Assignment M3
Search Function for Coupang e-Commerce App
CS6750 – Human Computer Interaction

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Abstract—This study examines opportunities to redesign the existing interface for the search function of the Coupang e-Commerce App by following a user-centered four-stage design life cycle. Coupang is the largest e-Commerce platform in South Korea by market share at the time of writing, in 2022, and the platform exists as a website and as an App. The four-stages in the design life cycle for this study are: Needfinding, Design Alternatives, Prototyping, and Evaluation. Participants for this study are all English-speaking adults.

STUDY CONTEXT

For further understanding of the overall study context, please refer to *Appendix 9.1: Extended Abstract*, *Appendix 9.2: Study Context and Problem Space*, *Appendix 9.3: User Types*, *Appendix 9.4: Data Inventory*, and *Appendix 9.5: Defining Requirements*.

BRAINSTORMING PLAN

In order to undertake individual brainstorming (for the purpose of generating ideas for design alternatives), the following rules and objective criteria were followed:

1. Write down the core problem(s) as identified from the Needfinding process, that is, the Requirements. Use this for focus, and as a reminder
2. Number of ideas: 20 ideas, as a goal/ideal
3. Amount of time: 15 minutes in 3 sessions (45 minutes total)
4. Amount of variation: at least one idea for a number of different categories, e.g. Visual/GUI, Touch, Auditory/Voice, Gestural, Handheld devices and VR/AR.
5. Break down the challenge into components and brainstorm solutions for each subtask.

6. Consider the different audiences that can use the interface, young, old, those with disability (mental or physical or both), levels of expertise, social class, familial role/responsibility, and so on.
7. Don't tunnel vision on the existing interface or particular device formats.
8. Be silly and don't delete any ideas, consider ideas that are too expensive or physically impossible.

INDIVIDUAL BRAINSTORMING EXECUTION

Using the above plan, ideas for design alternatives were brainstormed. Particular emphasis was put on the subtasks of how users may come up with the idea to purchase a particular item, how they communicate this to the interface and how they evaluate search results. Emphasis was also placed on the Korean language barrier for English speakers on a Korean-only platform (website and app). As an example, are there ways for a user to communicate what they want or need without the need for verbal or written language? Further, are there ways for the interface to automatically select items for the user, thereby offloading these gulfs of execution and evaluation challenges from the user to the interface? Can we reduce the amount of product alternatives considered using recommendations?

A summary of the brainstorming execution can be seen below in *Table 1* and a sample page, that also outlines key problems and considerations, can be seen below in *Figure 1*. The full results of the brainstorming execution can be viewed in *Appendix 9.6: Brainstorming Execution Worksheets*,

Table 1 — Brainstorming Execution Summary

List of Design Alternatives Generated
1. Full English App Support, with Eng/Krn button to switch between modes
2. In-built English auto-translate button, within existing App
3. Voice search in English, App reads search results in English
4. Photo capture & image product search, user can look at only photo/image to evaluate results. Incorporate 'camera' button
5. VR shopping center/mall in Eng. Navigate VR mall & stores to find products
6. Gestural description of items (not written or spoken language), using camera

