

INSPIRATIONAL SHOPPING

Improving Online Shopping Experience Through
Recommendation System Based on Personal Values

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*I would like to thank my advisor Peter Scupelli for his guidance in the course of this academic journey.
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Abstract

Online shopping has revolutionized retailing with low price and convenience since its arrival and is threatening brick-and-mortar stores. However, there is a shopping paradox. According to a recent survey, however, 65% of online shoppers still prefer to go to physical shops. Having too many choices is one of the reasons why online shops are less favored. Customer satisfaction decreases when they face too many options because it leads to high expectation, anxiety, and regret at their decisions. Shoppers suffer from a question; “Is this the right one for me?” Through investigating furniture and home decor shopping, this research has found that shoppers make a purchase decision not only based on external facts like the price but also based on their inner voices, such as personal values. This study has explored the opportunity and envisioned an e-commerce service with a recommendation model to raise customer satisfaction with the shopping experience. The model utilizes *laddering technique* and *means-end chain model* to identify an individual customer’s personal values. By answering the recommendation quiz, customers are suggested relevant products from various brands that align with them. The objective of this project is to assist customers to make more confident decisions and give online retailers a tool to improve the shopping experience for their customers.

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Chapter 1

Introduction

The Context, Online Shops VS Brick-and-mortar Stores

Shopping is one of the most common and frequent activity today. In 1994, online shopping was introduced and had revolutionized the landscape of shopping. It is threatening traditional physical stores with low price and convenience. For example, Amazon killed off some local bookstores and considerably imperiled major bookstore brands. However, according to a recent study by Pew Research Center, 65% online shoppers still prefer to go to offline shops in general.¹ The research question of this thesis project has emerged from this irony. What makes online shopping less attractive than physical stores? What does consumer seek for beyond price and convenience? How can design improve online shopping experience to increase customer satisfaction?

The Problem Area, The Paradox of Choice

One of the many benefits online shopping provides customers is a variety of selections. Various items across various brands and vendors are just a few clicks away. Various items across various brands and vendors are just a few clicks away. People believe that the more choices are always better. It is more likely to find a product fit precisely when there are many options. However, the truth is more choices do not guarantee satisfaction. Psychologist, Barry Schwartz, argued that too many choices lower satisfaction because it increases time and effort and produces high expectation, anxiety, and regret at their decisions.²

The paradox is rooted from a question; “Is this the right one for me?” Customers have a hard time to search the one that genuinely aligns with them. It is a particularly tough question when someone when shopping online. There are some tools, such as filters, invented to address this issues. Indeed, those tools effectively reduce time and effort by narrowing down choices. However, it does not answer the question.

The Opportunity Area, Furniture and Home decor Shopping

To investigate further, this research chose furniture and home decor shopping as the area of focus. Comparing different products, brands, and so on is named as the most arduous part of the furniture and home decor shopping. The discrepancy in consumer preference between online and offline channels is so prominent in this category. Despite that home furnishing sector is one of the fast-growing sector of digital retails, the majority of shoppers more favor buying furniture and decor at physical stores. Taking a close look at this phenomenon in home furnishing category, the research realized the friction point. Shoppers go to brick-and-mortar stores, looking for inspiration and expert assistance, which online shopping does not provide.

In the meantime, the research sheds light on an opportunity area as well. People express personal values while they are furnishing and decorating their home. Whether it is an individual piece, design style, or source, furniture and home decor embodies what the owner value. It means buying furniture and home decor are inherently influenced by personal values. Shoppers weigh products and brands not only based on external factors, such as price and size but also based on their inner voices. For instance, one interviewee said that she prefers to buy from small businesses because they can feel more connection and contribution. Through user research, the research also learned that shoppers who know their values prior to purchase tend to have more intense and long-lasting satisfaction with shopping experience than others.

The Design Solution, A Recommendation System Based On Personal Values

This study has explored the opportunity area and conceptualized a recommendation model guiding shoppers to items that align with their personal values. The model utilizes the laddering technique in order to identify an individual customer's values and match individual

items to the identified values. By answering to the laddering quiz built in a home furnishing e-commerce, customers can find relevant products corresponding to their values and design styles among thousands of product from various brands.

By proposing this design solution, this project aims to help e-commerce to provide consumers with the more satisfying shopping experience and help e-commerce to build a strong relationship with customers. Evaluating the prototype of this solution validates how it achieves the goal successfully. It shows that the laddering quiz model is able to identify one's personal values and design styles. The recommendation system based on personal values was seen helpful in making informative and consistent decisions in general. Also, the solution enriches shopping experience at the same time. Participants described the experience more personalized, human, novel, delight, convincing, and even reflective and thoughtful.

About This Paper

This paper is a comprehensive documentation of this thesis project including related works, design process, conclusion and discussion, and reflection. In related works chapter, preliminary study around the practice of shopping, consumer behavior, and related technologies will be discussed. Design process section describes how this study has discovered the problem and opportunity area and how the concept has been developed and evaluated. In conclusion and discussion chapter, what works well and what doesn't work of the concept is examined in order to advance the findings of this study further. Finally, reflection chapter will review the research outcomes and overall process.

Chapter 2

Related Works

Overview

The very first research question of this thesis project was how design could make shopping more meaningful. The journey to answer the question began from reviewing related works around shopping including recent articles and reports on retails, consumer behavior, and relevant services and technologies. This preliminary study glanced what is happening in shopping to scope its vast landscape down into a manageable one and determine a particular angle to investigate the research topic.

Related Works

Experience Economy and Customer Satisfaction

In the 21st century, experience does matter in retail. Pine and Gilmore argued that experience economy deliver memorable experiences instead of merely manufacturing products and supplying them.³ In this thesis, I argue that, the effectiveness of production and distribution are the parameter of a business' success in the industrial economy. However, in the experience economy, the parameter has been shifted into consumer satisfaction

Online Versus Offline Retail

The myth of online shopping predominance has been burst. According to a study by Pew Research Center in 2016, 79% of U.S. adults shop online today. Because merely 22% of them made a purchase online in 2000, Americans shopping habit has been substantially shifted. Nevertheless, 65% online consumers still prefer to go to brick-and-mortar shops if all things including price are the same.⁴ This phenomenon was also captured by TimeTrade's survey in 2017. When asked a preferred channel to buy the desired item, 75% of respondents reported that they would choose physical stores (Figure 01). Touching and feeling the product, in-store promotion and sales, and personal assistant were pointed out as the top reasons for the physical store preference (Figure 01).⁵ To sum up, consumers go online, but this does not mean that they are fully satisfied with the shopping experience e-commerce provides.



Q Why do you prefer shopping in-store versus online?



Figure 01 TimeTrade's study in 2017 shows that shoppers still prefer to go to physical store because they can touch and feel product, take advantage of in-store promotion and assistance




The Paradox of Choice

There is the paradox of choice in consumer behavior. People believe that the great choices in product selection are better. This is because it is more likely to find a perfect fit. However, the truth is more choices do not guarantee satisfaction. Psychologist, Barry Schwartz, points out that too many choices lower satisfaction because it increases time and effort and produces high expectation, anxiety, and regret at their decision. Even if people buy something that is the most similar to what they look for in reality, it would be hard for them to be completely satisfied with the outcome of the choice thinking of a better alternative.⁶

To solve this problem, retailers have devised tools to reduce customers' cognitive load and dissatisfaction. Digital shopping platforms are especially interested in the tools since they offer almost infinite number of items on their shelves. For instance, Amazon which moves fast in this area has implemented many features, from simple filters narrowing down choices to automatic recommendation surfacing relevant items like "Compare With Similar Items (Figure 02)" and "Customers Who Viewed This Item Also Viewed".

Figure 02 “Compare with similar items” is one of many features of Amazon.

Compare with similar items

			
	This item Zinus Mid-Century Upholstered 76in Sofa / Living Room Couch, Stone Grey Weave	Zinus Contemporary Upholstered 78in Sofa / Living Room Couch, Chestnut Brown	Zinus Classic Upholstered 71in Sofa / Living Room Couch, Soft Grey
	Add to Cart	Add to Cart	Add to Cart
Customer Rating	☆☆☆☆☆ (0)	★★★★★ (11)	★★★★★ (11)
Price	\$429 ⁰⁰	\$379 ⁹⁹	\$369 ⁹⁹
Shipping	FREE Shipping	FREE Shipping	FREE Shipping
Sold By	Amazon.com	Amazon.com	Amazon.com
Color	Stone Grey Weave	Chestnut Brown	Soft Grey
Item Dimensions	30.71 x 76.38 x 33.86 in	30.7 x 78.4 x 31.5 in	31.1 x 70.87 x 34.65 in
Material Type	Fabric, Foam	Fabric	Wood

The recommendation is a particularly popular tool recently as machine learning technology has been rapidly advancing. It even becomes the key value proposition of some online services. Netflix, an on-demand video streaming service, and Spotify, a music streaming service, attain competitive edge against its competitors with its sophisticated recommender system empowered by machine learning.

Chapter 3

Design Process

Overview

This chapter accounts for how this thesis has investigated the problem of customer dissatisfaction with online shopping, generated potential solutions, developed a proof-of-concept prototype, and evaluate the solution. The design process has utilized efficiently series of qualitative and quantitative design research methods including online survey, user interview, and participatory workshop. Although this chapter is unfolded chronologically and divided into three linear phases—exploratory, generative, and evaluative research, the actual design process involves multiple iterations.

Exploratory Research

Goal

This exploratory research aimed to identify a problem of online shopping that prevents customers from having a satisfying shopping experience and discover an opportunity space that will inform solutions to address the problem.

Scope

The preliminary research on the retail statistics revealed that the online shopping has been growing successfully but less appreciated than offline shopping. Shopping is, however, too big to investigate the problem and opportunity in-depth and find fruitful insights. Also, the shopping experience is different between types of merchandise.

