physical: Limited eyesight and reduced mobility	● Age: 21 (Young adult) ● Tech-level: Medium-High (Decent smartphone mastery) ● Physical: No constraints
Annabeth Context: ● Uses apps slowly, can get overwhelmed by clutter. ● Shops 1–2 times per week. ● Wants to stay independent. ● Wants to save money. ● Wants reassurance she's choosing the right store. ● Want reassurance the products she buys have positive reputation from customers.	**Jena context:** ● Tight schedule between classes. ● Foreign student. ● Wants to shop only in nearby stores. ● Limited budget. ● Shops 2–3 times/week. ● Gets frustrated switching between multiple apps.

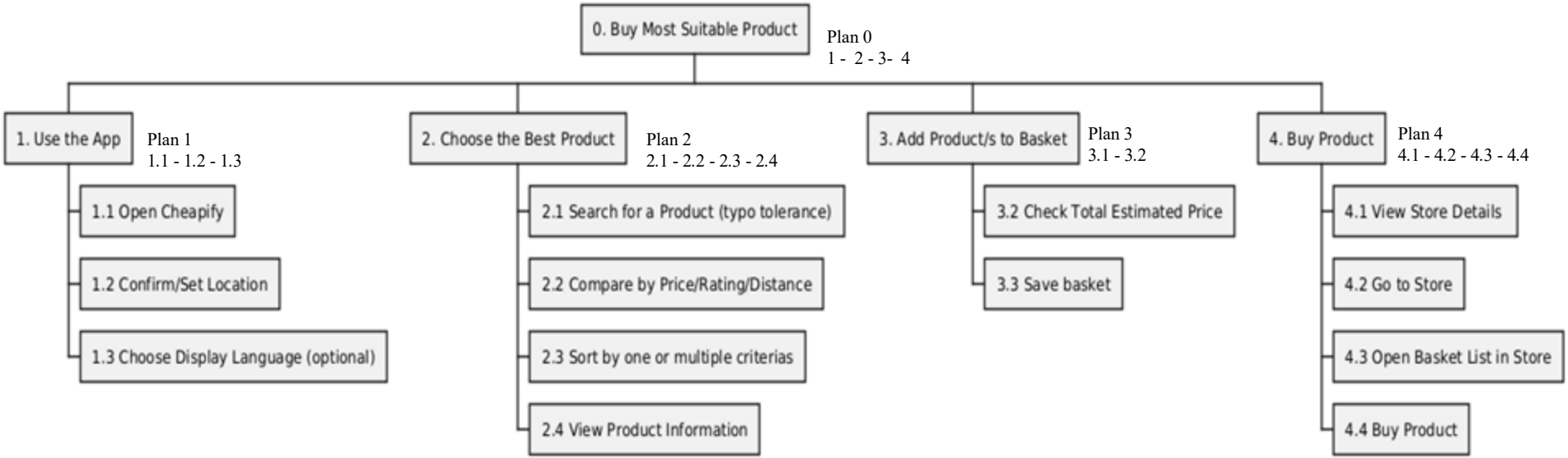
Personas Scenarios 1

Annabeth Scenario 1:	**Jena Scenario 1:**
Annabeth needs groceries for the upcoming 3 days, and because of her chronic back pain, she can't allow herself to travel long distances. She doesn't like using her phone for grocery related tasks as she has to change between applications to know location, availability, and trust of the brand. Due to her advanced age, she prefers good organic produced products and would like to know beforehand if they are available in the store she decides to go.	Jenna is struggling with finding time to buy groceries as all she does during the day is attend lectures and study. She's already dealing with some stress, and on top of that last week she went to grocery shopping and realized all shops were closed due to a national holiday upon arrival. The only app she related to grocery is REWE app, and since she doesn't know German, she just won't try to use it at this point. She would like to go grocery shopping as she comes back from Uni to save that time.
Cheapify Solution 1:	**Jena Scenario 1:**
Annabeth opens Cheapify, and watches a visually balanced list of the nearby stores to her current location. Once in the closest store menu, she looks up easily her desired product and with a clearly marked filter, she selects highest rated and bio options.	After downloading Cheapify, she can change the language of the app to the one she preffers. As she returns from Uni, she can look up for the nearest store to her current location and see before hand if it's closed or not, to avoid unnecessary trips.

