

A Phenomenological Exploration of the Apparel Sizing Practice of Small Womenswear
Businesses

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This dissertation is dedicated to my advisor, Dr. Elizabeth Bye, for her steadfast belief that I could finish a two-year project in half the time.

Abstract

Inconsistent garment sizing has plagued the apparel industry from its inception. Solutions to the problem require large anthropometric databases and advanced skills in statistical analysis, which small businesses have no access to or training in. To give a voice to those engaged in sizing practice, this study conducted a phenomenological inquiry into six small womenswear business' experiences regarding sizing practice. Findings suggest three major influences on sizing practice: Financial Resources, Experience, and Designer Mindset; and three themes are presented regarding how decisions about sizing are incorporated into the apparel design process: Timing of Decisions, Fit Model, and Design Intent. This study concludes with suggestions for how to incorporate technical design and entrepreneurship into apparel design curricula to better serve the student interested in design entrepreneurship, suggestions for easy improvement of sizing practice for small womenswear businesses, as well as suggestions for future research in sizing.

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Chapter 1 Introduction

Introduction

Donald Norman states that “Good designers never start by trying to solve the problem given to them: they start by trying to understand what the real issues are” (2013, p. 218). Sizing is a contentious issue in apparel: it is inconsistent across the industry, resulting in customer confusion and, often, frustration during the shopping experience. Inconsistency in sizing requires customers to remember large amounts of mostly arbitrary information in their head; for while the representations of sizing (i.e. S, M, L, or 2, 4, 6, 8) do have meaning when placed together (i.e. size 4 is larger than size 2), sizes themselves have no set relationship to the dimensions of the human body. Each apparel business has a slightly different way of setting the relationship between the representations of sizing and the dimensions of the human body.

A common error in problem solving is to solve the wrong problem (Norman, 2013). It matters little that the solutions are elegant; they do not account for the root causes of why apparel businesses invent their own sizing. Most apparel academics have addressed the most accessible aspect of sizing practice: methodologies for how to create an accurate sizing system for a population. The proposed methods did not take the consumers of the product (i.e. apparel businesses) into account during design, which resulted in a product that ill-suits the everyday realities and capabilities of apparel businesses. To better understand the root causes of inconsistent sizing so as to discover the real issues that must be addressed in order to improve sizing practice industry-wide, this study listened to six small womenswear businesses describe their experiences with sizing, concluding with two narratives describing the two distinctive practices discovered amongst the group. This chapter explains the rationale and significance of this study, the problems with sizing system methodologies, proposes two research questions, brackets the researcher’s experiences with apparel sizing practice in a small womenswear business, and lists definitions of key terminology before outlining the remaining chapters.

Rationale & Significance

The global women’s apparel market is estimated at \$621 billion, with the United States contributing an estimated \$385.7 billion, or roughly half, of this total (Fashion

United, 2017). SCORE (2016) found that 90% of Americans shop at small businesses at least once a week, with 34% visiting clothing/accessories stores, helping small businesses generate 54% of all U.S. sales. In essence, small apparel businesses in the United States could generate around \$208 billion, and routinely serve around 105 million Americans.

With the ability to impact a third of the US population and potentially a third of the global women's apparel market, small womenswear business' practices should be researched. Currently, voices from small womenswear businesses are not found in academic literature regarding sizing. Understanding the way these businesses function provides vital information on the state of the general apparel industry; information which can impact US trade policy and academic curricula.

Problem Statement

One of the most controversial aspects of women's clothing is sizing. A garment's size represents one specific set of dimensions that define the fit of the garment and the body type the garment is meant for (LaBat, 2007). The biggest issue with sizing is that it is inconsistent, with each business generating their own sizing system for their own target customer (Chun, 2007). This practice grew from the inception of standardized sizes in ready-made clothing, which developed haphazardly over the last two centuries (Aldrich, 2000, 2007). Developing standard units of measurement, anatomical landmarks, pattern-drafting systems, and grading systems was done primarily via trial-and-error by a myriad set of individuals (Aldrich, 2000, 2007). In addition, it is highly likely that tailors and dressmakers used their personal clients, assumptions, and methodologies as the basis for their sizing systems (Aldrich, 2000, 2007).

To solve the issue of inconsistency in sizing, the US government has proposed numerous voluntary sizing standards over the last 70 years for apparel businesses to use. Sizing standards are published documents that provide classifications, size designations, and body measurements for the total range of size and fit combinations of a specific population (LaBat, 2007). These voluntary sizing standards focus on the "average" man, woman, and child for the total US population, rather than on the specific target markets that apparel businesses focus on serving. In addition, these voluntary sizing standards fit the US population poorly since they are not based on anthropometric data, which is considered a necessity for accurate sizing (Petrova, 2007).

In response to the poor execution of voluntary sizing standards, academics have proposed sizing systems based on anthropometric databases (ex. CAESAR©) that use verifiable statistical practices (ex. principle component analysis and multivariate regression), which are shown to fit the targeted databases better than the voluntary standards (Staples & DeLury, 1949; Salusso-Deonier, 1982; Ashdown, 1998; Salusso, Borkowski, Reich, & Goldsberry, 2006; Xia & Istook, 2017). While accurate, solutions to the problem of ‘how to create a reliable sizing system’ do not address the needs or constraints apparel businesses face regarding sizing practice.

The greatest difficulty with the proposed academic sizing system methodologies is the requirement of a large, representative, and accurate anthropometric database from which to pull body measurements from. Governments and large corporations generally have the funding and human resources to requisition and analyze such databases to create and update their sizing systems. Most small apparel businesses do not. Small businesses account for 78.5% of non-employer businesses (i.e. businesses without employees; Small Business Administration, 2012), meaning most small businesses are run by a single person. This individual’s attention is divided between every aspect of running a business (ex. designing, marketing, accounting, selling, distribution, etc.). Without the time, human resources, funding, or training required to gather and analyze anthropometric data, small businesses cannot use the sizing methodologies suggested by academics.

Purpose & Research Questions

Research in sizing has stalled in the ‘how to create a reliable sizing system’ phase because researchers are not addressing the real needs of apparel businesses. As Donald Norman (2016) argues in *The Design of Everyday Things*, designers must design for how people *actually* do things, not how we wish they did things. Sizing systems are designed products, thus the needs and constraints of all sizes of apparel businesses, but especially those with less access to time, human resources, funds, training, and data, must be considered to best serve the entire apparel industry. This study began the discovery process through enquiries into the sizing practice of six small womenswear businesses. Apparel sizing practice includes the processes of designing, evaluating, and implementing the body and garment sizing systems for a business.

The goal of this study was to formulate a narrative of sizing practice that explains what influences sizing for small womenswear businesses to aid in improving academic curricula and developing future sizing research queries. Therefore, the purpose of this phenomenological study was to describe small womenswear business' experiences regarding apparel sizing practice. The research questions were:

1. What influences apparel sizing practice in small womenswear businesses?
2. How are decisions about sizing incorporated into the apparel design process?

Researcher Assumptions

Philosophical assumptions underpin all research, but in qualitative research it is imperative that they be made explicit. This section describes the interpretive framework underpinning the views of the researcher and how this interpretive framework applies to this study, as well as provides a description of the researcher's history with the research topic for the purposes of bracketing.

The interpretive framework utilized by the researcher is pragmatism. Pragmatism is a framework whereby the researcher is not committed to any one philosophy or reality. Instead it is believed that reality is what is useful, practical, and what works at the time, and should be viewed through multiple contexts to reflect both the views of the participants as well as those of the researcher. Operationally, pragmatists focus on the outcomes of research (i.e. actions/situations/consequences), particularly practical implications. Generally, the research process involves both quantitative and qualitative strategies, and both objective and subjective evidence are collected and analyzed. (Creswell, 2013).

To study sizing system usage by small womenswear businesses, this researcher first acknowledges that every small womenswear business experiences using sizing systems based on their specific target market, the culture they design for, and their own beliefs and assumptions about sizing, which are rooted in their training and life experiences. Second, this researcher acknowledges that my values, as well as the values of the small womenswear businesses, impact the study, and that multiple views must be heard to gain a comprehensive description of apparel sizing practice. To do this, the researcher collected stories from small womenswear businesses about their experiences with sizing. The qualitative research strategy of phenomenology was used as it was ideally suited to

describe what and how phenomena occur, allowing the researcher to find common meanings for the phenomenon from multiple viewpoints (Creswell, 2013).

After graduating with a Bachelor's degree in apparel design, this researcher moved to a large midwestern city and opened a women's custom-fit clothing store. The store utilized body scanning equipment and computer-aided design (CAD) software to custom-fit pre-designed outfits to customers. Customers were scanned and chose a garment which was altered to fit their body in CAD. The body scanner provided comprehensive body dimensions and an avatar for fitting, while a special CAD module automatically adjusted pre-graded patterns with measurements input from the scanner, but it was up to the researcher to input the correct measurements and tell the software which size to adjust from. To create grade rules, the researcher started with the ASTM D5585-95 (Reapproved 2001) *Standard Table of Body Measurements for Adult Female Misses Figure Type, Sizes 2-20*, using Excel to calculate grades. Due to the major differences between the standard and the customers, it took around four hours to alter a single garment, even with the automatic adjustments made by the CAD software. This led to an unsustainable business model, and the researcher closed the business after a year and a half. This experience led the researcher to return to graduate school to pursue research related to understanding and improving apparel production, with an emphasis on fit and sizing.

Overview

The introduction discussed the rationale and significance of the study, introduced the phenomenon to be studied, laid out the purpose and research questions, explained the interpretive framework used by the researcher, bracketed the researcher's experience with sizing system usage in a small womenswear business, and defined key terminology. Chapter two discusses the history of sizing, the conceptual framework utilized by this study, and briefly overviews apparel production practices. Chapter three outlines the methodology, including data collection and analysis strategies, and discusses the outcomes of two pilot studies. Chapter four presents findings from the interviews and discusses discovered themes as they relate to current academic literature. Chapter five concludes the study with actionable items for future research, policy changes, and recommendations for academic curricula planning.

Definitions

Body Sizing: A size chart (or multiple size charts) developed from body measurement data taken from anthropometric studies that represents the range of body types in a given population (Petrova, 2007).

Cost: The monetary value associated with the production, storage, maintenance, and distribution of apparel.

Garment Sizing: A size chart of finished garment measurements that are based on the key control dimensions for a garment (i.e. bust, waist, and hip) but do not need to follow the grade rules for the body size chart as the finished measurements are impacted by the garment design and textiles (Petrova, 2007).

Grade: The space between one size and the next for the major girths of a pattern (Schofield, 2007); also known as a “size interval” (Petrova, 2007).

Grading: The process of expanding a garment from a single base size to the multiple sizes of the size range (Schofield, 2007).

Size: A size represents one specific set of dimensions that define the fit of the garment and the body type the garment is meant for (LaBat, 2007).

Sizing Practice: Includes the processes of designing, evaluating, and implementing the body and garment sizing systems for a business.

Size Standard: A published document that provides classifications, size designations, and body measurements for the total range of size and fit combinations of a specific population (LaBat, 2007).

Sizing System Methodology: The statistical procedures used to systematically analyze an anthropometric database for the classification of sizes.

Sizing Systems: A sizing system represents the total range of size and fit combinations for a business’s total set of apparel product lines (LaBat, 2007).

Target Market: The subset of the population at which a company aims its product (Bougourd, 2007).

Chapter 2 Literature Review

Introduction

Understanding sizing systems from the perspective of small womenswear businesses involves many factors. This chapter outlines the history of sizing systems, explains the theoretical framework utilized in this research, discusses two key framework constructs related to apparel sizing, and provides a brief overview of apparel industry production and retailing practices.

History of Sizing Systems

Systems for sizing clothing developed haphazardly, beginning with the standardization of units of measurement (i.e. inches/centimeters) in the 18th century. Prior to measurement standardization, notches were placed along a strip of parchment at key garment locations so that tailors could draft patterns, copy existing garments, or adapt existing garment patterns into something new (Aldrich, 2000, 2007). With the standardization of units of measurement, the tape measure (a strip of fabric with units of measurement printed on it) replaced the notched strip of parchment (Aldrich, 2007). Even with the tape measure, developing patterns this way took an extensive amount of time and succeeded via trial and error (Aldrich, 2000). As such, patterns and the methods used to develop them were considered valuable commodities; a feeling assumed to be shared by apparel companies today.

The second aspect of measurement standardization was defining where measurements should be taken on the body. This was facilitated by the sudden general interest in “the mathematics of body proportion” (Aldrich, 2007, p. 17), which resulted in standard anatomical landmarks; key aspects in defining control points for the drafting and grading of garments (Aldrich, 2000). By the middle of the 19th century, most tailors were taking the bust and waist measurements from the body, rather than the garment (Aldrich, 2007).

Combining unit and landmark standardization with mathematical theories resulted in tables of measurements from which algorithms could be derived (Aldrich, 2007). Applications of mathematical principles to these measurement tables resulted in multiple pattern-drafting systems. From 1800 to 1870 two main types of pattern-drafting systems dominated: (1) reproduction of garments from existing garments, and (2) garments

created from body measurements based on anatomical landmarks (Aldrich, 2000, 2007). Within these two types, Aldrich's (2000) analysis of patterning texts from this time period led to a five-system taxonomy:

1. Pattern trace and simple geometry: These systems offered diagrams of garment shapes based on a few measurements.
2. Early divisional systems: Drafts used divisions of basic measurements, such as the bust, which allowed the development of "proportionate" sizing systems.
3. Direct measurement systems: Most of the measurements were taken from the body, but not all; some points were determined by the garment or the experience of the tailor.
4. Combination systems: a combination of divisional and direct measurements.
5. Systems based on anthropometry: More measurements were taken of the body than of the garment due to an increased interest in anatomy; these systems formed the basis for constructing relatively well-fitting size ranges for average-proportioned figures (pp. 176-83).

