Customizable and adaptable furniture: Designing for millennial lifestyles and environmental concerns

Taylor Johnson
Iowa State University

Follow this and additional works at: https://lib.dr.iastate.edu/etd

Recommended Citation
Johnson, Taylor, "Customizable and adaptable furniture: Designing for millennial lifestyles and environmental concerns" (2020). Graduate Theses and Dissertations. 18041. https://lib.dr.iastate.edu/etd/18041

This Thesis is brought to you for free and open access by the Iowa State University Capstones, Theses and Dissertations at Iowa State University Digital Repository. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
Customizable and adaptable furniture: Designing for millennial lifestyles and environmental concerns

by

Taylor Johnson

A thesis submitted to the graduate faculty

in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Major: Interior Design

Program of Study Committee:
Diane Al Shihabi, Major Professor
Daejin Kim
Christopher Martin

The student author, whose presentation of the scholarship herein was approved by the program of study committee, is solely responsible for the content of this thesis The Graduate College will ensure this thesis is globally accessible and will not permit alterations after a degree is conferred.

Iowa State University
Ames, Iowa
2020

Copyright © Taylor Johnson, 2020. All rights reserved.
## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF FIGURES</td>
<td>iv</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>vii</td>
</tr>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>viii</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>ix</td>
</tr>
<tr>
<td>CHAPTER 1. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Purpose Statement</td>
<td>1</td>
</tr>
<tr>
<td>Research Questions</td>
<td>5</td>
</tr>
<tr>
<td>Literature Review</td>
<td>6</td>
</tr>
<tr>
<td>Customization</td>
<td>6</td>
</tr>
<tr>
<td>Customization</td>
<td>10</td>
</tr>
<tr>
<td>Millennial waste</td>
<td>13</td>
</tr>
<tr>
<td>Longevity</td>
<td>15</td>
</tr>
<tr>
<td>Supporting female furniture makers</td>
<td>17</td>
</tr>
<tr>
<td>Refurbished products</td>
<td>21</td>
</tr>
<tr>
<td>Sustainable brands</td>
<td>24</td>
</tr>
<tr>
<td>Marketing strategies</td>
<td>26</td>
</tr>
<tr>
<td>Modular furniture</td>
<td>29</td>
</tr>
<tr>
<td>Conclusion</td>
<td>32</td>
</tr>
<tr>
<td>Methodology</td>
<td>33</td>
</tr>
<tr>
<td>Survey</td>
<td>33</td>
</tr>
<tr>
<td>Trend Research Trip</td>
<td>33</td>
</tr>
<tr>
<td>Design Process</td>
<td>33</td>
</tr>
<tr>
<td>Branding</td>
<td>34</td>
</tr>
<tr>
<td>CHAPTER 2. SURVEY</td>
<td>35</td>
</tr>
<tr>
<td>Introduction</td>
<td>35</td>
</tr>
<tr>
<td>Questions</td>
<td>36</td>
</tr>
<tr>
<td>Survey Results</td>
<td>38</td>
</tr>
<tr>
<td>CHAPTER 3. TREND RESEARCH TRIP</td>
<td>47</td>
</tr>
<tr>
<td>CHAPTER 4. RESEARCH SUMMARY</td>
<td>48</td>
</tr>
</tbody>
</table>
CHAPTER 5. DESIGN PROCESS .................................................................52
  Inspiration .................................................................................. 52
  Concept Sketches ......................................................................... 53
  Construction Research ................................................................. 59
  Prototype Specification .................................................................. 64
  Prototype Construction Process .................................................... 96
  Prototype Review and Updates ..................................................... 110
  Trend Research ............................................................................. 113
  Final Collection Material Proposal ................................................ 119
  Final Collection Design Proposal .................................................. 120

CHAPTER 6. MARKETING .................................................................131
  Brand ......................................................................................... 131
  Website ...................................................................................... 132
  Social Media .............................................................................. 137
  Offline Strategies ....................................................................... 138

CHAPTER 7. CONCLUSION ..............................................................140

REFERENCES ...............................................................................145

APPENDIX. IRB APPROVAL ..............................................................149
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Concept Sketches Page One</td>
<td>54</td>
</tr>
<tr>
<td>5.2</td>
<td>Concept Sketches Page Two</td>
<td>56</td>
</tr>
<tr>
<td>5.3</td>
<td>Concept Sketches Page Three</td>
<td>58</td>
</tr>
<tr>
<td>5.4</td>
<td>Sofa Leg Product Components Available, Courtesy of Ikea</td>
<td>61</td>
</tr>
<tr>
<td>5.5</td>
<td>Striplox Clip 50 Infographics Part One, Courtesy of Striplock</td>
<td>62</td>
</tr>
<tr>
<td>5.6</td>
<td>Striplox Clip 50 Infographics Part Two, Courtesy of Striplock</td>
<td>63</td>
</tr>
<tr>
<td>5.7</td>
<td>Modular Box Specification Page One</td>
<td>66</td>
</tr>
<tr>
<td>5.8</td>
<td>Modular Box Specification Page Two</td>
<td>67</td>
</tr>
<tr>
<td>5.9</td>
<td>Modular Box Specification Page Three</td>
<td>68</td>
</tr>
<tr>
<td>5.10</td>
<td>Modular Box Specification Page Four</td>
<td>69</td>
</tr>
<tr>
<td>5.11</td>
<td>Drawer Specification Page One</td>
<td>70</td>
</tr>
<tr>
<td>5.12</td>
<td>Drawer Specification Page Two</td>
<td>71</td>
</tr>
<tr>
<td>5.13</td>
<td>Drawer Specification Page Three</td>
<td>72</td>
</tr>
<tr>
<td>5.14</td>
<td>Drawer Specification Page Four</td>
<td>73</td>
</tr>
<tr>
<td>5.15</td>
<td>Square Top Specification Page One</td>
<td>74</td>
</tr>
<tr>
<td>5.16</td>
<td>Square Top Specification Page Two</td>
<td>75</td>
</tr>
<tr>
<td>5.17</td>
<td>Square Top Specification Page Three</td>
<td>76</td>
</tr>
<tr>
<td>5.18</td>
<td>Square Top Specification Page Four</td>
<td>77</td>
</tr>
<tr>
<td>5.19</td>
<td>Round Top Specification Page One</td>
<td>78</td>
</tr>
<tr>
<td>5.20</td>
<td>Round Top Specification Page Two</td>
<td>79</td>
</tr>
<tr>
<td>5.21</td>
<td>Round Top Specification Page Three</td>
<td>80</td>
</tr>
<tr>
<td>5.22</td>
<td>Round Top Specification Page Four</td>
<td>81</td>
</tr>
</tbody>
</table>
Figure 5.46. Warped Board Taped Down.................................................................104
Figure 5.47. Cutting Spline Grooves.................................................................105
Figure 5.48. Stacked Box Pieces.................................................................105
Figure 5.49. Box Glue Up Progress.................................................................107
Figure 5.50. Marked-Up Magnet Holes...............................................................108
Figure 5.51. Leg One.........................................................................................109
Figure 5.52. Leg Two.........................................................................................109
Figure 5.53. Assembled Prototype Option One......................................................112
Figure 5.54. Assembled Prototype Option Two.....................................................112
Figure 5.55. Color Trend Design Board ...............................................................114
Figure 5.56. Material Trend Design Board ..........................................................116
Figure 5.57. Pattern Trend Design Board ............................................................118
Figure 5.58. Solids Assortment Page One ..........................................................123
Figure 5.59. Solids Assortment Page Two ..........................................................124
Figure 5.60. Solids Assortment Page Three .........................................................125
Figure 5.61. Cherry Street Design Board............................................................126
Figure 5.62. Mulberry Street Design Board.........................................................127
Figure 5.63. Court Avenue Design Board..........................................................128
Figure 5.64. Grand Avenue Design Board..........................................................129
Figure 5.65. Locust Street Design Board............................................................130
Figure 6.1. Brand Website Homepage..............................................................134
Figure 6.2. Brand Website Build Your Own ........................................................135
Figure 6.3. Brand Website About ........................................................................136
### LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1.</td>
<td>Survey Questions</td>
<td>37</td>
</tr>
<tr>
<td>Table 2.2.</td>
<td>City Size Results</td>
<td>40</td>
</tr>
<tr>
<td>Table 2.3.</td>
<td>Survey Results</td>
<td>41</td>
</tr>
</tbody>
</table>
ACKNOWLEDGMENTS

I’d like to acknowledge the many people who have helped me get to this point. To my Kate Spade family, you taught me to push the boundaries of expectations and creative problem solving. I will forever cherish our team travels and many, many, late night working dinners. Thank you to Amy Gofton, Kathryn Sukey, Pooja Barbhaiya, Laurie Gow, Carolyn Renke, Lissette Siesholtz, Cassandra Shaw, Lauren Brazg, Brittany Hodrinksy, Joanne Henriquez, Kate Bruce, Casey Cronan, Alfred Yeung, Victoria Hagen, Adriana Chaves, and Ioanna Psaroudakis.

Thank you to my family who has always supported my unpredictable life choices based on my love for design and seeing where it takes me. I’m sorry I became a Cyclone, but I think things have turned out okay. Thank you to my parents John and Joy Johnson, sisters Alexandra Clark and Madilyn Johnson, grandparents Sally Mathis-Hartwig, John Johnson, Patricia Johnson, David Schuldt and Sandra Schuldt. To all of my extended family, you truly are the best.

To my Iowa State University mentors, thank you for your honest advice in life and design. You’ve helped me think about design and applying creativity in important new ways. Thank you to Major Professor Diane Al Shihabi, and Committee Members Christopher Martin and Daejin Kim, as well as faculty members Lee Cagley, Jeremy Thurlby, Yongyeon Cho, Jae Hwa Lee, Angela Koppes, Michael Ford, Fred Malven, Jamie Osmundson, and Meredith Foley. I appreciate the scholars you have introduced me to, particularly those who have influenced my thinking.

“You cannot understand good design if you do not understand people: design is made for people.” -Dieter Rams
ABSTRACT

The assortment of furniture available in the market today does not meet the wants and needs of millennial consumers. The literature review confirms that millennials value customization and higher quality products from brands that implement sustainable practices. This project distributed surveys to millennial consumers to understand their wants and needs in the furniture they purchase. If offered the opportunity, millennial consumers would replace components to adjust the function, aesthetics and quality of a furniture piece to keep it longer. Applying the knowledge gained from the literature review and the survey, a furniture collection with removable and interchangeable components was designed with millennials in mind using a traditional design process. Marketing strategies have been proposed for a new brand concept incorporating the information learned through the literature review, survey and design process.
CHAPTER 1. INTRODUCTION

Purpose Statement

Millennials in the United States (US) have been moving at an unprecedented rate but within a relatively short distance from their family homes. Millennials make up the population that was born between 1988 and 1996.\(^1\) Between 2016 and 2017, according to the American Housing Survey, 7,898,000 millennials moved and 74% of that group moved less than fifty miles from their former home.\(^2\) Millennials move to nearby larger cities because of what they offer, including metropolitan neighborhoods and job opportunities.\(^3\) Climate change is also a factor when deciding where to move for millennials in that they consider potential natural disasters and water shortages in the future.

As of 2017, 62% of millennials rent versus owning their homes.\(^4\) This tells us that the majority of millennials are not committed to living in their current home long term and could potentially be on the move again when their leases end. Whether it’s apartments within a few miles of each other or condos thousands of miles away, each time millennials move they must analyze how much it will cost to ship or transport belongings, including furniture, and how much they value the larger items they possess. The issue they face is whether it’s less expensive to dispose of furniture than to buy replacements in the new location. For example, Target is currently selling a three-shelf bookcase for $24.99.\(^5\) Purchasing a new bookcase may have been more appealing than the planning and cost involved in relocating an existing bookcase. An

---


\(^4\) American Housing Survey, 2.

additional problem and cost to the environment is that millennials have been known to leave furniture and other objects that they owned by the curb or near a dumpster, rather than paying a mover to transport it or attempting to sell it. In 2015 there was twelve point one million tons of furniture and furnishings thrown out. Wood made up the largest percentage of material but there was also large amounts of plastics, glass and textiles. Only 19.5% of the twelve point one million tons was able to be combusted for energy use, and the remaining 80.4% was taken to landfills.\(^6\) In addition to cost of moving, the low quality of most affordable furniture influenced these decisions. Because many low-cost furniture pieces warp in the center of the shelving or have been damaged, millennials may feel like they’re not losing much when they leave those pieces behind.

Another issue millennials face when moving, which influences their decision to dispose of or re-use existing furniture is that the layout of their new home may be different than their previous home. What could once fit next to a tv stand may no longer have a place. A nightstand may be too big to be functional in a different bedroom. The changing sizes and orientations of different living spaces make it difficult for millennials to retain previously purchased furniture, even if they like it and even if it is of a reasonable quality. The cycle of frequent moves, the limited availability of places to recycle furniture, changing spatial configurations, and poor quality of affordable goods contributes to increasing levels of waste ending up in landfills.

Beyond the layout of homes changing, personal tastes change as well. Each year millennials grow and evolve, and this is often reflected within their personal spaces. Only 22% of millennial households are “single person households”.\(^7\) This means that 78% of millennials


\(^7\) American Housing Survey, 2.
live with another person, whether it’s a roommate or significant other. The American Housing Survey also shows that 47% of millennial households include children. People who transition from independent living to cohabiting merge varying styles of furniture that was previously used in other living spaces. Millennial’s apartments end up looking like unplanned mix and match furniture collections with no common thread, because that’s exactly what they are.

The average millennial consumer doesn’t have extensive knowledge about the furniture that they buy. Unless they have been trained in furniture construction and materials, they can’t identify the details that make furniture pieces different from one another. In 2004 there was a study among millennials while they were in college to understand if they were capable of identifying different wood species used in furniture. At this time in their lives only 18% of the participants were able to correctly identify the wood samples they were given. This study didn’t include different types of finishes but that is another layer of information that would be helpful to millennial consumers when purchasing new furniture pieces. If millennial consumers understood the materials and construction methods used for furniture they purchase and how that affects the durability, quality, and life span of their furniture they may explore more options when making their next purchase. There’s a large number of people who do understand furniture quality and those are the people that have been purchasing and refurbishing older hardwood products instead of purchasing cheaper furniture from big box stores that are made of particle board and thin veneers. Millennials are lacking the product knowledge that is needed to make better and more informed purchasing decisions.

We’re at a point in society that science shows that sustainability and the environmental impacts we make do affect the future of this planet. Greenhouse gas emissions from the

---

transportation, excavation, and compaction are a few of the negative impacts that come specifically from landfills, where most of our old furniture ends up.\textsuperscript{9} Humans cannot continue to deplete resources thoughtlessly and support low quality products, including furniture, that end up in landfills. The millennial generation plays a valuable role in shifting practices and beliefs regarding climate change and sustainable practices because they make up such a large percentage of the population in the US. Millennials are projected to surpass Baby Boomers as the largest adult generation this year. The millennial generation is also projected to peak in population in 2036 with a population of seventy-six point two million people.\textsuperscript{10} If millennials continue to push for sustainable lifestyles, they can have great influence on the behaviors of the rest of this nation’s citizens across all age groups. This, however, does not address the problems millennials face in regard to the lack of furniture that can be adaptable to their needs in regard to frequent moves and evolving tastes. They need adaptable furniture that can change with them as they grow into new phases of life. It dawned on me that I had already designed products that can do this, but in the fashion industry.

Research and design related to my professional experience as a fashion accessory designer informs this problem and is potentially applicable to the solution. To explain, after graduating from Iowa State University in 2013 I moved to New York City and accepted a position with Kate Spade New York as part of their handbag design team. During my time at Kate Spade my team worked on a collection of bags called “Make It Mine”, which are still being updated and produced today.\textsuperscript{11} This collection is targeted to customers who want the appearance

\textsuperscript{10} Fry, “Millennials Projected to Overtake Baby Boomers as America's Largest Generation,” 1.
of having multiple bags without the cost of buying more than one. Many of the components are removable so that the consumer can purchase a variety of straps, flaps, and tassel add-ons in a variety of patterns and colors. Even the hardware closures are removable. Thus, without purchasing an entirely new bag you can buy a few different components and have a reconfigured bag feel completely new. Further, if a strap gets damaged the customer can order a replacement.