This study decided to focus on furniture and home decor shopping. It is a merchandise line where the contradiction between growth and preference of online retail is observed. In U.S. retail, home furnishing sector has shown a rapid growth of its online share (Figure 03).⁷ However, 67% of furniture shoppers reported that they prefer to go to physical stores, whereas only 27% of consumer would go for online channels (Figure 04). This gap is considerable than other sectors, such as books, movies, music, and video games where only 30% of consumers prefer in-store shopping against 57% of online shopping preference.⁸

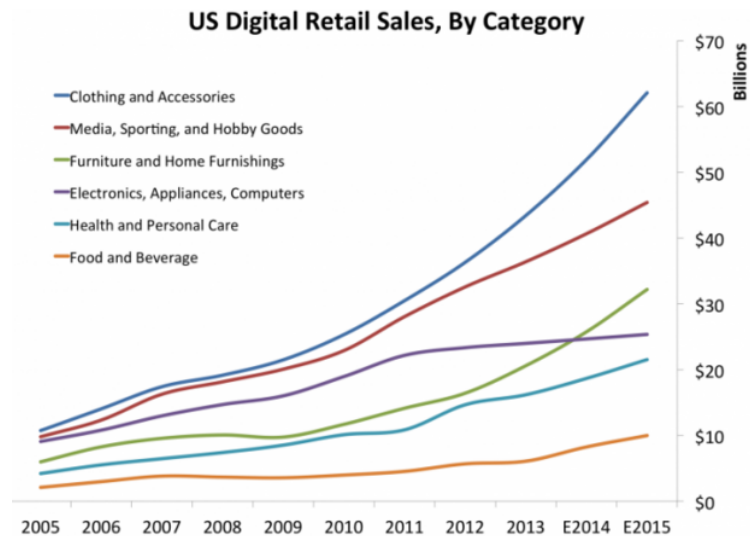
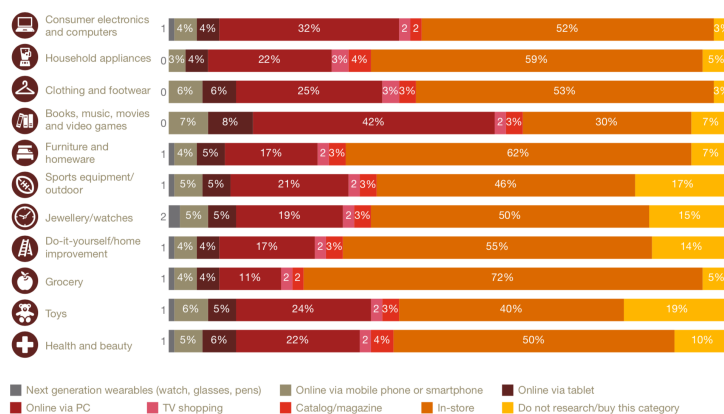


Figure 03 According to the forecast by Business Insider based on U.S. Economic Census data, furniture and home furnishings category shows a steep growth trend in online retail sales.

Figure 6b: The physical store is still a critical step in the purchase journey

Q: Which method do you most prefer for buying your purchases?



Base range: 22,164–22,452
Source: PwC, Total Retail Survey, 2016

Figure 04 A research by PwC exhibits that consumers' preference to physical stores is particularly high furniture and home furnishings categories.

Research Methods

Online Survey

With the scope, this study attempted to comprehend furniture and home decor shopping from the perspective of customers with breadth. In this study, shopping experience refers to customer experience not limited to the moment of shopping itself but including planning before shopping and the effect of the purchase afterward on daily life.

It conducted an anonymous online survey to reach out as many real-world consumers as possible. The particular interest of this survey was comparing online and offline consumer journey. To do so, it required participants to specify their last shopping channel and then asked them about the decision-making process and challenges alongside the shopping journey. Additionally, participants were asked to explain their relationship with home furnishing products so that the researchers can see factors of satisfaction/dissatisfaction with the end-result of the shopping. The survey collected responses from 90 participants. Followings are some questions of the survey.

- What was the last furniture or home decor product you bought?
- What was the most positive aspect of your shopping experience?
- How could the shopping experience be improved?
- Based on your “in-store or online shopping” experience, how would you rate the following? (Figure 05)
- What is your most/least favorite furniture or home decor that you own? And why?

Based on your "in-store or online shopping" experience, how would you rate the following? *

If you did not consider one of the following, select "Not Applicable"

	Very easy	Easy	Somewhat easy	Somewhat difficult	Difficult	Strongly difficult	Not Applicable
Finding a specific style/design you like	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Getting a sense of the actual size of a product	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Planning a layout of furniture and/or home décor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checking functionality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checking durability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Checking the quality of materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Comparing							

Figure 05 A question of “How was the overall shopping experience?” section in the survey.

Affinity Diagram

Survey responses were analyzed through affinity diagramming. There are two diagrams created by the survey results. The diagram no.1 analyzed how the participants perceive online and physical shopping differently by clustering the positive and negative comments on their most recent shopping experiences online or in-store (Figure 06). According to the responses, online home furnishing shopping is winning in terms of convenient delivery, time efficiency, and more selections. Meanwhile, physical stores excel at customer services, such as knowledgeable support, and entertaining and inspiring store environment. An interesting aspect of home furnishing category is that consumers seek for not only objective product information but also furnishing and decorating ideas while they are shopping.

Figure 06 The diagram no.1 compared pros and cons of online and physical home furnishing stores. Blue entries refer to online experience and pink ones are about in-store experiences. It reveals that online shops are good at convenient delivery, time efficiency, and more selections, while physical stores attract consumers with customer service and delightful environment.



The diagram no.2 examined what aspect shoppers like and dislike about their furniture and home decor, the outcome of shopping. Similar factors are clustered into a group and labeled (Figure 07). Then the clusters were moved around until some patterns emerged. Participants are attached to the possession when they found various types of values ranged from practical values to emotional, symbolic, and social values. For example, “It represents me.” is one of the cluster linked to social and symbolic values. In contrast, the reason they do not like it is mostly because of the lack of objective and practical values like defective product

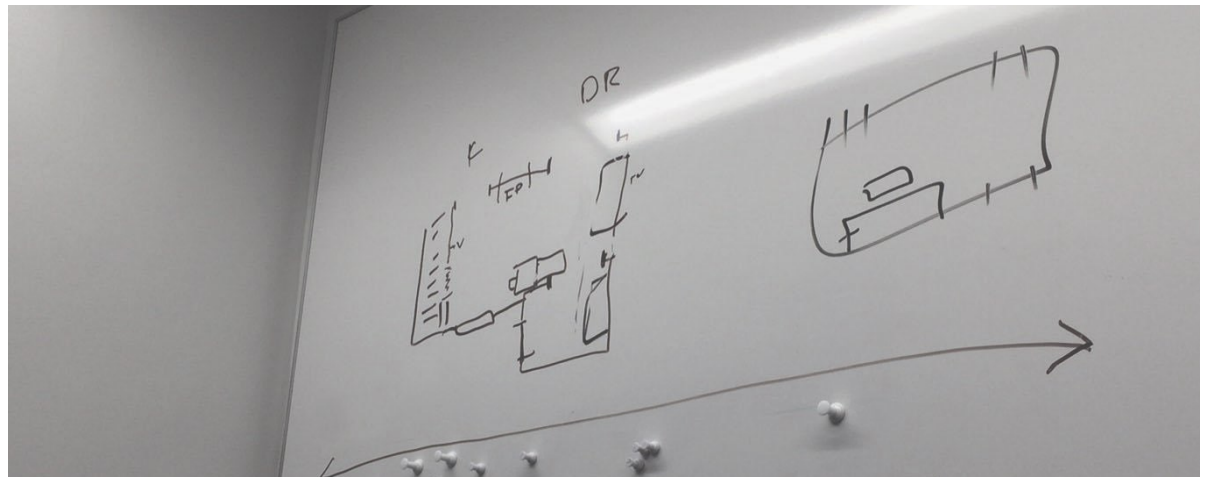
Figure 07 In the diagram no.2, the reasons why the participant like/ dislike their home furnishings was clustered into similar themes. The reasons are associated with practical, emotional, symbolic, and social values. Green shade of each entry represents confidence level of the respondent in home furnishings shopping.

Focus Group Interview

To delve deeper into the survey findings, the researcher recruited seven participants representing different types of shoppers and carried out focus group interview in person. The interview probed about participants' current habits, motivations, goals, challenges around home furnishing as well as furniture and decor shopping in-depth (Figure 08). Each session took about a half-hour and asked following common questions accompanied with follow-up questions.

- How much do you enjoy home furnishing and decoration? And why?
- What is your typical home furnishing shopping journey?
- What is the hardest part of home furnishing and decoration?
- Have you ever made a kind of furniture or home decors?
- Where did you shop? And why?

Figure 08 In focus group interview, a participant illustrated his house and explained challenges in furnishing his home.



Persona & Customer Journey Map

The findings of focus group interview and the survey were integrated and synthesized into consumer personas and customer journey map. There are three types of persona; an active shopper, a passive shopper, and an inactive shopper (Figure 09). Value awareness and the interest in expressing oneself through home furnishing and decoration are two key parameters that determined persona type. The value awareness refers to how much a shopper is aware of what he or she values and want most especially in the context of furnishing home. Different shopping experiences of these personas are visualized and mapped on customer journey map. This mapping surfaces and visualizes insights in furniture shopping (Figure 10).