Being male and thus educated in mathematics, reading and writing, tailors were the originators of most of these systems. Tailors specialize in menswear, therefore the majority of measurement tables, pattern-drafts, and grading methods focused on men (Aldrich, 2000, 2007). With the rise in popularity of women's tailored jackets came the opportunity for tailors to serve female customers. They found the best solution to fit their female clients was through the dressmaker's (i.e. women who were trained in fine sewing for wealthy clients) 'inside-out' method, where layers of fabric were mounted on top of a cotton lining fitted to a specific figure (aka a 'body') to create the final garment (Aldrich, 2000, 2007). This 'body' essentially translated into a block pattern, which could be easily modified. It provided tailors with a base for applying theoretical proportionate body measurements, beginning the process of creating size ranges for womenswear (Aldrich, 2007). As literacy rates increased among women, dressmakers noted that tailors had made no provision for changes in breast shape for larger sizes, nor for differences between bust and waist measurements for various body types in their theoretical sizing systems (Aldrich, 2007). Thus, from the outset of sizing system methodology, women's sizing has been based on the needs and proportions of male bodies.

Grading systems emerged from pattern-drafting systems. Grading is the process of expanding a garment from a single base size to the multiple sizes of the size range (Schofield, 2007). A grade (aka a “size interval”, Petrova, 2007) is the space between one size and the next for the major girths of a pattern (Schofield, 2007). In the US standard grades are 1” for the smallest sizes, 1.5” for medium sizes, and 2” for the largest sizes, though there is no actual reason for this besides critical mass (Schofield, 2007). Two methods were invented for grading patterns in 1908:

1. Nesting, whereby the smallest size, medium size, and largest size patterns were drafted, then layered to form a ‘nest’. Lines were drawn to connect key points and the remaining sizes were marked off along these lines.
2. The Shift Method, whereby a basic pattern was ‘shifted’ up and out a specific amount according to a predetermined chart and lines were drawn between these new points to form the alternative sizes. (Aldrich, 2007, paraphrased, p. 42)

Modern grading techniques mainly use these same methodologies, though the names have changed (Nesting = Proportional; The Shift Method = Shifting; Schofield, 2007). The one major update to grading comes from computer-aided design (CAD) software, which uses the ‘Edge Changes’ grading technique, whereby grade rules are assigned to specific garment landmarks that tell the software the precise increases or decreases to make from the base size (Schofield, 2007). In essence, the Edge Changes technique is an updated version of The Shift Method where the computer automatically fills in the lines between the landmarks.

A key aspect of sizing systems is that there are both body sizing systems and garment sizing systems (Petrova, 2007). Sizing systems represent the total range of size and fit combinations for a business’s total set of apparel product lines (LaBat, 2007). Body sizing systems are based on body measurement data taken from anthropometric studies, while garment sizing systems are unique to each garment (Petrova, 2007). Best practice states that there should be one body sizing system and multiple accompanying garment sizing systems, but these two types of sizing systems may be the same in small apparel businesses, meaning that the body sizing system may suffice for the garment sizing systems or vice versa. This may be one reason for poorly-fitted clothing.

Garment design is comprised of the amount of ease (i.e. the space between the body and the garment) present at each garment element (i.e. sleeves, bust, waist, etc.) as well as the textile chosen for the garment. Textiles may stiffly stand away from the body or may drape against the skin, showing the body's contours; they may be thick and heavy or thin and light-weight. All properties of textiles impact the necessary ease of a garment and thus the final garment design. Garment sizing is determined by the final design of the garment and uses the key control dimensions for that garment as the basis for determining garment grade rules (Petrova, 2007). Thus, garment grade rules may not equate to body grade rules of an accompanying body sizing system (Petrova, 2007).

To give a concrete example of how body sizing and garment sizing differ, compare the difference between two variations in garment design. A pair of skinny jeans made from a 95% cotton and 5% spandex denim blend will use a smaller amount of positive ease to ensure the same figure-hugging fit across the size range than a pair of wide-leg jeans made from 100% cotton denim. Both garments can be created by the same company and use the same base body sizing system, but they will require different grades between garment sizes to account for the differences in garment design and textile nature.

Academic literature has focused its efforts on assessing voluntary sizing standards and on proposing improved sizing standards and sizing system methodology. A sizing standard is a document that describes the set of body dimensions that represent an average individual from the population (LaBat, 2007). Good sizing standards use updated, accurate, and diverse populations as the basis for their sizing systems. Unfortunately, sizing standards in the United States are outdated, based in large part on assumptions made by the industry, and until recently, from a homogeneous population of white women, aged 18-35.

Staples and DeLury (1949) may be one of the first methodologies presented in apparel for building a representative, consistent, and uniform system for sizing women's garments. In an application of their proposed methodology, they analyzed data for 10,000 American women, finding that for women's slips, three control dimensions resulted in 208 sizes. Their study highlights the complexity of sizing any single garment for a large population.

Salusso-Deonier, (1982) began the practice of using multivariate statistics in computing sizing systems. This study aimed to structure sizing systems more efficiently than PS 42-70, the voluntary standard of the time. Using the 1977 U.S. Army database, Salusso-Deonier applied principle component analysis to the data to invent a methodology for the construction of sizing systems that better utilized the data from a given database. This methodology revolutionized apparel sizing research, providing a replicable model for generating sizing systems for a population.

Ashdown (1998) built three optimized sizing systems (Linear, Two-Tiered, and Unconstrained) from four measurements taken from the ANSUR database and compared them to ASTM D5585-94. Using the criterion of aggregate loss (i.e. a measure of how well a sizing system fits a given population, p. 329), Ashdown was able to show that all three optimized systems performed better than ASTM D5585-94, with the Unconstrained system performing best. This study showed that body dimensions do not group in as orderly a fashion as the theoretical assumptions of proportional sizing suggest.

Salusso, Borkowski, Reich, and Goldsberry (2006) reprised the Principle Component Sizing System methodology created by Salusso-Deonier (1982) to propose a new sizing system for women aged 55 and older. PCSS-55+ used the data from ASTM's Women 55 and Older body measurement database and was found to be more efficient and effective than either PS 42-70 or ASTM D5586-94 (the ASTM standard for women aged 55 and older), with only 25 sizes and 23 predictive measurements rather than the voluntary standards' 55 sizes and 57 measurements. Social conventions of industry sizing practice are highlighted in the differences between PCSS-55+ and PS 42-70/ASTM D5586-94 which speak to a larger issue than the statistical analysis that academics aim to perfect.

The most recently proposed sizing system methodology outlines the process to create either a body or garment sizing system, pulling best practices from previous studies (Xia & Istook, 2017). Principle component analysis, multivariate linear regression, and K-means cluster analysis generate sizes from a database, while the least Euclidean distance tests how well a given population fits into a database. This thorough system caters to governments and large corporations who can afford to pay statisticians, while simultaneously highlighting a fundamental misunderstanding of the analytical abilities of most apparel businesses.

The research on sizing systems indicates that sizing is a complex problem, governed both by the practical realities of data collection and statistical analysis, as well as the social conventions of industry practice. Practicalities with data collection include what data to collect, how to collect the data, and what population to collect it from. Practicalities with statistical analysis include knowing how to conduct statistical analysis, what analysis program to use, and how to interpret the results in actionable ways. While standardization should improve industries by making products easier for consumers to use (Norman, 2013), thinking of sizing system development only through the lens of standardization of sizing leads to practical barriers that can only be overcome by concerted effort and great financial burden on those who undertake the task.

The second half of the sizing equation deals with social conventions. Social conventions act as cultural constraints, meaning they determine what actions are allowable in specific situations (Norman, 2013). Social conventions in the apparel industry determine how the representations of sizes relate to the dimensions of the human body. It is possible that social conventions of sizing are market driven, for example, the formal womenswear market may have different conventions for size representations than the women's activewear market, which may be different than the women's outdoor apparel market. They may also be driven by geography, with sizing conventions differing between garment districts such as New York and Los Angeles.

Very little research has looked at the social conventions of the apparel industry as they relate to sizing, and none have conducted qualitative analysis of small apparel business' sizing practice. The closest any research has come to uncovering the social conventions of sizing was when Schofield and LaBat (2005) conducted a mixed methods study where 40 size charts from 1873 to 2000 were collected and analyzed. They identified four assumptions common to the development of all 40 size charts; none of which are based on empirical analysis of anthropometric data:

1. Constant intervals are used between sizes for all measurements within a grade.
2. All the vertical measurements increase as sizes increase.
3. The differences between principle girths are constant for all sizes.
4. All size charts used grades. (p. 19)

More research must be conducted on the social conventions of apparel sizing practice to document and understand the culture of the industry. Once this is understood, then it will become possible to affect substantive change in the industry, even if it happens slowly.

The Apparel Design Framework

To better understand sizing system usage by small womenswear businesses, the Apparel Design Framework (ADF) by Lamb and Kallal (1992) was used as the theoretical framework for this study. The ADF combines an apparel design specific design process with the Functional, Expressive, and Aesthetic Consumer Needs Model (FEA Model; Figure 1). This framework provides apparel design companies with a tool that adapts to any apparel design challenge, inviting synthesis from a wide variety of disciplines to solve said challenge.

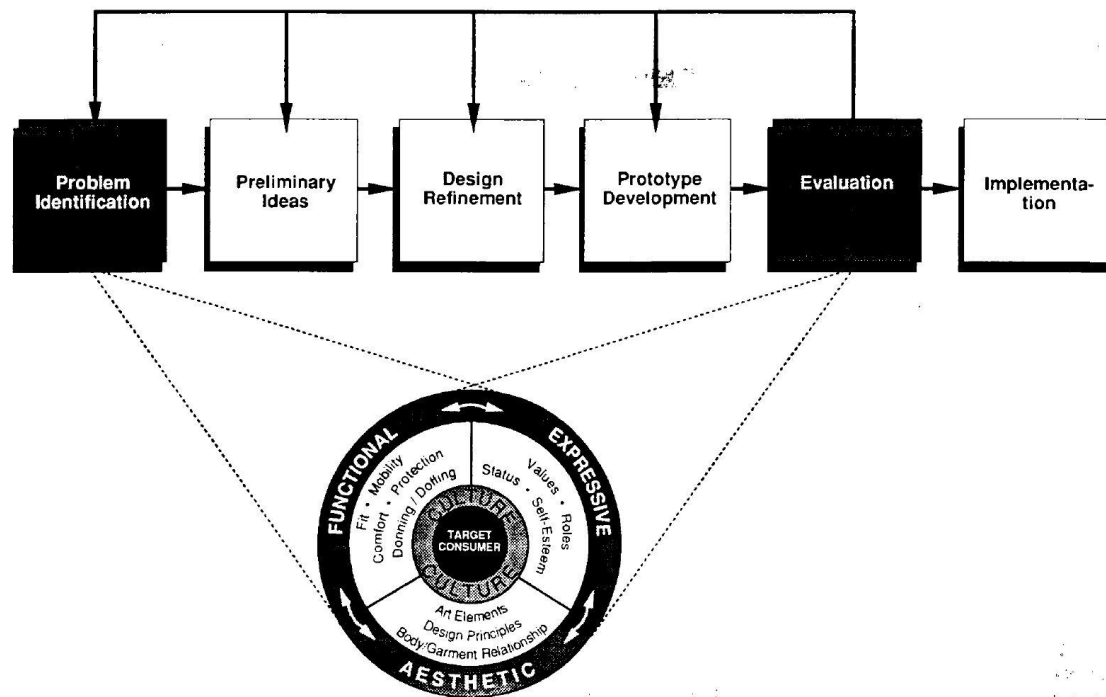


Figure 1: Apparel Design Framework (Lamb & Kallal, 1992; Fig. 2, p. 44)

The Functional, Expressive, and Aesthetic Consumer Needs Model

The FEA Model consists of three rings: the target consumer, culture, and design criteria. The first ring, the target consumer, sits at the center of the model because the consumer should be the center of the design process. Ideally, the target consumer represents the ‘target market’; the subset of the population at which the company aims its

product (Bougourd, 2007). For any design challenge, a user profile detailing demographics, psychographics, physical characteristics, user needs and wants (Lamb & Kallal, 1992, pp. 42-3, Bougourd, 2007, pp. 116-28), lifestyle (actual & aspirational), prior apparel experience, and technology knowledge/adoption practices (Romeo & Lee, 2016) should be created within the context of the challenge. Basically, any factor that directly impacts the target customer and explains who they are should be included in the user profile.

User Profile Factor Definitions:

1. Demographics: gender, age, size, shape, ethnicity, geographic location, income, education level, occupation (Bougourd, 2007; Romeo & Lee, 2016).
2. Psychographics: the benefits sought by the target customer from their clothing (Bougourd, 2007).
3. Physical characteristics: the body's form, any physical variations, coloring of skin, hair, and eyes, linear measurements, weight.
4. User needs: may be actual or perceived (Romeo & Lee, 2016); can be psychological, social, and emotional (Horn, 1968); what the target consumer needs in order to carry out their daily living with regards to their clothing.
5. User wants: may be realistic or not (Romeo & Lee, 2016); what the target consumer wants from their clothing that may not be satisfied by the selection available to them based on their actual lifestyle.
6. Actual lifestyle: how the target consumer lives; includes their daily schedule and leisure time activities, disposable income usage, health concerns, and the climate in which they live (Romeo & Lee, 2016).
7. Aspirational lifestyle: how the target consumer wants to live; includes desired leisure time activities or occupation, public image, social group, and increased wealth/status (Romeo & Lee, 2016).
8. Prior apparel experience: "gives the consumer a rational basis for both acquiring apparel to fulfil a specific need and holding particular expectations for its performance" (Romeo & Lee, p. 203; i.e. consumers are not empty vessels).

9. Technology knowledge/adoption practices: the target customer may behave differently based on the technology they use, or the technology they expect an apparel business to use (Romeo & Lee, 2016).