List of Design Alternatives Generated

7. Better search prediction using user interests, search history

8. Include friends in App

9. AR sampling of niche items. Suggests/projects items into living space for user consideration

10. Opt-in mailed catalogues, samplers and order form with QR codes for products

11. Telephone service for English speakers, recommend, make orders for users

12. Create in-app Stores for products, similar to eBay pro sellers

13. Scans home with camera, recommends missing items (everyday)

14. For fashion/personal devices, wardrobe / dress-up feature for users

15. Wearable chip + camera that sees/tracks user's life, predicts product wants/needs

16. Integration with personal assistant that orders products for user

17. Listen in on conversations in home, makes recommendations

18. Filter search results, English only descriptions

19. Scheduled reorders (everyday products). No need to interact with interface

20. Food/cuisine selector and auto-orders ingredients, like a meal-kit company

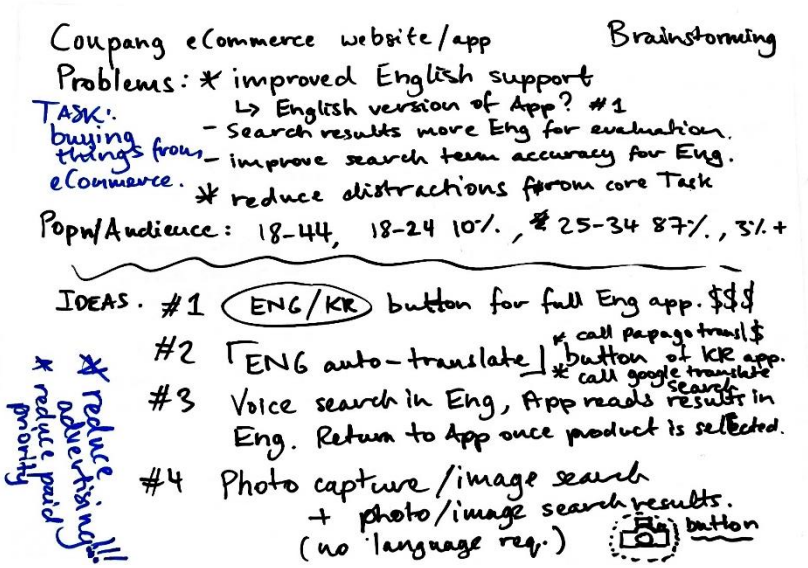

Figure 1 — Brainstorming Execution Worksheets, page 1 of 4

SELECTION CRITERIA

The following rules and criteria were used to select three ideas to move forward to prototyping. The rules were: remove any technologically infeasible ideas; remove ideas that are excessively expensive, require heavy development or with large logistical challenges; prioritize cost-effective solutions; and assume that the designers (we) are a small-medium sized developer 'solutions' team within the company that can develop an additional feature and make revisions to the existing Coupang eCommerce platform App or website. The criteria, connected to requirements and data inventory, are: enhance accessibility, overcome or remove English-Korean language barrier, remove barriers to age and expertise; leverage consistency where possible; reduce or remove distraction from the Task; and if possible, reduce reliance on typing as a mode of input keeping in mind those with reduced finger dexterity (elderly, those with physical disability).

The **first idea** selected to move forward to prototyping is **Idea #2: English Auto-Translation**. It should be possible for a small-medium development team to create or utilize an existing translation service to automatically-translate any Korean text within the App into English. This is highly feasible technologically and cost effective. This does not require the users to relearn any features or learn any substantially new features of the interface. There may be challenges with poor translations, however the language barrier will be reduced.

The **second idea** selected for prototyping is **Idea #4: Photo/Image-based Search and Search Result Evaluation**. Photo or image-based search and result evaluation completely removes the English-Korean language barrier. The existing Korean interface can continue to exist solely in Korean and English users can simply search for pictures/photos. This new feature could be developed and maintained by a small-medium team, using existing image data. Image-based search is already employed on other platforms, albeit not eCommerce platforms. Therefore, this idea is cost-effective, feasible and leverages consistency.

The **third idea** selected for prototyping **is Idea #10: Product Catalogues, Samples, with QR code ordering** (as an opt-in & premium service). This idea leverages traditional marketing strategies and hybridizes traditional product catalogs and samples with QR code-based ordering in the existing App. Although this would be an opt-in premium service, there is additional value gained (the samples) by the users to offset the perceived costs. This would be particularly

accessible to those of older generations, those with mobility challenges and those stuck at home. The solution is also logistically feasible due to Coupang's supply chain. The sampling of products and QR scanning products removes language challenges and helps narrow the gulfs of execution and evaluation.

PROTOTYPE 1 – WIREFRAMES

For the **English Auto-Translation** design alternative, a wireframe prototype (with multiple cards) was developed and evaluated. This prototype can be viewed in *Figure 2* below, and multiple cards for different views within the App (pre-search page, search results page and product evaluation page) can be viewed in *Appendix 9.7: Wireframes – Full Design*.

This prototype utilizes the existing design of the interface but with the addition of an English auto-translate button in the top-right corner of the screen, next to profile and shopping cart. In addition, the extent of advertising and other promotions has been reduced (cropped out) in order to minimize sources of distraction impeding evaluation of the interface. Participants were shown the three stages of searching for a 'Playstation 5' in both Korean and with the English translation feature on. The goal was to get participant feedback on the English auto-translate feature, the new button design, and the overall interface design. Evaluation of the prototype demonstrated that this design alternative offered improved English support within the App, which was a key requirement. It is anticipated that this solution offers better accessibility for those reliant solely on the use of English and who are of all ages and ability. Usability, another requirement, was also shown to have been improved through the reduction in promotional activities taking up screen real estate and creating user distraction from the core task. In terms of user base identified in the data inventory, it is anticipated that 18-44 years old English speakers residing in South Korea will have existing familiarity with auto-translation services. Young expatriates are familiar with using other translation services such as Google translate, Google lens or Naver Papago in order to achieve translation. These users are familiar with translations not being perfect and sometimes containing abnormalities.