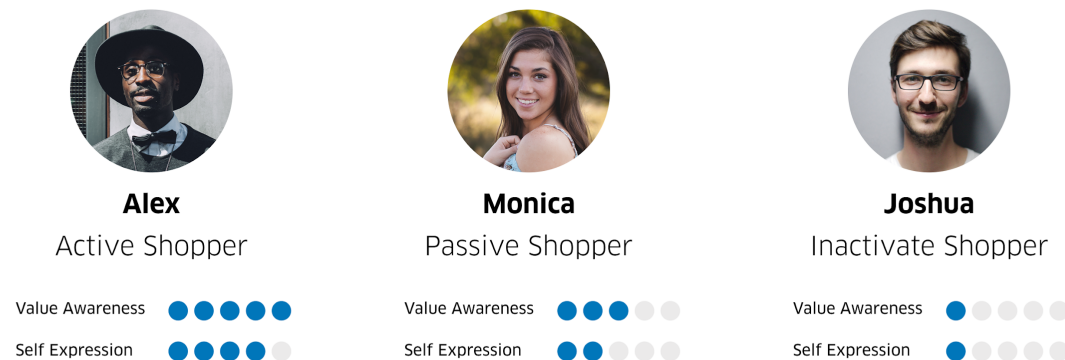
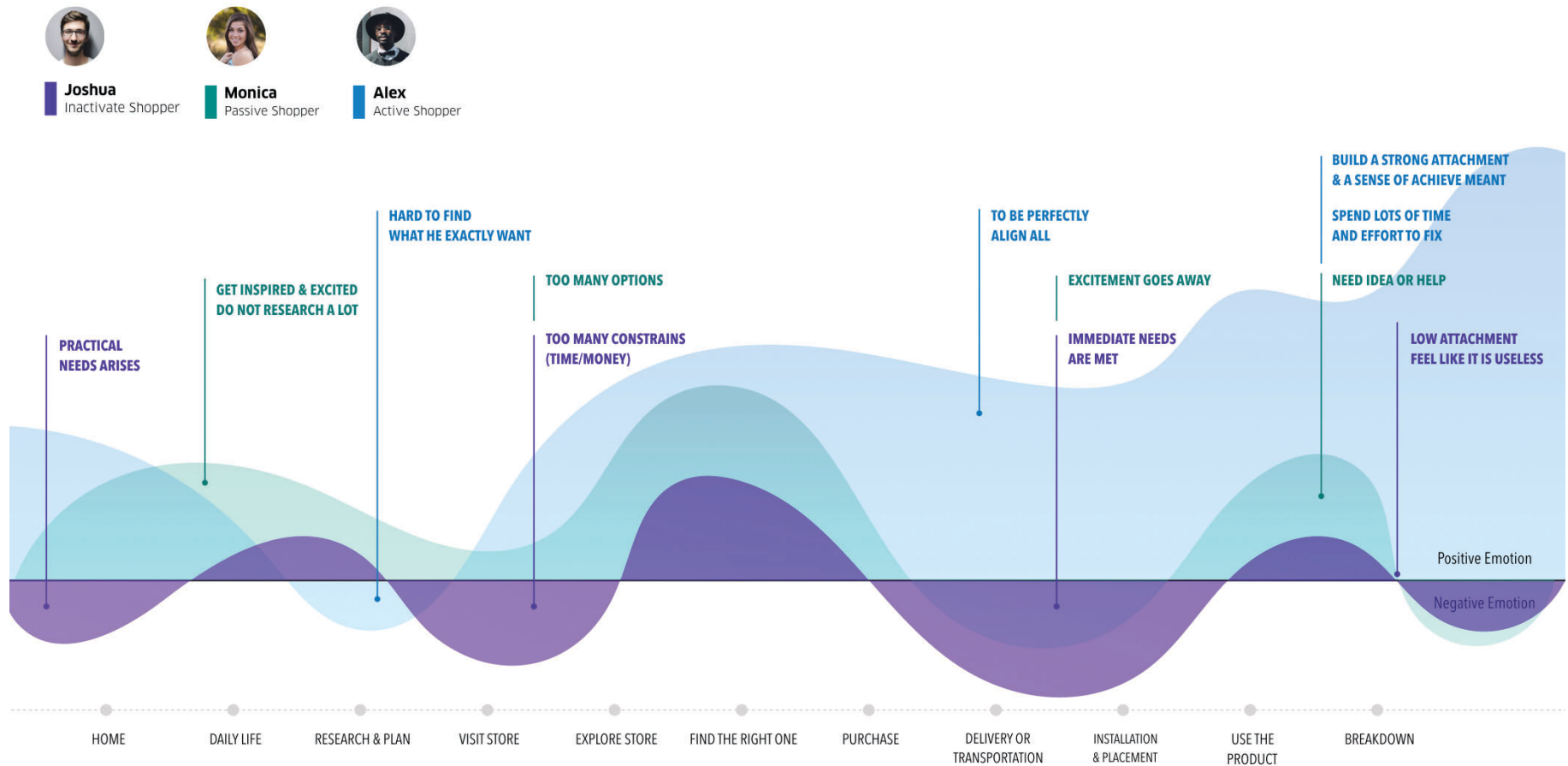


Figure 09 Three personas for different furniture and home decor shopper types.

Figure 10 The customer Journey map exhibits thoughts and emotion of the three personas throughout furniture and home decor shopping journey.



Key Takeaways

01 *Shoppers need knowledgeable support and inspiring information.*

By diving deeper into this by comparing online and offline shopping, the research found that people think online furniture retailers are good at convenient delivery, time efficiency, and more selections (Figure 06). Even though a more selection is considered advantageous, the paradox of choice found in the related works was also observed in furniture and home decor shopping. When asked the most difficult part of furniture journey, respondents named “comparing different products, brands, and so on” as the most struggling step (Figure 11). This result shows the paradox of choice happening in the real world. Consumer spending time and effort to find a better item. Deciding on overwhelming options is difficult and painful. They keep asking a question; “Is this the right one for me?”

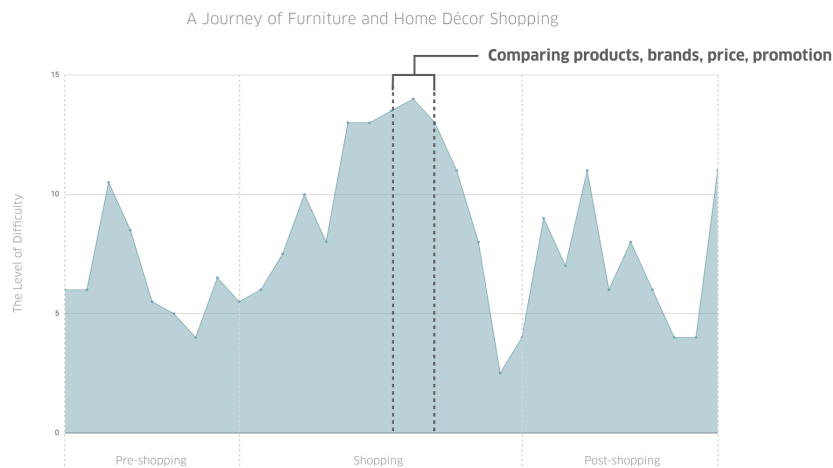


Figure 11 “How challenging each step of the home furnishing journey is?”, the survey asked to rate how difficult each of given shopping steps are on a scale. The responses were averaged and plotted on the a home furnishing shopping journey.

On that note, I noticed that the majority of people still prefers to shop in store. Consumers appreciate the knowledgeable support and inspiring information from physical stores. From this study, I concluded that customers need help in making a good choice. Customers are assisted by salespersons and can get inspired by exploring and feeling products and settings when they are at physical stores. On the other hand, they have to figure it with limited information when they shop online at this point. Online retailers would be able to enhance the shopping experience by incorporating the aspects.

02 *Buying furniture and home decor is informed by personal values.*

Shoppers reflect their desired self-images onto home settings. Participants said “When my classmates visited my house, they told me that my house feels like a professor’s house and I thought ‘Yes! That is what I want!’” and “I like my designer-looking lamp on my desk where I spend lots of time.” Furniture and home decor are an extended self that embodies what the owner value.

In other words, buying furniture and home decor is inherently influenced by personal values. A renowned psychologist, Milton Rokeach defined value as a belief which guides our judgment.⁹ Shoppers weigh products and brands not only based on external factors but also based on their inner drives (Figure 12). For example, one participant said that she prefers to buy from small businesses because she can feel more connection and contribution.



Figure 12 Buying furniture and home decor is informed by personal values.

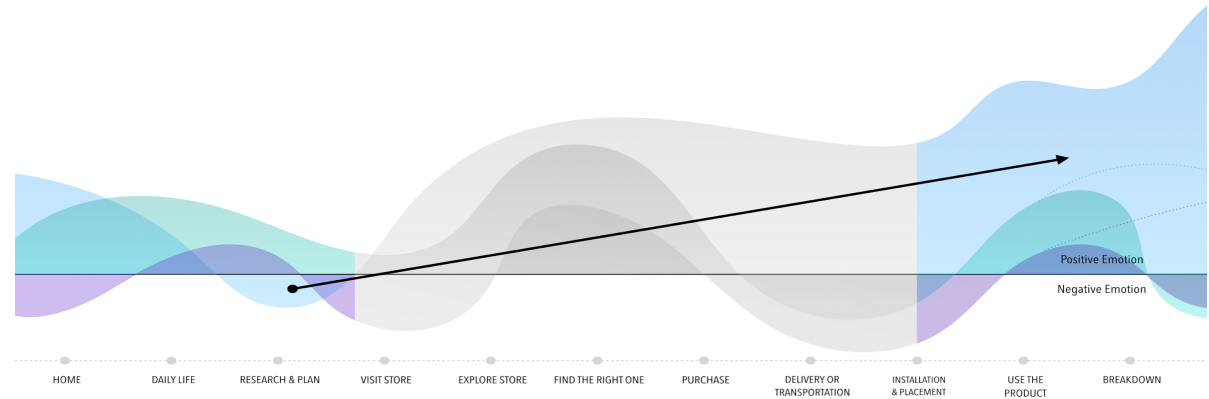
03 *Being aware of personal values facilitates making an informed decision and leads to a strong satisfaction in the long run.*

Through mapping out different types of personas on a customer journey for furniture shopping, this study learned that shoppers who know their values and research thoroughly before purchase tend to have a strong and long-lasting satisfaction (Figure 13).

Alex is an epitome of active shopper. He knows his values and is willing to spend time and put effort to find the right one from many options and even create the one on his own. This awareness enables him to express himself through furnishing and decorating his place. Eventually, he feels content with the shopping experience and the outcome of it. In contrast to him, Monica is a passive shopper and has not contemplated and articulated about her personal values. Because her decisions have been made by immediate needs and primarily influenced by her friend, family, and trend so far, she struggles with deciding on many choices by herself. Her self-expression through home furnishing and decoration is limited to what retail or product allows, such as customization option. Satisfaction with her purchase

heavily depends on the situation. She usually realizes the impact of her buying decision afterward.

Figure 13 The customer Journey map shows that active shoppers who are aware of their values and research thoroughly prior to purchase tend to have a strong and long-lasting satisfaction.



Personal values play an important role in evaluating choices and decision making no matter an individual is aware of it or not. It is already built in our mind. The advantage of using personal values is that consumers can make more consistent decisions over time than immediate needs. Also when a product resonates with one's values and becomes an extended self, it develops an emotional attachment which is less breakable than the functional one.^{10 11} As a result, consumers are satisfied with the decision in the long run

04

Design styles are universal vocabularies and basic frames for shoppers to communicate and express their personal values.

Usually, people do not articulate personal values when they describe products and setting they are looking for. Instead, they often explain them through design styles. For instance, when people say they have bohemian style, this implies that they value freedom and uniqueness. Also, design styles are the basic frame for shoppers to start to imagine their home and keep it cohesive.