The second ring, culture, acts as the mediator between the user and their apparel needs; it allows the target consumer to determine what is an acceptable solution to their problem (Lamb & Kallal, 1992, p. 43). The culture the designer works in may be dissimilar to that of the target consumer, hence the necessity of user profiles. Cultural considerations may include technology, knowledge, beliefs, folkways, mores, customs, laws, attitudes, values, art, and habits (Horn, 1968; Lennon, Johnson, & Rudd, 2017). Romeo and Lee (2016) highlight two aspects of culture: regional and social. Regional culture forms based on the geographical area in which the target consumer resides, whereas social culture revolves around common beliefs and interests which may stem from religion, ethnicity, race, politics, occupation, gender, and cybernetworks, like Facebook or Instagram (Romeo & Lee, 2016). For example, the target customer may reside in Saudi Arabia, a desert country in which Islam is the dominant religion; their regional culture may be based on surviving in a desert geography, and their social culture will require the body to be covered. Knowing the context, including the physical location, individual/group relationships, and social circumstances (Lennon et al., 2017, p. 13) in which the target consumer operates allows the designer to identify and select the necessary functional, expressive, and aesthetic design criteria to solve the design challenge.

The third ring of the FEA Model is comprised of three design criteria. The functional design criterion relates to the utility of a product; the expressive design criterion relates to the communicative, symbolic aspects of a product; and the aesthetic design criterion relates to the beauty of a product (Lamb & Kallal, 1992, p. 43). Key constructs are arranged in each of these three sectors based on how well they fit each sector's overarching theme; but they are not mutually exclusive, nor exhaustive. For example, Bye and Hakala (2005) found that safety was an important functional consideration, separate from protection, that was not listed in the Functional sector of the FEA model. Smith and Stannard (2016) found that authenticity was an important value to be considered in the Expressive sector that is not currently listed in the FEA model.

Functional Construct Definitions:

1. Fit: the specific way the garment interacts with the body.
2. Mobility: how easily the wearer can move while wearing the garment.
3. Comfort: how the wearer feels in the garment; may include thermal and structural fabric properties (Horn, 1968).
4. Protection: how well the garment protects the wearer from the environment.
5. Donning/Doffing: the process by which the garment is put on and taken off.

Expressive Construct Definitions:

1. Values: the behaviors we care about in ourselves and others; when combined with one's beliefs they may constitute an individual's life philosophy (Horn, 1968).
2. Roles: the behaviors expected of social positions or statuses (Lennon et al., 2017).
3. Status: "a socially recognized position within a social system" (Lennon et al., 2017, p. 366).
4. Self-Esteem: an individual's sense of self-worth (Lennon et al., 2017).

Aesthetic Construct Definitions:

1. Art Elements: line, shape, color, texture, & pattern
 - a. Line: connects distance between two points, encloses/divides spaces, defines shapes, indicates direction, leads eye through design (Liechty, Rasband, & Pottberg-Steineckert, 2010).
 - b. Shape: "enclosure of space created by joining the ends of a line." (Liechty et al., 2010, p. 23).
 - c. Color: created by the degree to which light rays are absorbed/reflected from a surface (Liechty et al., 2010).
 - d. Texture: the surface characteristics of the material – looks, feels, hangs/drapes, sounds; determined by fiber, yarn, fabrication & finishes (Liechty et al., 2010).
 - e. Pattern: "created by lines and shapes in color on fabric." (Liechty et al., 2010, p. 33).
2. Design Principles: balance, proportion, scale, rhythm, emphasis, harmony, & unity

- a. Balance: how the design elements are arranged within the garment (Liechty et al., 2010).
 - b. Proportion: how the design elements divide the body, garment, & outfit (Liechty et al., 2010).
 - c. Scale: size of one proportionally defined area/shape compared to another (Liechty et al., 2010).
 - d. Rhythm: how the eye transitions through elements (Liechty et al., 2010).
 - e. Emphasis: the dominant focal point (Liechty et al., 2010).
 - f. Harmony: when all design details relate to each other well (Liechty et al., 2010).
 - g. Unity: completeness of the garment – nothing missing and nothing extra (Liechty et al., 2010).
3. Body-Garment Relationship: how the elements and principles of design are used to create a stylized garment.

Everything within the third ring is interrelated. Interactions between the functional and expressive sectors acknowledge that a product can be both useful and communicate information about the wearer; interactions between the expressive and aesthetic sectors acknowledge that communication and pleasure can be simultaneously obtained from the product; and interactions between the aesthetic and functional sectors acknowledge that products can be both beautiful and functional (Lamb & Kallal, 1992).

Stokes and Black (2012) proposed a revision to the FEA Model. Based on their findings they took the ‘body/garment relationship’ construct out of the aesthetic sector and encircled the entire original Lamb and Kallal (1992) model with it (Figure 2). They also extended the relationship to include the near environment, so it became the ‘body/garment/near environment relationship’. Their alterations emphasize their finding that sometimes the three sectors interacted simultaneously. This study will not utilize this revised FEA Model, as the near

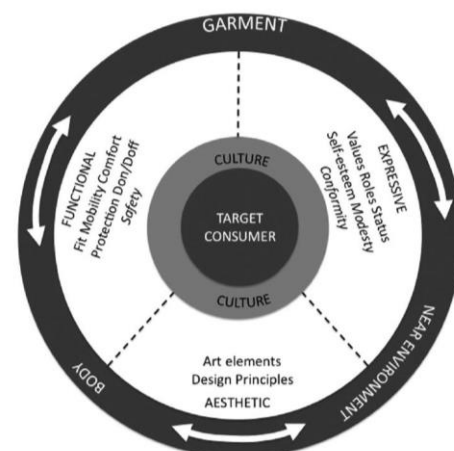


Figure 2: Revised FEA Model (Stokes & Black, 2012, Figure 3, p. 185)

environment is part of context, which is incorporated into the definition of the target consumer and culture in the problem identification stage of the ADF design process. What will be taken from this study is the idea that all three sectors may interact simultaneously, a consideration not presented by Lamb and Kallal.

Hierarchy Among FEA Criteria

Analysis of research using the FEA Model suggests a hierarchy among the FEA criteria. It appears that expressive criteria drive functional and aesthetic design decisions; functional needs must be met under all circumstances; and once functional needs are met, aesthetic and expressive needs then drive the customers' decision to use/buy the garment.

While most studies have found many more functional criteria than expressive or aesthetic, Smith and Stannard (2016) and Perry and Lee (2017) highlight how expressive needs drive function and aesthetics. Smith and Stannard analyzed reenactors' design decisions for Regency-era gowns, finding that while the expressive needs of roles and values were the least expressed criteria, these needs directly affected the functional and aesthetic design decisions. For example, one designer wanted to appear "sumptuously elegant", yet different from Caroline Bingley (a Jane Austin *Pride and Prejudice* antagonist); the color and trim choices (aesthetic criteria) of her gown were impacted by her desire to avoid being seen as conceited (expressive criterion; Smith & Stannard, 2016, p. 292). Perry and Lee eliminated the expressive criteria from their assessment of martial arts practitioners' satisfaction with their current uniforms; which may have caused them to miss crucial information explaining why martial arts uniforms are designed the way they are, impacting their view of the importance of garment fit (a functional criterion).

Studies by LaBat and Sokolowski (1999) and Black, Freeman, and Rawlings (2017) found that functional considerations were most important to their target consumers, and that without these, the garment would never be considered appropriate for the user. But, once the functional needs were addressed, expressive/aesthetic considerations became deciding factors in decisions regarding use. These studies suggest that emphasis on expressive or aesthetic considerations may be product-dependent.

The ADF Apparel Design Process

The ADF apparel design process involves six steps: problem identification, preliminary ideas, design refinement, prototype development, evaluation, and implementation (Figure 1). The problem identification phase begins the process and requires the designer to determine the FEA criteria for the target consumer in the context of the design challenge. In the preliminary ideas phase the designer generates a plethora of design solutions. The design refinement phase establishes priorities amongst the previously determined FEA criteria and applies these criteria to the ideas generated in the preliminary ideas stage to determine which ideas will move onto the next phase. The prototype development phase determines the materials and construction requirements for the ideas that meet the FEA criteria and creates test versions of these ideas. The evaluation phase assesses the prototypes for how well they meet the FEA criteria. If a prototype meets the FEA criteria then it moves onto the Implementation phase, where it is put into development and sold to the target consumer. If no prototypes meet the FEA criteria then the first five steps are repeated until something does. (Lamb & Kallal, 1992)

The Fashion Design Process

The ADF apparel design process differs from the fashion design process generally taught to students in fashion design majors. The processes are similar, but with different foci. The ADF is externally focused on the user and is based on general design processes, such as the human-centered design process which includes a) observation, b) ideation, c) prototyping, and d) testing (Norman, 2013) to develop design solutions. The fashion design process is internally focused on the designer and uses such tools as inspiration gathering, mood and color boards, sketching, market research, and prototyping to develop conceptual designs (Calderin, 2009; Mbonu, 2014).

The emphasis in fashion design is on the synthesis of information gleaned from the proximate environment through the individual designer's own internal worldview to create fashionable garments. The emphasis of the ADF is on the synthesis of information gleaned from intense study of a design challenge to provide user-centered solutions; the individual designer's worldview is not particularly relevant.

While the ADF provides a structured tool for analyzing academic research and developing interview questions, it is important to consider that individual fashion

designers most likely follow the fashion design process, rather than the ADF, as it is the internal synthesis of the designer that is thought to generate success for a business.

Theoretical Construct 1: Fit

Fit can be considered as the way a given garment interacts with the body. It is generally operationalized as the space between the body and the garment (Daanen & Reffelthrauth, 2007). This quantifiable concept is termed “ease” and is utilized by apparel designers in two capacities: movement ease and design ease. Movement or wearing ease is the basic amount of space added to a garment so that the wearer can breathe, walk, and raise their arms (Branson & Nam, 2007). Design ease is the extra space added to movement ease to create a stylized garment (Branson & Nam, 2007). Movement ease is generally only applied to the basic blocks that designers use as the basis for all of their designs. Design ease is applied to these basic blocks to create stylized blocks which are used to manufacture finished garments.

The other aspect of fit is the way the wearer feels about how the garment interacts with their body. Each individual has specific preferences about how this interaction should occur for individual garment types. For example, an individual may prefer looser fitting jeans, but skin-tight knit tops. This concept is termed “fit preference” (Pisut & Connell, 2007), and is much harder to understand than ease since it changes from person-to-person, garment-to-garment, and by wear-context.

Both aspects of fit – ease and preference – are present in all three sectors of the FEA Model. The following discussion focuses on how the theme of fit is found in research utilizing the FEA Model. In general, the FEA Model is used to focus on the needs of each target consumer and results in design criteria and garment attributes.

Chae and Evenson (2014) utilized the FEA Model to teach apparel students how to use the design process to solve a design challenge for a target market different from their own. Students in this class created golf-wear for six mature female golfers, aged 59 to 71, learning how to properly conduct a needs assessment and apply the most pressing needs to the development of golf-wear for their clients. Chae and Evenson cited teaching their students the physiological differences required for fitting 55-year-old bodies as a main consideration for using this target market. The students found that the most significant

needs were support, fit, comfort, freedom of movement, and flattering feminine/athletic styling. All of these significant needs can be addressed through garment fit.

Tennis-wear for female baby boomers was set as the design challenge for students in Chae (2017). Figure 3Error! Reference source not found. shows the design criteria and garment attributes found for this target market. Chae's students found that garment fit could be utilized to satisfy multiple design criteria, including comfort, self-esteem, age appropriateness, and flattering looks.

FEA needs	Design criteria	Clothing attributes
Functional needs	a. Comfort and fit b. Breathability, durability, and utility c. Free movement d. Protection from the sun	a. Provided by fabric choices (stretch cotton jersey knits), appropriate fit for female baby boomer body, and sewing quality for stretch fabrics b. Fabric choices (cotton and cotton blends); Recommended TransDRY for future study c. Sleeveless design for free arm movements d. Recommended UV fabrics for future study
Expressive needs	a. Self-esteem and professional look b. Age appropriateness, individuality, and personality	a. Improved fit, flattering to female baby boomer body b. Designed by baby boomers' design preferences
Aesthetic needs	a. Feminine and sporty look, strong and powerful look, slimmer look, and flattering b. Colorful and unique design	a. Feminine silhouette, Improved fit, and flattering to female baby boomer body b. Designed by baby boomers' preferred colors and styles

Figure 3: FEA design criteria & garment attributes (Chae, 2017, Table 2, p. 9)

Black et al. (2017) also used the FEA Model to introduce their students to designing for a specific target market; in this instance a single mature female chef. An interview with the chef revealed her desire for a jacket that fit, was aesthetically pleasing and met her professional needs, which included protecting her from cooking risks (i.e. boiling water, flames) and presenting a tidy appearance for meeting important customers. Fit addressed many of the core concerns of the chef, including freedom of movement, comfort, and protection (functional criteria), function (expressive criterion), and style (aesthetic criterion).

The Black et al. (2017) study highlights the main issue with the heretofore discussed projects: the final garments were custom designs because each student group created clothing for a specific customer. While custom-designed clothing has the ability to meet all of an individual's needs, it isn't how the majority of clothing is currently produced in

the United States. The following studies discuss more “mass” applications of the FEA model, yet still find fit to be a key component of success.