We began with very basic silhouettes and a limited number of color options and offered the products online and in stores. As the concept grew, so did the selection. Many other brands now have the same concept in their accessories. This inspired me to apply the same strategic approach to a related industry in the decorative arts, more specifically, furniture. At this point and after four years of experience, I returned to academia to pursue a master’s degree to develop my ideas. The purpose of this research is to fully understand the wants and needs of millennial consumers regarding furniture, and to design a collection that meets those needs.

**Research Questions**

1. Is there a need in the market for a customizable and interchangeable furniture collection for millennial consumers?
   - Will millennial consumers see value in higher quality and longer lasting furniture if it has customizable and interchangeable parts?
   - Do millennials have an understanding or appreciation for furniture quality, materials or construction that would make furniture pieces last longer?
   - Do millennials have an awareness of the waste they are producing and their impact on the environment?
   - Would millennials keep a piece of furniture longer and move it with them if they were able to disassemble it, reassemble it easily, and change the appearance of it?
- Do millennials support brands that emphasize sustainability?
- Do millennials show support for domestic female designer-builders?
- Would millennials consider purchasing refurbished components at a lower price point to reduce the amount of materials and resources used?

2. How can I develop furniture designs with interchangeable parts and implement sustainable solutions to issues that the furniture industry often faces so that furniture designs for millennial consumers are flexible and eco-friendly for the environment?

- If there are similar concepts in existence, what would make mine unique

3. How can I develop and market this concept to millennial consumers?

These are the many questions that should be asked when designing a new furniture collection to solve some of the problems millennials face today. Understanding each of these questions and implementing the information found could result in a new and innovative furniture collection designed with millennials in mind and a brand proposal that could take the furniture industry in a new direction.

**Literature Review**

**Customization**

Customization has been part of product design since the beginning of time, first through hand production and then through machines. Items such as clothing and furniture were made locally as needed for people and spaces. Craftsmen were prominent in communities and consumers could easily connect with the makers of products to have their specific needs met. The Industrial Revolution changed production and buying processes by mass producing goods that were then distributed across the country. Consumers were exposed to new designs and concepts through catalogs and newspapers. Brand name items became popular because they felt
advanced in design and trend, but they were no longer made for an individual person or family. Sears even offered entire homes in their catalog that began in 1894. People have grown tired of these standardized production practices and are seeking unique, one-of-a-kind goods once again. With the help of the internet and the ability to make communication between customer and producer immediate, customization has made a comeback.

In his book, *Custom Nation*, Anthony Flynn states that the shift towards and demand for personal customization in product design “is so enormous and all-encompassing that it ultimately promises to define the coming decades as powerfully as the Industrial Revolution defined the nineteenth and twentieth centuries.” Outside of material goods, society has been adjusting to a more customizable life through businesses such as Netflix, which creates recommendation lists based on what you’ve watched, and Pandora, the company that creates customized playlists for their users. A large percentage of these users are millennials. Seventy-two percent of the millennial generation has a Netflix subscription. Millennials live in an age where they expect customization and they value it. Flynn agrees that there is value in businesses that make the most of customization. He mentions that in 2010, Nike sold more than $100 million worth of customized and made-to-order sneakers.

---

In the furniture industry today, it is projected that the customized economy will continue. Individualized goods will be built to order to stay competitive with international market demand and customization will give added value to products that are made domestically.\textsuperscript{16} A 2008 study by Lihra Torsten, Urs Buehlmann and Robert Beauregard, three experts in the wood furniture industry, found that price isn’t always the most important deciding factor for the end user when purchasing new products. This research team found that customization, customer service, and delivery times were three of the most important factors in purchasing. When surveying furniture manufacturers, Torsten, Buehlmann and Beauregard found that twenty one out of the twenty-three companies were convinced that with customization, products could be sold at higher prices. When asked about which types of customization customers appreciate most, they responded by saying that color, finish, and dimensions were the top three factors their customers responded to. Hardware options and a variety of configurations were also viewed as valuable traits.\textsuperscript{17} Millennials view themselves as confident, open minded, and wanting to express themselves uniquely through their social media and the products they purchase. They desire distinctive brands that offer products that will reflect their own traits and that can serve as a form of self-expression.\textsuperscript{18} Companies today can achieve the millennial desire for personalization and self-expression through mass customization. In his book, \textit{Mass Customization: The New Frontier In Business Competition}, Joseph Pine defines mass customization as “a process by which firms in different industries apply technology and management methods to provide variety and customization through flexible production and quick responsiveness.” The goal of mass


customization (MC) is to offer enough variety in a company’s product assortment for everyone to find exactly what they want.\textsuperscript{19}

Besides being able to create unique products that reflect their personal tastes, millennials want to be able to customize products for their end uses. Dieter Rams has been designing products since 1955 and he feels that second to quality is usability. Rams argues that products should be “adaptable to their owners wishes and changeable when requirements change.”\textsuperscript{20} As mentioned in the introduction, millennials are moving to larger cities and an unprecedented rate, and due to higher cost of living, are moving into smaller living spaces than they had lived in previously. There is also a wave of millennials interested in tiny houses designed so that they can be to be self-built and mobile, collectively leading to an era of small scale living.\textsuperscript{21} As a result millennials need products, including furniture, that can adapt to their changing lives and living spaces. Furniture selection is made based on the space available and the proportions of the overall living environment. Following the moving trends of millennials and their changing needs, furnishings would be most functional and least expendable if they were designed to be more modularized, systemized, customized, and integrating higher qualities of construction.

Millennial users desire to be more actively involved in the design process and if they become better educated in furniture production they will willingly participate in the process and care about the quality, while still being economically minded.\textsuperscript{22}

Unique products that provide millennials with a tool for self-expression and adaptability for changing tastes and changing needs are in high demand in the US. This generation has been

exposed to customization for years and appreciates products that feel unique to them and that express their individuality. This thesis will argue that millennial consumers will pay more for a customizable product compared to the mass-produced counterpart.

**Customization**

Italian designer Enzo Mari believed that to make more informed choices customers should have a deeper knowledge of the products that they buy. His focus was the functional aspects of products and through his work he challenged consumers, and even the production culture, by encouraging the buyer to participate in the creation of products themselves by following assembly instructions. Through this design model, Mari promoted a form of consumer knowledge. Consumers of the twenty-first century have limitless options when it comes to purchasing products, but do they have more than an elementary knowledge of furniture assembly or of wood products?

University of Mississippi State researcher, Kassandra Stout surveyed 1,479 millennials and found that only 23% of millennials responding indicated that they learned about the wood industry or wood products from high school or college, and only 13% said they have an immediate family member that works in the wood industry which gave them a limited knowledge. If millennials didn’t and don’t have many opportunities to learn about wood products, will they take the initiative to learn about them on their own and be open to a more useful education about their household investments? Stout’s survey suggests this possibility.

---

23 Fineder, Martina, *Nomadic Furniture 3.0*, 86.
When Stout performed her survey, she asked a range of questions regarding wood products. After she analyzed the responses about their knowledge and interest, she used the analysis to provide the respondents with specific information about wood uses, wood construction and environmental factors. She then re-administered the survey to those who indicated an interest in the topic and observed that their responses and viewpoints had changed substantially, with millennials demonstrating more product information related to wood construction and a greater understanding of its’ environmental impact. Seventy one percent of the respondents in Stout’s survey said that they want companies to create more awareness of their environmental friendliness.\(^{25}\) Currently, 62% of millennials think that wood industries damage forests and yet with that perception, 56% responded that wood products are important to their daily lives.\(^{26}\) This research suggests that millennials are not only interested in gaining knowledge of wood products, but also generally more information about environmental concerns related to this industry. Multiple studies have shown further that consumers have a preference for products that have been certified by the Forest Stewardship Council (FSC),\(^{27}\) which suggests that consumers value certification or may have some knowledge of the FSC and the process of wood product production.

Seventy six percent of the respondents indicated that they agree or strongly agree that they prefer the natural grain appearance of wood products.\(^{28}\) They like the appearance of wood grain but there needs to be further investigation into their ability to distinguish wood types and

---


solids hardwood from laminates or thin veneers. A study researching the effects of species information and furniture price on consumer preferences for wood products found that preferences were influenced by three different factors. These include “the look and perceptual images of species, consumer income and willingness to pay, and preferences for regional species.” This study also found that consumers perception of items is affected by the information provided to them. For example, if a customer sees a birch dresser, they may be interested in it when they see it, but after reading the label describing it as birch they no longer have as much interest. Some species had more positive reactions after information was provided and others had more negative reactions after the information was provided. This tells us that most of the time consumers cannot identify a wood species by looking at it, and they have preconceived ideas about certain species of wood. Cherry and oak were found to be the more desirable wood species in the furniture pieces they demonstrated.29

Stout also asked questions about wood furniture and furnishing in her survey. She asked if respondents agree or disagree that wood furniture lasts longer than metal or plastic furniture and 54% responded that they agree or strongly agree that it does.30 Millennials generally understand that some hardwood products are valuable. Stouts survey showed that 72% of respondents agree or strongly agree that hardwood floors increase the value of a home.31 This shows that millennials have an understanding that hardwood, or real wood, is more valuable than laminates, fiber board, or other less costly materials. In sum, while millennial consumers lack knowledge of wood and the furniture industry, their responses to Stout’s survey and other studies

show that millennials want to learn and could change their opinions or level of interest in wood furniture of more information is provided to them.

**Millennial waste**

In 2015 there was twelve point one million tons of furniture and furnishings thrown out. Wood made up the largest percentage of material but there was also large amounts of plastics, glass and textiles. Only 19.5% of the twelve point one million tons was able to be combusted for energy use, and the remaining 80.4% was taken to landfills. Millennials need to address and improve upon the issue of waste from used furniture. Because millennials make up the majority of the adult population, they contribute a large portion of the waste. Are millennials aware of the waste they produce? According to a study by Anthony Leiserowitz, consumers search for tangible rewards for reducing consumption. Those rewards are most often financial. Providing goals or rewards can be a good way to bring awareness to consumption habits but it usually focuses on one area and not consumption behaviors as a whole. In regard to millennials specifically, studies show that millennials are receptive to ethical issues and feel comfortable expressing themselves and their opinions in part because of the ability to communicate so quickly with people all over the world. At certain times millennials admitted that their main concern was self-gratification, but at other times they responded their main concern was social improvement. When being rewarded for ethical choices, millennials react. If it is a topic is discussed online and in social settings millennials are more aware of their consumer behaviors

---

compared to less popular topics. Plastic straws are a good example of this. Celebrities and influencers highlighted the issue of plastic straws and the waste they create. This led to the general population to discus and take action on a topic they may not have been interested in before. Many restaurants and bars stopped using plastic straws once the general population voiced their concerns. Starbucks designed a patented new lid for their beverages to take plastic straws out of the equation. “It sounds dramatic, but this lid is going to get used about a billion times a year. It’s going to take billions of single-use plastic straws off the market.” Other industries and products create just as much, if not more waste, but it isn’t talked about, and the consumers care less, so producers care less.

In his book, *Less Is Better*, by Dieter Rams, he talks about the consumer society and how design can change consumer perceptions about what they buy and how they buy it. “The crisis in our product culture is forcing us to adopt a new design ethic: design is capable of providing an impulse towards constant improvements in the immediate material and ecological qualities of a product. And much more importantly, the design of products has a duty to contribute to a sustainable reduction in the number of products as a whole.” Manufacturers need to get creative with their designs and outlook for the future. If brands continue to design and produce products, consumers will buy. In order for millennial consumers to become more aware of their waste production and wasteful behaviors it needs to be a conversation had by all, including manufacturers. The problem is, to run a successful business you need continued sales and production of products. Ethically we should be designing products to last longer and reduce the

35 “Say Hello to the Lid That Will Replace a Billion Straws a Year.” Say Hello to the Lid That Will Replace a Billion Straws a Year, 2019.
amount of products needed in our day to day lives, but that isn’t an economic model that will work for most businesses.\textsuperscript{37}

This thesis argues that there is a way to reduce wasted furniture from millennial consumers while also offering products that continue to produce new styles and sales for a business.

**Longevity**

Records from moving companies, internet companies, real estate data and college enrollments all show that millennials are living a nomadic lifestyle. Millennials are moving often, and they need solutions that make those transitions easier. These trends suggest that products should be designed with this fact in mind.\textsuperscript{38} According to Torsten Lihra and Raoul Graf, making a purchase happens in phases for consumers. The first phase is activation, and this is often initiated from change in taste, broken or worn out items, and lifestyle changes such as moving. The remaining phases are as follows: information search, evaluation of alternatives, and product choice.\textsuperscript{39} If a product were able to have components removed and replaced this could impact the activation phase and the evaluation of alternatives in a variety of ways.

Designers need to develop and market products more creatively to compete with international markets to address people’s desire for change and variety and to realize a society’s goal of reducing consumption and waste. For optimal appeal, products should serve multiple functions, have flexibility, and improve one’s quality of life. Millennial consumers have


\textsuperscript{38} Fineder, Martina, *Nomadic Furniture 3.0*, 9.

experience with knock-down furniture that arrives unassembled in the form of Ikea products. These are typically viewed as medium to low quality items and often lack ease of use or the user-friendly aspect of furniture pieces.\textsuperscript{40} Ikea realized financial success by removing a large portion of the labor cost through consumer assembly of their products. It gave the company a further edge with lowered cost and shipping fees, but its designs don’t allow for easy disassembly or exchange of parts once purchased. For this reason, the design model also puts the product’s lifecycle and longevity at risk. In addition, if an error is made during assembly on the part of the consumer, the quality of the finished piece is decreased, and could mean that the furniture piece lasts a shorter period of time than initially anticipated. If a furniture brand designed products of higher quality and promoted interchangeability of parts would millennials participate? This thesis will argue that they would due to need and that a gap exists in the market for this type of product.

As previously mentioned, millennials move often and sometimes decide to leave furniture behind instead of moving it to the new location because they don’t feel that there is enough value, or the size no longer works. Life-cycle costs include cleaning, repairing, and replacing parts. If the millennial consumer considered costs for these services over replacing furniture pieces completely, they may reevaluate their purchase in the activation and product evaluation phases. Ikea has a customization method, but it is meant to be customized at the point of purchase and remain unchanged after. If millennials had the ability to change the appearance and size of their furniture pieces without purchasing new, would they keep items longer? This thesis will argue that when the values of quality, cost, and flexibility are weighed, the millennial

\textsuperscript{40} Kilmer, \textit{Designing Interiors}, 496.
consumer would respond by purchasing furniture with a greater lifespan, in part because it would serve their needs and second it would positively impact the environment.

**Supporting female furniture makers**

Millennials have been labeled as open minded, individualistic, more diverse, and more inclusive than other generations.\(^{41}\) This bears the question, are millennials ready to break stereotypes and support furniture businesses run by women? Throughout American history woodworking and furniture making have been viewed as men’s roles, specifically white men. Nina Stritzler-Levine, gallery director at Bard Graduate center says, “Historically, furniture design is a microcosm of the architecture microcosm and architecture has always been very male dominated.”\(^{42}\) Women are usually associated with textiles and ceramics in the world of craftsmanship, and less often thought of when it comes to furniture design. Even when women were initially interested in other areas of the arts, it can sometimes lead them to furniture and woodworking. Fashion brands such as Ralph Lauren, Kate Spade New York, Prada, and many others have expanded into home accessories, textiles and furniture creating links between fashion and decorative arts. Ray Eames, one of the most famous midcentury furniture designers went to college to study art and worked under an artist in New York City before exploring furniture.\(^{43}\) Historian, Edward Cooke Jr., believed that the Arts and Crafts movement during the nineteenth century was the beginning of women learning formal woodworking. He stated, “given the number of women who were enrolled in the early twentieth century it is surprising how few of

---


them are presently known and how little of their work has been documented.”