Summary

Too many choices provided by e-commerce are one of the reasons that lower customers' satisfaction with shopping furniture and home decor online. This paradox poses a question to consumers, "Is this the right one for me?" that increases time and effort and dissatisfaction about their decision. Although current solutions, such as filter, allow shoppers to save time and effort by narrowing down options effectively, these solutions do not address the fundamental question. Through investigating furniture and home decor shopping, the research has found that shoppers need knowledgeable help and inspiring information and they make purchase decision not only based on external factors like price and space but also based on the alignment between products and their personal values. The benefit of personal values is that it guides customers to more consistent and long-lasting satisfaction with their purchase decision. In this light, if e-commerce help shoppers to make a better choice with personal values, customers would be able to have more satisfying experience with their online home furnishing shopping. Currently, design styles like mid-century modern are a more familiar vocabulary and frame that plays a similar role with personal values.

Generative Research

Goal

Exploratory research drove this project to the following design direction that guides shoppers to products and brands that align with their personal values and design styles to provide more satisfying shopping experience. To do so, generative research has to figure out what is personal values, how to identify one's personal values, and how to draw a connection between the identified values and specific furniture and home decor items.

Scope

In generative research phase, this thesis decided passive shoppers who are overwhelmed by too many choices as its target audience and created a persona, Monica (Figure 14). It envisioned a home furnishing e-commerce, called HoMe, that aggregates diverse products from different brands and brainstormed ideas for its recommendation feature. The service's business model lies in the recommendation feature that identifies customers' values and design styles to find relevant products so that the service can deliver more fulfilling shopping experience.



Monica

*"Furnishing home is hard.
There are too many things to consider.
Where should I start from?"*

Life Stage	22 years old, New graduate
Goal	Growing up and being independent.
Influence	Peer and trend
Challenges	Make a decision among many choices by herself.
Needs	Articulate what she likes and wants.
Buying Pattern	Social and sometimes impulsive. Fling with diverse brands and products for exploration or keeping up the trend.

She graduated her college last month and moved to an apartment in a new city for her job. She hasn't lived alone so far until this time. The apartment is empty. **She needs to furnish home by herself for the first time.**

She is looking at various online/offline home furnishing shops, such as West Elm, Ikea, and Wayfair. **She is overwhelmed by a variety of products and brands.** Given that furniture is not cheap and will last few years at least, **it is hard for her to make a decision on which one is the right choice.**

At that moment, she comes across home furnishing e-commerce, called HoMe. It aggregates diverse products from different brands. Its core feature is a recommendation quiz that identifies customers' personal values and design styles to help them find relevant products.

Figure 14 Monica, the persona of target audience and her scenario with the recommendation proposed by this thesis.

Research Methods

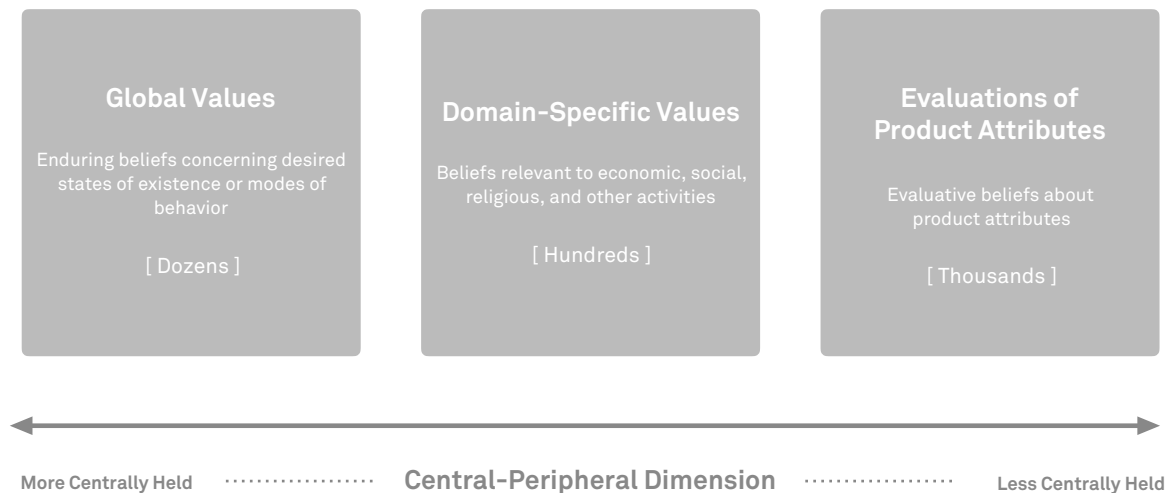
Literature Review

In generative research phase, I researched literature in various fields of study to attain knowledge around values. Personal values have been one of the most critical concepts in the field of psychology. Defining fundamental human values is a particular interest of many types of research. Ten universal values including self-direction, hedonism, power, and so on is one of the basic value set defined by Shalom Schwartz. He argues that the ten values are prevalent across all cultures.¹² Values are also explored in the field of marketing more practically. Steve Diller et al. boil down 15 core meanings which are implied in products and services, such as beauty and harmony that appeals to consumers.¹³ These all sorts of personal values were identified from button-up researches like self-report surveys and

interviews. From this literature, I was able to learned research methods and collect sets of potential personal values to be applied to this project.

Another approach of the literature to personal values is developing a model that can describe systems of personal values. Eric Almquist et al. came up with a model to develop better products and services for customers. The model organizes 30 elements of products and services recognized by customers in four levels; functional, emotional, life-changing, and social impact. For example, quality belongs to a functional level, and nostalgia belongs to an emotional level.¹⁴ Meanwhile, Donald E. Vinson et al. suggest a model of consumer value system that is comprised of 3 dimensions; global values, domain-specific values, evaluations of product attributes (Figure 15). Global values are more central and general, whereas evaluations of product attributes are more peripheral and situation-specific.¹⁵ These studies provide a lesson that sorting out a set of personal values relevant to furniture shopping context is crucial to implement it successfully.

Figure 15 Individual's value system in three dimensions adopted by a study of Donald E. Vinson et al. in 1977.

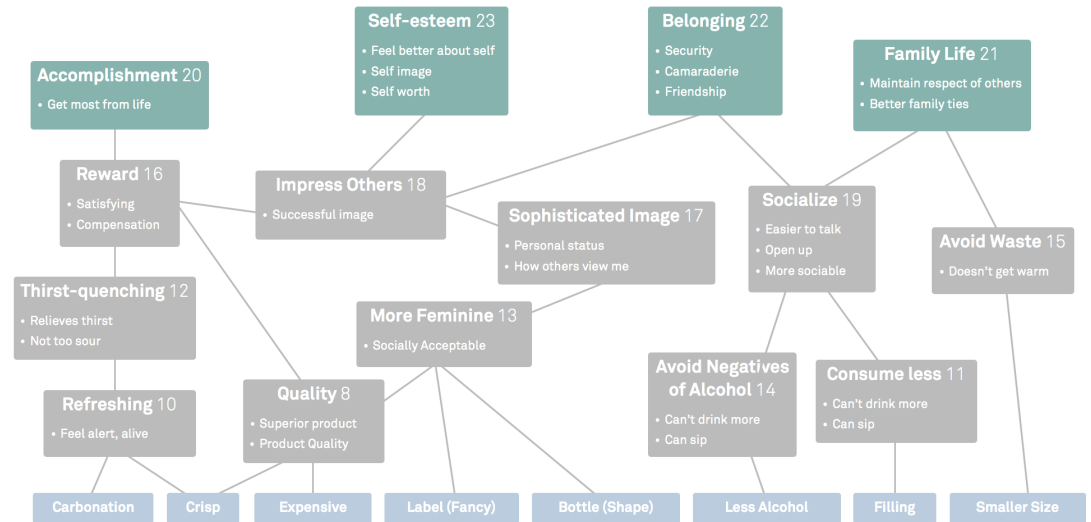


Lastly, I have discovered some tools that have been invented to identify an individual's personal values. The laddering interview technique is a widely used tool in the field of marketing to find customers terminal motivation from their choice of product or service. Thomas J. Reynolds and Jonathan Gutman theorized and coined *laddering*. It refers to an interview technique used in one-on-one condition. When marketers keep asking “why does that matter to you?”, customers answer their reasoning of the choice from attributes of the chosen product or service to its functional and psychological consequence, and eventually to their values (Figure 16).¹⁶ The thread of laddering interview result can be stored and described through means-end chain model proposed by Gutman (Figure 17).¹⁷ Another tool is Value Exercise. It was designed by Barb Carr to help people to figure out core values by following several instructions.¹⁸ Unlike laddering interview technique, it has already defined an adequate list of personal values. It is designed to help people to find the most relevant values from the list rather than dig their values by themselves.

Interviewer	You indicated that you would be more likely to drink a wine cooler at a party on the weekend with friends, why is that?
Respondent	Well, wine coolers have <i>less alcohol</i> than a mixed drink and because they are so <i>filling</i> I tend to drink fewer and more slowly.
Interviewer	What is the benefit of having less alcohol when you are around your friends?
“...”	
Respondent	Well, I knew I would be drinking a long time and I <i>didn't want to get wasted</i> .
Interviewer	Why was it important to not get wasted at the party last weekend?
Respondent	When I'm at a party I like to <i>socialize</i> , talk to my friends, and hopefully make some new friends. If I get wasted I'm afraid I'd make an ass of myself and people won't invite me next time. It's important for me to be <i>part of the group</i> .

Figure 16 A laddering interview example regarding wine coolers, adopted from “Laddering Theory, Method, Analysis, Interpretation” by Thomas J. Reynolds and Jonathan Gutman.

Figure 17 A hypothetical value map for wind cooler category adopted from Thomas J. Reynolds and Jonathan Gutman's study mention in Figure 16.



Case Study

There are already some furniture retail startups utilizing design style recommendation as their core business models. Havenly (<https://havenly.com>) and Modsy (<https://www.modsy.com/>) prompt customers to find their style through Style Quiz. Once a customer's design taste is identified, the service connects the customer with interior designers who share similar design styles so that he or she can complete interior design projects with help and advice from the experts. The fundamental mechanism of the quizzes is a user's choice of given options become a determinant that sort out possible preference (Figure 18). This is possible because each option is tagged with specific information, design styles in this case. This mechanism is a basic and common for many recommendation systems. However, when it is repeated throughout several steps, the prediction becomes probable and reliable enough.