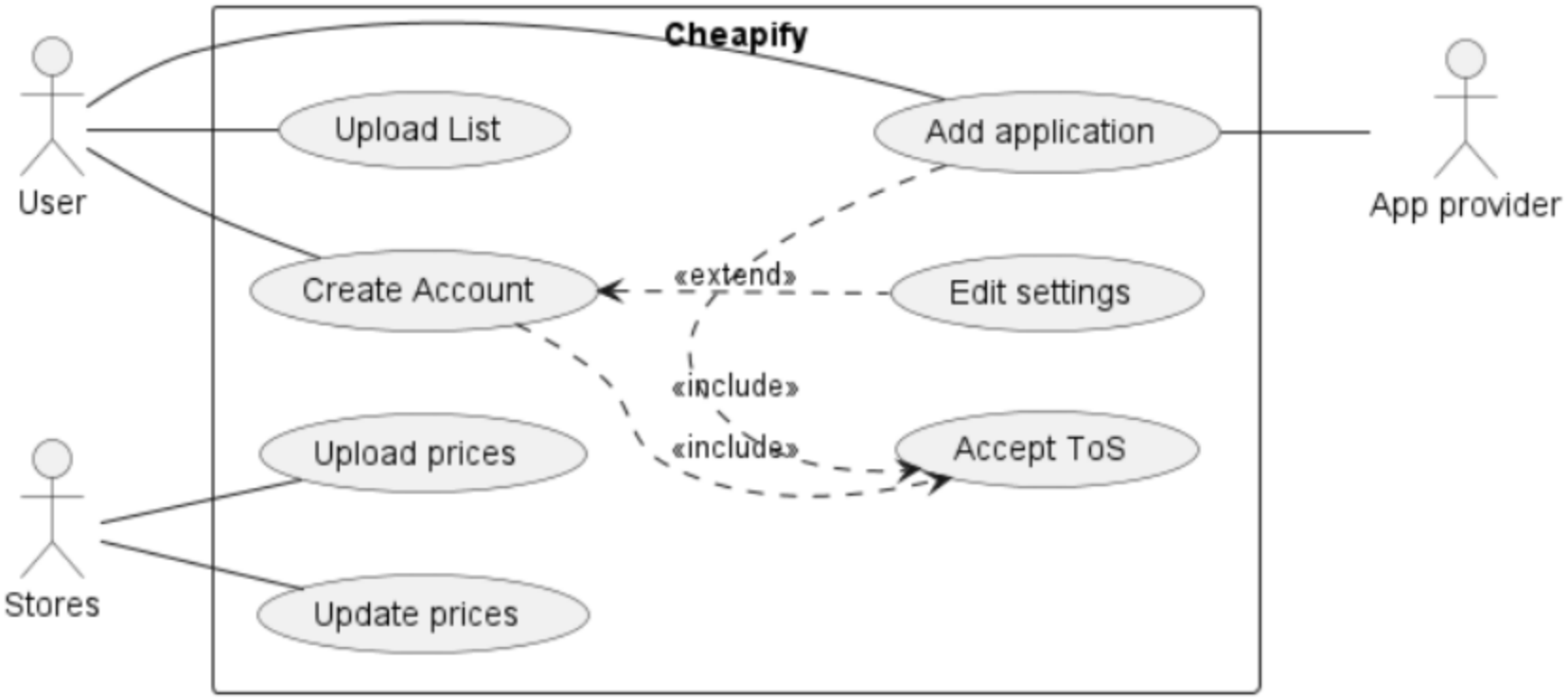
Personas Scenarios 2

Annabeth Scenario 2:	**Jena Scenario 2:**
Now that Annabeth is a bit more familiar with phones she's been trying other grocery shop apps. She tries to check prices for strawberries, but because of her limited eyesight she sometimes mistypes product names. Usually, "no results" follow when she makes a typo, which frustrates her. When she finally finds the item, one store has a missing price on it, so from her point of view, the product would just not appear.	Jena tries to plan her meals for the week but struggles to find discounts for products she usually buys. On top of that, she keeps losing her list of items because most grocery apps reset the cart if she doesn't complete a purchase, which is frustrating since she only wants to compare, not buy.
Cheapify Solution 2:	**Jena Scenario 2:**
Annabeth switches to Cheapify again, Cheapify corrects her misspelled search term if it was not too far off from the product's real name. If a store price is missing, the app clearly displays reported prices by user's who recently where there.	Instead of multiple banners like other apps, Cheapify only shows relevant promotions for the items she often buys. Cheapify keeps Jena's basket saved automatically even if she switches screens or closes the app.

Task Analysis



Use case Diagram



4. Justification for the requirements extracted from the data collected

Each functional, nonfunctional and user experience requirement group was concluded after carefully analyzing the 3 need finding methods we used.

They were then adjusted as we progressed with the persona and scenario analysis. To finally develop a task analysis that examined all the components expected within our scope.