Design Criteria	Garment Attributes
A. Functional Needs	
1. Thermal Balance	• layering system to maintain thermal balance/ waterproof, breathable • soft, smooth fabrics • good fit • 3-layer rip stop nylon, 4-way stretch with a fleece back and inner laminate.
2. Mobility: Quick actions in a confined space (ex, tacking the boat)	• pattern for a free range of motion/ ergonomic fit
a. Lightweight	• 4-way stretch fabric • lightweight fabrics and findings • reduce bulk with closer silhouettes
b. Need for quick/easy bathroom breaks	• convenient access to lower torso • easy don and doff
c. Functional stowing of items	• pocket placement, size, mesh for visibility of contents
3. Safety: Rescue sailor overboard	• bright colors and reflective tape for better visibility • interaction with personal flotation device
4. Fit	• Fitted for the female body
5. Quality: Durability	• quality fabric selection, sewing quality
a. Abrasion resistant	• durable face fabrics
b. Value	• performance over price
B. Expressive Needs	
1. Self-esteem size issues	• improve fit • flattering to female body
C. Aesthetic Needs	
1. Want to be uniquely feminine/fit in with the crew	• feminine silhouette/traditional colors

Figure 4: Design criteria & garment attributes (Bye & Hakala, 2005, Table 2, p. 49)

In an industry-university partnership to improve the wear-life of an ankle brace, LaBat and Sokolowski (1999) found that the functional criteria of fit, mobility, comfort, and protection, and the expressive criteria of focus minimization were most important to the users of the ankle brace. With feedback from wear-tester athletes, the researchers recommended that the shape of the brace be changed to better accommodate the form of the foot. Fit played a major role in satisfying both functional and expressive criteria.

A prototype sailing garment was created based on interviews with fifteen competitive female sailors in Bye and Hakala’s (2005) product development research project. As can be seen from the highlighted sections of Figure 4, fit may be considered as just one of five functional design criteria, but was utilized as a garment attribute to fulfill the needs of multiple FEA criteria. The authors noted how some of the design criteria related to each other, specifically, that fit affects mobility and safety (suggesting hierarchy among

the functional design criteria), as well as the expressive need of self-esteem (function impacts expression).

Unlike other research using the FEA Model, Stokes and Black (2012) focused solely on understanding the needs of their target consumer; they did not propose garment designs. In an assessment of the level of satisfaction that adolescent girls with disabilities have with sportswear, Stokes and Black found that fit, donning and doffing, and safety were common issues. Functional design criteria included fit, comfort, mobility, and donning/doffing; expressive design criteria included self-esteem and modesty; and aesthetic design criteria included a desire for body-flattering garment styles. Each sector includes criteria that can be addressed through garment fit.

The Integrative Process Model for Universal Design (IPM-UD; Figure 5) condensed the Lamb and Kallal (1992) apparel design process into three stages situated within the FEA model and added an outer ring of the Seven Principles of Universal Design to the FEA Model (Park, 2014). As the ADF already covers inclusive, or universal design, as it was originally envisioned to address garment creation for individuals with special needs (Lamb & Kallal, 1992), this revision will not be used in this study.

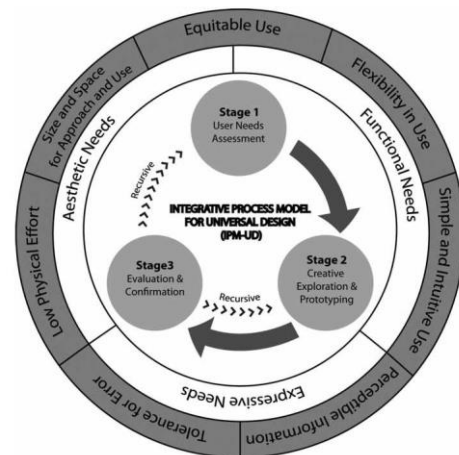


Figure 5: The IPM-UD Model (Park, 2014, Figure 3, p. 182)

To validate the proposed IPM-UD model, Park (2014) re-designed a hospital gown, finding from surveys of hospital patients and healthcare providers that fit was a key theme spanning all three FEA sectors (Figure 6). Design problems were all solved by construction techniques (ex. mobility was solved by careful seam/closure placement and sleeve length) which highlight the importance of garment fit to solve multiple design challenges.

In the most recent study utilizing the FEA Model Adelaja, Salusso, and Black (2016) presented three western-style formal dress designs to the female Nigerian populace via an online survey. Contrary to other research utilizing the FEA model, consumer feedback consisted mostly of expressive and aesthetic needs rather than functional needs, assumed

to be due to the garment type and wear-context. Functional needs comprised garment fit, comfort, ease of wear, and overall function. Expressive needs comprised modesty, cultural identity, and self-esteem of the wearer. Aesthetic needs comprised overall appeal of the design, stylishness, design details, and the textile. Feedback suggested that garment fit was used to meet the expressive and aesthetic needs (i.e. comments included phrases such as “flattering/not flattering to the body”).

Attribute	Design problem	Design approach	Target universal design principles
Functional	Enhancement of patient mobility	Avoid seams and closures at uncomfortable locations, keep sleeve length just above elbow	Equitable use
	Easy access for examination/treatment	Complete upper sleeve separation, back opening at least 9" – 12" long with room to manipulate equipment	Low physical effort
	Accounting for physiological changes	Hidden pocket to keep hands warm and a storage solution for personal belongings	Simple and intuitive use
	Accommodation of various body sizes and shapes	Adjustable chest width by draw strings	Perceptible information
Expressive	Improvement of patient dignity in the social context	Stylish look and unique fabric colour and patterns, should be accepted by users and observers	Low physical effort
	Securing patient modesty	Reverse the opening to front, front opening with hidden back flap to cover exposed skin	Equitable use
Aesthetic	Development of gender-neutral fabric colour and pattern	Nature meets geometric patterns, muted pastel tones	Simple and intuitive use
	Offering a versatile look	Waist ties to allow two different silhouettes	Perceptible information
			Low physical effort
			Equitable use
			Flexibility in use
			Flexible in use

Figure 6: Design criteria, solutions, & universal design principles (Park, 2014, Table 1, p. 184)

In sum, regardless if the client received a customized garment, or if the garments were meant for mass production, fit was shown to permeate all aspects of the FEA model, with functional criteria being necessary to ensure garment success and expressive/aesthetic criteria being important once functional criteria were met. In addition to ensuring that the baseline desire for garments properly fitted to the body, common requests included ease of movement through the patterning and design features of the garments, as well as figure-flattering final garments. This suggests that fit is a universally important criterion and a unifying aspect of garment design which should permeate small womenswear business' discussions about their sizing systems.

Theoretical Construct 2: Cost

The second important theoretical construct is cost. Cost can be considered the monetary value associated with the production, storage, maintenance, and distribution of apparel. Cost is not included in the original Lamb and Kallal (1992) FEA Model but is generally placed in the Functional sector when found to be an important construct.

Gordon and Guttman (2013) utilized the FEA model to develop a new hospital gown design to meet the sponsor hospitals' needs:

1. Provide a sense of modesty and self-esteem to patients;
2. Be easy to use for both patients and staff;
3. Be able to be laundered and manufactured using current capabilities; and
4. Keep the cost and life cycle comparable to the current hospital gown.

(paraphrased, p. 141)

Ahsan and Tullio-Pow (2015) used the FEA model to guide the development of an adaptable poncho for Pakistani natural disaster survivors. After interviewing survivors, relief workers, and aid administrators, the researchers determined key design criteria (Figure 7).

Functional	Expressive	Aesthetic
Lightweight	Multicultural	Variety of colours
Small package	Hygienic	Poncho-like
Low cost	Distribution process	Shawl-like
Unisize	Sustainable	
High visibility	Simplified functions	
Multiseasonality		
Universal design		

Figure 7: FEA Model Data (Ahsan & Tullio-Pow, 2015, Table 1, p. 310)

What is so important about these two projects is that they emphasize the importance of the cost to produce, maintain, store, and distribute the garments. In any situation where garments are meant to be mass-produced, the cost of production must be a factor.

Interestingly, both projects needed to fit a nation's entire population in a single sizing system; an incredibly difficult task when considering the high variation of bodies in any given nation. This is one reason why Ahsan and Tullio-Pow (2015) chose to make a one-size-fits-all poncho. Gordon and Guttman (2013) noted how difficult it will be to meet sizing needs, and their initial prototypes are being tested for a small range of sizes only.

LaBat and Sokolowski (1999) separated cost from the FEA Model completely. They included cost to produce, time to produce, methods of production, and sales potential in their design process model. Since cost is not included in the original Lamb and Kallal (1992) framework, and research provides conflicting integration strategies, the following paragraph will demonstrate how cost can be fit into any section of the FEA Model.

Cost can be addressed in many aspects of the FEA model. Overall price considerations for selling the final garment can be defined by the target consumer, as different target consumers can afford different levels of garment quality. Culture may also determine prices for specific garments or garment services (ex. alterations, cleaning), affecting the cost to produce or maintain garments. Functional considerations such as donning and doffing may affect cost depending on the closure method chosen, and comfort could be affected by the materials chosen. Expressive considerations such as modesty may require more material, and the desire to display one's high status position may require higher-quality materials. Aesthetic considerations such as the body-garment relationship may require special patterns which can reduce the overall effectiveness of marker layouts, increasing materials costs. Design features may also impact the sewing process, as more complicated designs take more time to complete, increasing labor costs.

Production & Retailing

Demand for ready-made apparel grew from America's rising middle class demanding clothing of similar styles to those worn by America's upper class, though without the price associated with custom-work. Tailors responded by providing medium-quality, reasonably priced clothing that could be purchased off-the-shelf. By the end of the 1800s ready-made apparel surpassed custom-made in the collective mind of the American populace due to lower prices, the time saved in acquisition, the fashion-forward nature of the designs, and the ability to see how the garment looked on you prior to purchase. (Kidwell & Christman, 1974).

Improvements in textile technology, like Eli Whitney's cotton gin and Samuel Slater's cotton manufacturing system; and manufacturing equipment, like John Northrop's automatic filled bobbin changer, twelve-color cylinder printing, the sewing machine, electric fabric cutters, and the steam iron played key roles in ready-made apparel's success on the production side. The invention of department stores with their policies of free delivery for the immediate area, satisfaction guarantees, and set prices, and the improvement of mail-ordering, solidified ready-made as the go-to option for apparel in America across all social strata and geographic locations. (Kidwell & Christman, 1974).

Modern advances in production have included new production systems, such as the straight-line system/progressive bundle system (Abernathy, Dunlop, Hammond, & Weil, 1999), unit production systems, modular manufacturing, flexible manufacturing, automated production, and computer-aided design systems for pattern-drafting, grading, and marker making (Ashdown, Lyman-Clarke, Smith, & Loker, 2007). Modern advances in distribution and retailing include bar coding and uniform product codes (UPCs), as well as electronic data interchange (EDI) and data processing (Abernathy et al., 1999).

In terms of production, problems with the pattern, fabric, marking, spreading, cutting, sewing, garment processing, or labeling, can all impact the final size of a garment. Patterns must be developed to preserve the fit and manufacturability of the style throughout the size range. Markers must be created that maximize fabric efficiency, but also preserve the original pattern, and allow for knife clearance during the cutting process. High quality sewing requires well trained operators who understand how garments are meant to be constructed for multiple types of materials so that they can check for errors in in-coming and out-going work. Garment processing usually includes washing, steaming, or pressing the garment, which may cause material shrinkage or stretch. (Ashdown et al., 2007).

Retailers must carry garments in a wide combination of sizes, colors, styles, fabrics, and price ranges to cater to their target consumers. The broader the target market, the more products necessary to serve them. Traditionally, effective merchandising matches the retailer's product mix to the needs and desires of their target consumer. Most merchandisers practice demand forecasting, which is the practice of predicting how many stock-keeping units (SKUs) should be shipped to a store to avoid both overstocking (carrying goods that won't sell) and stock-outs (running out of a good). Demand forecasting has a high degree of uncertainty due to trends, seasonality, cyclicity, and random fluctuation. Getting the mix just right is exceptionally challenging for any company. (Abernathy et al., 1999).

Conclusion

This chapter documented the history of sizing, explained the conceptual framework utilized in this qualitative study, analyzed research using this framework, and offered a brief description of production and retailing practices. Two main themes were found during reviews of studies using the conceptual framework: Fit and Cost. Fit, a functional criterion, provided the main means by which garment attributes met the design criteria for all three FEA sectors. Cost, not considered a design criterion by Lamb and Kallal (1992), was shown to be an important consideration in designing garments and should be included for each ring of the FEA Model, and for each construct within the three design criteria. Placing sizing into the context of the larger apparel production and retailing setting provides this project with a sense of sizing's importance to overall garment production.

Chapter 3 Methods

Introduction

The purpose of this phenomenological study is to describe small womenswear business' experiences regarding apparel sizing practice. This chapter explains the research approach, the data collection method including alterations to the interview questions based on two pilot studies, and the data analysis method.

Research Approach

The qualitative research tradition is appropriate when the aim of research is to generate a complex, detailed understanding of an issue, to empower individuals, and to explain the mechanisms or linkages within theoretical frameworks. Common characteristics of qualitative research include collecting data in the natural setting of the phenomenon, the researcher acts as the key instrument for data collection and analysis, multiple methods are used to gather data, inductive-deductive reasoning is used, focus is kept on the meanings ascribed to the phenomenon by the participants, the research design is emergent, reflexivity informs the study, and holistic accounts of the phenomenon are presented. Qualitative researchers must commit to extensive time spent in the field, complex data analysis, writing long passages to substantiate claims and show the multiple perspectives of the participants, and accept ambiguous procedural guidelines. (Creswell, 2013).

The qualitative research approach chosen for this study was phenomenology. Phenomenological inquiry is the study of human experience. Four philosophers crafted the primary principles of phenomenology: Husserl, Heidegger, Merleau-Ponty, and Sartre. Husserl laid the foundation for current philosophical inquiry. He grounded the discussion of phenomenology in the idea that through rigorous reflection by an individual, that person could identify the essential qualities of an experience, and that these essential qualities can transcend the singular experience and illuminate the underlying consciousness of the collective human experience. Husserl introduced the idea of intentionality, which describes the relationship between the experience and the attention given to the experience, in other words, all experiences are experience "of something". (Smith, Flowers, & Larkin, 2009).