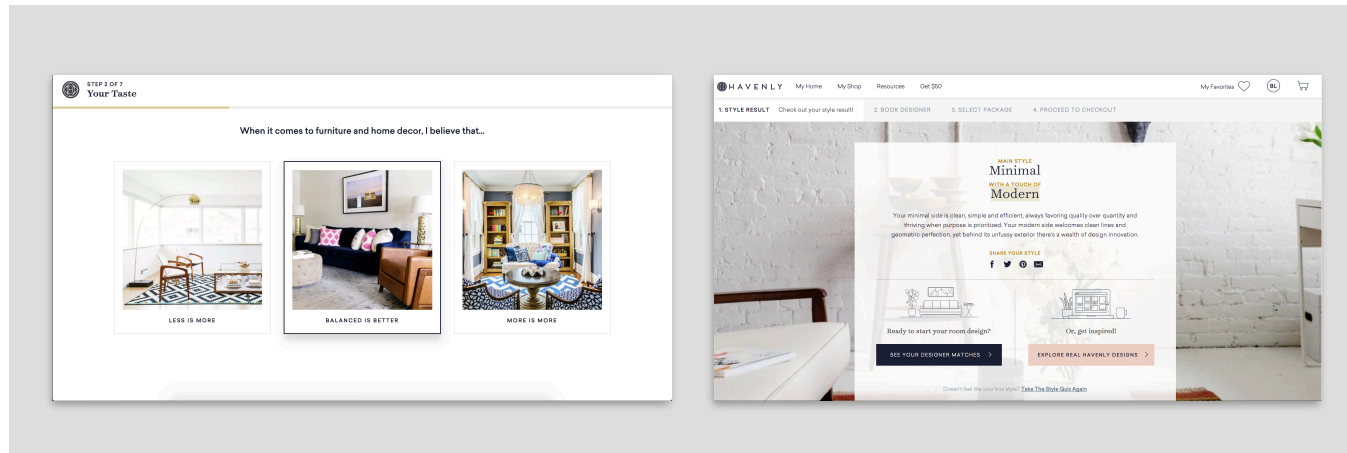


Figure 18 Style Quiz provided by Havenly asks users to specify their style among three options.

This project also probed user experience and interfaced design of various recommendation system and found a couple of salient patterns. First, what and how this quiz can help users clearly explained in the beginning. What the result means and how it has been driven by a user's answers explained to some extent as well. For example, a music recommendation quiz start with the statement that it will discover music genre and songs users will like. If Jazz is identified as the result, it describes what jazz is why it is selected and shown to the user. A list of jazz songs, the end-recommendation of this quiz, comes with some indicators of how it is related to the user. These design patterns share the intent of the system to convince and persuade users. The second pattern is that the quiz is usually divided into multiple steps by one question or task at a time. This pattern reduces cognitive load and confusion when users are answering to the quiz.

Ideation

By utilizing the above-mentioned findings, I generated four following ideas.

Simple Choice

E-Commerce gives a customer a list of personal values and ask to choose some applicable to them. According to the choice, a batch of different home setting photos is presented to the customer and asks them to select several photos they like the most in order to finalize his or her personal values and determine design styles. The, the quiz result and recommended products show up (Figure 19 top right).

Simple Survey

An e-commerce figures out a customer's personal values by asking them to complete a survey manipulated from Schwartz's value survey for the context of home furnishing shopping. According to the answers, the same with Simple Choice occurs in the rest of steps (Figure 19 top left).

Daily Collection

A customer uploads or takes a picture of furniture, home decor, or setting that he or she encounters and feel interested. When saving those photos, the customer tags the reason why it is drawing Once enough entries are collected, the system analyzed and delivered the customer's values and recommended products. (Figure 19 bottom left).

Means-End Chain

A customer is instructed to select a couple of his or her favorites among given imagery of various home settings. In the next step, the system asks what attributes of the selected

Simple choice

1 Select values

2 Select features

3 Be presented with options

Later on you'll have your choice made.

Shown with 10 items, according to the selection in 1

Guided by + Validation / support

Simple choice PQV or SVS

1 Indicate importance

2 Select features

3 Be presented with options

You make the choice according to the importance of the values

Select from the list according to the importance of the values

Your personal values are...

Your selection will appear here

Guided by + Validation / support

Multi category

1 Take personal values and assign to categories

2 Collect data

3 Be presented with options

Later on you'll have your choice made.

Shown with 10 items, according to the selection in 1

Guided by + Validation / support

Multiple choice

1 Select values

2 Select features

3 Be presented with options

Later on you'll have your choice made.

Shown with 10 items, according to the selection in 1

Guided by + Validation / support

Figure 19 Sketches of the ideas Top left, Simple Choice; Top right, Simple Survey; Bottom left, Daily Collection; Bottom right, Means-end Chain.

Value Mapping Workshop

Value Mapping workshop was designed to cope with challenges found in the ideation. The first challenge regards personal value itself. The study had collected hundreds of personal values across multiple dimensions from literature reviews.^{19 20 21 22 23} This workshop aimed to reduce the number of personal values into manageable size relevant to the furniture and home decor shopping context through participatory exercises. The second challenge was connecting personal values to a specific product. By running both laddering interview technique and tagging exercise, this workshop attempted to grasp how people interpret product or interior images regarding personal values and design styles.

This workshop consisted of three exercises. Exercise no.1 takes advantage of laddering interview technique to trace one's personal values from a couple of product and home setting images a participant choose from given furniture catalogs (Figure 20). Exercise no.2 requests participants to associate given personal values to products and settings they like. Exercise no.3 provides four pictures^{24 25 26 27} of houses at different scales and asks participants to make an association between each picture and given personal values cards (Figure 21). Four participants took this workshop individually.

Figure 20 Exercise no.1. Laddering interviews were conducted and recorded in a structured way.

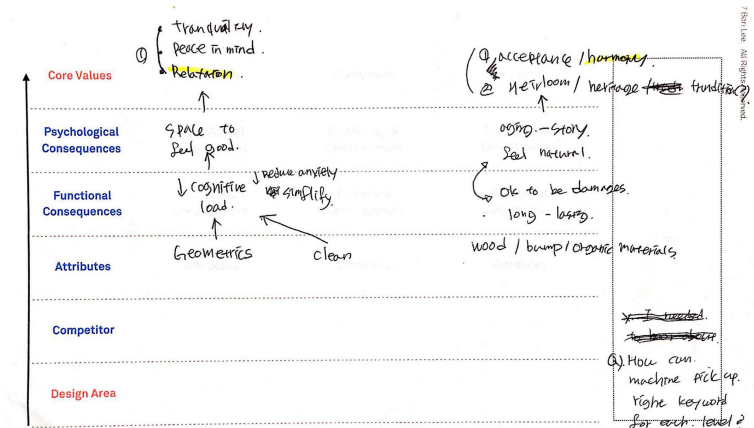


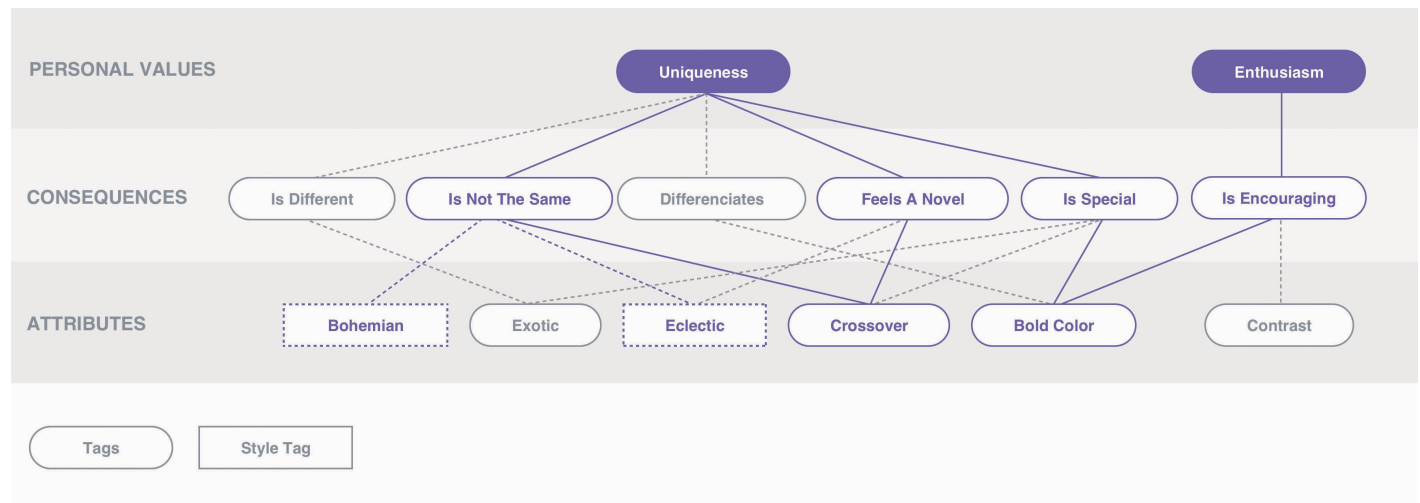


Figure 21 Exercise no.3. Participants associated personal value cards to four given images.

Consequently, this workshop determined the final lineup of personal values and the frame of the recommendation quiz. Based on the pattern of the participants' attitude toward home—home as me versus external entity and home as private place versus public/shared space, about 250 personal values were merged into 40. For example, Learning, Professionalism, Personal Development, Passion, and Vision, which are mixed with global values and domain-specific values, were converged into Growth. Regarding recommendation quiz, Attribute-end Laddering was chosen as the basic frame. This is because this idea successfully pinpointed the participants' values and enabled a system to capture and build linkages between products and personal values in a structured way. Additionally, I noticed that small-scale images focusing on properties of things are more suitable to evoke the participants' subconscious drives.

Based on the design decision and data in the workshop, Attribute-Value Network, the model of the recommendation system was created. It is comprised of three layers. Attributes of a product or setting go to the lowest layers. Design styles fall into the attribute group. Personal values position at the top. Functional/psychological consequences of a product and a setting bridge attributes and values in the middle. These form Attribute-Value Networks that enables a computer system to identify one's personal values from interior/ furniture photographs. This network keeps adding attribute and consequence data and adjusting the connections. As it collects more answers from users, it becomes more sophisticated and accurate. These tags are also attached to furniture and home decor products in the inventory so that matched products can be pulled out according to a quiz result. Figure 21 illustrates how the personal values, consequences, and attributes map to each other.