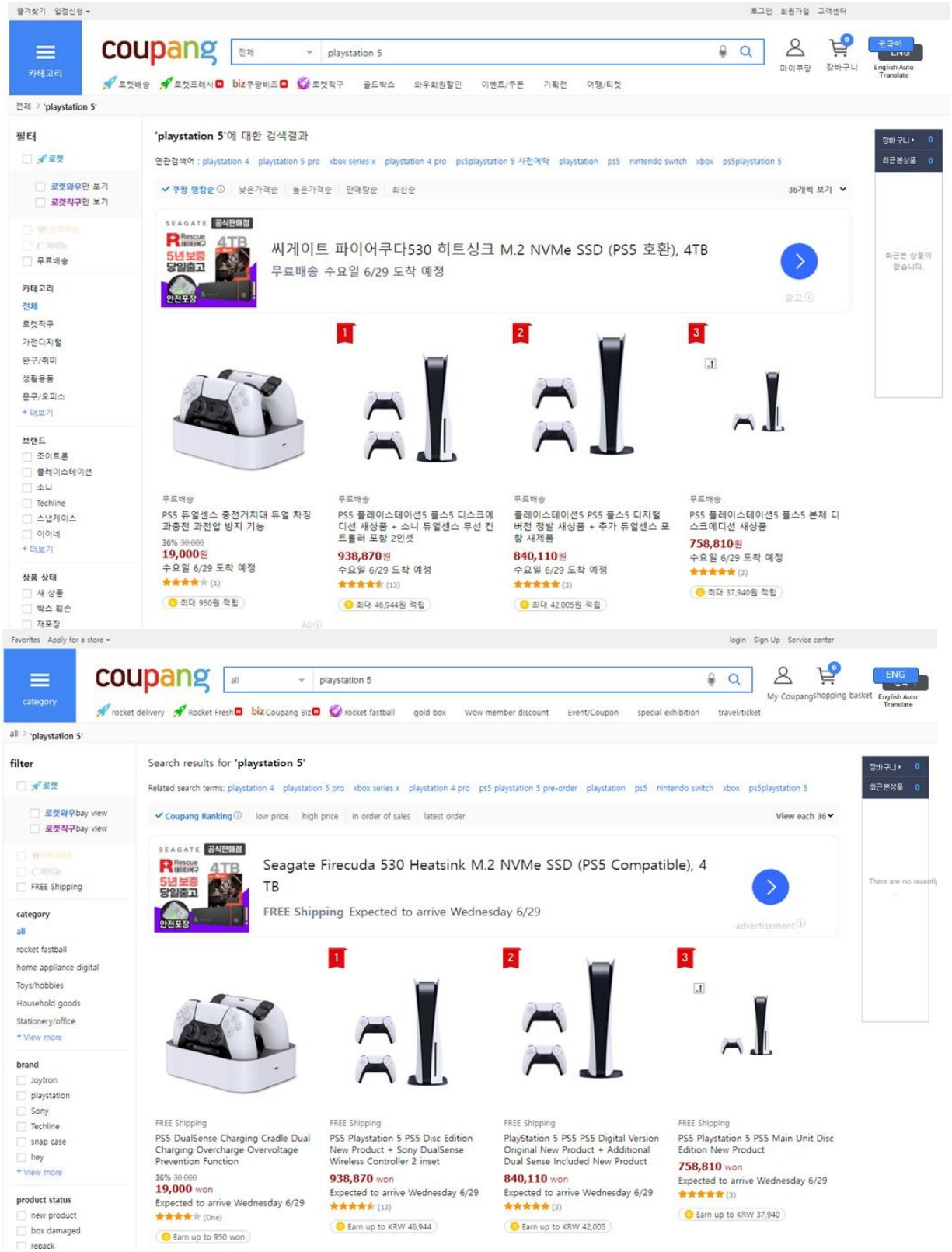

Figure 2 — Wireframe: Search Results with Eng (bottom)

PROTOTYPE 2 – VERBAL

For the **Photo/Image-based Search and Search Result Evaluation** design alternative, a verbal prototype was developed and evaluated. A loose conversation script, user conversation branches and user questions used in this prototype follows. The interviewer asked/provided the following questions and advice, in chronological order:

- How would you feel about incorporating photo or image-based search in the Coupang app? It would be like using Google's image search, but instead you are using your smartphone's or tablet's camera, or any saved pictures, in order to search for products you want to buy on Coupang.
- There would be a button for this feature added next to the existing search button, depicted by a camera icon. Again, similar to Google image search.
- You could then evaluate search results using product images.
- The whole point of this is to offer a non-language-based alternative to searching for items.
- Can you talk me through how you might use this feature on an average day?
- What benefits and challenges can you foresee with a feature like this (neutrally-balanced question)?
- Can you think of any situations where this would be better than using the current search functions?

Anticipated answers could involve a positive, neutral or negative response to the overall idea. The interviewer could then probe further into the reasons for this. Answers could involve negative feedback such as: effectiveness/accuracy of search using images vs. searching using English and fumbling through search results with Korean text; the logistics of the company maintaining image recognition software/AI; will there be enough screen space to evaluate only images; is it possible to evaluate the quality and suitability of a productor using only images; privacy or security issues in allowing the App any camera and storage permissions. Answers about situations where image search would be better than searching online could include: comparison/researching prices of grocery shopping, shoes or personal electronics. For example: "We need more of this household item, so I'll just take a picture of it instead. That'd be a lot quicker than typing it in."

This prototype utilizes the existing design of the interface but with the addition of image-based search. This effectively removes accessibility barriers caused by search terms and search results being natively in Korean, thereby discovering an alternative to English language support. The use of image-based search will also allow users to consciously filter out other visual distractions such as advertising, thereby assisting with the second requirement. The evaluation of search result may be difficult with limited screen real estate on a smartphone. In terms of user base identified in the data inventory, it is anticipated that 18-44 years old English speakers residing in South Korea will likely have the visual ability to assess images on smartphone screens since they are subjected to health tests for long-term Visas. However, image-based search result evaluation may prove challenging for those with bad eyesight and the elderly who have lessened visual acuity. So, this idea may prove suitable only for younger and more experienced smartphone

PROTOTYPE 3 – PHYSICAL

For the **Catalogue, Samplers and QR-scan** design alternative, a physical prototype was developed and evaluated. This prototype can be viewed in *Figure 3* below.