In her article, “This is my work: The rise of women in woodworking,” Anne Carlisle pointed out that the number of women taking wood shop courses in college has increased in non-coastal cities. Carlisle interviewed a recent graduate from Iowa State University who shared her experience in the wood shop course and was surprised that seventy five percent of the students that semester were female. Carlisle discovered that overall there was still less female enrollment in specialized woodworking programs when compared to larger university courses.

Percentages of women learning woodworking and furniture making are low compared to their male peers, but they are even lower in the professional world coming in at 10%. Most of the women interviewed by Carlisle said that often times their work is assumed to have been done by a male counterpart. Society seems to be surprised by the the ability and skills of women making furniture. The group of women that Carlisle interviewed concurred that in the beginning they didn’t like being labeled as “women woodworkers”, and that it made them feel like their gender meant more than the products they designed and made. They also agreed that in time they realized the importance surrounding the conversation of gender in furniture making because being a woman can be inherent to their artistic process and final products. In 2017, Laura Mays, Program Director of The College of the Redwoods Fine Woodworking Program listed a few statistics from an issue of Fine Woodworking Magazine. In the entire issue there were; zero articles written by women, and of the thirteen pieces of furniture featured in the gallery, none were made by women. Mays’ observation challenged the woodworking community to be more proactive in fostering diversity and in increasing the visibility of women and minorities in this

field. Women haven’t always played a large role in this industry but with the support of each other and their male counterparts the conversation about women in woodworking will be less of a surprise and more of an expectation.

Gender equality has been a major issue in the United States and continues to be an important conversation across all industries. Eighty four percent of Americans believe that companies should take a stance on women’s rights, which surpasses other major issues such as climate change and immigration. SHE Media conducted a study to understand consumer reactions to “femvertisements” (ads that feature female empowerment alongside commercial brands). Results of this study showed that 52% of the respondents indicated that they have purchased from a brand because of the way women were positively portrayed in the brands messaging and 45% of those respondents shared the ads with others. Firms using feminism as a brand strategy can gain great support from millennials, but only if it’s done appropriately. SHE Media’s survey showed that if the message of female empowerment is too strong or unrelated to the actual product it can come off as being condescending. These negatively perceived advertisements rarely addressed men in the issue of inequality and only looked to women to change their thought process and views of one another. Women becoming equals in any workplace requires the attention and efforts of male peers and their ability to support women of all ages. Increased visibility from publications, showrooms, and social media of female work has a direct effect on those who see their successes. Appropriately practicing “femvertising” could have a positive effect on the perception of this industry and the success of the women who

are designing and building furniture today. SHE Media shared that 81% of the respondents of their survey believed that these types of positive ads for women are valuable messages for young girls as they explore their interests.\(^{50}\)

These female-focused ads are particularly successful on social media, which has been known to fill in gaps and shed light on underrepresented people. Platforms such as Instagram have given people optimism about the future of women in woodworking. Carlisle’s view on sharing experiences being a woman in this industry were clear. “Everyone’s identity is so much at the heart of their creative process that it’s important to acknowledge that the work is being made by women.”\(^{51}\) This can be achieved through Instagram, Facebook, Youtube and other social media platforms that are used by the majority of millennials. #woodworkingwomen has been shared 32,500 times so far on Instagram and that number increases regularly.\(^{52}\)

Engaging millennials in the support for gender equality and females in the furniture industry can be done through the marketing strategies previously mentioned as well as further development of social media presence. The ads make millennial consumers feel connected to the designers that they are buying from. Being transparent with consumers and sharing the personal journey of process, product and maker has been proven to increase the overall satisfaction of consumers. For example, Domino’s Pizza created a tracker for delivery orders which shares the stages of pizza production, the delivery person’s name, location, vehicle and estimated time of arrival. The company saw an improvement in customer satisfaction and sales through the implementation of this tool that allowed the customer to feel connected to their purchase.\(^{53}\)

---


\(^{53}\) “99% Invisible.” 99% Invisible (podcast), 2019.
Sharing personal stories has also been a marketing strategy used for decades. The Eames’s were photographed in their case study home filled with the furniture that they designed, and it got people’s attention on a global scale. Consumers became curious about the people behind the work and liked the feeling of knowing who they were supporting.\textsuperscript{54}

Millennials grew up in a world of sharing through social media and the internet and they also value entrepreneurship, quality, and gender equality. This thesis will argue that by tactfully promoting women in an under-represented industry and by sharing the personal journey of those women through social media, a female woodworker and entrepreneur could gain the attention of millennials consumers and help the designer stand out among others. Further, that millennials would be willing to spend more money on products if they would know who they are supporting and why it mattered as opposed to purchasing from corporate big box companies.\textsuperscript{55}

Refurbished products

In 2020, many designers and consumers show great interest in the living conditions of the western world and in their consumer behaviors within it. Designers of all disciplines consider environmental impact and the types of innovations that could reduce consumer waste by repairing, recycling and up-cycling materials and products.\textsuperscript{56} Rosemary and Otie Kilmer, authors of \textit{Designing Interiors}, a textbook used across the country in many interior design programs, emphasize concerns for recycling and reusing materials and components as well as the use of biodegradable materials. They are aiming to reach the next generation of interior

\textsuperscript{54} Koenig, \textit{Eames}, 36.
designers and to instill the importance of environmental efforts at the beginning of a student’s education.\textsuperscript{57}

What does this mean in furniture design? How can furniture makers incorporate recycling and reuse of materials to promote better consumer behaviors and will millennials consumers respond positively? One way to accomplish this is by refurbishing used components of furniture pieces. Refurbishing is defined as the process of disassembling, cleaning, inspecting, repairing, replacing and reassembling the components of a part of a product to like-new condition. Refurbishing is an effective way to reduce waste and involve both the consumer and seller in improving consumer behaviors and waste reduction. In 2016 the market of refurbished products was at forty-three billion dollars in the US.\textsuperscript{58}

If furniture brands could promote refurbished components and give incentive to customers to return the components, they no longer need those pieces could then be refurbished and sold. This would reduce waste, material consumption, and give consumers the positive feeling of contributing to a brand that works to effect positive environmental initiatives.

A primary question related to custom furniture collections is, would millennials participate in the refurbishment trend? Students at Georgia Southern University studied consumer responses to questions regarding recycling practices with the focus on generational differences. The overall response from all participants was that 48.8% said that very frequently or always donate used items instead of throwing them away. Twenty one percent always or frequently purchase used or secondhand products. Eighty-three-point three percent of respondents agreed that buying used products is good for the environment. The question that

\textsuperscript{57} Kilmer, \textit{Designing Interiors}, 2.
almost all respondents agreed on at 95.1%, was that products should be made to last longer. After analyzing the ages of the respondents of the Georgia study, they found that millennials showed more concern than other generational groups regarding recycling and reducing waste from products. This thesis will argue that if a brand were to emphasize and promote a program to refurbish their products, based on the results of the above study, millennials would likely react positively and participate in such a program.

An important factor to consider from a business standpoint in regard to selling refurbished components is the consumers’ willingness to pay. Consumers value green products and the concept of reducing waste but they need to have a sense of trust that the information being provided is accurate and that the products are actually green. The 1990s was filled with businesses greenwashing or promoting green products and services that was based on false or limited proof or results. Millennial consumers hesitate to believe everything they are told because so many brands overly promote green practices that don’t actually have a positive impact on the environment. One way that companies have proven their green practices is by hiring a third-party organization to certify their claims. This is called eco-certification and consumers are willing to pay 2%-10% more for a product if there is proven certification that it is a responsibly made product.

Incorporating eco-certification is a way to increase the consumer’s willingness to pay for refurbished products, which is important in this market. Millennial consumers are more likely to pay for products that reduce waste when there are tangible or intangible rewards associated with

---


60 Kahle, Communicating Sustainability for the Green Economy, 92.
the purchase.\textsuperscript{61} refurbished products or parts are by definition not new and consumers, including millennials, may view this as being less valuable. Millennials may be less willing to pay for products that aren’t new; however, lowering the price by 3.47\%-7.13\% has made consumers consider refurbished items.\textsuperscript{62} Manufacturers still incur labor costs for refurbishing those products and need to maintain margins high enough to continue their business. Adding eco-certification to refurbished goods can increase consumers perception of value and can raise the retail value of an item.

Refurbishing products is an effective strategy for incorporating environmentally friendly practices in a business. Creating a collection of furniture that has removable components meant to be replaced as often as needed or wanted leaves the question to the consumer of what they should do with the parts currently not needed. Educating the consumer from the beginning to return pieces for a discount on new items or keeping them for a future move, can reduce the amount of furniture that ends up in landfills and is an innovative and marketable way to change how millennials purchase and dispose of furniture. This thesis will argue that if offered, millennials would consider participating in a refurbished goods program that is easy to use and accessible.

\textbf{Sustainable brands}

There are multiple ways that companies can focus on being sustainable and be considered environmentally friendly. It almost always costs money to alter processes, source different materials, and to pay for marketing strategies that successfully and legitimately help a company

\textsuperscript{61} Harms, “Willingness to Pay for Eco-Certified Refurbished Products: The Effects of Environmental Attitudes and Knowledge,” 114.
\textsuperscript{62} Harms, “Willingness to Pay for Eco-Certified Refurbished Products: The Effects of Environmental Attitudes and Knowledge,” 110.
better the environment and our society. Is it worth the costs needed and do millennials support brands that do so? In his book, *The Ecology of Commerce*, Paul Hawks believes that if there is transparency in costs the consumer will be more willing to spend money on products that are good for all. This “rests on the premise that people, if given honest information not about about price, but cost, will make intelligent and appropriate decisions that will improve both their lives and the lives around them.”

Public concern for the environment grew in the 1960s but the idea of environmentally friendly products and businesses wasn’t prominent in the United States until the early 1990s. This is when the millennial generation was young and being exposed to marketing strategies from a variety of businesses. The millennial generation became supportive of social causes and companies that were socially and environmentally responsible. According to Stephanie Bedard and Cari Tolmmie, social media has revolutionized how consumers and sellers communicate about sustainability and green products, often giving consumers the opportunity for a more collaborative and interactive purchasing experience.

This thesis argues that combining millennials’ preferences for social media and individualized experiences with sustainability in a business is a way to gain interest in a brand that promote sustainability.

Sustainable brands sometimes charge more for their products and services in order to cover the costs needed to incorporate sustainable practices, however, this hasn’t stopped millennials from selecting those brands when making purchases. In the study done by students at Georgia Southern University, the young researchers found that 73.7% of the respondents noted that they would spend more on environmentally friendly products. This study surveyed a range

---

of ages, but millennials had more positive responses than other generations when asked about sustainable products. Ethical attributes can’t completely substitute for other important attributes such as price and quality. Not all millennials have the option to choose products that cost more but are environmentally friendly. Bedard and Tolmmie reported that millennials with higher income levels are associated with higher levels of green purchase intentions. This brings us back to offering refurbished goods. This suggests that creating a product line that would target a wider range of income levels would still appeal to millennials who have varying levels of disposable income to spend more on brands that are environmentally friendly.

**Marketing strategies**

If creating a collection of furniture with interchangeable parts for millennials was a reality, how would this collection be best marketed to the consumer? Jochen Gros showed us in the early 1990s that in order to survive alternative production and product concepts should be accompanied by similarly unique marketing concepts. Gros experimented with recycled materials and new production methods in Germany and began conversations about marketing to consumers who will recognize sustainable responsibilities. In today’s competitive market, furniture brands need multi-channeled experiences for consumers to ensure long-term loyalty. The internet has given millennial consumers the opportunity to work directly with businesses in ways that older generations didn’t experience. In the furniture industry there is a lack of brand recognition which remains a fundamental obstacle for most manufacturers; this creates problems

---

gaining and growing consumer interest. In 2020, the use of social media could be used to change this. Over 70% of American millennials engage in social media, often using multiple platforms. When surveyed, 77% of millennials said they believe social media is an effective tool, and 73% agreed that social media helps build a stronger brand identity. When the respondents were asked to rank their use of social media platforms the top three were Facebook, Instagram, and YouTube. The internet and social media provides brands a way to reach larger audiences in a variety of ways. Millennials are influenced by what they see on social media and having a large presence that can have a direct effect on the success of businesses. Consumers see what other people have and decide that they also need those products, whereas before they may have never even known they existed.

As mentioned previously, problem recognition, or the activation phase, is the first step in the purchasing process. “Problem recognition occurs whenever consumers see a significant difference between their state of affairs and some desired or ideal state.” Social media is the activation phase for many consumers in all types of product industries. Instagram inspires the activation phase when users see influential people wearing clothing and promoting fitness, home goods, and many other product categories. The internet and social media are the main tools used in the search state, when consumers are looking for information and options. The internet allows for immediate responses to thoughts and questions, it’s easy to use, and is already apart of most consumers’ habits.

---

Having a social media profile and website is the best way to reach millennial consumers. How those are used can play a big role in how a brand is perceived. Photographs communicate furniture designs and functions well. Slide shows and videos are also shown to be effective tools for communication. If verbal presentations are an option, humor and candidness can prevent boredom and allow consumers to relate to the seller. Instagram is a great tool for sharing the process of designing and manufacturing products. With the ability to post photos and share videos within seconds, it gives the millennial consumer the feeling they are along for the ride. Allowing consumers to see what goes on behind the scenes draws more interest than big box businesses that seem disconnected and impersonal. Furniture isn’t as easy to sell to consumers as clothing or beauty products because they tend to be higher cost products. It takes more time and thought to make a purchase of a four-hundred dollar furniture piece when compared to a twenty-four dollar makeup product. Deborah Leslie and Suzanne Reimer suggested that the demand for furniture products may increase by changing the consumers’ perception of furniture from a commodity to a fashion item. This could also speed up the replacement cycle for millennial consumers. Department stores carry color and style themes current to fashion trends through their furniture and home good offerings. Promoting the idea that furniture could be changed out seasonally like clothing would give consumers reasons to buy products for multiple times of year.

Off-line strategies can also be successful. Trade-show presence, billboards, and television commercials along with brick and mortar stores can lead people to investigate further into a brand online. Having physical stores is helpful for consumers who want to experience and touch the products before making a purchasing decision, especially when mass customization

75 Kilmer, Designing Interiors, 578.
comes into play. With multiple configuration options and the fact that the consumers themselves would assemble the main parts of the furniture it would be helpful to have sales staff available to demonstrate and encourage consumers to try to use the products themselves.\textsuperscript{77}

Public relations and marketing can set brands apart from one another and allows brands to share what makes them unique. Marketing is an image-building process and public exposure is key to growing consumer interest. Having work published in magazines, papers, and most importantly online can play a large role in a furniture brands success.\textsuperscript{78} Never-the-less when targeting millennial consumers, social media is the best way to reach and relate to these consumers.

Collectively, this thesis will argue that social media is the most important platform to create brand awareness and promote marketing materials.

**Modular furniture**

The concept of designing a clean, simple, functional and modular furniture collection that can be disassembled isn’t new. In 1870, the folding chairs for officers in the Italian army were collapsible and could disassemble for easy transportation during wartime.\textsuperscript{79} In the early 1950s Gillis Lundgren was struggling to fit a table into the trunk of his vehicle so he removed the legs in order to make it fit. This simple motion led to the invention of flat-pack furniture.\textsuperscript{80} Flat-pack furniture disassembles into flat rectangular boxes that require fewer packaging materials and that

\textsuperscript{77} Lihra, “Mass Customization of Wood Furniture as a Competitive Strategy,” 216.
\textsuperscript{78} Kilmer, *Designing Interiors*, 590.
\textsuperscript{80} Fineder, Martina, *Nomadic Furniture 3.0*, 61.
are easier to ship. It developed in the twentieth century and filled a need for affordable, collapsible furniture for mass-consumption.