Heidegger moves away from Husserl's transcendental intentions with phenomenology by focusing more closely on the hermeneutic and existential aspects of the philosophical view. Basically, Heidegger focused on context and the relation of the person to that context. While Husserl aimed to describe the content of consciousness itself, Heidegger focused his efforts on understanding practical engagement with the world. He developed the concept of worldliness, whereby the human being is afforded a range of options that are concurrently physically- and intersubjectively-grounded. Physically-grounded options are those things, people, relationships, and languages that actually exist in the lived world. Intersubjectively-grounded options allow human beings to make meaning through shared engagement with the world. In essence, Heidegger argues that human beings cannot be removed from context as context allows us to make experiences significant, and in turn, the experiences we give significance form the world in which we live. Heidegger sees experience as inherently interpretative. (Smith et al., 2009).

Merleau-Ponty also emphasizes experience as inherently interpretative, but diverges from Heidegger in that he sees human beings as engaged with the world rather than subsumed within it. Merleau-Ponty espouses the embodied perspective of phenomenology, arguing that the body is how human beings communicate with the world, suggesting that the way we access the world informs the way we assess it. He introduces the concept of "other", stating that humans see themselves as separate from other objects in the world, which means one human being can never entirely share another human being's experience. As each individual starts from a place of difference due to individual bodies, no two individuals can access the world the same way, therefore, no two individuals can assess phenomena in the same way. (Smith et al., 2009).

Sartre extends Heidegger's existential phenomenology through the idea of "the project". Sartre sees projects as how human beings engage with the world. The individual is free to choose their path in the world but is impacted by the context of their life, their biological history, and the social climate in which their project occurs. Social relationships play a larger role in Sartre's view of phenomenology, with both the presence and absence of relationships affecting our actions. The concept of nothingness describes the absence of a relationship, with Sartre arguing that an absence can define an

experience as strongly as a presence. In terms of sizing, the absence of plus-sizes can define the shopping experience as strongly negative for a larger woman, whereas the presence of plus-sizes can define the same shopping experience as strongly positive. (Smith et al. 2009).

In summary, Smith et al. (2009) define experience as invoking “a lived process, an unfurling of perspectives and meanings, which are unique to the person’s embodied and situated relationship to the world” (p. 21). The discussion of phenomenology has moved from Husserl’s purely mind-based analysis of phenomena to a practical analysis of the individual’s interaction with the world as understood by their perceptions of it. Nonetheless, Husserl’s phenomenological method provides the basic methodology for identifying the essence of phenomena:

1. Bracket, or put aside the everyday world, to concentrate instead on perception of the world.
2. Describe and reflect on all salient aspects of the phenomenon via eidetic and transcendental reductions.
 - a. Eidetic reductions focus on the content of conscious experience, they are the properties that underly perception of the specific object.
 - b. Transcendental reductions focus on the content of consciousness itself, attempting to understand human consciousness at the grandest level.
3. Explain the essence, or the core subjective experiences of a phenomenon, which are arrived at via a sequence of reductions (Smith et al., 2009).

Bracketing, also known as ‘epoche’, is the practice of the researcher explaining their personal experiences with the phenomenon. Bracketing is meant to empower the researcher to separate themselves from the phenomenon so that they can more objectively interview participants and analyze data. In addition, it allows reviewers to determine if the researcher’s personal biases towards the phenomenon affected their analysis. (Creswell, 2013).

Creswell (2013, pp. 78-9) provides more concrete steps for conducting the phenomenological method than Smith et al. (2009), listing seven defining features of phenomenology:

1. The phenomenon is phrased as a single concept.

2. Explore the phenomenon using a group of individuals who have experienced the phenomenon.
3. Basic philosophical ideas of phenomenology are discussed.
4. Researcher brackets their personal experiences with the phenomenon.
5. Data is collected primarily via interviews.
6. Data analysis moves from the narrow to the broad, explaining what was experienced, and how it was experienced.
7. Research concludes with a description of the essence of the phenomenon.

This study attempted to follow Creswell's seven features of phenomenology while also paying homage to the deeper philosophical viewpoints expressed by Husserl, Heidegger, Merleau-Ponty, and Sartre. In practical terms, this study moves beyond the shallow 'what' and 'how' dictated by Creswell towards a more interpretative look into the phenomenon of sizing practice.

Data Collection

Creswell (2013) notes seven steps in the data collection process: (1) locate the site/individual, (2) gain access & rapport, (3) purposeful sampling, (4) data collection, (5) record information, (6) resolve field issues, and (7) store the data (p. 146). For the first step, locating the site or individual, this study targeted small womenswear businesses in the United States, located primarily in Minnesota. Participants were identified through Internet searches and word-of-mouth. Smith et al. (2009) suggest a homogeneous sample as it is easier to analyze patterns of convergence and divergence, but participants in this study were purposively chosen to explore a wide range of market segments with the goal of finding as many possible methods of sizing practice as possible from a small sample. In addition, participants were required to have control over the design and sizing of their garments. Emails were sent requesting permission to speak with the person in charge of sizing in the business, and consent forms were provided to each participant along with an explanation of the study. All participants were given the opportunity to ask questions of the researcher regarding the purpose and methods of the study, which many did.

The Small Business Administration (SBA, 2017) defines a small women's cut and sew apparel manufacturer as 750 employees and under, a small women's clothing and accessories merchant wholesaler as 100 employees and under, and a small women's

clothing store as those with less than \$27.5 million in profit. According to the SBA Office of Advocacy, there were 27.9 million small businesses in 2010, with the majority (78.5%) acting as non-employer businesses (Small Business Administration, 2012). If this trend holds for the apparel sector, it suggests that the majority of small womenswear businesses may be run solely by the owner, with less than a quarter hiring any staff at all. Even with the prevalence of non-employer businesses, targeting only businesses with one employee was considered too limiting, while businesses employing 750 employees were considered too large to truly be a “small business”. Therefore, for this study, a small women’s apparel business was defined as a business with 50 or fewer employees who control the design and sizing of their apparel.

One-on-one, in-depth, semi-structured interviews employing open-ended questions were used to learn about six business’ sizing practice. The interviews took place in-person (at coffee shops and in the main office of the business), as well as over the phone, and via Skype. Interviews were conducted between the months of March and April, 2018. Interviews lasted between 35 minutes and 1.5 hours. All interviews were recorded via an audio-recording phone application, and then transcribed using a transcription service. An interview protocol was created to guide the interview process while field notes and reflections were recorded in a notebook. Reflections captured the perceptions of the researcher and were written within a few hours, usually directly after, an interview.

Field issues related to access included convincing people to participate in interviews, building trust and credibility, and eliciting detailed responses from participants. Field issues related to interviewing focused on the phrasing of questions, especially regarding terminology surrounding body configuration and fit. Field issues related to ethics included the procedures of informed consent and participant confidentiality. For phenomenological studies in particular, Creswell (2013) warns that when the interviewer shares their own personal experiences with the phenomenon being studied, it may minimize bracketing and elicit response bias. Participants in this study wanted background on the researcher prior to giving consent for the interview, thus in order to build trust and credibility, the researcher had to share some of their personal experiences with the phenomenon of sizing practice.

Interview Questions

The foundation questions were meant to elicit information about the brand, including the history of the business, the target customer, and the brand's aesthetic style. These were considered "icebreaker questions" which would ease the interviewee into the discussion by engendering conversation around the branding aspects of their business. It was thought that by sharing these aspects of their business the researcher could (a) establish the foundations by which the designer makes decisions about their design process and sizing practice, and (b) make the interviewee comfortable enough to discuss topics that they don't usually share with outsiders (i.e. sizing and manufacturing).

The aim of the design process questions was to understand the steps used by the designer to go from an idea to a completed garment. Since it was expected that each business would have the same general process (i.e. idea → prototyping → manufacturing), but different ways of achieving each step, this question was left purposely vague. Because the design process is so integral to the production of apparel, it was expected that the interviewees would be able to discuss it without much prompting. Sub-questions were added to understand the mindset of the designer at each stage of the design process, as well as to prompt them to recall if they had changed their process over time. It was believed that fit and sizing would play a role in the general design process, especially if the target market was chosen because of a hard-to-fit body type.

The aim of the sizing practice questions was to get the designer to talk about how they make decisions about sizing for their business. These questions were phrased in ways that did not make the designer feel as though the researcher was trying to steal proprietary information. Yet, the questions still needed to stimulate the designer to provide pertinent information to answer the research questions.

The concluding questions were included because the researcher may have missed something important during the interview. These questions provide the interviewee with a chance to provide information they deem important, potentially providing critical, yet previously unknown, information that may influence the course of the study. Knowing what small womenswear businesses wish they had access to provides relevant topics for future research.

Pilot Study 1

The initial pilot study was conducted with the designer-owner of a dancewear business targeted at women aged 40 and older who desire beautiful, age-appropriate social tango apparel. The interview was conducted at the designer's home in early February at a time convenient for the interviewee. This designer-owner was selected for the pilot study because of their personal connection to a committee member, which made them convenient to contact and willing to participate. In addition, this interviewee has a background in academia, which provided the additional benefit of gaining feedback on the overall study design and interview questions.

Foundation Questions:

1. Please tell me why you founded this business.
2. Please tell me about your target market.
 - a. Why are you interested in them?
 - b. Has your target market changed over time? If so, why and how?
3. Please tell me about your design style.
 - a. How did you develop it?
 - b. Has it changed over time? If so, why and how?

While the designer answered each of the foundation questions, the designer quickly grew frustrated with the slow pace of the questions; perhaps due to the fact that the designer was able to answer all of the foundation questions in a single statement. The designer's response to the first question covered the basic aspects of the second and third questions. This suggested that the foundation question section could be shortened significantly.

Design Process Questions:

1. Please walk me through your design process. How does a typical design go from ideation to the sales floor?
 - a. What is most important during XX stage?
 - b. What is least important during XX stage?
 - c. Has your process changed over time? If so, why and how?

The designer enumerated four ways used to design a garment and stated their top three design considerations as: aesthetics, materials, and time; but it was generally difficult to get the interviewee to share their design process through the main question. Sub-question 'b' received a blank stare and, once stated aloud, it was obvious that it was a poor question, since no one can know what they aren't thinking about at any given time. The final question, regarding change over time, generated the most information, with the designer discussing lessons learned from experience in previous apparel jobs, as well as changes made to the sizing system to accommodate shorter clientele. It was concluded that this section required more specific questions targeted at the fit and sizing aspects of the design process.

Sizing Practice Questions:

1. When you first started what was your sizing system like?
 - a. What is your sizing system like now?
 - b. Have you made any adjustments to your sizing since you started? If so, why and how?
2. What indicates that your sizing is working?
3. What indicates that your sizing isn't working?
 - a. What do you do when this happens?
4. How do you communicate sizing to your customers?
 - a. Have you changed how you do this over time? If so, why and how?

These questions pulled the most information from the participant, but still did not get to all of the topics that the researcher was interested in learning about. The wording was too general and required rephrasing during the interview. This suggested that the questions could be rephrased to ask about more specific topics that came closer to answering the research questions. Question 2 was eliminated, as question 3 provided more information and better discussion.

Concluding Questions:

1. Is there anything else I should know?

The designer did not really respond to this question, but on prompting with other similar questions, did provide some advice for others interested in starting a small

womenswear business and opinioned on sizing by large corporations. These responses suggested the addition of questions geared towards understanding what would make it easier for a designer to (a) design clothes and (b) create an effective sizing system.

Pilot Study 2

The second pilot study was conducted with the designer-owner of an ethical, sustainably-minded sportswear business targeted at modern women who want timeless yet trend-influenced clothing. The interview was conducted at a local coffee shop in mid-February at a time convenient for the interviewee. This designer-owner was selected for the pilot study because they work in close proximity to the researcher, which made the designer-owner convenient to contact and willing to participate. Overall, the flow of the interview went more smoothly than the initial pilot study due to the updated questions.

Foundation Questions:

1. Can you give me the sales pitch for your brand?
 - a. What are your mission/vision/values?
 - b. Who do you make your clothing for? Why these people? Has this changed over time? Has it expanded/shrunk? Why?
 - c. How would you describe the clothes?

New questions were added to the foundation question section during the interview. The question ‘What do they look like?’ was added as a follow-up for sub-question ‘b’, and ‘How do you want them to fit your customer?’ was added as a follow-up for sub-question ‘c’. Asking what the customer looks like was aimed at understanding body type, as this should lead into decisions regarding garment fit, and asking more directly about intended fit was aimed at understanding the intended body-garment relationship espoused by the business. The updated questions elicited more detailed discussion from the interviewee and provided a deeper understanding of the underlying influence of the customer and the designer’s design intent on sizing practice.

Design Process Questions:

1. How does a typical garment go from an idea in your head to a finished product?
 - a. What are the most important things you think about when designing? Patterning? Fitting? Manufacturing?

- b. Have you changed how you do this over time? If so, why and how?
- 2. What tells you that a garment isn't working?
 - a. What do you do when this happens?

Question 2 was eliminated from this section as it confused the interviewee and upon further reflection it was determined to be irrelevant to the question of sizing practice. Adequate information on the apparel design process was provided from question 1, thus the focus of this section narrowed in on the overall process.

Sizing Practice Questions:

- 1. What sizes do you produce? Why these sizes?
 - a. Have your sizes changed over time? Why?
 - b. What size do you grade off of (i.e. what is your base size)? How did you decide on the measurements for each size?
 - c. Do you use a fit model? Do you find it useful to use a fit model? Why/Why not?
- 2. What tells you that your sizes aren't working?
 - a. What do you do when this happens?
- 3. How do you communicate your sizes to your customers?
 - a. Have you changed how you do this over time? If so, why and how?