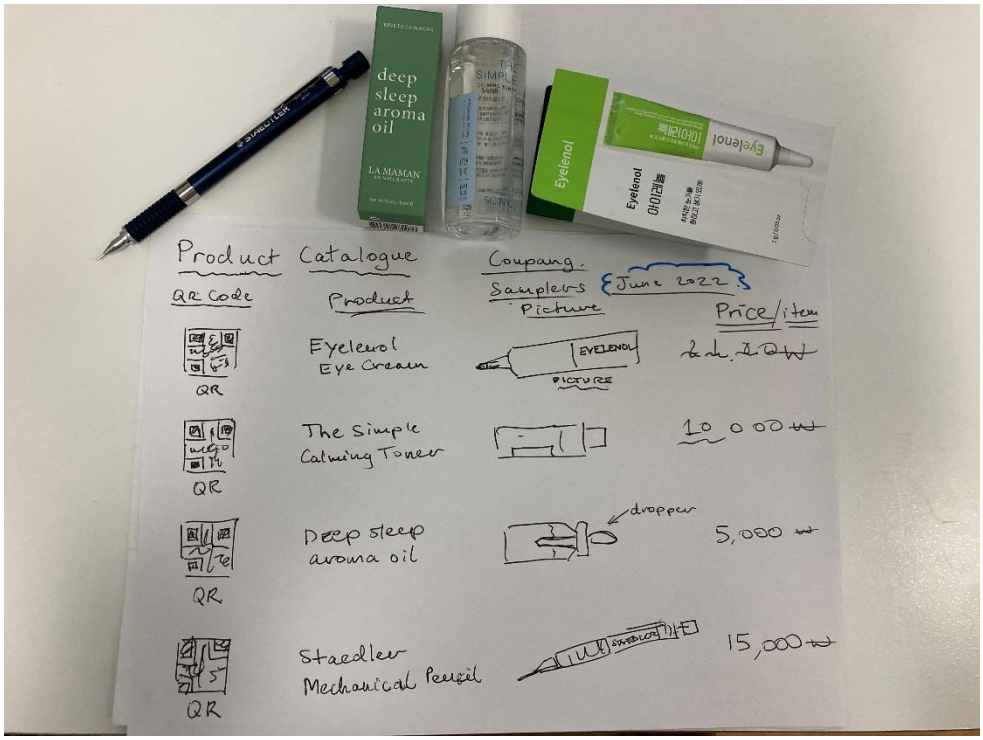

Figure 3 — Product Catalogue, Samplers and QR Codes

The prototype took the form a traditional product catalogue with product names, associated pictures, prices and a QR-code for ordering via the App. Participants were asked to simulate using the samplers, the catalogue and associated QR-codes with their own smartphone devices. The researcher explained how the App would respond when the camera scans a QR-code, that is, the QR-codes result in the App automatically adding the item to the user's/participant's shopping cart. Participants were asked to provide feedback and think aloud as they simulated the interaction.

This particular prototype is somewhat novel and moves away from reliance on the App. Other than the initial opt-in to the premium service for the catalogue and samplers, all subtasks, other than finalizing payment, can be performed using a paper catalogue and physical objects. As the catalogue is in English and physical products (samplers) are used for execution and evaluations, it is anticipated that this prototype improves accessibility and usability not only for English speakers, but for those of varying ages, level of expertise and mental/physical ability. Furthermore, distraction caused by advertising within the App is no longer a factor as the App is not used for any subtasks other than finalizing payment. This idea leverages traditional marketing techniques and would be more familiar to older generations. This idea is more inclusive to those who cannot leave their homes easily and less chances are taken ordering something they have never experienced before. Usability is enhanced in one way, the process is more straight forward and grounded in physical products, however it is more time-consuming to find products in this manner. Further to this, users are constrained and limited to ordering what is available on the catalogue. They have to evaluate less items, but evaluation takes longer and there are less options to choose from. In saying that, there is the opportunity for users to discover products they wouldn't otherwise experience or buy. In summary, it is likely advisable to have a service like this only as an opt-in paid-for service.

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APPENDICES

1.1 Appendix: Extended Abstract

Abstract—This study examines opportunities to redesign the existing interface for the search function of the Coupang e-Commerce App by following a user-centered four-stage design life cycle. Coupang is the largest e-Commerce platform in South Korea by market share at the time of writing, in 2022, and the platform exists as a website and as an App. The four-stages in the design life cycle for this study are: the Needfinding stage, where research seeks to establish a comprehensive understanding of both the task and its users; the Design Alternative stage, where multiple preliminary ideas are formulated to tackle the task; the Prototyping stage, where alternatives with the most potential are developed into prototypes for future user testing; and the Evaluation stage, where user testing occurs on prototypes and user feedback is collected. Participants for this study are all English-speaking adults.

1.2 Appendix: Study Context and Problem Space

This portion of study created a plan for and undertook individual brainstorming to generate ideas for design alternatives. These design alternatives were then evaluated against selection criteria and shortlisted to three ideas to move forward to prototyping. Finally, these three ideas were developed into three prototypes of low to high fidelity (for academic purposes and exploration), and then evaluated.