Throughout history there have been historical styles and famous designers that believed in simplistic and functional furniture. Their tried and true designs have stood the test of time and prove that simple designs with utility in mind never go out of style. Shaker furniture, for example, was generally delicate in proportions but sturdy. It exhibited the essentials of form in a way that was as efficient as possible. Shakers believed that the value of the product depended on the suitability of the item to its purpose and that form should follow function. In the 1960s George Nelson designed the L-Shaped Desk for Herman Miller which had a clean, modular and modern feel. This design is still produced today. The philosophy of Bauhaus design was to simplify the design of products so that material usage, function, and construction techniques were evident in the finished product. Bauhaus taught, celebrated and produced standardized parts.81

Modular furniture is made up of standardized components such as shelves, drawers, surfaces and cabinets. They are systems that can be grouped in different configurations based on the needs of the consumer.82 In 1949 The Museum of Modern Art hosted “An Exhibition for Modern Living”. Charles and Ray Eames’s storage units were shown for the first time to the public. They exhibited unique settings and options that worked for both homes and offices. The versatility of the design systems allowed for the product to be easily adaptable for individual needs.83 Dieter Rams designed a similar shelving unit he called the 606 Shelving Unit. Rams promoted the concept of “less but better” and believed that the function and simplicity were the

81 Fineder, Martina, Nomadic Furniture 3.0, 86.
82 Kilmer, Designing Interiors, 512.
83 Koenig, Eames, 52.
best philosophies when designing products. With this shelving unit his goal was to give consumers the option to configure their shelf to be completely individualized and one that allowed for change.\textsuperscript{84}

The consistent pattern throughout history of simple, functional, and modular design shows us that less, can indeed be better. How can designers take this information and develop it into innovative concepts? If customization and adaptability are layered onto the ideas of simple and functional products it will elevate the concepts that some of the most successful global designers of the twentieth century explored.

Other industries have already tapped into this concept and made substantial profits in doing so. Dell offers consumers the opportunity to customize the computers they order from the aesthetics, applications, storage and other features to maximize the function for individual users.\textsuperscript{85} Honda adopted a modular approach to their product offering to maximize on profits. The 2002 Honda CRV, which is a sport utility vehicle, uses the same wheelbase and frame as the Honda Civic and Honda Pilot.\textsuperscript{86} Production is simplified when there are fewer components to design and update.

Offering customization as a domestic manufacturer can be a successful model in furniture. Office furniture strategies have already proven this.\textsuperscript{87} History has also proven that this concept can be successful in furniture and there are currently very few brands exploring how to

\textsuperscript{84} Rams, \textit{Less But Better}, 135.
\textsuperscript{85} Qian, Xiaobo, and Alessandro Deserti. “Design Oriented Approaches to Mass Customization in Furniture Industry,” 2297.
grow and evolve this concept. This thesis argues that the present time is appropriate for these
design principles to be redeveloped for both residential and commercial use.

**Conclusion**

This literature review answered some of the research questions previously listed. Millennials in general do not have knowledge of furniture quality, materials or construction. Millennials are aware of waste such as single use plastics like straws but it is unclear if they are aware of the amount of furniture that ends up in landfills. In regards to sustainable brands, millennials talk about sustainability but their actions do not always match their words. When rewards are involved millennials are more likely to make a purchase from brands known for being environmentally friendly. The literature also revealed that millennials are more open minded than other generations and supportive of gender equality. Historically the furniture industry has been predominately led by white males, but millennials have been proven to purchase from brands because of the way they positively portray women.

There are modular products on the market that are focused on configuration, such as the container store. There are brands focused on aesthetics and quality such as Kate Spade New York. The literature review and market research show a gap in the market for products that address all of the above. This thesis will explore the design of customizable and modular furniture targeted to millennial consumers.

---

89 “Say Hello to the Lid That Will Replace a Billion Straws a Year,” 1.
91 Valentine,“Generation Y Values and Lifestyle Segments.” 5.
Methodology

Survey

The first method of research was an online survey. The literature review revealed that social media is the most popular platform for communication among millennials. In response to this information the survey was distributed via social media. Millennials were the focus of this study so only the results from millennials were analyzed. Other variables were considered such as location, specific age group, marital status, and renting versus owning their homes.

The survey questions were separated into two sections. The first section was meant to gather demographic information for more specific analysis of the questions that follow. The second section was written using the Likert scale and covered the initial research questions as well as questions that came to surface during the literature review.

Trend Research Trip

The author attended the 2020 Maison & Object exhibition in Paris, France. This is an event where brands from all over the world present their newest collections of design work ranging from furniture, textiles, home goods, artwork and fashion. Top designers share what is coming in the next year for their brands and it’s a one-of-a kind experience to gain trend knowledge. This information was used and adapted to fit the needs of the furniture collection.

Design Process

The second method addressed the process of designing a product and the development of design concepts. Based on the information from the literature review and survey analysis a

collection of customizable and adaptable furniture was designed. The steps followed include concept inspiration, concept sketches, construction research, prototype specifications, building a prototype, reviewing and making changes to the design, trend research, final collection design proposal. This thesis argues that completing these steps of the design process will answer pending questions on how to develop a collection of furniture that fits the needs being discussed in the literature review.

**Branding**

Once there was a clear direction from the survey results and there was a proposed design for the furniture collection the next step was a marketing plan. Creating a strong brand is important to have in impact in the market. Branding decisions addressed the brand name, mission statement, and other factors that would help promote the concept of the furniture collection. Based on the literature review it is known that social media plays a very large role in communicating advertisements and brand awareness. Having a great product or idea means less if you don’t have an effective way to share it.

---

95 Leslie, “Fashioning Furniture: Restructuring the Furniture Commodity Chain,” 431.
CHAPTER 2. SURVEY

Introduction

The purpose of the survey was to gather information from millennials. This furniture collection targets millennials and considers their moving habits, buying abilities and changing tastes and styles. The majority of the questions were related to furniture. Understanding millennials experiences buying, moving, and disposing of furniture can help to guide the design of an effective and appealing furniture collection. To best analyze the responses the survey was broken up into two sections. The first section includes general demographic questions and the second half asks about furniture (Table 2.1). It was possible that people with different backgrounds, whether it be age, location, or race, would answer differently and the survey sought to identify patterns in the responses.

The findings in the literature review were that millennials rely heavily on social media for communication and information. Because of this information, the survey was distributed online, through social media platforms. A link was copied onto Facebook, Instagram, and open for anyone to respond. The link was posted with a very short description that made the public understand that the purpose was to design a new and affective furniture collection targeted at millennials. Instructions noted that the survey was only meant for millennials and the survey only analyzed the respondents that fit the defined age range. There was no limit to how many people could respond to the survey and the link was active for one week.
Questions

SECTION ONE - DEMOGRAPHIC INFORMATION
Please select only one answer for each question.

1. What is your age?
   a) 23-26
   b) 27-30
   c) 31-34
   d) 35-38

2. What gender do you identify with?
   a) Female
   b) Male
   c) Non-binary
   d) Gender fluid
   e) Prefer not to say

3. Please specify your ethnicity.
   a) Caucasian
   b) African American
   c) Hispanic or Latino
   d) Native American
   e) Asian or Pacific Islander
   f) Other

4. Which best describes your current household?
   a) Living alone
   b) Living with significant other
   c) Living with a roommate
   d) Living with family

5. Which best describes the location of your home?
   a) 0-10,000 People
   b) 10,000-50,000 People
   c) 50,000-100,000 People
   d) 100,000-500,000 People
   e) 500,000-1,000,000 People
   f) More than 1,000,000 People

6. Which best describes your home?
   a) Rent, Month-to-month lease
   b) Rent, 12 month lease
   c) Rent, More than 12 month lease
   d) Own
SECTION TWO - PERSONAL EXPERIENCE AND PREFERENCES
Please select only one answer for each question.

<table>
<thead>
<tr>
<th>Table 2.1. Survey Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
</tr>
<tr>
<td>I have seen furniture with components that could be removed and replaced in the market.</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because you no longer liked how they looked.</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because there was damage.</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because it was too difficult to move.</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because it no longer had a place in a new home layout.</td>
</tr>
<tr>
<td>I find it difficult to donate furniture in my community.</td>
</tr>
<tr>
<td>I would keep a furniture piece longer if the quality would allow disassembly and reassembly during moves.</td>
</tr>
<tr>
<td>I would keep a piece of furniture longer if I could easily change it’s appearance.</td>
</tr>
<tr>
<td>I understand how to tell the difference between high and low quality furniture components.</td>
</tr>
<tr>
<td>I understand the differences between high quality furniture construction and low quality furniture construction.</td>
</tr>
</tbody>
</table>
I value sustainable practices for the environment and prefer to purchase products from firms who support them.

I would consider returning used parts I no longer need if I received a discount for future purchases.

I am interested in knowing who makes my products and how they are made.

I would purchase refurbished components at a discounted price to reduce waste in the furniture industry.

I support the advancement of formerly marginalized groups in the furniture industry such as women and minorities, and would prioritize purchasing from them as long as they are competitive to other brands.

I get design inspiration from Instagram.

I get design inspiration from magazines.

I learn about most new products through social media.

**Survey Results**

The survey yielded a total of 100 respondents. It was open to the public yet only counted the responses of people age twenty-three to thirty-eight. That age group was broken down into four groups for the first question on the survey. Of the one hundred responses, 16% were between the ages of twenty-three and twenty-six, 63% were between the ages of twenty-seven and thirty, and 14% were between the ages of thirty-one and thirty-four. The smallest percentage...
of responses came from the eldest age group between the ages of thirty-five and thirty-eight coming in at 7%.

The one hundred responses were made up of twenty-nine people that identified as male, seventy people that identified as female, and one person that identified as non-binary. Of the responde, 89% were Caucasian. This was not a diverse group to observe but it was a place to begin. If this survey was distributed again it would be helpful to send it to specific social media groups or tags that would promote more diverse and inclusive responses.

One of the initial findings in the literature review showed that the majority of the millennial population rents their home versus owning. This survey confirmed that information. Of the respondents, 47% own their homes and 53% rent.

The location of consumers home can alter exposure to products, brands, and lifestyles. As a new brand that is customizable to a range of consumers, it was best to understand the opinions of consumers living in a variety of types of cities. The survey asked respondents to identify the population of their location. While it appears two people did not answer this question, there was a good spread of responses for this question. It was helpful to understand that the opinions regarding the furniture questions came from people in very large cities and very small as well (Table 2.2).

The most important questions came in part two of the survey. These were the questions that identified the wants and needs in the furniture industry of millennial consumers. See the following images for the breakdown of the one hundred responses (Table 2.3).

---

The second set of questions and the responses by the group of one hundred served as a guide for how to move forward in the design process of this collection. Understanding previous decisions and current opinions from millennials regarding furniture was key in designing the most functional and useful collection possible. The collection was designed using the Evidence-Based Design (EBD) method.

The first question was about seeing similar concepts and was intended to get initial thoughts on what people have seen in the furniture market. Fifty people responded that they agree or strongly agree that they have seen something with removable components. This was higher than anticipated but this also means that half of respondents haven’t seen anything like this. The collection being designed would be a completely new concept to those people.

Question two asked about throwing out furniture because of its aesthetics and sixty-two of the respondents agree or strongly agree that they have done that in the past. Giving millennials the option to change the aesthetics of a piece could reduce the number of pieces being thrown out. Seventy-nine of the millennial respondents agree or strongly agree that they

<table>
<thead>
<tr>
<th></th>
<th>City Size</th>
<th>Percentage</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0-10,000 people</td>
<td>8.16%</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>10,000-50,000 people</td>
<td>24.49%</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>50,000-100,000 people</td>
<td>16.33%</td>
<td>16</td>
</tr>
<tr>
<td>4</td>
<td>100,000-500,000 people</td>
<td>26.53%</td>
<td>26</td>
</tr>
<tr>
<td>5</td>
<td>500,000-1,000,000 people</td>
<td>15.31%</td>
<td>15</td>
</tr>
<tr>
<td>6</td>
<td>More than 1,000,000 people</td>
<td>9.18%</td>
<td>9</td>
</tr>
</tbody>
</table>
would keep a piece longer if they could easily change its appearance. This proved that aesthetic variations are just as important as functional variations in the collection.

Similarly, seventy-six of the millennial respondents agreed or strongly agreed that they threw out a furniture piece because it was damaged. If components were removable, the damaged piece could be replaced, and this would prevent consumers from throwing pieces out as frequently.

Table 2.3. Survey Results

<table>
<thead>
<tr>
<th>Field</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have seen furniture with components that could be removed and replaced in the market.</td>
<td>9.28% 9</td>
<td>23.71% 23</td>
<td>15.46% 15</td>
<td>37.11% 36</td>
<td>14.43% 14</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because I no longer liked how it looked.</td>
<td>11.22% 11</td>
<td>17.35% 17</td>
<td>8.16% 8</td>
<td>28.57% 28</td>
<td>34.69% 34</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because there was damage.</td>
<td>7.22% 7</td>
<td>3.09% 3</td>
<td>11.34% 11</td>
<td>43.30% 42</td>
<td>35.05% 34</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because it was too difficult to move.</td>
<td>16.49% 16</td>
<td>27.84% 27</td>
<td>9.28% 9</td>
<td>31.96% 31</td>
<td>14.43% 14</td>
</tr>
<tr>
<td>I have thrown out a furniture piece because it no longer had a place in a new home layout.</td>
<td>6.25% 6</td>
<td>15.63% 15</td>
<td>4.17% 4</td>
<td>43.75% 42</td>
<td>30.21% 29</td>
</tr>
<tr>
<td>Statement</td>
<td>2.68%</td>
<td>22</td>
<td>23.71%</td>
<td>23</td>
<td>25.77%</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>--------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>I understand how to tell the difference between high and low quality furniture components.</td>
<td>7.14%</td>
<td>7</td>
<td>19.39%</td>
<td>19</td>
<td>14.29%</td>
</tr>
</tbody>
</table>
Moving furniture can be difficult, but of the respondents, only forty-five people said that they would throw out a piece because it was too difficult to move. The process of moving may not be the cause of millennials throwing out furniture, but the changing layout of a new home is.

When furniture no longer fits because of a move, seventy-one of the one hundred millennials said that have thrown out a piece of furniture. When asked if millennials would keep a piece longer if the quality would allow for assembly and disassembly, only thirteen of the one hundred participants disagreed or strongly disagreed. This proved that millennials would value higher quality furniture with removable components. Millennials responded that they feel they

<table>
<thead>
<tr>
<th>Table 2.3. Continued</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I support the advancement of formerly marginalized groups in the furniture industry such as women and minorities, and would prioritize purchasing from them as long as they are competitive to other brands.</strong></td>
</tr>
<tr>
<td>4.21% 4 4.21% 4 12.63% 12 28.42% 27 50.53% 48</td>
</tr>
</tbody>
</table>

| **I get design inspiration from Instagram.** |
| 7.22% 7 11.34% 11 4.12% 4 27.84% 27 49.48% 48 |

| **I get design inspiration from magazines.** |
| 8.25% 8 29.90% 29 17.53% 17 24.74% 24 19.59% 19 |

| **I learn about new products through social media.** |
| 3.09% 3 4.12% 4 9.28% 9 34.02% 33 49.48% 48 |
understand what high-quality furniture materials and construction, which showed that there is added value in choosing higher quality versus low quality in regard to materials, finishes and joinery.

Keeping the environment and sustainable practices in mind was important to this project. The information found for the literature review regarding furniture in landfills was alarming. Of the twelve point one million tons of furniture thrown out in 2015, 80.4% ended up in the landfill.98 Because of this, the questions of donation and refurbishing were asked to the participants. In some areas it’s more difficult to donate furniture than others. After analyzing the survey responses this doesn’t appear to be a major issue. Only twenty-seven of the respondents agree or strongly agree that it’s difficult for them to donate furniture in their communities. In the literature review, sustainable preferences in millennials pointed to positive brand awareness and willingness to spend more on environmentally friendly products.99 Evidence from this survey told us that of the one hundred respondents, sixty-three say they agree or strongly agree that they value sustainable practices for the environment and prefer to purchase products from brands that implement them. One idea for this collection was implementing a refurbishment program. This would reduce the need for producing or purchasing completely new pieces. Consumers would have the opportunity to return components to be refurbished and sold to another consumer. Based on this survey, only eight millennials said they would not consider returning used parts to receive a discount for future purchases. That left a very large percentage of millennial consumers that would consider participating in such a program.