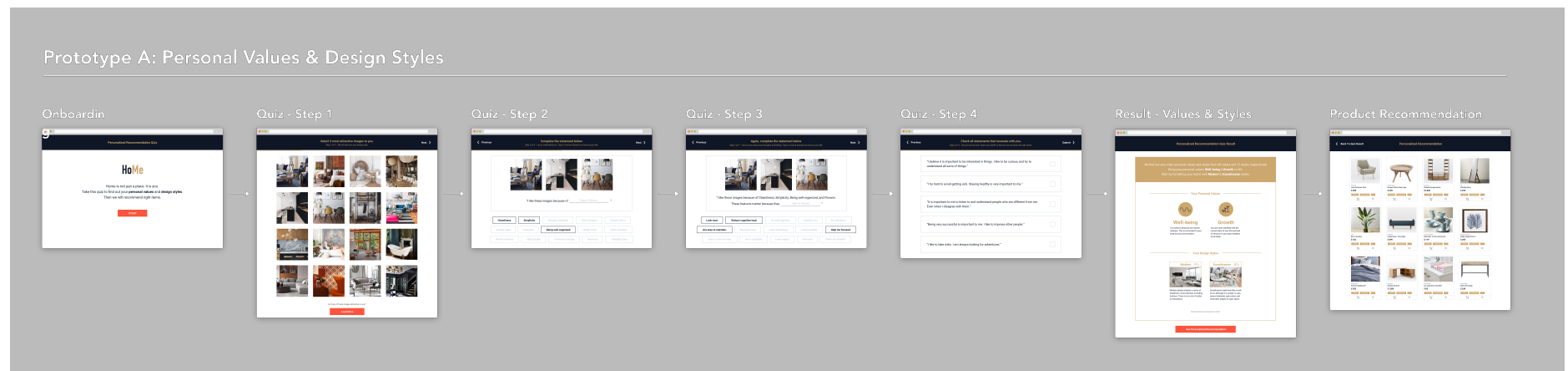
Figure 22 An example of Attribute-Value Network based on the participatory workshop.



Prototype

This thesis project envisioned online furniture e-commerce site, called HoMe, where the recommendation system plays a core role in the business. The online shop aggregates diverse products from many brands and uses this recommendation quiz that identifies customers' personal values and design styles to aid them to find relevant products. Customers can find it when they visit HoMe website. Following screens are the prototype of HoMe desktop website 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 with a scenario of Monica, the persona of the target audience, using this recommendation feature (Figure 23).

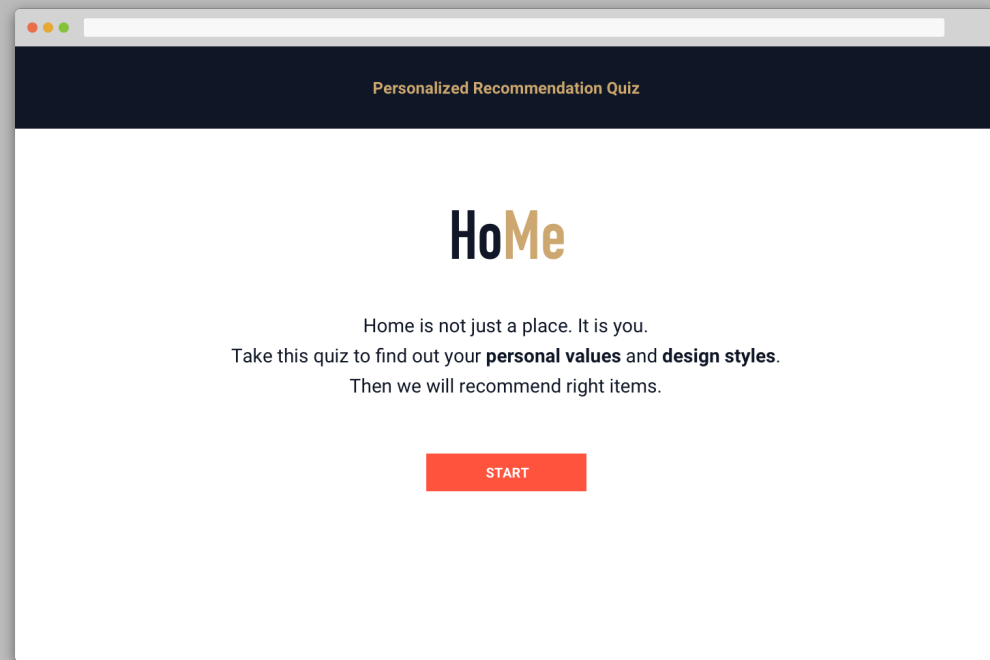
Figure 23 Monica's user flow of the quiz starting from the on-boarding screen to the quiz steps, quiz result, and product recommendation screen.



On-boarding

In the on-boarding page, HoMe briefly introduces Monica that the quiz will recommend products by understanding her design styles as well as personal values (Figure 24).

Figure 24 On-boarding page of HoMe introduces how it can help Monica.



Quiz-Step 1

Then it asks her to select three images she likes the most saying it will figure out her personal values and design styles (Figure 25).

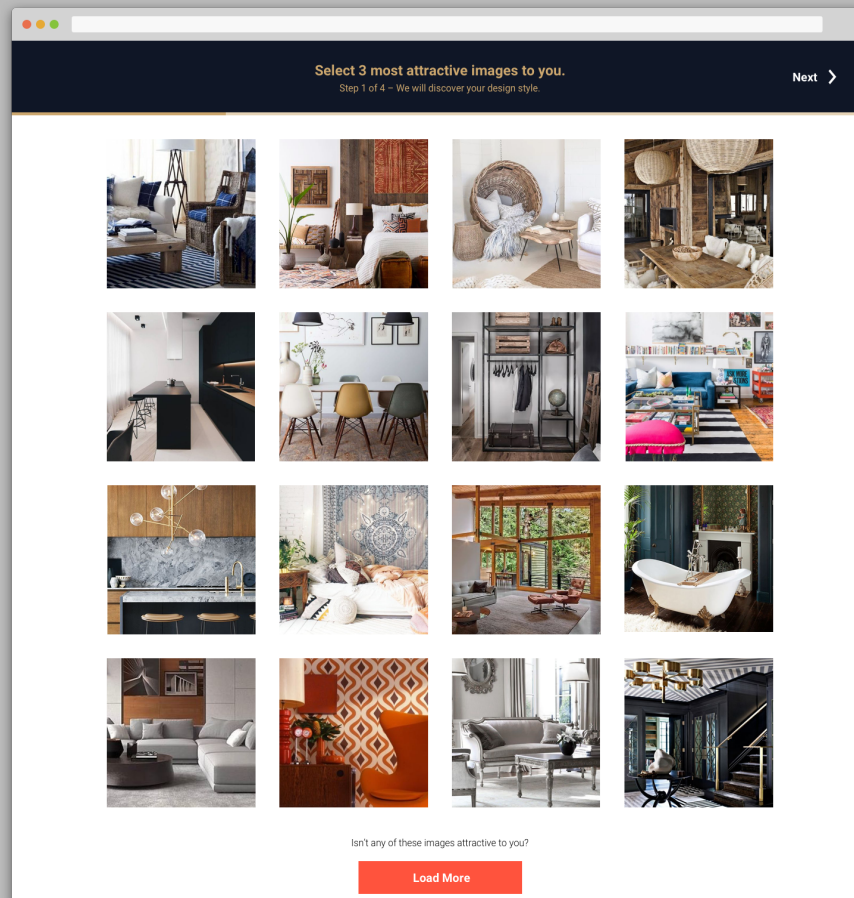





Figure 25 The page of the 1st step of HoMe quiz.

Quiz - Step 2

The selected images are shown in the next step, and the quiz prompted Monica to specify what attribute they liked from the images. Example answers are provided to help her to answer the question. She can manually write down her answers as well. She responds that she liked them because of cleanliness, simplicity, and so on (Figure 26).

Figure 26 The page of the 2nd step of HoMe quiz. Monica selects some pre-generated answers.

Previous **Complete the statement below.** Next >
Step 2 of 4 - Let us understand you. Type or choose answers as much as you like.

"I like these images because of _____ Type or Choose _____."

Cleanliness **Simplicity** Wooden material Color Scheme Pastel Colors
Natural Light Artworks **Being well-organized** Bright Color Color Contrast
Marble material High Quality Conscious Design Harmony Straight Lines

Quiz - Step 3

Then, the quiz instructs her to tell why those attributes are important (Figure 27).

Quiz interface showing Step 3 of 4. The instruction is: "Again, complete the statement below." The user is prompted to "Tell us more about your thoughts and feeling. Type or choose answers as much as you like."

The user has selected three images (a living room, a kitchen, and a dining area) and provided the following response:

"I like these images because of Cleanliness, Simplicity, Being well-organized, and Flowers. These features matter because they Type or Choose."

The user has selected the following pre-generated answers (indicated by a dark border):

- Look neat.
- Reduce cognitive load.
- Are easy to maintain.
- Help me focused.

Other available pre-generated answers include: Go well together., Comfort me., Are efficient., Represent me., Look interesting., Look beautiful., Give a room to relax., Are a standard., Look unique., Harmony, and Make me mindful.

Figure 27 The page of the 3rd step of HoMe quiz. Monica selects some pre-generated answers.

Quiz - Step 4

In the next step, it pulls up a bunch of value statements according to her previous answers and ask her to check if the statement resonates with her in order to determine the rank of her personal values (Figure 28).

Figure 28 The last step of HoMe quiz. Monica is prompted to check value statements she agrees with.

The screenshot shows a web browser window with a dark blue header. On the left of the header is a back arrow and the word "Previous". On the right is the word "Submit" followed by a right arrow. In the center of the header, the text "Check all statements that resonate with you." is displayed in yellow, with a smaller subtitle below it: "Step 4 of 4 - We are almost done. Share your belief so that we can nail down the right result." The main content area is white and contains five rectangular boxes, each with a value statement on the left and a small square checkbox on the right. The statements are: "I believe it is important to be interested in things. I like to be curious and try to understand all sorts of things.", "I try hard to avoid getting sick. Staying healthy is very important to me.", "It is important to me to listen to and understand people who are different from me. Even when I disagree with them.", "Being very successful is important to me. I like to impress other people.", and "I like to take risks. I am always looking for adventures."

Statement	Response
"I believe it is important to be interested in things. I like to be curious and try to understand all sorts of things."	<input type="checkbox"/>
"I try hard to avoid getting sick. Staying healthy is very important to me."	<input type="checkbox"/>
"It is important to me to listen to and understand people who are different from me. Even when I disagree with them."	<input type="checkbox"/>
"Being very successful is important to me. I like to impress other people."	<input type="checkbox"/>
"I like to take risks. I am always looking for adventures."	<input type="checkbox"/>

Results

When she completes the quiz, she can see her top two personal values as well as top two design styles with brief descriptions, respectively (Figure 29).