The Data Inventory and Requirements from the previous portion of the study (as seen in *Appendices 9.4* and *9.5*, respectively) played a large role in framing: the

initial brainstorming idea generation for design alternatives; the development of prototypes; and the evaluation of both design alternative ides and prototypes.

Coupang is the largest e-Commerce platform in South Korea by market share at the time of writing, in 2022. Coupang is often referred to as the "Amazon of South Korea" (Heebs, 2021) because of its significant local market share, large variety and supply of available goods, low and competitive prices, short delivery times, significant logistics infrastructure, and ease-of-use owing to its online website and App. However, it has not held this mantle for a significant time. Coupang's revenue has increased from 4,054 million USD in 2018 to 18,406 million USD in 2021, and its profit has increased from 189 million USD in 2018 to 3,109 million USD in 2021 (Coupang Inc., 2022).

This study seeks to examine opportunities to redesign the existing mobile App interface's search function (depicted in Figure 4) or to discover alternative solutions to the search function. Due to the size and high usage of this e-Commerce platform within the domestic market, such opportunities yielded by the research could potentially have far reaching benefits. The study is limited to understanding the environment surrounding the use of the mobile App and does not include the website version of the e-Commerce platform.

Figure 4 — Coupang App Interface, Search Bar shown (Byun, 2022)

At a glance, the search function on the Coupang App is similar to search functions on other popular e-Commerce platforms such as eBay or Amazon. After completing a search for a particular product, closest or related matches for products from Coupang or other sellers are displayed.

At a glance, the App landing page is populated with banner advertising directly underneath search bar. Banner advertising usually relates to sponsored brands, special deals or new proprietary offers from Coupang. Beneath the banner advertising are 10 icons including: product categories, current specials, Coupang Eats (a food delivery service similar to Uber Eats), and Coupang Play (similar to Amazon Prime video and gaming). Further beneath these 10 icons are further product spotlights.

Once a product is selected it is added to the user's shopping cart. From there, assuming the user wishes to proceed with a purchase or number of purchases, the user will then be prompted to organize shipping details, delivery methods and payment. Of particular note, Coupang offer 'Rocket Wow' delivery (similar to the Amazon Prime shipping service) which offers expedited shipping and no minimum shipping for a monthly fee.

1.3 Appendix: User Types

Coupang primarily serves the domestic market (South Korea) and the website and App are only available in the Korean language. However, international shipping is available for users to various locations such as Canada, the US and Europe. Therefore, a majority of users are based domestically within South Korea and there is a smaller international base of users.

In order to register an account with and use the Coupang App, a user requires an Android or iOS mobile device, a bank card or credit card capable of online purchases, a cell phone number, their name, and a suitable address. This means that users could potentially be anyone in South Korea that fulfills these requirements.

In saying that, users of the Coupang App require a baseline technical proficiency in using mobile technology, the necessary expertise to download, open and operate a mobile app, and necessary understanding to complete account registration.

For the purposes of this study, all participants and user groups will be English-speaking adults.

Of note, those without sufficient Korean language proficiency (such as expats, international students and travelers) often use Google Chrome's in-built

translation tool as a workaround on the Coupang website. However, it is not possible to open the App in a translated form. It is possible that these users may open the website version in Google Chrome on their mobile device, with the translation functionality enabled.

The underlying motivations for a user to use the search function of the Coupang App is to search for products they may be interested in buying now or in the future. It is also reasonable that a user may also search for products on the e-Commerce App without a purchase decision in-mind. A user may simply be searching to gain an understanding of product prices and product variety.

1.4 Appendix: Data Inventory

Users: Who are the users? What are their ages, genders, levels of expertise?
Refer primarily to Online Survey Summary, and Interview Summary for supporting information. As a result of only performing this survey in English, the users are English-speakers in Korea who primarily rely on their English ability, not being able to take advantage of using Korean in the Coupang app. Ages are primarily 18-44 and excludes older demographics. Levels of expertise are intermediate to advanced based on duration of using the apps, web browsers and particular devices. Gender was not covered. I was very restricted with identifier collection so as to enhance participation. A larger survey could take place with a longer duration which also includes more identifiers such as heritage/race and gender.

Environment: Where are the users? What is the environment?
Refer to both Online Survey Summary and Interview Summary. This is primarily at home, but also takes place at work, while shopping at other locations and while commuting to a lesser, but still significant degree. There were no identifiers to establish if participants had families and thus likely more background distractions. A larger survey could take place with a longer duration to cover this.

Context: What is the context of the task? What else is competing for users' attention?
Refer to both Online Survey Summary and Interview Summary. At home, home chores or family could be a source of divided attention. While shopping at another location, having other items in mind is another source of divided attention. While commuting, paying attention to one's surrounding and not missing their

stop or boarding the correct bus/train is a source of divided attention. Within the app itself, some survey respondents highlighted that banner advertising and pop-ups are distracting and this results in divided attention.

Goals: What are their goals? What are they trying to accomplish? Refer to the Interview Summary. To buy an item, or to compare prices of an item.