Another idea for this collection was sharing the background information on the makers behind the brand. Millennials appreciate transparency with brands. Domino’s pizza is a great

example of this with their pizza delivery tracker. Consumers take more interest in what they are buying when they have access to behind the scenes information. The internet has given consumers access to so much knowledge that people are curious about processes and the products they buy. The survey asked if consumers would be interested in knowing who makes their products and how they are made and only eight of the responders said they are not interested. Sharing behind the scenes information on the design and production process could be an interesting way to engage consumers on social media. If the designers and makers were different from the stereotype for the furniture industry, social media would be a good way to highlight that as well. The participants responded positively to supporting makers that are underrepresented in the industry. Seventy five percent of participants agree or strongly agree that they support the advancement of formerly marginalized groups in the furniture industry such as women and minorities and would prioritize purchasing from them as long as they are competitive to other brands.

The last few questions of the survey cover design inspiration and social media. Information on new products comes from social media for 81% of the one hundred millennials surveyed. Inspiration comes specifically from Instagram for 75% of the respondents. The internet has taken the lead when it comes to social media and inspiration and print magazines play a smaller role in communication. The survey confirmed this with the majority of respondents saying they don’t refer to magazines for design information.

This survey confirmed many thoughts and questions that the literature review brought up. If millennial consumers had purchasing options with furniture that had interchangeable components based on aesthetics, quality, and functionality they would keep those pieces longer

---

100 “99% Invisible.” 99% Invisible (blog), 2019.
and utilize the concept of replacing specific components. Some respondents have seen furniture with components that could be removed and replaced but based on competitive research in the marketplace there are few to no brands that offer such a variety for so many different reasons.

Based on these results, this concept would be attractive to millennial consumers and would reduce production resources needed and reduce the amount of furniture that ends up in landfills each year.

For marketing purposes, this survey told us that millennial consumers react positively to furniture designer-makers that have been historically marginalized in this industry. Sharing the stories of those people and their work related to this brand and its’ products could gain interest and create brand awareness with millennials. Communicating this strategy through Instagram and other social media outlets is the best way to reach millennial consumers today.
CHAPTER 3. TREND RESEARCH TRIP

After gaining an understanding of millennial habits and preference through the survey to develop preliminary ideas about the overall design concept and required functions, it was important to research trends and aesthetics to further develop and finalize design schematics for the collection. For this part of the project, the author attended the 2020 Maison & Object exhibition in Paris, France. This is an event where brands from all over the world present their newest collections of design work ranging from furniture, textiles, home goods, artwork and fashion. Top designers share what is coming in the next year for their brands and it’s a one-of-a-kind experience to gain trend knowledge. This exhibit, as well as a few textile presentations from brands such as Pierre Frey and Hermes, were the guide for trend information applied to this project. Most brands did not allow images to be taken, but exceptions were made for students. Presentations and exhibits are closed to the general public and because of this, images are shown, but the brands and designers were not named. The main trends that were analyzed during this trip were color, material and patterns. This information was used and adapted to fit the needs of the furniture collection.

CHAPTER 4. RESEARCH SUMMARY

Landfills are overflowing with furniture. Something needs to change in the furniture industry to reduce waste and encourage consumers to keep furniture longer. Wood, Plastic, glass and textiles from furniture are thrown out, and only 19.5% of that waste can be combusted for energy. Furniture ends up in landfills for a few reasons and this project focuses on two specifically. The first reason is because millennial consumers move frequently and need furniture that can adapt to the changing layouts of their homes. The second reason furniture is thrown out is that the personal tastes of millennial consumers are constantly evolving, and they need furniture that can change along with their aesthetic preferences.

The research questions aim to understand the wants and needs of millennial consumers in regard to furniture. The answers to those questions are needed to guide the design process. The first source of information in answering these questions was the literature review.

Customized products are viewed as being unique and exclusive compared to standard products. In Anthony Flynn’s book, Custom Nation, he wrote that personal customization in product design is so enormous and all-encompassing that it ultimately promises to define the coming decades. Millennials live in an age where they expect customization and they value it.\footnote{Flynn, Custom Nation: Why Customization Is the Future of Business and How to Profit., 4.} A 2008 study by Lihra Torsten and her team of experts in the wood furniture industry found that price isn’t always the most important factor for consumers. Customization, consumer service, and delivery times were three of the most important purchasing factors according to their study. When asked which types of customization customers appreciated the most, they responded saying that color, finish and dimensions were the top three custom features they looked for. A profitable production strategy to give consumers customizable options is mass-customization. In

\footnote{Flynn, Custom Nation: Why Customization Is the Future of Business and How to Profit., 4.}
the book, *Mass Customization: The New Frontier In Business Competition*, Joseph Pine defines mass customization as “a process by which firms in different industries apply technology and management methods to provide variety and customization through flexible production." The goal is to offer enough variety in a product assortment for everyone to find exactly what they want. From the literature it’s clear that custom products are valued and appreciated by millennial consumers.

It’s important to understand the level of knowledge consumers have regarding furniture design, function and production. A survey administered by the University of Mississippi revealed that only 23% of millennials learned about wood or wood products in high school or college. The survey did show that millennial consumers showed interest in learning more about wood products. Incorporating process videos and images on a website or social media would educate consumers and keep them interested in the brand.

Waste is an issue all over the world and we live in a society consumed by consumption. This project is aiming to reduce the amount of waste that ends up in landfills. Millennials search for tangible rewards for reducing consumption through promotions and financial rewards. Celebrities and social media influencers often share themselves doing positive things for the environment and are rewarded by brands. Their followers are then motivated to do the same.

Longevity of a product affects how often replacements are needed. For optimal appeal, products should serve multiple function, have flexibility and improve one’s quality of life. Ikea has seen financial success by removing a large portion of labor costs because the customer assembles fit furniture on their own. Relying on the customer to assemble the product creates opportunity for mistakes which puts the longevity of the product at risk. Those products are not

---

meant to be disassembled and assembled once again. If there are higher quality products offered, they could be kept longer. With interchangeable components, only the parts that really need it would be replaced and the overall piece could be kept longer.

Millennials have labeled themselves as open minded, individualistic, diverse and more inclusive than previous generations. Through American history, woodworking and furniture making have been viewed as men’s roles but this may be the generation to celebrate women and change the stereotype. Based on the literature review, millennials are ready to support and share the work of women in this field.

Designers of all disciplines consider environmental impact and the types of innovations that could reduce consumer waste by repairing, recycling, and up-cycling materials and products. If furniture brands promoted refurbished component and give incentive to customers to return parts, it would reduce waste consumption of resources and give consumers the positive feeling of contributing to an environmentally friendly program.

In the furniture industry there is a lack of brand recognition which remains a major obstacle for most manufacturers. Marketing strategies can be implemented to change this. When targeting millennials this is best done through social media.

The literature review shows that there is a gap in the market for products that address all of the research questions. The purpose of the survey was to fill in the remaining gaps of information that was not found in the literature review.

About half of the respondents had seen something with removable components but this would still be considered an innovative concept to the other half of participants. The survey proved that millennial consumers would take interest in replacing individual components due to aesthetic or functional reasons instead of throwing out the entire piece of furniture. Sustainable
practices are important to millennials and the participants responded that they would support brands that implement them. The background information of a brand such as the designers, design processes and production interests the survey respondents. The survey also confirmed that millennials communicate and gain inspiration from websites and social media. The survey was very helpful in answering the remaining research questions. If millennial consumers had purchasing options of furniture that had interchangeable components based on aesthetics, quality, and functionally they would keep those pieces long and utilize the concept of replacing specific components.

All of this information from both the literature and survey motivated the author to explore possible furniture designs to meet these needs. Interchangeable components are most successful with a cohesive design system. There are many brands in the market that offer custom options for seating such as sectional pieces that are mix and match, or legs that can be twisted off and on. To try something new, tables are the first category of furniture being worked out. A furniture collection is most powerful with a brand message or concept to back it up, so the branding of this concept is also very important.

Based on the research, this concept would be attractive to millennial consumers and could reduce production resources and materials that end up in landfills.
CHAPTER 5. DESIGN PROCESS

Inspiration

After graduating from Iowa State University in 2013 I moved to New York City and accepted a position with Kate Spade New York as part of their handbag design team. During my time at Kate Spade my team worked on a collection of bags called “Make It Mine”, which are still being updated and produced today. This collection is targeted to customers who want the appearance of having multiple bags without the cost of buying more than one. Many of the components are removable so that the consumer can purchase a variety of straps, flaps, and tassel add-ons in a variety of patterns and colors. Even the hardware closures are removable. Thus, without purchasing an entirely new bag you can buy a few different components and have a reconfigured bag feel completely new. Further, if a strap gets damaged the customer can order a replacement. We began with very basic silhouettes and a limited number of color options and offered the products online and in stores. As the concept grew, so did the selection.

This concept of interchangeable components could help solve most of the issues that come with furniture that were covered in the literature review. Difficulty moving a large item, needing a variety of configurations to fit in new homes, and the ability to replace one part without purchasing an entirely new piece of furniture. There are furniture brands that have implemented this concept in small ways such as sofa sectional configurations or having the ability to select from a variety of leg types. The closest category found that followed this strategy was garage systems. The customer is able to mix-and-match components based on the space they have available and their needs. The company, Gladiator, is an example of a brand

that offers customized furniture systems. Their website includes a feature that allows you to “build your garage”\textsuperscript{105}. It guides you through selecting a variety of storage options whether it’s different sizes or types of storage units there are options to mix and match that connect and can come apart or reassemble based on the user’s needs.

Inspiration for this furniture collection also came from the need to move furniture to new locations or new homes. Between 2016 and 2017, 7,898,000 millennials moved\textsuperscript{106}. The cost and stress of moving larger items can drive millennials to leave items behind. By creating a furniture collection that can be easily disassembled and reassembled it would reduce the efforts needed to move or keep a piece of furniture long term.

\textbf{Concept Sketches}

The next step in the design process for this project was concept sketches. Getting initial thoughts onto paper helped to take the creativity and problem solving further. It helped to visually see each piece sketched to address how many pieces should be able to come apart or remain connected. How do the pieces connect or what are the available variations offered? Sketching the variations onto paper narrowed down the ideas to be clearer and easier to explain to others. The first round of concept sketches helped me think through and address each piece.

The concept sketches were done with pencil and a sketchbook. They were meant to be quick thumbnails to start brainstorming ideas. The first idea was to offer a variety of tabletop shapes and sizes as well as a variety of leg shapes and sizes. This addresses the issue of changing spaces or uses for the table (Fig 5.1). By incorporating a cube like center, the table


\textsuperscript{106} American Housing Survey, 2017.
could be used in a modular way by stacking or placing them next to one another. The sketches

Figure 5.1. Concept Sketches Page One
explore the possibilities of how they could be configured for a variety of uses. Having an optional drawer allows the final product to be open shelving or a drawer closure. Initially the idea was to have varying leg shapes to communicate different design styles but after beginning the thumbnails with modular concepts and varying uses it seemed clear that it would also be beneficial to offer legs in a variety of heights.

The next round of sketches narrowed down the concept and began to address the construction of the tables (Fig 5.2). Stacking and connecting designs were brainstormed through the same quick sketching as the first image. The first thought was, how do we connect one on top of the other? Dowels were the first idea that came to mind. Dowels however would not provide the kind of stability needed for this concept. Taking inspiration from industrial designer Benjamin Vermeulen, magnets were added. One of the goals for this collection was to have modular, and easily interchangeable components, without those characteristics dominated the aesthetics of the collection. Hiding the connectors was important so this was also explored in the second sketch page. Including an overlay was another idea explored through these sketches.

While sketching, the top became a focal point. Should the connectors be exposed or hidden if there is no additional top? When there was a larger box with a smaller one stacked on top, the other connecting areas are exposed. This led to the idea of a flush top. If there wasn’t a tabletop to change the surface size, there could be a top that sits flush with the edges that could also be removed in the future. This idea was shown in the bottom sketches (Fig 5.2).

---

MAGNETIC DOWELS?

HOW TO CONNECT?
DO THEY ALWAYS ORDER TOPS FOR WHATEVER TOPS ARE EXPOSED?

MAGNETIC OVERLAY?

STILL DEVELOPING .... CONNECTOR IDEAS ....

SLIGHT LIP? WITH MAGNETIC EDGE?
The third round of sketches (Fig 5.3) explored the concept of notches and lips around the top and bottom of the boxes for easy stacking. The idea of a flush top is also shown here versus a standard tabletop that adds surface area. The location and type of magnets were not addressed here which was something that needed to be equally incorporated as a notch to help lock the pieces into place. This concept made the top of the standard box open, and only closed off when a flush top or tabletop are added. Initially this concept seemed ideal to save on material use but when thinking more about it the time and precision it would take to create the pieces with small notches would add time in labor and create possible breaks with narrow pieces sticking up. This sketch page was finished, and it became clear that the stacking mechanism still needed to be worked out.

The third sketch page got more detailed with drawer concepts. Does there need to be a drawer? If you chose to have a drawer is that also interchangeable? The sketches show a beveled edge on the face of the drawer. The idea behind this feature is that another face piece could potentially layer over and rest on those edges created by the change in thickness.

Construction research began and the information found also helped to shape the concept and connecting mechanisms for this project.
Figure 5.3. Concept Sketches Page Three

Tops could be flush with edges like "lid" for top layer or cantilever over edges as table top.

Notch on bottom side for stacked layer below.

Front view no drawer.

Front view with drawer (pocket drawer).

Back: full panel.

Sides: full panels.

Open front.

Open top.

Drawer face is beveled at edges. Face plates can layer over top.

Holes for removable pulls attached pulls also secure new face plates.

Magnetic strip?

Similar view on bottom of stackable base.

Notched top to fit over base piece with lip on edge.

Lip edge for stacking (magnetic elements for added stability?)
Construction Research

The concept of interchangeable components in a furniture collection means that the construction and mechanisms involved are incredibly important. There are many brands such as Ikea, Wayfair, and Target that sell affordable pieces of furniture that are shipped in separate pieces that require assembly. Those pieces are not meant to be disassembled and assembled again. The quality of materials typically used, such as particle board, cannot withstand that kind of use. Particle board can be sensitive to moisture and are only moderately strong. For this collection, being able to take the pieces apart and put them back together multiple times important.

A modular box is the main component of the table and needs to be able to stack on top of, and next to itself. As mentioned in the design process introduction there are garage concepts that have many interchangeable components but that doesn’t translate to interior furniture. Another concept worth noting is organizational containers. Brands such as the Container Store have evolved them to include drawers and the possibility of stacking.

Adding a stacking element allowed for many configurations of boxes to serve multiple purposes. To keep the aesthetic integrity of a well-designed product, the appearance should not be dictated by this feature. Besides quality, a unique and well-designed product is what really sets this collection apart from lower quality organizational containers.

In regard to the issue of space and adaptability the tabletop is usually the largest surface of a table. Having the opportunity to remove the top and replace it with a different size means that table could move locations with different space available. The top needs to be secure

---

108 Larsson, Roland, and Peter Ringo, Particle Board and Use Thereof.
enough that it won't come off if it's bumped but easy enough for the customer to change easily. While researching similar concepts Benjamin Vermeulen, a product designer, came to surface. One of his portfolio projects included a flatpack furniture collection that connected completely with magnets.110 There is a video on his website that demonstrates how the furniture pieces are assembled and it takes very little effort and time. Vermeulen’s work inspired the use of magnets into the prototypes of the new furniture collection.

“While traditional permanent magnets such as alnico and hexagonal ferrites remain widely used as mass-produced magnets, most high-performance magnets are now made from rare-earth intermetallics. They are used, for example, in cars, wind-energy generators, medical applications and computer disk drives.”111 Skonmski and Sellmyer studied rare earth magnets and their applications. Because the volume of energy per unit has increased with new technology, miniature magnets are able to be produced. These smaller magnets, while still very strong, work with smaller items and functions such as wrist watches. Rare earth magnets were chosen for the prototype mechanism of the removable tabletops in this collection.

The multiple uses of the magnets also led to the development of the box design. The original design had a lip around the edge and was more complex than incorporating magnets into the flat surface. If the magnets are strong enough, they may not need the lip to hold the pieces in place which would save time during the construction process.