New questions were added to the sizing practice section during the interview. The question 'Where did you get your sizes from?' as added to question 1, and 'Where did you learn how to do this?' was added to question 1, sub-question 'b'. These were explicit inquiries into sizing that were missing from the interview and elicited the process of developing the size chart and the interviewee's background. Knowing the process of developing the size chart was crucial in explaining how each business operates, while knowing the interviewee's background provides insight into where assumptions about sizing and design originate.

Concluding Questions:

- 1. What do you wish you had/knew that would make it easier to design your clothes? To create your sizing?
- 2. Is there anything else I should know?

The questions regarding the wants and needs of the interviewee provided potential actionable items for policy, curricula, or future research. As with the first pilot study, the final concluding question provided no real substantive discussion, though conversation continued after the official interview questions concluded and was just as informative, and more relaxed, for both interviewee and interviewer. To keep the interviews conversational the research started each interview by sharing that there were formal questions but that the interview did not need to strictly adhere to them.

Final Interview Questions

The interview questions were rewritten after the second pilot study to improve the flow of the interview and elicit an informative conversation rather than a formal interview. Interestingly, once the question of what the customer looks like was added into the foundation question section, the interviewee invariably ended up discussing their fit model, which jumped the conversation straight into the sizing practice questions. Interviewees did end up answering all of the interview questions, though not necessarily in the order presented. As different interviews jumped through different questions in varying orders, the final interview questions are listed below in what the researcher believed to be the most organized state:

Foundation Questions:

1. What are the mission/vision/values for your brand?
2. Who do you make your clothing for? Why these people? How do you know who is buying your clothes?
 - a. What does your imagined/real customer look like?
 - b. Has your imagined/real customer changed over time? Has your market expanded/shrunk? Why?
3. How would you describe the clothes? How do you want your clothes to fit your customer?

Design Process Questions:

- a. How does a typical garment go from an idea in your head to a finished product?
 - a. What are the most important things you think about when designing? Patterning? Fitting? Manufacturing?

- b. Have you changed how you do this over time? If so, why and how?

Sizing Practice Questions:

1. What sizes do you produce? Why these sizes? Where did you get your sizes from?
 - a. Have your sizes changed over time? Why?
 - b. What size do you grade off of (i.e. what is your base size)? How did you decide on the measurements for each size? Where did you learn how to do this?
 - c. Do you use a fit model? Why/why not? Where did you find your fit model? Does your fit model accurately represent your customer?
2. What tells you that your sizes aren't working?
 - a. What do you do when this happens?
3. How do your customers know which size is right for them?

Concluding Questions:

1. What do you wish you had/knew that would make it easier to design your clothes? To create your sizing?

Invitation to continue conversation: "That is the end of my formal questions. Do you mind if we continue our conversation – I am finding it enlightening and would like to hear more."

Data Analysis

Phenomenological data analysis has eight basic steps: (1) data organization, (2) reading/listening to the data, (3) coding and initial annotations of the data, (4) memoing (5) writing the narrative, (6) thematic analysis, (7) discussing the themes, and (8) representing the essence (Smith et al., 2009; Creswell, 2013). Data, including transcriptions, reflections, annotations, and memos, were stored and analyzed in NVivo12, a software program created to organize, manage, code, query, and visualize qualitative data to help researchers meet transparency and reliability standards (Beckstrand, 2017).

Once all of the data was organized in NVivo12, each interview was treated as a separate case. Reading, listening, coding, annotations, memoing, and writing the narrative for an interview occurred for each of the six interviews. Once narratives were written for

all interviews, then narratives, codes, annotations, and memos were analyzed for common themes. Each theme was discussed in terms of prevalence in the narratives, and was compared to current academic literature. Analysis concluded with a description of the essence of the phenomenon of sizing practice, including textural and structural descriptions, which led directly to the actionable items for curricula and business.

Close reading of the transcriptions while listening to the audio-recording, as suggested by Smith et al. (2009), made it easier to understand the text of the transcripts, make more appropriate annotations, and code the data correctly. The first reading of the transcript was always accompanied by the audio-recording of the interview and no coding or annotations were recorded. On the second reading, the transcripts were rough coded into eight categories:

- a. Mission/Vision/Values: Included anything that comprised a basic building block for the business, including who they are, their history, their passions, and their/the business' worldview.
- b. Clothing Description: Included all information on stylistic decisions for the garments, including what the business wants their clothing to look like and how they want it to fit their customers.
- c. Target Customer: Included all information pertaining to who the business targeted, including their lifestyle and body type, as well as how the business communicates with them.
- d. Design Process: Included all information related to how the business designs their clothing, from inspiration gathering through manufacturing.
- e. Sizing: Included all information related to sizing, including the size range, the process of developing the size range, grading, and communicating sizes to customers.
- f. Fit Model: Included all information pertaining to the fit model, including what she looks like, her role in the design process, and how she was found.
- g. Wants/Needs: Included all the wants and needs expressed by the interviewees.
- h. Barriers/Challenges: Included anything that sounded like a difficulty that was (a) out of the hands of the business (i.e. barrier), or (b) something that was within reach of the business, but not yet achieved (i.e. challenge).

All categories were derived from analysis of the data and can be considered super-ordinate themes (clusters of like-minded themes, via Smith et al., 2009). At this stage in the analysis process, the categories were used to help organize the writing of the narratives.

Annotations were made during the second reading of the transcripts as the data were coded. In this study, annotations are the notes and comments made by the researcher that are linked to specific sentences and paragraphs in the transcript. Smith et al. (2009) recommend commenting on the things that matter to the participant, as well as anything that allows you to understand the phenomenon from the participants' point of view. They list three types of comments:

1. Descriptive: notes on key objects, events, and experiences for the participant,
2. Linguistic: notes on the ways content and meaning were presented by the participant through their language use, and
3. Conceptual: interrogative or interpretative notes that draw on the researchers' own experiential/professional knowledge.

More focus was given to descriptive and conceptual comments than linguistic ones in this study, as Smith et al. (2009) espouse a psychology-driven hermeneutical phenomenology that does not fit precisely with the goals of this study.

In NVivo12, memos are documents akin to Microsoft Word documents that allow for expanded discussion of topics. Memos were written after the annotations and comprised the researcher's attempts to interpret, group, and analyze the data for each super-ordinate category. One memo was created for each interview which formed a rough draft of the narrative and acted as a place to explore the themes within and between each super-ordinate category.

Narratives were written in Microsoft Word that described each business, including information from all eight super-ordinate categories. Each narrative acted as a textural and structural description of sizing practice for a business. Interpretations and analysis of the data were not conducted during the writing of the narratives.

Reductions, abstractions, and interpretations occurred during thematic analysis of all six interviews, which occurred after all six interviews were converted into narratives. An Excel spreadsheet was generated to organize fifteen key components from the narratives

(Table 1). Comparisons were made between the businesses for these fifteen key components. Themes were derived from the memos, annotations, and comparisons resulting in three themes related to each of the two research questions for a total of six themes.

Table 1: Key Componets from Narratives as Compared in an Excel Spreadsheet

Interviewee's Role in Business	Interviewee's Mindset	Apparel Type
Customer Profile	Sales Strategy	Inspiration
Design Process	Fit Model Used?	Fit Model Body Type
Number of Samples?	Size Range	Grade
Why Those Sizes?	Sizing Process	Communication Strategy for Sizing

Conclusion

This chapter explained the background and principles of phenomenology, related how the phenomenological research approach was executed in this study through data collection and analysis, described data collection and analysis procedures in detail, and shared the results of two pilot studies. The interview formatting and questions were altered to elicit a conversational interview style which led to a more relaxed atmosphere during the interviews. Memoing revealed eight supra-ordinate categories and comparisons of fifteen key narrative components resulted in six themes for discussion.

Chapter 4 Findings & Discussion

Introduction

This chapter documents the findings from six interviews with employees from small womenswear businesses. Narratives of each interview are presented first, followed by thematic analysis via cross-case comparisons. Narratives provide an overview of the business, a description of the target customer, and detailed accounts of the apparel design process and sizing practice. Each narrative concludes with the stated desires of the interviewee regarding apparel design and sizing. Thematic analysis drew on similarities and differences between interviews to answer the research questions. Three themes per research question were discovered during thematic analysis of the data.

Narrative 1: Interview with ‘A’

The first interview was conducted in-person at a coffee-shop with the designer for business ‘A’. The interview lasted one hour and six minutes. Interviewee ‘A’ is the designer for the business and will be referred to as ‘the designer’ throughout the narrative.

Small womenswear business ‘A’ aims to “*create versatile, stylish, and functional travel garments*” that are respectful of their customers’ travel destinations. Their eventual goal is to create a travel capsule wardrobe that solves common travel challenges. Garments are designed to evoke destination appropriateness through classic aesthetics and attention to detail that help travelers not feel out-of-place regardless of cultural atmosphere or weather conditions. The silhouette was described as more tailored, with broader shoulders and longer sleeves than competitor brands, to accommodate the taller, lean athletic build of the target customer.

A market analysis revealed two distinct target customers who would be willing to invest in high-quality travel apparel: a) nearing or newly retired Baby Boomers, and b) their Millennial children. Baby Boomers responded more enthusiastically than expected, buying garments for themselves and their Millennial children. Interest in the garments stems initially from an appreciation of the garment aesthetics, followed by pleasant surprise at the functional garment aspects, including wrinkle resistance and anti-microbial properties.

Sales occur via both pop-up shops and online sales. Pop-up shops have given the co-founders and designer the ability to meet their customers, which provided important insights into who the real customer was, feedback on garment aesthetics, function, and fit, and customer body type. Online sales have been tougher than in-person sales due to low or nonexistent brand recognition, which makes it difficult for customers to know which size will suit their body type and fit preferences.

The design process for these highly technical garments takes much longer than the typical apparel design process, spanning six months to three years, depending on the product. The business starts with a travel challenge, questioning how a garment can solve the challenge. The designer and co-founders ideate possible solutions, refining their ideas through discussion and market analysis to see if the proposed designs fit their targeted price range. Garments tend to utilize complex engineering to incorporate design elements such as hidden pockets, inflatable hoods, and garment reversibility. A final design solution is chosen and the designer formulates a mini technical specification package for a sample house. The sample house handles prototype development, including drafting the patterns, making the sample, hosting fit sessions, digitizing the final garments, and formulating a final technical specification package for the production facility.

The business uses sample houses from all around the United States. Sample houses consolidate patterning, grading, sample sewing, and technical specification package writing skills into one business for businesses who cannot handle these skills themselves. For fit sessions conducted locally, the designer and a fit model meet in-person with sample house staff to discuss the prototype. Glaring errors, including puckering and pulling, are dealt with first, followed by decisions regarding garment fit. The designer must balance the fit of the garment on the fit model with the desired fit on the target customer, a task made more challenging by frequently switching fit models, and the two distinct age groups of their customers, who have slightly different body types. For fit sessions not conducted locally, the prototype assessment process occurs over Skype, which brings the additional challenges of poor Internet connectivity and pixilation of computer images, making judgments about fit difficult. Attempts are made to limit the process to three prototypes, with one fit session per prototype. Records of changes are kept by the business to remember what decisions they made and why they made them.

Business 'A' does not use professional fit models. Instead, they started out using one of the co-founders as the fit model for their jacket and switched to an intern mid-development when the co-founder became pregnant. When the intern moved to New York, they found another friend to act as fit model instead. The constant change in fit models slowed the already slow development process considerably. The goal with the revolving friends/co-worker fit models is to ensure they are not "too much of an outlier" for their target consumer body type. The body type was originally set by the body configuration of the co-founder (5'7", very thin, broad shoulders, long arms), followed by the similar body type of the intern (5'7", thin, curvier than co-founder).

The designer noted that their customers tend towards this body type (lean, broader shoulders, longer arms), though she was uncertain if there is any cause-and-effect at play. It is possible that their success with customers of the lean, broad shouldered, long-armed body type is because their garments are designed to fit that body type best. It is equally possible that the pursued target market is composed of that body type and the first fit model they used just happened to correspond to the target customer's body type. Regardless, some garment details were designed specifically to accommodate more petite customers. For example, the sleeve cuff on the jacket was designed to look nice rolled up.

Newer designs incorporate more intentional body type specific fit decisions due to knowledge gained about the actual customer's body type and fit preferences through the pop-up shops. The designer expressed a wish to eventually have two fit models, one to represent the Baby Boomer customer and one to represent the Millennial customer, as the Millennial customers were seen as having curvier hips than the Baby Boomer customers. As illustrated in the following quote, one downside of narrowing the focus of their target customer is that they lose out on sales to customers who do not fit this body type:

"It's easy to get discouraged when that happens when we're in popups and we get people who are really excited about what we're doing and they're just not our fit that we've come up with and it's really hard to not try and grasp at every apple that comes along. And like, well, we need a little bit more of this and a little bit-- Because you can't be everything and no one has really come up with a solution to that yet with sizing. And so, it's really hard to not be like, "Oh, if we had only been a little bit more this, you

know, we would have made that sale." But then we wouldn't have made the next sale, so it's really hard to say that, like, something's not working per se, because that's just sizing. People are just very different bodies and there's no way around it." ~ 'A'

Sizes were determined by considering what would work best for the target customer prior to knowing who their actual customer was. Since it was expected that their customers would be of a lean, athletic build, the sizes were kept to the standard size range of extra-small to extra-large, or five sizes in total. The designer noted they would like to offer more sizes, including petites, tall, and plus-sizes, because they dislike losing sales due to customers being outside their range, but they do not have the resources to do it.

While the designer was taught grading in school, they were not taught how to create a sizing system from scratch, nor how to apply it to a specific customer base. To determine what dimensions should belong to each size, the designer reached out to alumni from her school for advice. Upon learning that their experience with sizing systems extended only so far as tweaking or moderately updating pre-existing sizing systems for established businesses, the designer invented her own method.