Needs: Right now, what do they need? What are the physical objects? What information do they need? What collaborators do they need? Refer to the Interview Summary. Users require: the Coupang app or a web browser; internet connection; and smartphone device, tablet or computer with power; a goal item in mind; and money for the purchase of the item in mind. I asked no questions regarding collaborators, and so in the future, I could expand questions to cover who else is involved in making this part of the interface work as intended i.e. get the participants to attempt to identify the collaborators themselves. This would be very dependent on their level of expertise.

Tasks and Subtasks: What are their tasks? What are they doing physically, cognitively, socially? What are the subtasks? How do they accomplish those tasks? As outlined in the Interview Results and Summary.

1. Need [insert item], triggered by memory or another action/observation.
2. Open app or browser and type web address.
3. Click search bar.
4. Search using English. Sometimes using predictive text or recommended search terms.
5. Look at results.
6. Compare prices of first 5-10 items.
7. Assess quality of first 5-10 items.
8. Compare price vs quality trade-off.
9. Decide on particular item.

As mentioned in Participant Observation, users are using their visual senses for input/out and touch input (clicking virtual buttons or typing) in order to utilize the app's search function. Furthermore, they solely use visual feedback to evaluate their actions, using a combination of textual language and pictures.

As identified in the Interview Results and Summary, using Coupang can be a subtask of cleaning the home and undertaking other home chores, or as part of a bigger task of shopping. For example, when performing grocery shopping, the Coupang search function may be used to check or compare prices or availability of alternative products.

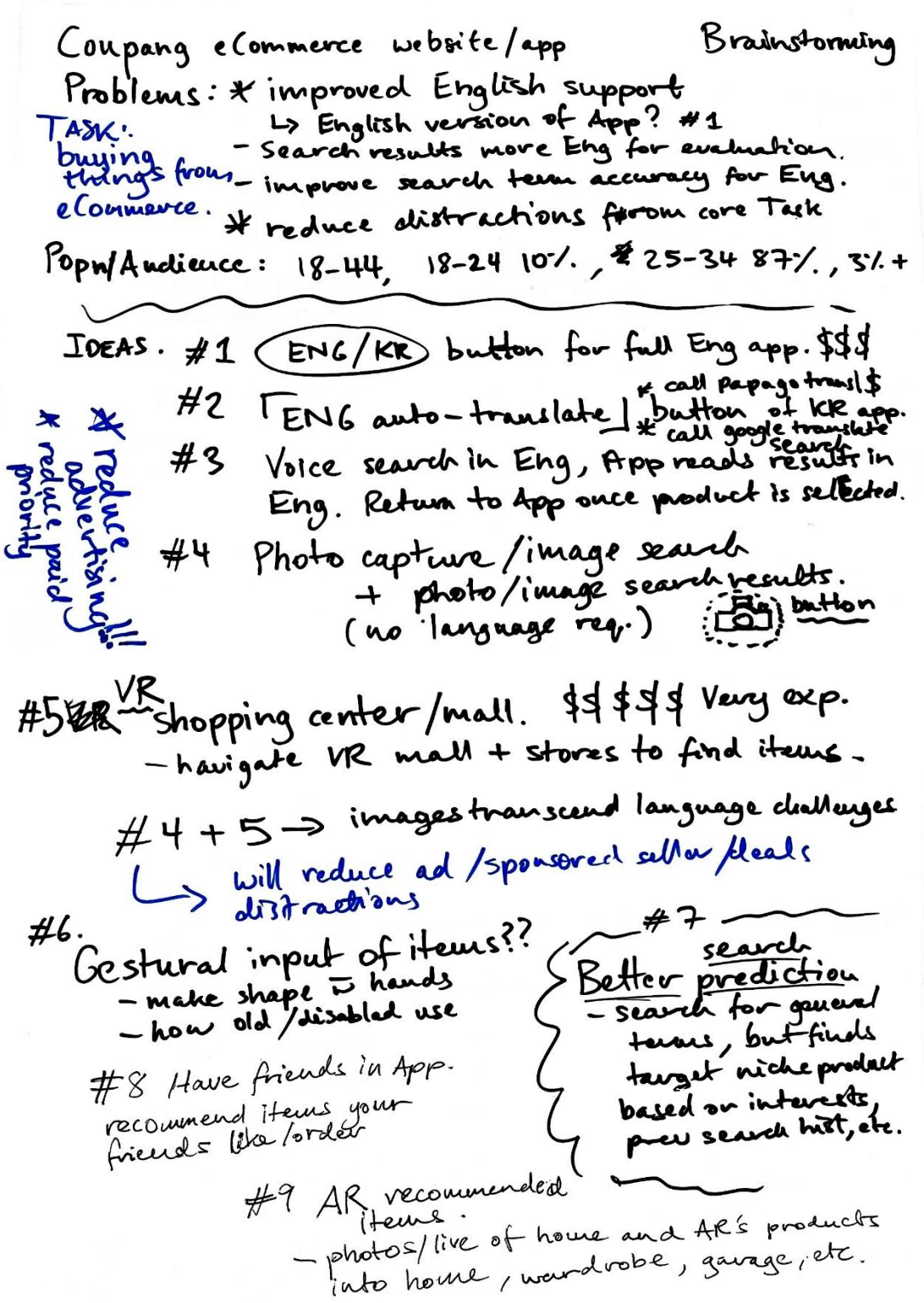
1.5 Appendix: Defining Requirements

Improved English support – better accessibility for those reliant solely on the use of English. Ideally, in the form of a fully English version of the app. Meeting in the middle, search results featuring more English for evaluation. At the bare minimum, improving search term accuracy when using English.