The security of the leg attachment will be important because the overall stability of the table relies on this joinery. If the legs are shaky then the integrity of the entire table is compromised. There are existing furniture pieces with removable legs, mostly sofas and chairs.

Based on the literature review and competitive market research these legs are screwed on. A good example of a brand selling replaceable legs would be Ikea. They do not offer a wide variety of shapes of finishes, but they do offer some (Fig 5.4). The image below shows four of the six styles they offer.

![Sofa Leg Product Components Available, Courtesy of Ikea](image)

While these legs are effective for these brands, it’s worth testing out other options. Christopher Martin, Professor of furniture design at Iowa State University, suggested looking into different types of hardware pieces. The vacuum pressing system being used in the wood shop at the Iowa State University has a removable arm with a twist-lock hardware piece. This inspired further exploration into similar hardware pieces. Striplock brand offers many types of connecting and joining hardware. The Clip 50 product (Fig 5.5-5.6) is strong enough for leg pieces and strong enough for commercial or architectural use.


For this product there should be cuts made to both the leg side and the connecting side so that the hardware piece sites flush with the surfaces. Once connected, the leg will not have any gap between the connecting pieces.

The option of having a drawer in this collection added another element of customization beyond just a tabletop and legs. There are many ways a drawer can be installed and function but considering this will be assembled by the customer it needs to be as simple as possible while also
functional. It is ideal to offer both the option of a drawer and an open shelf to maximize on aesthetic variation and configurations. A pocket drawer, or a drawer with no slider hardware, is a good option to try. If sliders were used, they would be visible for anyone that decided they wanted an open shelf option with no drawer. Pocket drawers can be a successful option if they are constructed correctly and accurately measured. The proportions of the drawer affect the ease of motion when there are not sliders to guide the drawer. Creating a prototype will indicate if a pocket drawer is a feasible option for this design.

Figure 5.6. Striplox Clip 50 Infographics Part Two, Courtesy of Striplox
The next step in this process is to take the research and decisions made regarding construction and see how they work together as a single piece of furniture that is able to be customizable and adaptable. Once a physical prototype is made it can be analyzed for overall design proportions and function of the connecting mechanisms. To create a prototype, specification packets for each component needed to be created.

Prototype Specification

Plan drawings are important to have as a guide when beginning to build and they also allow for replication. Using Adobe Illustrator, full scale drawings were created of each separate component of the table collection. Once the full-scale drawings were complete, specification packets were made to communicate dimensions, construction details, materials, hardware pieces, and so forth. The type of specification used to create new products is called prescriptive specifications. It gives specific details regarding measurements and construction details.

The specification information was laid out on eight and a half by eleven-inch sheets including technical drawings of each view of the table components. This step in the process was adopted by the work processes followed during the author’s time at Kate Spade New York as a handbag designer and adapted it to best fit the needs of furniture design. Specification packets are important at multiple phases of design, beginning with prototype packets. These are the

115 Kilmer, Designing Interiors, 170.
instructions that the maker follows to properly construct the prototype. There are details or errors that could be edited during the process of creating technical drawings or calling out the dimensions and details.

Building a prototype is the best way to catch errors and make improvements on a design before working on the final pieces. The intent of the prototype was to communicate and demonstrate the intention of the concept, a modular furniture system that has interchangeable components that can be assembled and disassembled. These components are the basic proportions and functions that will develop into the detailed products moving forward. Originally a scaled model was going to be produced but once the connecting hardware had been found it seemed more applicable to build a full-scale prototype to best understand how the hardware pieces can function for this concept.

The following pages are the specification packets created as a guide to constructing the physical prototype of each component (Fig 5.7-5.36).

---

116 The Complete Book of Woodworking, 19.
Figure 5.11. Drawer Specification Page One
Figure 5.13. Drawer Specification Page Three

TOP VIEW

BACK, SIDES, AND FRONT PIECES HAVE NOTCH ALONG BOTTOM. BOTTOM PIECE INSERTS INTO NOTCH TO BE GLUED AND SECURED

BOTTOM VIEW

1/2"

1/2"

13 3/8"

13 3/8"

LOGO (CENTERED)

LEATHER INLAY
Figure 5.14. Drawer Specification Page Four
<table>
<thead>
<tr>
<th>PAGE 1 OF 4</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SEASON:</td>
<td>FALL 2020</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DATE:</td>
<td>10.31.2019</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROUND:</td>
<td>PROTO</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DESIGNER:</td>
<td>TAYLOR</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STYLE NUMBER:</td>
<td>T11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STYLE NAME:</td>
<td>19 INCH SQUARE TOP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOGO:</td>
<td>BOTTOM CENTER</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATERIAL:</td>
<td>TBD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TRIM:</td>
<td>NONE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FINISH:</td>
<td>NATURAL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOTES:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ADD PROFILE DETAIL AT NEXT ROUND</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 5.16. Square Top Specification Page Two
<table>
<thead>
<tr>
<th>SEASON:</th>
<th>FALL 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE:</td>
<td>10.31.2019</td>
</tr>
<tr>
<td>ROUND:</td>
<td>PROTO</td>
</tr>
<tr>
<td>DESIGNER:</td>
<td>TAYLOR</td>
</tr>
<tr>
<td>STYLE NUMBER:</td>
<td>TT2</td>
</tr>
<tr>
<td>STYLE NAME:</td>
<td>22 INCH ROUND TOP</td>
</tr>
<tr>
<td>LOGO:</td>
<td>BOTTOM CENTER</td>
</tr>
<tr>
<td>MATERIAL:</td>
<td>TBD</td>
</tr>
<tr>
<td>TRIM:</td>
<td>NONE</td>
</tr>
<tr>
<td>FINISH:</td>
<td>NATURAL</td>
</tr>
<tr>
<td>NOTES:</td>
<td>ADD PROFILE DETAIL AT NEXT ROUND</td>
</tr>
</tbody>
</table>

Figure 5.19. Round Top Specification Page One
SIDE VIEW

3/4"

"THERE WILL BE A PROFILE DETAIL ADDED NEXT ROUND"
<table>
<thead>
<tr>
<th>PAGE 1 OF 4</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>SEASON: FALL 2020</td>
<td>DATE: 11.4.2019</td>
</tr>
<tr>
<td>ROUND: PROTO</td>
<td>DESIGNER: TAYLOR</td>
</tr>
<tr>
<td>STYLE NUMBER: TT3</td>
<td>STYLE NAME: 34X19 INCH RECT. TOP</td>
</tr>
<tr>
<td>LOGO: BOTTOM CENTER</td>
<td>MATERIAL: TBD</td>
</tr>
<tr>
<td>TRIM: NONE</td>
<td>FINISH: NATURAL</td>
</tr>
<tr>
<td>NOTES:</td>
<td>ADD PROFILE DETAIL AT NEXT ROUND</td>
</tr>
</tbody>
</table>

Figure 5.23: Double Top Specification Page One
**THERE WILL BE A PROFILE DETAIL ADDED NEXT ROUND**
Figure 5.27. Base Connector Specification Page One
Figure 5.28. Base Connector Specification Page Two
Figure 5.29. Base Connector Specification Page Three
<table>
<thead>
<tr>
<th>SEASON:</th>
<th>FALL 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE:</td>
<td>10.08.2019</td>
</tr>
<tr>
<td>ROUND:</td>
<td>PROTO</td>
</tr>
<tr>
<td>DESIGNER:</td>
<td>TAYLOR</td>
</tr>
<tr>
<td>STYLE NUMBER:</td>
<td>L1</td>
</tr>
<tr>
<td>STYLE NAME:</td>
<td>LEG 1</td>
</tr>
<tr>
<td>LOGO:</td>
<td>NONE</td>
</tr>
<tr>
<td>MATERIAL:</td>
<td>TBD</td>
</tr>
<tr>
<td>TRIM:</td>
<td>NONE</td>
</tr>
<tr>
<td>FINISH:</td>
<td>NATURAL</td>
</tr>
</tbody>
</table>

**NOTES:**

---

**Figure 5.31. Leg One Specification Page One**
Figure 5.32. Leg One Specification Page Two
Figure 5.33. Leg One Specification Page Three
Figure 5.35. Leg Two Specification Page Two
Prototype Construction Process

To begin the process of building the prototype professor Christopher Martin was consulted. Martin is a Professor in the Department of Art and Visual Culture at Iowa State University (ISU) as well as a furniture designer-maker. If this collection were to be manufactured labor prices need to be considered. Re-sawing, measuring, cutting, gluing and assembling each individual piece is very time consuming. Martin suggested making the prototype with the CNC router to save on construction time. The CNC (computerized numerically controlled) router automatically controls the movement of the bit and table. The CNC router is a computer aided router that cuts pieces quickly and efficiently.117

To be cost effective the prototype was made out of medium-density fiberboard (MDF). MDF is made from refined fibers with a synthetic resin and binder. With the presence of moisture, heat and pressure, the boards are produced. This material allowed for the prototype to be full-scale and a fraction of the cost of hardwood. In MDF the prototype was also strong enough to test construction techniques and joinery.118 Originally the prototype was going to be a half-scaled model. After discovering hardware pieces to test it made the most sense to create a full-scale prototype to apply the hardware.

The next step in making the prototype was to meet with Jeremy Thurlby, supervisor of the CNC router at ISU. Thurlby also has a background in furniture manufacturing so his advice was very helpful and based on experience using the router in the furniture industry. In order to

cut the pieces for the prototype, the outlines needed to be uploaded to the software called V-
Carve. This was done by drawing full scale outlines of each piece in Adobe Illustrator, exporting
the file, and uploading it to V-Carve. Jeremy had the skills and knowledge to work V-Carve so
he took the Illustrator file and indexed it to the board and the router.

The initial strategy was to complete as much cutting as possible using the router to save
time on the building process. After speaking with Jeremy, it became clear that it wasn’t that
simple. The file created reflected miter cuts as well as pieces with cuts made on both surfaces.
In Jeremy’s experience it is better to cut mitered edges on a table saw versus the CNC router.
Not all routers have the bit required for making angled cuts of this size on hand. It takes very
little time to adjust a table saw to forty-five degrees and pass boards of the same size through it.
His recommendation was to cut them manually and simplify the technological side of the
process.

The two basic cuts made on the CNC router are called cut-through and pocket cuts. Cut-
through cuts are exactly what they sound like. The piece is cut all the way through the depth of
the board. Pocket cuts are cuts made that do not go all the way through the material. Based on
the thickness of material that was used for the prototype a quarter inch bit was be used for pocket
cuts and a half inch bit will be used for cut-through areas. The software V-Carve translates the
line drawings and makes them into step by step instructions for the computerized router. Pocket
cuts are done first and then followed by the cut through areas. In order to keep the board in place
for the entirety of the cutting process the pieces are held in place with small tabs every few
inches so there are not loose pieces on the board. This meant that once all cutting was complete
on the CNC router the tabs needed to be manually removed.
When setting up the digital file to send to Jeremy it was important to understand these different types of cuts. The cut types are communicated with different layers in the drawing created in Adobe Illustrator. Two layouts were created to cut all necessary pieces. Outlines needed to be placed with at least five eights inch in between to accommodate for edges and the router bit clearance. While setting up the cut layout the question of making cuts on both sides of the board came into question. It is possible to do so, but it requires more time. In order to do that successfully one file needed to be indexed and cut. Next the board would be physically flipped the and aligned perfectly to the router to then index and cut the file for the second side. The time it would take, and the risk involved with incorrect placement due flipping the board led to the decision of manually cutting the second side. There were only a few pocket cuts that were done with a drill press very quickly and faster than the alternative to adjusting the router.

The final cut layouts were sent and indexed by Jeremy (Fig 5.37-5.38). The first time the file uploaded to V-Carve it was not translating correctly. After analyzing the Adobe Illustrator file, it was discovered that some of the layers had white filled shapes and others had no fill. All shapes needed to have no fill in order for v-carve to translate the cuts correctly. These layers were adjusted and sent once again to Jeremy. The layout was approved and ready to be cut.
Figure 5.37. CNC Router Layout One
Before starting the router, the large MDF boards were placed on the table (Fig 5.39). Clamps were used along the sides to help keep the board in place (Fig 5.41).

The router was turned on and adjusted to pick up the quarter-inch bit. It moved to the correct areas where pocket cuts were to be made. The amount of dust created was more than expected but Jeremy ensured that it would not interfere with the remaining cuts or placement. Images were taken to document the cutting process (Fig 5.40, Fig 5.42, Fig 5.43). The speed was controlled by settings before cutting began. The router was set on a slower setting to limit tear out and make clean cuts.

Figure 5.39. MDF Board on CNC Router Table
Once the first board was finished being cut it was removed from the table and replaced by a new board. When shopping for MDF the goal was to find one three-quarter inch board and one half-inch board. Those would create enough pieces with correct thickness without needing to adjust any of the pieces before or after cutting with the router. Unfortunately, the only thickness available was three-quarter inch. The drawer pieces were designed to be half-inch thick and the drawings had already been completed to reflect that. After gaining some experience from the first board, the layers were updated to accommodate for the changed thickness. In order to finish with the pieces being half-inch thick, the router needed to shave off a quarter inch of the material before making any cut-through cuts (Fig 5.44).
A lesson learned from this trial was that there was an incredible amount of dust from these preliminary pocket cuts. Jeremy continued to ensure that the dust would not interfere with the cutting process and he was correct. Something that was not anticipated however was the material warping during this process of removing thickness (Fig 5.45).

The board was warping which cause the depth of the bit to vary depending on the placement of the board. Tape was added to try to secure the edges of the board during the cutting process, but it was not enough to prevent errors in cutting (Fig 5.46).
Luckily, there was enough unused material on the second half of the board. The board was turned, re-indexed and the necessary pieces were cut out again. The second board took much longer to cut due to the initial cuts to adjust the thickness. When comparing the estimated time needed to mill, glue up, measure and cut it may not have saved much time.

Once both boards had been cut by the CNC router the pieces needed to be manually removed from the board. The small tabs holding the pieces in place were about a quarter-inch wide and an eighth-inch thick. The pieces were removed using a small hand saw and any remaining extrusion from the tabs were sanded off.

Taking Jeremy’s advice, the cuts made on the router were only straight cuts. The miter cuts on the box portion of the table needed to be done on the table saw. The saw was adjusted to forty-five degrees and cut all sides necessary for the box portion of the table. To make sure the joint is secure there were splines added to the center of the connection.
A wood spline fits into the angled, butted edges of perpendicular boards by cutting
grooves into to center (Fig 5.47-5.48). The spline the box pieces were set flat on the table and
cut once again with a forty-five-degree angle to make these cuts.

The wood shop at Iowa State University had scrap material available to use for the spline.
Strips were measured and cut to fit the grooves that were made in the box pieces.

The next step in this process was to glue up the box component (Fig 5.49). Applying the
right amount of glue was important for this joinery. If there wasn’t enough glue, the pieces
would be not stable. If there was too much glue it would spill out from the edges and cause a
mess. If not completely cleaned off it would affect the finishes applied. An even more
important detail to remember during a glue-up is ensuring the corners are a squared, ninety-
dergree angle. This was especially important for the box component because the drawer needs to
fit and function smoothly inside. If the corners are not perfectly square, the drawer will not fit.

The clamps were left in place for two hours while moving on to sanding off the tabs on
the drawer pieces. The drawer pieces came from the second board that had preliminary cuts to
reduce the thickness to be half inch. The other cuts made on these pieces were pocket cuts for
the notches along the bottom of the pieces where the base fits in. The process of gluing the
drawer was similar to the first box. The main difference was aligning the base piece into the
notches of the other pieces instead of aligning the splines and mitered edges. Checking for
squared corners on the drawer is important for it to fit and function within the box component
the clamps were held into place for two hours.

---

One discussion that came up during the planning of the layouts was the option of having cuts made on both sides of the board. The time it would take to flip the board and load the second file to begin cutting it would take a lot of time and also create room for error if the board is placed slightly differently than before. The pieces were cut on one side with the CNC router and then the areas that needed cutting on the opposite side were done manually.