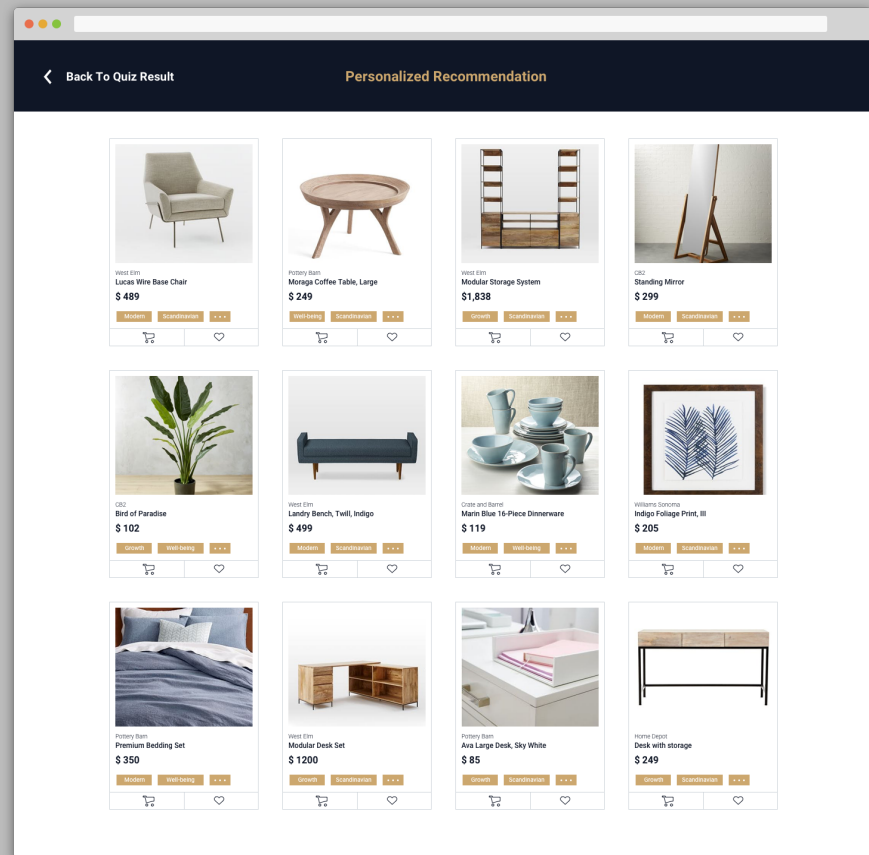


Figure 29 Personal value and design style results of HoMe quiz. Two values and two styles are provided.

Product Recommendation

After learning about them, she finally arrives at the recommended products pulled up by the identified personal values and styles from various brands and categories. Each product has tags indicating what value and style the product is associated (Figure 30).

Figure 30 Recommended product screen of HoMe. Identified values and styles are tagged to each item.



Summary

Generative phase focused on realizing the design direction of this thesis; To improve online shopping experience by guiding shoppers through an informed purchase decision making with their personal values and design styles. To maximize the effect of a design solution, this project conceptualized an idea for online furniture and home decor shopping platforms that offers a great selection of products from various brands like Google shopping.

Participatory workshop finalized personal values for this solution and created a recommendation quiz model utilizing laddering interview technique. A high fidelity website prototype of HoMe, imaginary furniture e-commerce demonstrates how the recommendation quiz works.

Evaluative Research

Goal

In this research phase, the design concept of this project was evaluated by the design prototype, HoMe. This thesis project finds the problem that too many choices undermine customers satisfaction with online furniture and home decor shopping. It also recognized the opportunity of value-based recommendation system as a design solution. With the insights, this project poses a hypothesis that if customers are assisted to find the right items by the recommendation when they shop online, their satisfaction with the shopping experience will increase.

Scope

There are three points to evaluate with the prototype. First, the recommendation model. Does the recommendation model work? Can it successfully identify a customer's values and design styles? Second, the usefulness of design solution in decision making. Would shoppers find the recommendation based on personal values helpful? Finally, the effect of the design solution on customer satisfaction. How does the design solution impact on customer satisfaction with shopping experience?

Research Methods

User Test

To validate the success and effect of the recommender system, I created another version of HoMe which only works on only design styles (Figure 31). Each participant went through both versions of the prototype in a mixed order. There were seven one-to-one sessions with participants who had participated in either in-depth interviews or value mapping workshop. Because the user tests were wizard-of-Oz experiments, the quiz and results were tailored for each participant based on the data gathered in the previous researches as if the system is actually working (Figure 32). During the test, participants first listened to the scenario of Monica and immersed themselves in it. Then they were prompted to talk their thoughts aloud as they were interacting with the prototypes. After experiencing the prototypes, they completed a survey quantifying their experience and had several common questions.

- How do you feel about each recommendation in general?
- Which one do you prefer among the two recommendation? why?
- Has each recommendation influenced on how do you feel about HoMe? why?
- On a scale of 0 to 7, how much does each quiz result resonate with you? 0 is not at all, 7 is it completely resonate.
- On a scale of 0 to 7, how satisfying was the product recommendation each time?

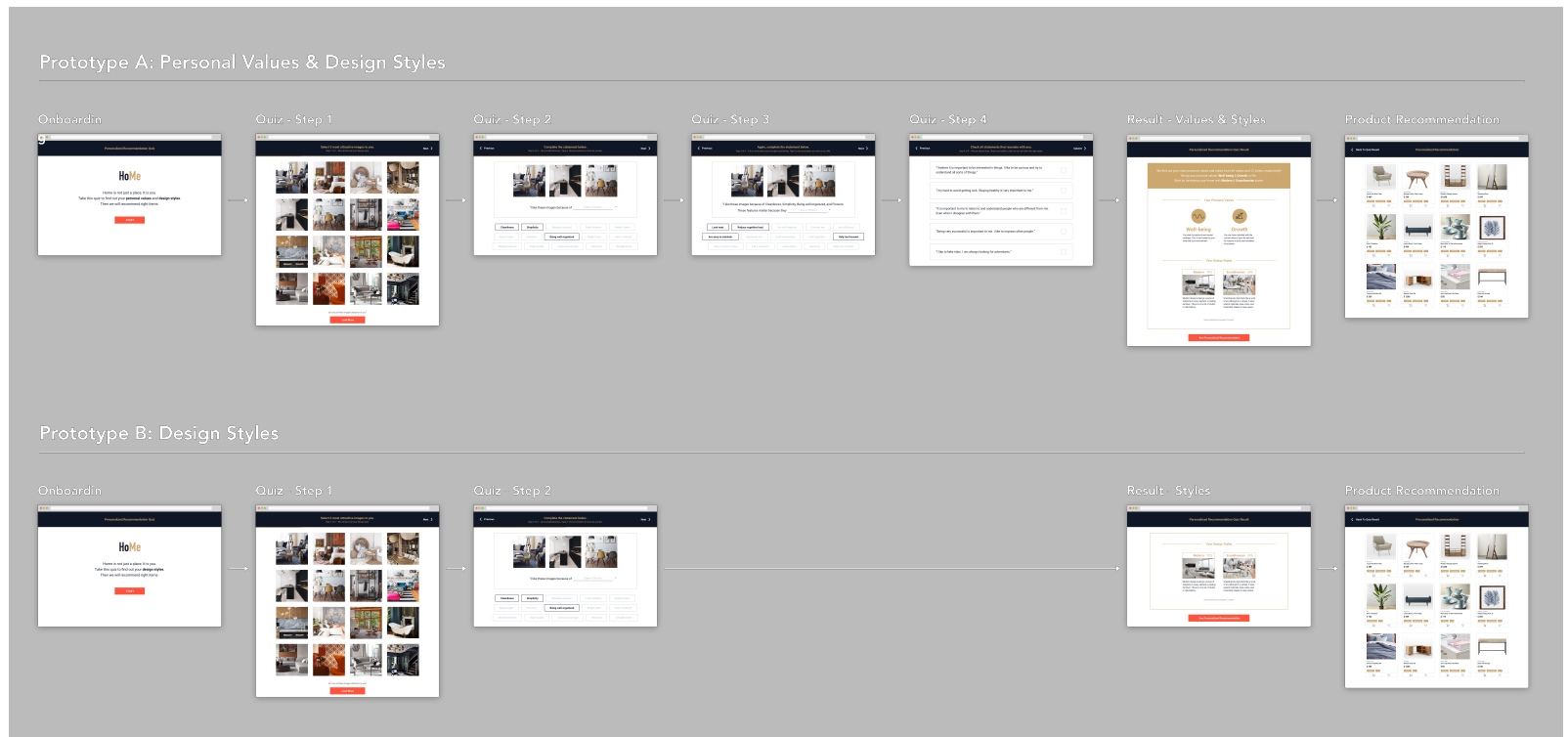
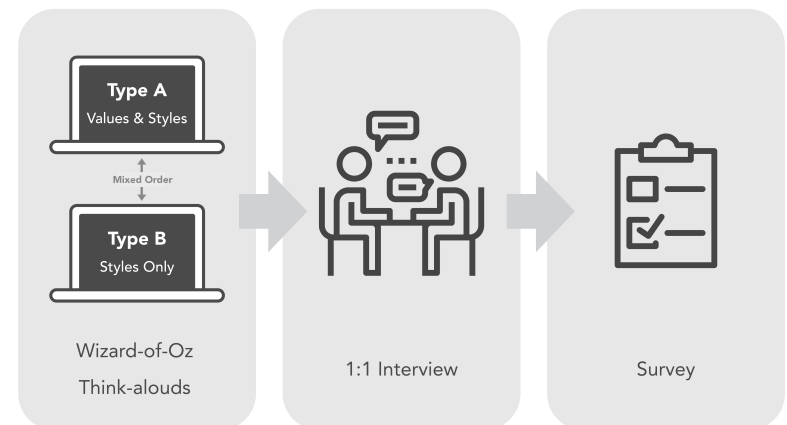


Figure 31 (Top) Two different versions of HoMe prototype for user test.