Enhance usability – despite the application and the search function requiring minimal cognitive effort to use (according to the needfinding), there are several sources of distractions within the app itself. There are many promotions, sales and pushing old-stock that are advertised as banner advertising and pop-ups, as evident from the survey results and participant observation. Investigating, less invasive and distracting alternatives of promotion would be ideal.

I believe functionality and learnability are fairly well performing at present. If better English support is offered, the learnability aspects will be taken care of. The core features of the application appear to perform well, it is simply the periphery features that require improvements.

1.6 Appendix: Brainstorming Execution Worksheets



#10 Opt-in Mailed Catalog and Samples and Order form w/ QR code
Hybrid of traditional mailing marketing + App Integration
using order form w/ QR codes. → older gen accessible.
X typing required. disability w/ carer

#11 Telephone service for Eng speakers → accessible
- recommendations
- can make orders for you.

#12 In App Stores for particular types of products.
- takes you to store if you X find niche product.

#13 Scan home with camera → recommends missing items. (everyday items)

#14 For fashion / personal devices:
→ wardrobe / dress yourself feature.
- camera: picks it out. prices it. orders for you

#15 Wearable? chip + camera that sees your life - for you

#16 integration with hi-tech personal assistant that orders for you (Jarvis?) accessible deals w/ language barrier for users

#17 Listens to conversations
at dinner table / living room, (family portrait time!)
makes recommendation

#18 Filters by location, language, price (details)
for search results
- omit results w/o Eng info.

#19 Scheduled reorders (everyday)
- no need to open App / internet.
- recommends based on order history / freq.

#20. Food / cuisine selector
↳ like meal prep service, but auto-orders ingredients based on recipes part of food / cuisine.

1.7 Appendix: Wireframes – Full Design

Figure 5 — Landing Screen Korean (top), Eng-transl (bot)