One piece that needed cutting on both sides was the base connector. One side had areas cut for magnet placement and on the other side there are areas cut for the leg attachment hardware. The leg attachment cut out was larger and more complex than the magnet cuts, so the simpler cuts were left to be done manually. Those areas were measured, marked and cut using a drill press with a half inch router bit (Fig 5.50). One challenge was the size of the drill press surface versus the size of the base connecting board. Keeping the board stable while pulling
down the drill to the correct depth was a challenge and it would have been helpful to take a little
more time if done again to add more clamps in place. Some of the magnet cuts were deeper than
they were supposed to be.

The other piece that required manual cutting was the drawer face. There were two holes
to be drilled on the drawer face for interchangeable drawer pulls. This was done with a power
drill and a one-eighth inch drill bit.

Once all pieces were cut it was time to apply the magnets. Because the holes were drilled
to the exact size of the magnet there was some concern of how they would fit. It’s best to have a
hole slightly larger than the magnet. Using a hammer, the magnets were placed into the holes.
They managed to fit tightly without glue. If the hole was a little bigger, glue could be added for
a more secured connection.
Two sets of legs were made. One tall set (Fig 5.51) and one short set (Fig 5.52). These were made under a restricted timeline due to shop availability. The goal was to demonstrate the varying options and functions of the table set. The short set was made using glued up MDF with the understanding that these legs would not be required to function structurally for a long period of time. The tall set of legs was made using white oak. Due to the limited time, the leg attachment hardware was screwed onto the top surface of the legs without first cutting out the area so the pieces would sit flush with the top of the leg.

All of the pieces were sanded at the edges to ensure there were no sharp pieces that could potentially be dangerous while assembling or disassembling the table set.
Prototype Review and Updates

Once the prototype was complete, each detail and function needed to be reviewed. Aesthetically there were changes to be made as well as functional updates. Assembling and disassembling each component multiple times revealed the changes that needed to be made. The following explains the changes to be made to any piece that requires updating.

The box component had a few changes to report. The proportions of the box were too large for this type of table system. Decreasing the height of the box will allow for more stacking options as well as a drawer that is a more traditional height. When drawing the layout for the CNC router, the magnet opening was drawn to the exact size of the magnet. It was appropriate to increase these openings to be slightly larger than the magnet to allow for glue and easier assembly. While constructing the box, there was not enough material to include the back panel. This should be added in future samples.

The drawer component was updated to mirror the changes in the box dimensions. The drawer dimensions need to be smaller than the box opening in order for the drawer to function smoothly. If the drawer is too big it won’t fit in the box and if it’s too small, it will not be stable within the box. The original design had the drawer face dimensions as wide as the overall box front. This was not aesthetically pleasing. The drawing was updated to reflect an update that has the drawer face slightly overlapping the box opening instead of fully covering it.

The tabletop sizes were all updated. The square top was updated to be smaller and the circle top was updated to be wider. The top that corresponds with two boxes next to each other was also reduced in size.
The base connector piece was updated to reflect the size changes made in the box component. On the bottom side of this piece there were cuts made to create a stepped edge. Once the pieces were assembled this detail was not visible, so the decision was made to remove it. This will also save time during the construction process.

There were a variety of ways that the prototype components could be configured. The box could stand alone with the round top or squared top. There is also the choice of tall legs or short legs. The boxes could be connected and placed next to each other using the base connecting piece. The double top would work in this configuration. Enough pieces were developed to demonstrate the overall concept of this collection (Fig 5.53-5.54).

There were many takeaways from testing the function of how the components connect. The magnet holes that were manually cut had extra space and the magnets didn’t hold as strong as the holes cut on the CNC router. Glue was placed in these areas to add security, but the magnets still came loose after a few uses. The magnets placed in the holes cut by the CNC router stayed in place through all uses. The magnets were strong enough to keep the tops in place and also light enough to remove the tops without too much force.

Because there was limited time to finish constructing the prototype the leg attachment was attached to the surface of the top of the leg without first cutting an opening for the hardware to be flush with the top. The legs were not as secure as they would need to be to sell to a customer. As the prototype was built, the center of the leg hardware stuck up and there was a gap around the edges of the leg tops that caused some wobbling once assembled. Two things could be done to further test the stability of the legs. The first option would be to take more time to make the necessary cut outs for the hardware piece to sit flush with the leg. This would remove the gaps and reduce the instability of the legs. The second option would be to test out a
different piece of hardware that would be a twist-on method used in other furniture pieces. The concept was strong enough to continue design development and time could be taken at a later date to improve the structure of the collection.

Figure 5.53. Assembled Prototype Option One

Figure 5.54. Assembled Prototype Option Two
Trend Research

Color trends change seasonally and can vary across design categories. A fashion color is promoted annually, and the seasonal colors are typically selected by fashion and textile designers. During this trend analysis in Paris there were many variations of color observed. Black and white combinations are typically a staple used across seasons and that was the case this year as well. Cool grays and navy were used as neutral colors paired with mustards, greens, mauve, burgundy and orange. A trend page for color was assembled to demonstrate a color palette pulling the most common colors seen throughout the exhibit (Fig 5.55). This is the color palette that will be used for the furniture collection.

Materials have a longer trend cycle, whereas color combinations change each season. Materials may be popular across many design categories for long periods of time, and those materials are often defining factors when analyzing historical design. Shag carpet, for example, was a major home trend in the 1960s. The materials observed in Paris this year were a mix of new concepts and continued popular past materials (Fig 5.56). One of the most common trends this season was mixed materials. This trend has been around for a while but integrating new material types is new. There were some wood products with solid color blocking added. Woods and marbles combined to create unique pieces. One of the newer materials being used in this category is terrazzo. Terrazzo was once a very popular material used as flooring, and today its being mixed with other materials and often placed as a tabletop.

---

121 Kilmer, Designing Interiors, 496.
Figure 5.55. Color Trend Design Board
Velvet is another material that has continued to be a trend and is most often used in seating. Velvet has a more luxurious appearance and holds saturated colors well. Colorful velvets are seen more commonly today compared to neutrals.

In addition, leather trims were a trend observed in Paris this year. Leather was included in a wide variety of categories ranging from lighting, and seating and even case goods. Leather is a good way to incorporate interesting color, pattern and texture to a piece of furniture. Leather can be manipulated in creative ways to communicate designs such as embossing and perforation. This is one trend that is typically always followed but reworked and applied in new ways.

Caning was seen in the market this year being applied to doors and seat backs. This is a subtle detail that adds value to a piece because of the intricate details and time put into creating those pieces. Similar to caning is marquetry. Marquetry is a technique that has been used throughout history and was once again a trend in the furniture industry highlighting geometric shapes.

Mixed metals were a prominent trend in the furniture exhibits for 2020. This is similar to the first trend mentioned, mixed materials, but mixing metals is more specific and applies mostly to lighting and smaller home goods. Mixing metal types is one-way designers have followed this trend along with mixing different textured metals.

Another key material trend observed at this exhibit was colored glass. The very high-end brands used back painted glass for saturated color statements. This technique was seen on tabletops, light fixtures and artwork.
Figure 5.56. Material Trend Design Board
The last category of trend research was patterns. There were many patterns in the furniture that came from textured hard materials and textiles (Fig 5.57). Chevron patterns have been trending for a few years and the trend continues into 2020. This was achieved through upholstery stitching, marquetry patterns and directional woodgrain in furniture pieces.

Geometric shapes were another trending pattern type. Geometric tiles are often used in kitchens and bathrooms in a variety of colors. Wood marquetry often highlights geometric shapes furniture doors, tabletops and headboards. Wall coverings are an easy way to incorporate geometric shapes to a room as well.

A pattern that will never go out of style and continues to be incorporated into designs in unique ways is stripes. This year there were many stripes created with wood slatted benches and feature walls. Carving stripes into wood cabinetry is a simple way to incorporate this pattern on a small scale. One of the newer concepts observed as weaving roped through canvas to create striped artwork.

Patterns are often what make furniture pieces unique in their design and should not be overlooked. Color, material, and pattern are three important trends to research in order to design a successful new product line.

The exhibits and shows from Paris provided unique insight into the design trends of this coming year. Interior designers, buyers and competitors gathered to share the best of the best. This added great value and legitimacy going into the final collection proposal.
PATTERN TRENDS

CHEVRON

GEOMETRIC

STRIPES

PARIS 2020

Figure 5.57. Pattern Trend Design Board
Final Collection Material Proposal

The material for this collection could not be selected based solely on aesthetic preferences. The prototype created with the CNC router was made of MDF board. To incorporate the lessons learned through that process and still have some components cut with the router, the modular boxes will be made of plywood covered in a variety of thick solid veneers. Projects made in the industry today are almost always built using plywood with solid wood veneers because of the issue of expanding and contracting hardwood. If the box and base connector were made completely out of hardwood they would expand and contract and inhibit the function and connection of the components. Plywood is a very strong material that is reliable for commercial furniture production because of the alternating directions of the layered material. If sourced appropriately, plywood is also more sustainable than hardwood. To use plywood as the core material in these components they would need veneered material on the outer edges. Constructing furniture in this manner is also more sustainable for the slow-growing hardwood trees because of the reduction in material needed.

The remaining components will be made out of solid hardwood to match the veneer selected for the drawer, base connector, and box. A few important characteristics to consider when selecting wood are grain, color, and hardness. After careful consideration the following materials were selected to be used for this season of the collection; white oak, mahogany, walnut and painted poplar.

Incorporating a labeling program with third party verification for the wood being sourced is a great way to abide by positive environmental practices. This would give the consumer a

---

122 The Complete Book of Woodworking, 24.
123 Kilmer, Designing Interiors, 517.
125 The Complete Book of Woodworking, 48.
visual to identify that the brand does their part to maintain the resources on this planet. The Forest Stewardship Council (FSC) has organized a system that allows companies to document their sustainable path from harvesting materials to production and installation.\textsuperscript{126}

Selecting paint that is safe for the user and the environment is also important. Selecting paint with low VOCs, volatile organic compounds, is the best option. This collection includes components that are completely painted as well as components that have painted details. Selecting low VOC paint is another way to inform the consumer that the brand is conscientious of their wellbeing.

**Final Collection Design Proposal**

The final collection proposal was separated into two categories, solids and seasonal. The solids category was made up of the components developed through the prototype phase. They are as follows; square top, round top, double top, box, drawer, base connector, eighteen-inch square tapered legs, nine-point five-inch square tapered legs, twenty-two-point five-inch round tapered legs and two-point five-inch round tapered legs. The components were offered in white, white oak, mahogany, walnut, and black.

This offering allows for many different configurations depending on the needs of the millennial consumers. These components could be purchased as sets suggested by the brand or as individual pieces. This type of production is considered mass customization, which is when manufacturers produce customized products tailored to meet customers’ needs at mass production cost and speed.\textsuperscript{127} The solid category is meant to be continuously offered each season to ensure there are replacement components if consumers need to replace them. The aesthetics

\textsuperscript{126} The Complete Book of Woodworking, 36.

\textsuperscript{127} Azouzi, “Exploratory Case Studies On Manufacturing Agility In the Furniture Industry,” 425.
of the solid category were designed to be simple and fit the preferences of a wide audience while still allowing for creative customization. (Fig. 5.58-5.59). Tables could be made out of components of matching materials, or components with varying materials could be mixed for a color blocking effect (Fig. 5.60).

The second category is seasonal. As a new brand, introducing new products every season can be overwhelming to maintain so the strategy is to add only a few new items each season. Limiting the number of components being produced at a given time is necessary to support mass customization. There are five seasonal sets proposed here and there would be five new sets introduced on a quarterly basis. The seasonal components would remain in production for one year and then be discontinued to make room for new product. Each seasonal set includes a few unique components and a few solid components to make one complete item.

Each seasonal set is named after a street in Des Moines, Iowa, where the collection was designed. Assigning a product name and SKU (stock-keeping-unit) number allows for consumers to search specific products on the website and on other browsers linking to the brand website. The SKU number is also helpful in tracking orders and history of purchases and production. The first two letters in the SKU number are the initials of the set name, followed by the year and the number assigned to that set. For example, Court Ave. was numbered CA202003. This will help to stay organized moving forward.

The first proposed set is called Cherry Street (Fig. 5.61). This group of components pulled from the trend of mixing materials. The unique pieces are the top, boxes and drawers. The legs and base connector are from the standard solid assortment. Terrazzo and gunmetal hardware were selected to communicate the idea of mixing a variety of materials for visual

---

interest. The terrazzo includes colors from the seasons color palette with pops of orange and neutral grays. The SKU number for this set is CS202001.

The second set is called Mulberry Street (Fig. 5.62). Taking note of the leather trims trend observed in Paris this set features black pebbled leather inlays and wrapped hardware. The unique components to this set are the drawer and legs. The top and box are from the solids assortment. The SKU number for this set is MS202002.

Court Avenue is the name of the third set proposed (Fig. 5.63). This set features angled grains with small cuts made with a trim router to create a chevron pattern. The unique components in this set are the top and two different drawer options. The box, base connector and legs are from the solids assortment. The SKU number for this set is CA202003.

The fourth set is called Grand Avenue (Fig. 5.64). Combining the caning and marquetry trends this set has unique features. The details on the drawer fronts are thin white oak veneers inlayed in a traditional caning weave pattern. The unique component in this set is the drawer. All of the other components that make up this set come from the solid assortment. The SKU number for this set is GA202004.

The final proposed set of this season is called Locust Street (Fig. 5.65). This set pulled from the stripe trend that continues into 2020. There are two unique drawers in this set. One drawer face was made with a vertical wood grain and thin vertical white painted stripes. The other drawer face was made with horizontal wood grain and thin horizontal white painted stripes. The drawers could be configured in a variety of ways other than how the image depicts them. Besides the drawers, the remaining components are from the solid assortment. The SKU number for this set is LS202005.
Figure 5.58. Solids Assortment Page One
CONFIGURATIONS SOLIDS:
CONFIGURATIONS COLORBLOCK:
Figure 5.61. Cherry Street Design Board

SKU # CS202001

SET INCLUDES:
- TERRAZZO DOUBLE TOP
- STRIPE HARDWARE BOX LEFT
- STRIPE HARDWARE BOX RIGHT
- WHITE OAK BASE CONNECTOR
- WHITE OAK 18" SQUARE TAPERED LEG
- TERRAZZO DRAWER (X2)

MATERIALS USED:
- WHITE OAK
- TERRAZZO
- GUNMETAL HARDWARE
- ORANGE VELVET WITH EMBOSSED LOGO
Figure 5.62. Mulberry Street Design Board

SKU #: MS202002

SET INCLUDES:
- Mahogany square top
- Mahogany box
- Mulberry Street leg
- Mulberry Street drawer

MATERIALS USED:
- Mahogany
- Brass hardware
- Black pebbled leather
- Mustard velvet with embossed logo
Figure 5.63. Court Avenue Design Board

SKU # CA202003

SET INCLUDES:
- COURT AVE TOP
- WALNUT BOX (X2)
- WALNUT 2.5" ROUND TAPERED LEG
- COURT AVE DRAWER LEFT
- COURT AVE DRAWER RIGHT
- WALNUT BASE CONNECTOR

MATERIALS USED:
- WALNUT
- MATTE BLACK HARDWARE
- NAVY BLUE VELVET WITH EMBOSSED LOGO
SKU # GA202004

SET INCLUDES:
- BLACK SQUARE TOP
- BLACK BOX (X2)
- BLACK 9.5” SQUARE TAPERED LEG
- GRAND AVE DRAWER (X2)

MATERIALS USED:
- BLACK PAINTED WOOD
- WHITE OAK VENEER
- MATTE BLACK HARDWARE
- FOREST GREEN VELVET WITH EMBOSSED LOGO

Figure 5.64. Grand Avenue Design Board
Figure 5.65. Locust Street Design Board
CHAPTER 6. MARKETING

Brand

The brand development took place after designing the first round of products. The concept is designed for millennial consumers, so the name needed to connect to that age group. Part of the inspiration behind this product concept came from the author moving four times in New York City. The difficulty moving furniture in small, walk-up apartment buildings prompted the idea to disassemble the pieces for a smoother moving experience. The author’s experience was similar to an episode of the popular television show, Friends. Episode sixteen of season five, the characters attempted to move a large sofa in a narrow stairwell. One of the characters yells, “Pivot!” repeatedly while panicking and trapped by the sofa. This scene is memorable to fans and was seen by many viewers. During this season of the show it became the number two television series in the United States.¹²⁹ This moment in television history inspired the name for this brand. Pivot.