Figure 32 (Right) User Test Design



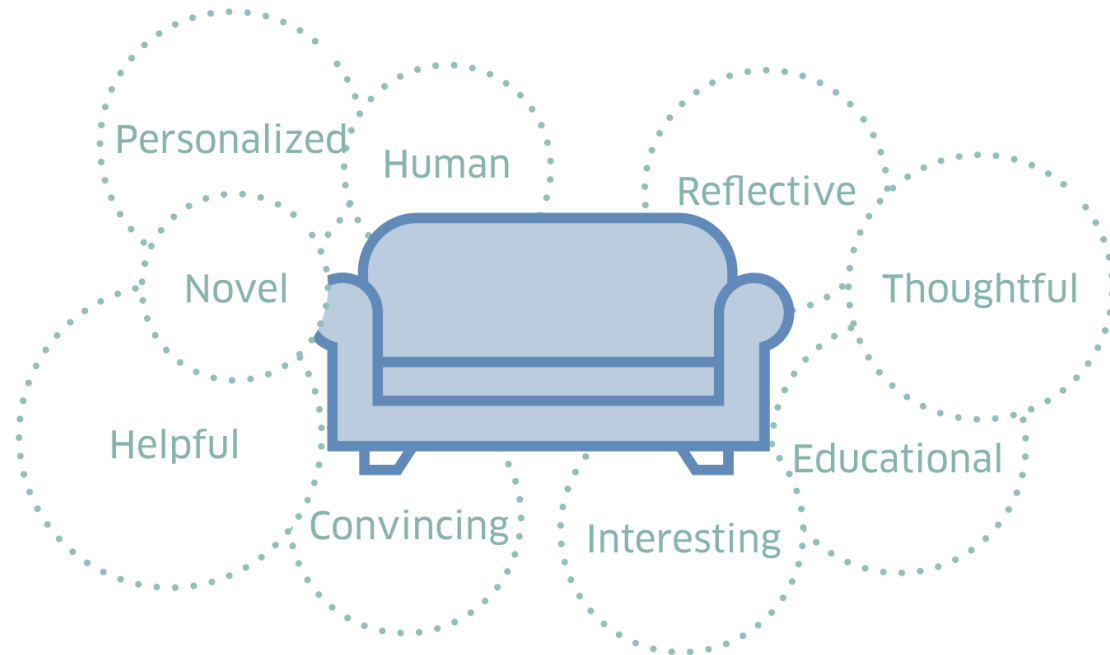
Results

Regarding the recommendation model, the laddering quiz works well. All participants agreed that the personal value and design style results provided in the sessions accurately portrayed them. One participant disagreed with the rank of design styles but agreed with that the top two styles are for her.

Regarding the concept, overall participants preferred to having both personal value and design style results except a couple of cases. When they are willing to explore personal value regardless of awareness, participants are more favorable to personal value version. In the meantime, a couple of participants preferred design style version for some reasons apart from the awareness or willingness. One participant was skeptical about and did not accept the personal value result at all even though they think it is true. He thought the provided personal values sounds too good are too general so that people would accept them regardless. He also said that the values are not worth paying attention as long as they are a calculated prediction rather than advice from his family and friends.

When it comes to the satisfaction with the matched product, it did have significant difference between the two versions. The participants reported a similar level of satisfaction with suggested products. They paid attention not only to how the items are related to their values and styles, but also to price, the quality of pictures, brand, categories of the items, and so forth. Participants told “I really like them but they are not affordable for me.”, “I think I will not needs the framed print.”, “I don’t know some of these brands but they seems to offer a good furniture design.”, “I like the interior design of this picture but I know it won’t usually goes well with my room.”, and etc.

Figure 33 Qualitative responses to the value-based prototype from the user test



In general, participants described the personal value version felt more helpful, informative, personalized, human, novel, delight, convincing, and even reflective and thoughtful (Figure 33), while they described the style-only version as just a filter. This result implies that the design solution increased overall satisfaction with the shopping experience. Some participants explicitly said that it would be helpful to make a better decision. One participant said that she preferred it because “Personal values seems helpful for her to be consistent with what I buy in the long run.”

Summary

The objective of the evaluative research was to verify the design concept of this project. The design concept hypothesis that customers satisfaction with online shopping experience would be improved if the recommendation based on their values and design styles helps them to find the right items. To achieve it, the user test compared participants responses to two different versions of design prototype. One prototype assists shoppers through their personal values and design style. The other version utilized only design style. By doing so, the user test was able to isolate the success and the effect of implementing personal value. According to seven user tests, it is confirmed that the proposed design successfully identifies shoppers personal values and design styles. Although there was no significant increase in quantified satisfaction with the recommended products, the overall quality of shopping experience was enhanced.

Chapter 4

Discussion & Summary

Discussion & Summary

This thesis seeks a design solution that delivers more satisfying shopping experience by addressing the choice overload problem of e-commerce. Through design researches, it found that personal values are one of the major drivers of shoppers purchase decision, especially in furniture and home decor shopping. Recognizing that shoppers who are aware of their values and use it have higher satisfaction with their purchase, this study decided to assist customers who are not familiar with taking advantage of their values in shopping. A recommendation system on online shopping platform is developed inspired by laddering interview technique.

Evaluating the design solution prototype validated that the laddering recommendation quiz is successful enough to identify one's personal values and design styles. The result also shows the value-based recommendation improved shopping experience. Participants stated that they appreciated the shopping experience because it is more helpful, informative, personalized, human, novel, delight, convincing, reflective, and thoughtful. The overall experience has a positive impact.

The user test also brought up several important points to discuss. First, who should be the target audience? Speaking to the right audience is critical. Initially, the research aimed to aid people who cannot take the advantage of personal values because of the lack of awareness. However, the user test found the other criteria of the ideal target audience; the willingness. Regardless of awareness, those who are willing to explore their personal values through the recommendation preferred to and enjoyed having value results. One participant who are already aware of her values and styles stated that she always finds exploring and constantly checking what type of person she is and what is important for her exciting. Aside

from the awareness or willingness, openness to the system should be considered too as the outliers of user test has shown.

Second, how to effectively apply to the design solution at its maximum potential? In user tests, some participants were confused how the recommender system works. They asked, “Are these design styles suggested because people share the same values with me tend to like it?” Some were curious about what is happening in the backstages and asked “Why are there only two values? What alternatives could I have?” One participant mentioned “I was quite surprised by how the results are accurate and helpful. I would like to know the advantage of taking the quiz in the beginning.” First and foremost, clear and active communication is essential. This links back to the case study on the design pattern of other recommendation systems. Clear and active communication through design can convince shoppers and reduce shoppers cognitive load and confusion when they are answering the quiz. Given that recommending products based on personal values is a novel approach, this is particularly important.

Third, how to extend the design solution to the rest of parts of shopping experience? This study defines shopping experience not to end at the point of purchase. Buying a furniture item is just a starting point for a shopping experience. Making whole room is also a part of the shopping experience. One participant stated, “I am not sure about how they apply to my home.” If an item does not go well with other furniture, the shopping experience would be broken down. One of the potential benefits of personal values is consistency beyond specific situation and immediate goals over time. This is also beneficial for customers to put individual furniture pieces into whole room composition. Responses from the user test also reveal a need for the next steps. Some participants said “I can imagine that this type of recommendation can help me to buy furniture and furnish home consistently.”

Last but not least, how to incorporate other factors into the proposed design? Affordability, home environments, household composition, and so on are some examples of the factors. This study has intentionally excluded these critical factors to get rid of their influence on the participant's responses to the proposed concept. However, even though personal values is a fundamental inner motivation that drives decision making, shoppers also consider a lot about external factors at the same time. Current design solution does not accommodate those of who are living with family members, for example. Revisiting the Daily Collection ideas, gathering user-generated data, such as photo of current room or home refurnishing project plan, might be a bottom-up way to understand their needs better.

To conclude, the design solution enriches online shopping experience by helping customers to unearth personal values and design styles so that they can find relevant products. Meanwhile, to apply this idea to the real world, there are several discussion for the future exploration. The target audience should be reconsidered. Along with value awareness and willingness to explore personal values, openness to the idea is also important. More studies on interface and contents design are necessary to convey the idea clearly and maximize the potential of the concept. Integration with post-shopping steps should be considered to amplify the advantage of the design solution. Lastly, incorporating other factors in decision making is crucial to be a viable solution.

Chapter 4

Reflection

Research Outcome

This thesis project is successful in that it brings down personal values, an abstract and high-level concept, to a concrete and practical design solution, a recommendation system for home furnishing e-commerce. This was possible because this study has adopted efficiently relevant research methods while jumping between theories, emerging technologies, and user-centered design back and forth.

However, the research outcome still requires further iterations to be implemented to the real-world services and yield fruitful impact. As discussed in the previous chapter, target audience, UX and Interface design, integration with the next steps, the other decision-making factors should be studied and considered.

On top of that, this study should reflect the implication of the proposed design concept. The technological premise of the concept, in particular, involved in some ethical and socioeconomic problems, such as human dependence on technologies, replacing human interaction, and filter bubble. These negative implications could be detrimental to the design solution as well. In user test, one participant showed hostility to the automatic system utilizing very intimate and personal issues. Some people already have had distrust and doubt in a machine system. Thus, if this research outcome does not take consideration of the implication of technology, it will not be able to be welcomed by users.

Process

In hindsight, there are some limitations in execution, which might have biased crucial insights and conclusions. One limitation is regarding the sample group, and the other is the validity of the prototype.

Firstly, participants in the value mapping workshop and user test do not sufficiently represent the target group. The number and demography of the participants were minimum viable to notice useful patterns in feedback but not optimal to generalize to the real consumers. There were only four participants in the workshop and seven in the user test. Since each session takes about 30 minutes, it was difficult for I to accommodate more participants. The research would be able to produce more abundant insights and reliable if it had conducted more sessions. Also, the participant group focuses on college students from the early 20s to mid-30s. This demographic was illustrated as a persona of the extreme user group because of the consumption behavior in their transitional life stage. However, other characteristic of the group like tech-savviness might have led the study to overlook related issues of the research outcome. Listening to more diverse demographics could have informed the studies with different perspectives.

In user test, because the prototype was not running on a real algorithmic system, example choices and results of the quiz for each participant were manually tailored. This is the reason why user test recruited participants from the ones taking part in previous research like the workshop. When creating the materials, I tried not to include human bias and background knowledge by solely utilizing the laddering technique. However, there is a possibility of human bias that may make the material more knowledgeable or vice versa. Either way implies that the evaluation of the success of the proposed recommendation model might not be an absolute truth. Future work should be based on system that is able to collect data from users to predict their preferences.

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