Decisions about sizing appear to occur after a garment has been designed, and the fit of the garment is correct for the fit model (who represents a size medium). The designer and co-founder conducted competitive market analysis via shopping trips with the aim of understanding the sizing system of their competitors. While the designer described this process as fairly informal, she did note that there were three things they looked for during the trips:

1. They wanted to understand who their competitor's customer was,
2. They measured the difference between the sizes in the range to find the grades used by their competitor, and
3. They tried on the garments to understand the fit, compared their bodies to their target customer, and considered how those grades would work for their target customer.

Through this competitive market analysis, they arrived at the best fit for the extra-small (represented by the co-founder) and the extra-large (represented by the designer). The small and large sizes were determined through what appears to be a version of nested

grading (Aldrich, 2007), whereby the smallest, middle, and largest sizes were used to triangulate the remaining two sizes. The designer also mentioned that they used standard grades of 1” for the extra-small to large sizes, and 3” for the large to extra-large sizes as their starting point for grading their garments, with the intent to alter the grades as needed.

The final step in creating the size range for their garments was to sew a size run and test the garments on bodies. For their newest design, a pair of pants, they used a local sample house and during a fit session for the pants they had all but the size large represented amongst those present. In addition to the formal fit sessions with the sample house, they conduct informal “focus groups,” using friends to test the garments and provide feedback on fit, function, and style. While this has had limited success for the brand due to their friends forming a rather homogeneous size grouping, the business is looking for other ways to incorporate customers into the process. Business ‘A’ believes this method will work better now that they have built a more extensive network.

Communication of their sizing is currently left to a size chart. For in-person interactions at pop-up shops, the designer noted surprise at how flexible customers were with sizes, noting they gave a range in what sizes they usually fit, rather than adamantly stating they were a particular size. To make it easier for customers to find their size during in-person interactions, Business ‘A’ is working to learn how their garments compare to their better-known competitors, so that they can provide that information for their customers (i.e. “if you are size X in Brand Y, you’ll be size Z for us”).

Online interactions are mostly limited to the customer knowing their measurements and knowing how to read and understand a size chart. The designer believes this to be a strong barrier to sales for three reasons: a) people may not know their measurements, b) they may not know how to get their measurements, and c) they may be intimidated by the process of getting their measurements. To combat this, Business ‘A’ is in the process of updating their sizing charts to include a ‘how-to measure’ section. They also rely on high-quality customer service, with the co-founder hand delivering alternate sizes to local customers when necessary.

When asked what would make designing and/or sizing clothing easier, the designer wished for more local resources in line with the established garment districts of New

York and Los Angeles. In particular she wanted more local partners for pre-production (sample houses and sewing teams) that can be accessed in-person. She also wished there were more fit models with greater variation in body types, heights, and weights available to test the clothing on so that they could understand how their clothes fit different bodies. Her most (self-described) far-fetched desire is to have consistency in industry language, as she feels that standardized language would make design and development much easier.

Narrative 2: Interview with ‘B’

The second interview was conducted over Skype with the owner of business ‘B’. The interview lasted 50 minutes. Interviewee ‘B’ is the owner and designer for the business and will be referred to as ‘the designer’ throughout the narrative.

Small womenswear business ‘B’ aims to provide comfortable apparel that empowers the wearer, making her feel like a “girl boss”. Ease of wear, beautiful, and minimalistic in style, the clothes from business ‘B’ focus on simplicity. The silhouette was described as well-fitting, but not clingy. Balance is a key aspect of the brand, with individual garments needing to be proportionally balanced and garments across a collection requiring balance with some fitting closer to the body and some fitting more loosely.

The designer knew she wanted to be a member of the ethical, sustainable apparel community, but it took her two years to settle on her niche of comfortable and presentable clothing for women who work at home: stay-at-home-moms, entrepreneurs, and students. She says that even after two years she is unsure that her customer will be able to sustain her business long-term. Her interest in the sustainable community stems from her belief that a better life includes owning only a few high-quality clothes, a belief she uses to market her business to potential customers. Her knowledge of the customers in the sustainable market came from market research, in-person interactions at pop-up shops, and emails with customers.

When describing her target customer’s body type, designer ‘B’ stated that she aimed her line away from a single body type or a single age group, citing Eileen Fisher and Elizabeth Suzann as inspiration for the decision. She uses the looser-fitting aesthetic of her clothing to accommodate multiple body types. Instead of using friends to test-fit her clothing, she chose to use someone who matched her image of a realistic woman. She found her fit model at the gym, explaining that she:

“tried to find, like, the most relatable body type in the sense of what people think of, not like model status, but like just a well-proportioned individual.” ~ ‘B’

Her design output currently follows the seasonal output strategy common to most of the apparel industry, with collections released in spring and fall, though she intends to move away from this method. Ideally, she would like to release new designs on a rolling basis, the way that Everlane does.

Her design process starts by gathering inspiration. She looks at what friends are wearing, what is trending on Pinterest, what other businesses are selling, and also considers what she wants to wear. From there, she sketches out ideas, considering the construction of the garment during ideation. Ideas are refined as the construction is simplified, making the garment design stronger in her opinion.

Designer ‘B’ handles the pre-production processes of patternmaking and sample-making as a way to reduce her costs. She works with a technical designer from another apparel design business to choose materials and perfect the garment patterns. Designer ‘B’ is still learning how various fabrics perform and values the help of the experienced technical designer in choosing fabrics for each design. Perfecting the pattern blocks is of utmost importance, with five fit sessions per new style conducted to ensure accuracy in the garment. When fit testing the garments the designer looks for mobility, balance, that the desired ease is present, and that the design features and seams are placed correctly on the garment. When checking that the desired ease is present in the garment, the designer uses intuition to determine whether to add or subtract ease to get the correct aesthetic.

After formalizing the fit of a new style, the patterns are graded by hand. The current size range is small, medium, and large, with a grade of 2” between each size. This range was chosen because (a) it was obtainable for the designer, (b) it allowed her to maintain integrity in the design details and style of the garments, and (c) she expected most women in her target market would wear those sizes. Once funding is acquired, the designer intends to expand the size range so that more customers can be accommodated.

Dimensions for the sizes were compiled via competitive market analysis of apparel businesses that Designer ‘B’ personally favors. The designer first tried on garments and assessed the fit of them on her body, considering whether she liked the fit or not. For

those businesses where Designer 'B' like the fit, she looked at their size charts. She compared the size charts from all of the businesses that she liked to see if there was consistency among them. She built her size chart from the consistent dimensions she found.

Grading has been difficult for Designer 'B' to learn and apply to her garments. While she learned how to grade as part of her education as a fashion design major, she felt that the grading process was too complicated. She gained experience with grading during her first job out of college but noted that the grading strategy she learned there was less detailed than she desired for her own business. As she defined the grading for her business, she found that ensuring consistency among the different sizes for a single style as well as among the same size for the different styles were important considerations. In addition, she found that her limited experience with grading affected her designs. To ensure consistency across different sizes of a single style she sometimes needs to re-design the garment so that garment features can be graded accurately. To improve her grading she bought a book recommended by a trusted small apparel business owner (*Professional Pattern Grading for Women's, Men's, and Children's Apparel* by Jack Handford). The designer has found the book helpful and uses the principles of grading it espouses to conquer the more complicated design features in her garments.

Once a garment has been graded, Designer 'B' cuts out the material, bundles it, and sends it to seamstresses for sewing. The designer controls these aspects of the production process to keep her costs down. She uses local seamstresses and is proud to manufacture her garments in the United States. She is currently looking to expand her manufacturing from Minneapolis to factories on the East Coast.

A size chart is used to communicate the sizing system to Business 'B's customers. She considers this the most "barebones" way of communication, but it suffices for both online and in-person sales for the moment. She has plans to update her website to include more tools to help the customer choose their best size, including 'how-to measure' diagrams. She also plans to assimilate multiple models wearing different sizes of a style along with the garment and model measurements into her website so that customers can make informed decisions about what size is right for their personal fit preference.

When asked what would make designing and/or sizing clothing easier, the designer wished for the resources to make informed decisions regarding her target market and sizing. She desires research on body types, sizes, and customer purchase behavior in her market, but doesn't know where to go to find it. She also mentioned that the use of a computer-aided-design program like Optitex would make her grading more accurate.

Narrative 3: Interview with 'C'

The third interview was conducted over the phone with the owner of business 'C'. The interview lasted 35 minutes due to the busy schedule of the interviewee. Interviewee 'C' is not a designer, and thus will be referred to as 'the owner' throughout the narrative.

Small womenswear business 'C' aims to support plus-size women's participation in physical activity by providing them with fashionable, high-quality activewear in seven sizes (XL to 6X). The guiding principle of business 'C' is that all women deserve the right to be active, regardless of their size. For business 'C', high-quality activewear means long-lasting clothing with a fit that ensures mobility during activity and makes the wearer feel good emotionally.

The business was founded in 1995 after market analysis revealed a gap in the activewear market. The business began as a cataloger but switched to e-commerce after the 2007 recession due to the prohibitively high costs of mailing catalogs. The switch from catalog to e-commerce has resulted in lower sales, which owner 'C' attributes to the push-pull nature of the two retail outlets. With the catalog, they pushed their product into the market, targeting the women they felt made up their market. With e-commerce, they rely on their brand and products to pull women to their website. Close comparisons of the ship-to and bill-to addresses coupled with low gift certificate purchases revealed that the women buying the products are the same women using the products.

The typical consumer of business 'C' was described as between 35 and 65 years of age, fairly well educated, most likely employed at a job involving heavy computer usage, and fairly affluent. In terms of physical activity, the typical consumer belongs to a gym and works out three times a week, usually with lower-stress activities such as walking or swimming. In terms of body type, owner 'C' stated they have "*a wide range of people because it's a wide range of sizes*", indicating business 'C' doesn't design for a single body type.

There are two possible routes for the ideation stage of the design process in business 'C'. The first route is when the business needs completely new designs, while the second route is when they only need minor updates to old designs. For completely new designs, a design brief is sent to a freelance designer who ideates numerous options after taking into consideration what the customer wants, what the business wants, and the production capabilities of the manufacturer. Customer wants are determined by the Customer Service Lead who pays close attention to customer feedback via emails, customer service phone calls, and product reviews. Business wants are determined by the owner and other key staff who pay close attention to trends they see forming in the marketplace.

The ideations from the freelance designer are sent to business 'C' where some are chosen for production. The in-house technical designer handles the minor updates to old designs. Once ideations are completed, the technical designer builds a technical specification package for each garment and sends that to the manufacturer, who drafts the patterns and constructs a sample garment. The technical specification package, or "tech pack" includes business 'C's grade rules and garment measurements. Effort is made to ensure clear communication of business 'C's expectations for the garments to make patterning easier for the manufacturer, as well as clear instructions on how to measure the garments to make sample assessment easier for the manufacturer.

Once constructed, the sample is sent back to business 'C', where a fit session is held with their fit model, who they found through an advertisement on Craigslist. The fit model was described as 'A-shaped' and 'Pear-shaped', indicating a bottom-heavy figure, and fits the size 1X (the second smallest size). During fit sessions the fit model tries on the clothes selected by the technical designer while the technical designer, owner 'C', and the Director of Merchandise all make notes on the garment. The technical designer analyzes the notes and writes specific changes for each garment which are sent to the manufacturer. The manufacturer updates the patterns with these changes and produces the final garments.

Beyond fitting the fit model well, garments for business 'C' are engineered with what the owner described as a "flexible fit". Flexible fit is the deliberate design decisions made to accommodate a range of body types within a single garment:

“Well, we make sure that, for example, our fabrics have good stretch so that if somebody is larger in the thigh or larger in the hip or something like that that they could still wear that item, that there's a range of plus or minus at least two inches on all dimensions that are going to be comfortable.” ~ ‘C’

It is the job of the freelance designer and in-house technical designer to take the base fit from their fit model and determine how to accommodate other body type variations into a single garment while simultaneously maintaining consistent sizing across the collection. They pay attention to six critical dimensions during this design process: stomach, upper arm, thigh, back width, total garment length, and sleeve length. The owner acknowledges that even when they design with this flexible fit mentality, they cannot accommodate every body type in a single garment, thus the business works to ensure that every woman can find something that works for her in the collection, if not in every garment.

Business ‘C’ built their sizing system and grade rules from measurements gathered during a survey of over 200 US women in conjunction with a researcher at the University of Minnesota. As the sizing system was built 23 years ago, the owner could not provide any more concrete information on the construction of the system, though she maintains that they used sound research practices and a good-sized sample to build it.

The original sizing system comprised six sizes: 1X, 2X, 3X, 4X, 5X, and 6X. At the time, the market did not offer 4X or 6X sizes in activewear, thus it became a competitive advantage for the business to cater to these women. But, while the plus-size woman does go higher than the size 6X, the business decided to stop there due to there being too few women to send catalogs out to once you passed that size. This was a financial decision based on the economic idea of diminishing returns. The new sizing system recently expanded to include size XL which is one size smaller than the 1X. This change was based on customer requests. As their customers engaged in physical activity many lost weight, sizing them out of the business’ size range. These women continued to have a difficult time finding activewear that fit their body types, and as they were determined to have the same ‘A-shape’ as the fit model, business ‘C’ expanded its sizing to continue servicing these customers.

The block patterns were drafted by a local patternmaker by hand. During the original drafting of their block patterns, owner 'C' and the patternmaker discussed the most appropriate grading strategy for the business' sample. There was special emphasis placed on how the patterns changed across the range, with special effort made to ensure that dimensions that change at different rates were accurately represented. For example, it was important to ensure that the neck circumference changed at a smaller rate than the bust circumference to mimic the way that bodies actually grow as more weight is added. The size 1X was selected as the base size for grading. This size was chosen because they could fit it to the fit model and also use samples for marketing purposes.

To communicate their sizing system, business 'C' uses a body size chart which includes diagrams on how-to measure the body, as well as select garment measurements for each product. Business 'C' focuses on making it easy for customers to find their size. The body size chart can be found by clicking a link present on every product page, while trained customer service agents can walk a customer through the body measurement process and help them decipher where their measurements fall in the body size chart. If a customer falls in-between sizes, customer service agents are trained to guide them through picking the best-fitting size based on individual products.