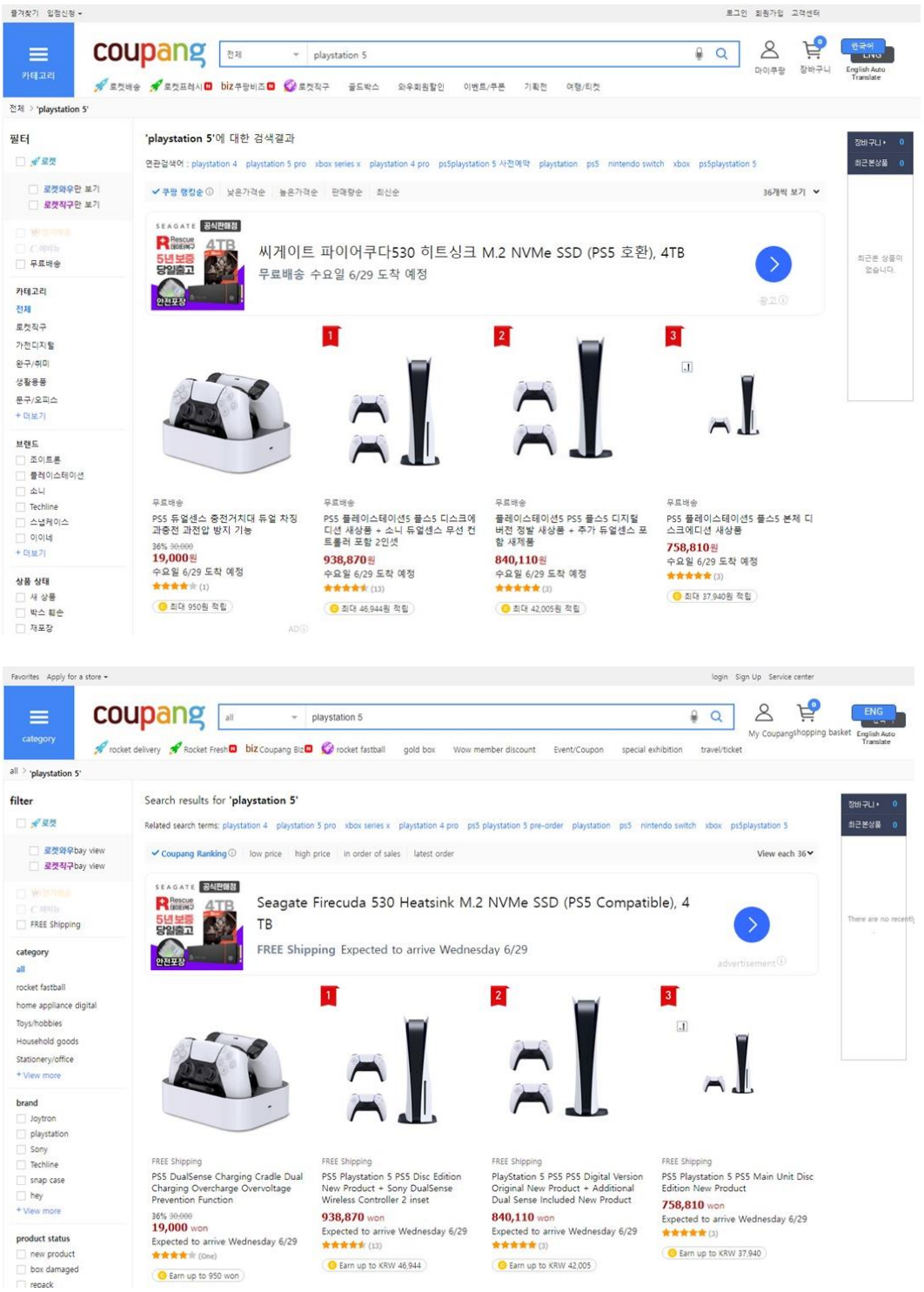


Figure 6— Search Results Example with Eng-Transl (bot)

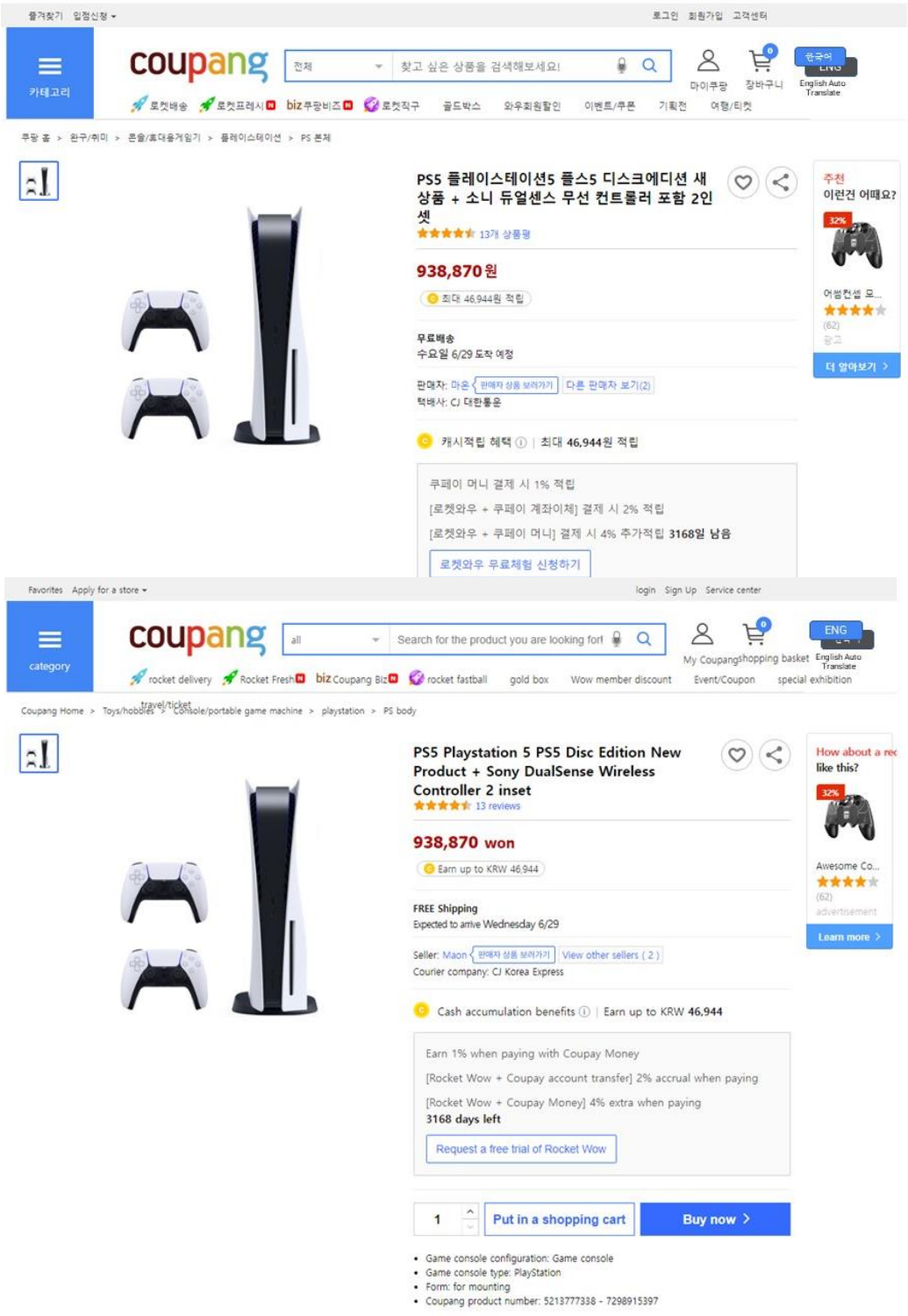


Figure 7— Product Selection Example, Eng-Transl (bot)