The logo for the brand is simply the name, Pivot, in the font Futura. In some cases, there is a rectangular outline surrounding the name. The mission of this brand is an accumulation of all of the evidence collected throughout the literature review and the survey. Providing an assortment of products that will meet the needs of millennial consumers while reducing the waste from furniture products.

Website

The internet has given millennial consumers the ability to interact with companies immediately and directly. The literature review covered the consumer purchasing. The “search stage” is an important phase of the purchasing process and it involves the internet because of the immediate responses and existing habits of consumers today. Giving consumers access to an easy to use website promotes communication and sales (Fig. 6.1).

There are a few initiatives that the brand would like to promote when engaging consumers and this will be done through the website as well as other platforms. Offering interchangeable components that could adapt to the changing needs and wants of the millennial consumers is the highlight of this collection. The website will have a tab along the top that leads to a interactive web page on the website. Here consumers can browse suggested sets and individual components to build their own furniture piece. The goal was to make this as easy as possible for the consumer while also giving them creative freedom to combine components in a way that is unique to their space and style (Fig. 6.2).

Another tab on the website homepage is for custom requests. This page will give the consumer the option to contact the designer to inquire about custom pieces. This could include custom designs using the materials already offered or completely new designs. No matter what the design decisions are, the joinery and connecting mechanisms must remain the same so that if one piece is customized it could still work with other components offered in the assortment. Customers could send in materials they already have in their possession to be incorporated into

---

the piece or request the designer to source a unique material. The customization service would come at a higher cost based on additional materials and time needed to produce the item.

Another marketing initiative communicated through the website would be the refurbished components program. A tab along the top of the website homepage will lead consumers to a page dedicated to refurbished products and also the instructions on how to return used components. Once pieces have been received and refurbished by the team, they will be posted on this area of the website. This page will also share statistics on waste from the furniture industry and how this program could help reduce the amount of materials that end up in landfills.

The final marketing initiative to help the brand stand out is sharing the information about the designers and how the products are made. This would be under the “about” tab on the homepage of the website. Sharing videos of the design process and production process will give millennial consumers an inside look into what goes into the products they are buying. Sharing images and biographies of the employees helps to connect the consumers and appreciate the products even more because they know who is putting time and effort into making them (Fig. 6.3)
Figure 6.1. Brand Website Homepage
BUILD YOUR OWN
Select a set below to enlarge and drag individual components to the box to create your own piece. Save your configurations to view them side by side.

Figure 6.2. Brand Website Build Your Own
PIVOT DESIGN CO.

PIVOT, was created for millennials by a millennial. Taylor Johnson worked as a handbag designer at Kate Spade New York before pursuing her Master of Arts degree in interior design. The changing lifestyles and needs of millennials were not being met by the furniture industry so Johnson designed a collection that was customizable and adaptable. Offering interchangeable components allows consumers to purchase furniture in sets or individual components to change the aesthetics and functions at any time.

Figure 6.3. Brand Website About
Social Media

Over 70% of American millennials engage in social media, and often on many platforms. Understanding that social media is a very important communication tool, it’s important to create accounts for this brand on a variety of platforms. The top ranked social media platforms are Facebook, Instagram and YouTube.

Something that many furniture manufacturers struggle with today is brand recognition and having the ability to gain consumer interest. Millennial consumers view social media as being an effective tool for building strong brand identity. Sharing the unique initiatives that this brand is proposing, like building your own furniture, refurbishing components and sharing behind the scenes information about the brand can be successfully done through social media. Videos are great marketing tools for gaining the attention of consumers. Sharing videos of the production processes, sketching, and employee interviews will connect consumers to the brand. Candidness and transparency through social media promote the idea that consumers can return the website or social media platforms to see new and exciting information on a regular basis.

Sharing appealing images of inspiration, process and production on social media promotes the idea that consumers should want to have those things in their own lives. Problem recognition occurs when consumers see a difference between their lives and the imagery

---

133 Leslie, “Fashioning Furniture: Restructuring the Furniture Commodity Chain,” 431.
135 Kilmer, Designing Interiors, 517.
promoted by others on social media creating a desired or ideal state. When consumers are inspired by people online such as celebrities or influencers it makes millennial consumers feel like they want those things as well. Getting the brand image and products shared by influential people would be a positive way to gain brand recognition among millennials.

**Offline Strategies**

Although the internet is where most people search for information today, off-line strategies could help gain online orders and inquiries. Tradeshows such as Maison & Objet are a great example of this. This exhibit which takes place in Paris shows thousands of brands’ innovative designs and trends for the year. Showing at an exhibit like this would introduce a new brand to high level designers and retailers from all over the world. This specific tradeshow even has an area dedicated to up-and-coming designers with innovative concepts.

In urban cities there are many places that display printed advertisements, such as billboards, digital ads, taxi and bus advertisements to name a few. Getting the logo and brand name in front of people visually can create interest if consumers have seen it enough.

Another off-line strategy that many successful brands implement is pop-up shops. Committing to a brick and mortar location for a store can be a financial risk when starting out. Offering pop-up shops would give consumers the opportunity to see, touch and try the products.

---

in person without committing to the bills that a permanent location would require. Brands like Lululemon, Goop, Kylie Cosmetics, and Central Perk create pop-up shop experiences that feel exclusive because of the limited availability. Having physical stores can be helpful for consumers who want to experience and touch the products before making a purchasing decision, especially when mass customization comes into play. With multiple configuration options and the fact that the consumers themselves would assemble the main parts of the furniture it would be helpful to have sales staff available to demonstrate and encourage consumers to try to use the products themselves.\textsuperscript{138} These well-known brands bring thousands of consumers out to a location they would have never had the opportunity to shop.

Creating an innovative product is useless without strong marketing initiatives to support it. Implementing a user-friendly website, an Instagram that shares behind the scenes imagery and interactive off-line strategies could gain consumer interest and make this a successful concept.

\textsuperscript{138} Lihra, “Mass Customization of Wood Furniture as a Competitive Strategy,” 216.
CHAPTER 7. CONCLUSION

The majority of millennials rent their homes\textsuperscript{139} and move often. Moving to a new home begs the question of what to do with the furniture millennials currently own. If a piece of furniture is too large, damaged, or out of style the owner could decide to throw it out. Twelve point one million tons of furniture ended up in the landfills in 2015 and unless something changes in the furniture industry this will continue.\textsuperscript{140} New homes often bring different layouts and space available. Sometimes furniture just doesn’t work in a different space. This is another reason furniture is thrown out. We’ve reached a point in society where changing out habits for the environment is a necessity and reducing waste from furniture is a good place to begin. Referencing a design concept, the author worked on in fashion accessories, a brand was design and proposed as a solution.

The first research questions the author began with was asking if there was a need in the market for customizable and adaptable furniture for millennial consumers. Do millennials value higher quality if there are interchangeable components, and do millennials understand what high-quality furniture materials and construction even are? Another important question is if millennials are aware of their wasteful habits? Would millennials react positively to promoting the reality that this brand proposal was designed by a female designer-maker? Offering a refurbishment program could help reduce waste but would millennials participate? Understanding if there were similar concepts on the market was important to designing something unique.

\textsuperscript{139} American Housing Survey 2017 Results: Millennials. 2017, 2.
The literature review answered many of the research questions. In today’s market, millennials expect customization. Individualization can add value to products made domestically\(^{141}\), and millennial consumers express themselves through custom products. Because millennials are the largest adult population today, they create a large portion of the waste that ends up in landfills. Dieter Rams believes that design can change consumer perceptions and is capable of promoting improvements regarding material and ecological qualities of products.\(^{142}\) When furniture is flexible enough to serve multiple functions it can also improve one’s quality of life. In this flexibility comes longevity. Women have typically been associated with textiles or ceramics in the world of craft, but less connected to furniture making. The tides are turning in regard to gender equality and millennials are leading the way.\(^{143}\) Showing their support for a brand is easy and immediate through the use of social media. Social media is an effective tool for building strong brand identity and gaining a following.\(^{144}\) There were questions that still remained after the literature review. Have millennials seen competitive concepts in the furniture market? Have they thrown out furniture for specific reasons such as damage or aesthetics? Are they interested in knowing who designs and makes the products they buy? Would they react positively to promoting the female designers and makers that are so rare in the furniture industry, and where do they learn and share information about new brands and products? How can a furniture collection achieve these goals?

\(^{142}\) Rams, Less But Better, 149.
\(^{143}\) Champlin,“How Brand-Cause Fit Shapes Real World Advertising Messages: a Qualitative Exploration of ‘Femvertising’,” 1255.
The methodologies used to answer the remaining questions were a survey, the design process, and marketing strategies. The survey was distributed through social media and one hundred millennials responded. The first set of questions covered demographics and the second section covered furniture opinions and experiences. The design process allowed for hands on experience in exploring and problem-solving furniture designs. Hand sketches were done for initial concept of interchangeable components followed by technical drawings and specification packets for each component. The specification packets were used to build a physical prototype to understand how to best construct this type of collection. After learning from the prototype, a final collection was designed based on trends observed at a high-end exhibit in Paris, France.

Marketing ideas are crucial to new businesses and specific initiatives were brainstormed to help this concept stand out in the market.

The survey provided great insight into what millennial consumers want in their furniture. The millennials surveyed responded very positively when asked about keeping furniture longer if they could change out specific components. Sixty two percent said they have thrown out furniture because they no longer liked the way it looked and 79% agree or strongly agree that they would keep the piece longer if they could easily change its’ appearance. Similarly, 76% of the respondents agree or strongly agree that they have thrown out furniture because it was damaged. (Fig. 2.5) Creating a furniture collection that could change the appearance easily or replace a damaged component is the answer to meeting the needs of millennial consumers and reducing waste from the furniture industry. Sixty three percent responded that they value brands that implement sustainable practices and this concept in-of-itself is more sustainable than traditional furniture pieces. Using strong females to design and promote the brand is unique in the industry and 75% of the survey responses showed that they support furniture makers that
have been underrepresented in the industry. Having a new design concept is great but only if people are aware of it. Eighty one percent of the millennials surveyed said they go to the internet to learn about new products and 75% use Instagram specifically. The survey confirmed that there is a gap in the market for customizable and adaptable furniture.

Developing a prototype was informative to understanding the best way to construct such a concept. The purpose of the prototype was to demonstrate and experiment with joinery mechanisms that would all for easy assembly and disassembly. The magnets used were strong enough to guide the components into the correct placement and hold them there without making it too difficult to take apart. The leg attachment was not as successful partly due to the way it was assembled. Taking more time to attach the hardware would have shown a more realistic demonstration of the strength and reliability of the pieces. Seeing the full-scale prototype prompted immediate updates of size and proportions of the general components. Creating another round of samples based on the knowledge gained from the prototype round would undoubtedly present a more successful sample.

The price point of the collection would vary based on the category and materials. To be profitable and ensure good quality it would need to be in a medium to high price point. After the research has been completed it is worth noting that for any brand it is best to not alienate anyone. There needs to be careful consideration on how it advertises towards millennials. Many of the functional needs would be most useful to consumers in urban areas. Advertisements that display functional changes should be most heavily focused in larger cities.

Beyond the research that has been done it would be helpful to understand the how to implement this concept as a profitable business plan. There needs to be more research done to know exactly how much these products should cost, how much time can be spend producing
them, and how many employees would be needed. The concept answers the research questions and fills the gap in the market but now we need to know how to best move forward.

The research that has been completed is important to the interior design industry for a few major reasons. Products are always evolving and improving as consumers needs change and evolve and this concept is one way of moving furniture into the future for millennials especially. Consumers have access to unlimited content online and their personal styles and preferences change much faster than they did for previous generations. Offering them a product that can change as quickly as they would like without needing to throw out older pieces promotes change and creativity in furniture design. People will also be willing to take more risk with unique designs in spaces if they know that they can change it at an affordable cost if they decide to go in another direction. This could help interior designers propose new and exciting designs to consumers that may have been previously been hesitant about color or pattern as part of their furniture selections. Another reason this research is important is because it is offering a way for furniture to address waste.

This project highlights the changing wants and needs of a consumer driven society. Giving consumers the option to buy new components every season without breaking the bank or adding to landfills is a creative solution. This process shows that developing any new product is best done following an evidence-based-design method. Developing more samples to propose a strong new concept to the furniture industry would be the next steps to take.

Millennials are ready for new furniture products and this collection could help pivot the furniture industry in a new direction.
REFERENCES


Koenig, Gloria. In Eames, 10. Taschen.


Qian, Xiaobo, and Alessandro Deserti. “Design Oriented Approaches to Mass Customization in Furniture Industry.”

“Say Hello to the Lid That Will Replace a Billion Straws a Year.” Say Hello to the Lid That Will Replace a Billion Straws a Year, 2019.


Tagliamonte, Sali, and Chris Roberts. “So Weird; so Cool' so Innovative: the Use of Intensifiers in the Television Series FRIENDS.” American Speech 80, no. 3 (2005).


APPENDIX.  IRB APPROVAL

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date:  03/04/2020
To:  Taylor Johnson  Diane Alshihabi
From:  Office for Responsible Research
Title:  Customizable and Adaptable Furniture
IRB ID:  20-083
Submission Type:  Initial Submission  Exemption Date:  03/04/2020

The project referenced above has been declared exempt from most requirements of the human subject protections regulations as described in 45 CFR 46.104 or 21 CFR 56.104 because it meets the following federal requirements for exemption:

2018 - 2 (i): Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) when the information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

The determination of exemption means that:

- You do not need to submit an application for continuing review. Instead, you will receive a request for a brief status update every three years. The status update is intended to verify that the study is still ongoing.

- You must carry out the research as described in the IRB application. Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, nature or duration of behavioral interventions, use of deception, etc.), any change in privacy or confidentiality protections, modifications that result in the inclusion of participants from vulnerable populations, removing plans for informing participants about the study, any change that may increase the risk or discomfort to participants, and/or any change such that the revised procedures do not fall into one or more of the regulatory exemption categories. The purpose of review is to determine if the project still meets the federal criteria for exemption.

- All changes to key personnel must receive prior approval.

- Promptly inform the IRB of any addition of or change in federal funding for this study. Approval of the protocol referenced above applies only to funding sources that are specifically identified in the corresponding IRB application.
Detailed information about requirements for submitting modifications for exempt research can be found on our website. For modifications that require prior approval, an amendment to the most recent IRB application must be submitted in IRBManager. A determination of exemption or approval from the IRB must be granted before implementing the proposed changes.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Additionally:

- All research involving human participants must be submitted for IRB review. Only the IRB or its designees may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

- Please inform the IRB if the Principal Investigator and/or Supervising Investigator end their role or involvement with the project with sufficient time to allow an alternate PI/Supervising Investigator to assume oversight responsibility. Projects must have an eligible PI to remain open.

- Immediately inform the IRB of (1) all serious and/or unexpected adverse experiences involving risks to subjects or others; and (2) any other unanticipated problems involving risks to subjects or others.

- Approval from other entities may also be needed. For example, access to data from private records (e.g., student, medical, or employment records, etc.) that are protected by FERPA, HIPAA or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. An IRB determination of exemption in no way implies or guarantees that permission from these other entities will be granted.

- Your research study may be subject to post-approval monitoring by Iowa State University’s Office for Responsible Research. In some cases, it may also be subject to formal audit or inspection by federal agencies and study sponsors.

- Upon completion of the project, transfer of IRB oversight to another IRB, or departure of the PI and/or Supervising Investigator, please initiate a Project Closure in IRBManager to officially close the project. For information on instances when a study may be closed, please refer to the IRB Study Closure Policy.

Please don’t hesitate to contact us if you have questions or concerns at 515-294-4566 or IRB@iastate.edu.