FR1 Product search

From the interviews and questionnaire we could see how most of the participant's are not familiar with grocery apps. People however, is familiar with a search bar in most contexts. To facilitate products search for inexperienced users, Cheapify needed to allow product search by name. Expecting a typo tolerance was later added after considering Annabeth's persona, and how some of her physical capabilities could influence her typing abilities.

4. Justification for the functional requirements

FR2: Comparing and Sorting options

Questionnaires showed how the majority cared mainly about price, distance, and saving time. They also mentioned wanting to compare products quickly and to have reusable lists for comparison. Supporting this questionnaires, the studies analyzed on grocery apps showed that reduced decision-making effort could be achieved by price comparisons and product quality indicators (ratings). Also, when testing REWE a nice feature that let you sort product proved to be useful for faster lookup.

FR3: Discount Visibility

When app testing, Mercadona and Instacart highlighted promotions on the home page, which showed us that discounts are already a common and expected feature. Plus, money saving already proved to be a very concurrent motive among the questionnaires.

FR4: Product information

From the tested apps, branch and price proved to be the most useful and insightful details a product should display. Additionally, since users require a way to evaluate if the product being bought is good, a user rating feature is added among the product displayed details if available (In the questionnaires, quality was also mentioned among the important characteristics of a product during grocery shopping).

4. Justification for the functional requirements

FR5: Location Store Display

First, distance travelled to shop was one of the most important factors across all people who answered the questionnaires. Some people also emphasised time efficiency and minimising walking time, naturally both go concerns go together. This can be achieved if the closest stores to the current location of a user is shown in a map, so the user can know how to get there. Additionally, when testing apps like REWE, Instacart, even though close items to your locations are displayed, they are associated to the zip code you use when logging in, and doesn't count for people who go to the store, instead of relying on delivery (The requirements tackle and take into account this very issue). Then Cheapify account for all people who go in person to do grocery shopping.

FR6: Basket feature

In this case, it was a pretty convenient feature noted in the tested apps. It was also a good idea mentioned in the questionnaires.

FR7: Language Handling

All the tested apps didn't provide the option to change the app's language. Which is such a simple but convenient feature, taking into account some users don't dominate the app's region language (Jenna's persona was also very useful for this requirement),

4. Justification for the non-functional requirements

NFR1: Performance

Assuming the internet connection is average, when testing app we didn't wait much for any option to load, so we set 2 seconds as the maximum time of resources to load in a normal scenario. And 1 extra second for map related features, as this features always take more time to load.

NFR2: Compatibility

Tested apps did adapt to screen sizes and where available for popular mobile operating systems, we took notice of this.

NFR3: Data Reliability

We could conclude from the studies how data reliability is crucial, specially for decision support apps like grocery shopping helpers. We even experienced it by ourselves on a day to day basis.

NFR4: Maintainability

Not retrieved from data research, but an essential on any application.

NFR5: Data Protection and Privacy

Not retrieved from data research, but an essential on any application.

4. Usability / User Experience requirements

UX1: Simplicity and Responsiveness

Simplicity and responsiveness comes from all three requirement gathering methods used. First, in the answers to the questionnaires, the great majority of selected people haven't used price comparison apps before, even when we knew from their background that some had strong digital skills (we didn't reveal the names, but it's fair to say we knew most of the asked people). Hence, a simple UI that doesn't require any previous experience was required.

Moreover, the studies showed how reducing the decision making effort benefits the users, specially when using this grocery aid apps, when only necessary and summarised information should be shown. The app testing helped a lot in this aspect, as we could retrieve good and bad features from each of the different apps tested. For example, REWE provided a clear layout of products, navegable and visible options as well as good contrast within the colors to distinguish properly the icons (Worth notice that this icons where pretty intuitive to understand what they represented).

Messy layout like the one seen in Instacart where taken into notice. Mercadona’s list of products was also taken into account and compared to Instacart's. Mercadona used mainly a vertical scrollable list while Instacart's was horizontal. For all of us, the vertical scroll was so much more intuitive and easy to scan and follow the presented products.

4. Usability / User Experience requirements

UX2: Accessibility

When app testing, all apps like REWE, Mercadona, and Instacar presented common positive patterns like a clear visual feedback anytime an action was made (Readable text, straightforward wording, and large tap targets). Putting this features into notice in the user experience requirements was necessary as old users can be benefited as well from this. This even proved to be useful for as. When testing REWE, since the app is displayed in german, the visual feedback of the app and simple wording made some actions easier without the need of us to switching to google translator.

Since Cheapify aims to present critical information such as prices and distances, following some of these established pattern ensures the app remains usable and accessible. Finally, the simple language switching UX requirement was also added, since, if there was an option to change the language in any of this apps, it was very hard to find to the point none of us could.