When asked what would make designing products easier, owner 'C' mentioned two things:

1. Access to trend forecasting services, and
2. Designers who can design for this niche market.

Owner 'C' states that if they can hit a trend then they will, but without the financial resources to subscribe to trend forecasting services, it is difficult to stay on top of the trend cycle. She believes access to trend forecasting services would give her business a competitive advantage, and without it she consistently feels behind the trends.

Owner 'C' says their business has a difficult time finding designers who can work well in this niche market. Designers for the plus-size activewear market need to be able to synthesize trends, know how to fit plus-sized female bodies, and make sure their designs can be practically executed by a manufacturer. Owner 'C' feels the most important quality for a designer in this market is the ability to place oneself into the life and understand the perspective of another human being, especially one who may be vastly

different from oneself. She strongly believes that the ability to do this leads to better design and would like to see more designers trained with this capability.

When asked what would make sizing easier, owner 'C' said that she is interested in implementing some form of customization into her product mix. Business 'C' caters to a wide variety of body types and tries to accommodate differences in body coverage preferences through multiple garment and sleeve lengths. She is currently unsure how to implement customization into the business but is interested in exploring the idea.

Narrative 4: Interview with 'D'

The fourth interview was conducted in-person at the studio of business 'D'. The interview lasted fifty-five minutes. Interviewee 'D' is the owner and designer for the business and will be referred to as 'the designer' throughout the narrative.

Small womenswear business 'D' works to enhance women's everyday lives by making them feel beautiful, confident, and put-together through comfortable sportswear. Comfort is provided by the softness and stretch of knit fabrics and enough ease to make daily activities, like eating lunch, enjoyable. Silhouettes are a mix of body-conscious and loose-fitting styles with mostly tops, dresses, and skirts.

After leaving college after her sophomore year designer 'D' founded her own apparel design business. Throughout that time, she designed for a number of markets including Juniors, Missy, Children's and Men's before settling on Contemporary in 2006. At the time of the switch to the contemporary market the business phased out their wholesale accounts and moved into the direct-to-consumer market. At the inception of her business 'D' found it difficult to design for the Missy market of 40- and 50-year-old women. It wasn't until she became her client (i.e. she aged into the 40 to 50-year-old market) that her business became successful. Based on her experiences, she believes that designers must represent their own target market in order to successfully design clothes for them.

Designer 'D' designs clothing for the way she lives her life, stating she is her client. She feels that she has a similar lifestyle to many American women and this similarity allows her to design clothing that suits not just her own life, but theirs as well. She uses her skills as a designer to solve everyday problems associated with dressing, such as dressing appropriately day-to-day and feeling cute and a little sexy. She sees it as her job to interpret trends in wearable ways that do not risk embarrassing her clients.

Communication with clients occurs either directly via social media (Facebook and Instagram) or indirectly via sales representatives. Feedback on the clothing is constant: clients share with their respective sales representative and the sales representatives share with each other and with the designer. To share information on the clothes the designer sends out a regular newsletter, seasonal Facebook Live videos, and holds sales meetings with the sales representatives twice a year. The Facebook Live videos share tips on how to wear the new clothes, shown on two models with different body types.

Designer 'D' designs the clothing to fit her body and her lifestyle using herself as the fit model. The designer acknowledged that while her body is proportional and the clothes that are made to fit her seem to fit the customers well, her customers' bodies vary greatly both in overall shape (i.e. apple, pear) and in body component (i.e. long torso, narrow shoulders). She makes clothes and they either fit the bodies of her customers or not.

The design process starts with gathering inspiration, which comes from the everyday experiences of the designer. She thinks about her life and what clothes can solve problems she may be having, blending that with her interpretations of current trends. After interpretation she dives into a cycle of prototyping, evaluating, and redesigning: test patterns are made, a sample is sewn in-house, a fit session is held, the pattern is tweaked, and the sampling and fitting sessions start again. When making the patterns, the designer focuses on how the two-dimensional shape is turned into a three-dimensional form, and that the design lines are flattering on the body. During fit sessions the designer focuses on the fit at the shoulders, tightness on the arms, the appropriate length of tops, and if there is enough ease at the hips of skirts to be comfortable. The design cycle takes as many times as necessary to get the fit perfect; anywhere from once to ten times.

Once the design is finalized and the patterns are perfected for the sample size, the patterns are graded and the larger sizes tested. The designer acts as the fit model using the extra small as the sample size and the base size from which the remaining sizes are graded. The small size is tested on the production manager while the large size is tested on the office manager. Rather than use a professional fit model, the designer insists on using the women in the business because they are easily available. After testing, the production manager writes technical specifications, cutting and sewing instructions.

Everything is sent to their manufacturers in Los Angeles who cut and sew the garments, then ship them back to business 'D' for distribution.

Ethical manufacturing is a key value for the business. Designer 'D' is passionate about ensuring the fair treatment of garment industry workers. While she is proud to manufacture in the United States, the higher costs attached do influence the design of her garments: a) fewer steps are needed in the construction of the garments, b) the garments cannot have a lot of embellishment, and c) the garments cannot have intricate details. Working with the manufacturer is a chance to build a strong relationship predicated upon trust. Because the manufacturers are so far away from the designer, she must trust them with materials and intellectual property (i.e. the designs and patterns).

The five sizes produced by business 'D' are extra small, small, medium, large, and extra-large. These sizes were chosen because they are the normal range of women's sizes bought and sold by most wholesalers, and they are the most economical in terms of inventory for a small-batch manufacturer. The size range was developed via trial and error over the last 30 years. When designer 'D' first started at the age of 21 she had three sizes (small, medium, and large) and used a 1" grade between each size, using her own measurements for the size small. Feedback from retailers suggested she reconsider her sizing range, as most women are not as small as her. She switched her grades when the business moved from the Junior market to the Missy market, but does not recall what she switched them to or what information she used to make her decision. When the business switched to the Contemporary market designer 'D' changed her grades again to fit somewhere in-between the Junior and Missy grades. Feedback from current customers suggests that her current sizing system works well.

To communicate the sizing, customers have to try the clothes on. There is no size chart provided, nor is guidance given to the sales representatives on how the garments are designed to fit. The reason behind the more relaxed attitude towards garment fit is due to designer 'D's view that she cannot force a customer to wear a certain size as they have their own personal fit preferences and will wear what they want to wear:

"So, if you're doing body conscious and it shows your figure, then you're always just going to have half the women who are like "Oh no, no. I can't show my body," and either they won't choose it at all or they'll size up, and

then we've got the looser things and you'll have half the women say "Oh, that's just too much fabric," and either size down or not choose that style at all, which is totally a prerogative." ~ 'D'

Sales representatives learn the way garments fit through experience and are able to compare new styles with older ones to make recommendations to their customers. Communication flows freely between the sales representatives and the designer, with the designer adjusting garment designs based on feedback regarding fit and sizing. The designer relies on this information from the sales representatives to improve the garments and increase the sales potential of her garments.

When asked what would make designing easier, designer 'D' wished for a local garment industry with skilled laborers, especially skilled sewers. When asked what would make sizing easier, designer 'D' stated she did not need to improve her sizing currently, but that she wished she had been able to experiment with sizing for another business, as learning on her own was expensive in terms of time and money.

Narrative 5: Interview with 'E'

The fifth interview was conducted in-person at a café. The interview lasted one hour and twenty-six minutes. Interviewee 'E' is the owner and designer for the business and will be referred to as 'the designer' throughout the narrative.

Small womenswear business 'E' makes fashionable apparel for breastfeeding mothers. The clothes needed to be stylish, versatile, easy to wear, functional, and work-appropriate. Each garment is engineered for easily accessible breastfeeding or pumping. The aesthetics of the business are driven by trends, with the initial collection styled with a softly draped vibe, and the new collection taking on a more minimalist vibe. The designer is passionate about changing the current social stigma surrounding public breastfeeding:

"So, my mission is to get women to join society, to get women out of the rooms and out of their houses and join in participation, and also if they want to not join in participation. It's about giving women choices" ~ 'E'

The concept for the business originated from the designer's own experience of being unable to find work appropriate clothing that allowed for pumping. In her job as a designer for a large corporation she presented trends and was expected to dress formally

and fashionably, which ruled out the slit t-shirt available for nursing mothers. To pump at work, she needed to undress completely, leaving her feeling vulnerable in addition to distraught for being apart from her new baby. She has an Associates Degree in Applied Science in Fashion Design from FIT and so could design and sew clothing to solve her own problem but felt that it was important to fill this market need for other nursing mothers.

The clothes need to accommodate the fluctuations that the female body goes through during nursing. Changes to the human body during nursing are unpredictable; women can lose weight quickly or slowly, maintain their weight, or gain weight. In addition, the breasts themselves change unpredictably during the nursing period. The target customer for business 'E' covers all nursing mothers who lack time, want to look put-together, and want functional breastfeeding and/or pumping attire. She purposefully does not design for a specific body type because her target customer varies so greatly.

While 'E' knows she cannot fit every body, she tries to fit as many as possible. To accomplish a more inclusive fit, 'E' designs the garments to fit generously and constructs all of the garments using knit fabric. Multiple fit models are used to test the fit of the garments which has allowed the designer to test the reliability of the functional aspects of the designs. Garments are designed to fit and flatter at least three different body types. The designer uses the term 'expression of fit' to describe the amount of ease and the expressive value of each garment (ex. 'loose and cool'). She aims to keep the expression of fit across the size range for a garment.

The design process starts with researching a nursing need and gathering fashion inspiration. Needs come from direct interaction with nursing mothers via three routes: online forums, membership in the Minnesota Breastfeeding Coalition, and live presentations given to the market. Fashion inspiration includes competitive market analysis of street styles, runway shows, and other retailers to stay on top of trends, which constantly evolve. Synthesis of needs and trends results in fashion and technical sketches. To test the ideas in the sketches, prototypes are created of the internal functional components. Once the construction of the functional components has been worked out, designer 'E' creates a technical specification package.

The technical specification package is sent to a WRAP-certified manufacturer in Nanjing, China, where the in-house patternmaker drafts the patterns and sews a sample. The sample is sent back to 'E' who measures critical points of measurement on the garment – waist, hip, bust, under-bust – and fit tests the garments on multiple fit models. The main goal of the fit tests is to understand if the fit models are comfortable and if the functional aspects of the garment work with one hand only (i.e. mother has one hand to hold the baby and one hand to do everything else). Samples are sent back to the patternmaker with comments and redesign requests. The patternmaker makes the changes and sews a new sample. This process of patterning, sampling, and feedback occur two to three times.

Once the sample is approved, 'E' places a purchase order for production. For her first order she anticipated selling more of the larger sizes than the smaller ones and so ordered a ratio of 1-1-2-2-2. Her market research in that area was incorrect and she sold out of the smaller sizes, but not the larger ones, indicating to her that her target market was different from what she originally expected. Once the purchase order is made the fabric is ordered and the garments are manufactured and shipped to business 'E'.

Business 'E' sells five sizes: extra-small, small, medium, large, and extra-large. The medium is the base size from which the remaining four sizes are graded. These five sizes were chosen because they align with what retailers in the contemporary market stock in their stores. In addition, five sizes are the most economical for business 'E' to produce. Designer 'E' is hoping to introduce size 2X within the next year, but requires additional funding to add the 2X size to the current production lineup.

Without a steady target market from which to capture measurements, the dimensions for each size were chosen via competitive market analysis. While there were no direct competitors, twelve businesses were identified as providing similar enough clothing to use for size analysis. Working with a contracted technical designer, designer 'E' measured across the size range at several critical points of measurement for all twelve competitors. This analysis provided garment grade rules which were averaged to create composite measurements for each competitor. Basic pattern blocks were drafted using the composite measurements for the size medium, the remaining sizes were graded with the other composite measurements based on the expected target market's body dimensions.

Two years after developing the initial grade rules, designer 'E' mocked up the internal, functional aspects of the garments. These garments were tested on various fit models to see if they fit the way that designer 'E' intended. Due to the fleeting nature of the nursing phase of motherhood and the difficulty of finding nursing mothers in the same geographic location as herself, designer 'E' created a private Facebook group of select volunteer fit models. Designer 'E' felt this was not the optimal way to get feedback, as it was difficult to get useful feedback on fit with none of her volunteers trained in proper garments fit, but it sufficed as the volunteers were open and clear about what did and did not work for them.

In general, designer 'E' feels that communication regarding sizing is difficult, especially for online purchases. She meets a number of women in-person at presentations, and they are able to try the clothes on and discuss them on the spot. Designer 'E' asks lots of probing questions to identify problem areas and is always working to improve her garments, even when she knows that she cannot fit everyone. But online the customer is responsible for reading the garment descriptions and paying attention to the fact that the clothes are sized generously.

When asked what would make designing easier she replied that access to how the customer thinks and why they make certain purchases would be invaluable. She would also like access to in-house pre-production services, which allow for a garment to go from a sketch to a sample in 48 hours. If she could implement computer-aided design into her business she would.

When asked what would make sizing easier, designer 'E' mentioned wanting a large sample of women surveyed with questions surrounding sizing. She also desired a formal system for tracking her customers through the nursing stage of motherhood (ex. what happens to their bodies, what do they need, etc.). Lastly, she wants more information on the body-garment relationship, specifically how patterns are impacted by the body and what the resulting patterns actually look like across different bodies of the same size as well as across a range of sizes.

Narrative 6: Interview with 'F'

The sixth interview was conducted in-person at the retail location owned by the designer. The interview lasted thirty-five minutes due to a request by the interviewee that

the interview be finished within a narrow timeframe. Interviewee 'F' is the owner and designer for the business and will be referred to as 'the designer' throughout the narrative.

Small womenswear business 'F' makes bohemian-inspired garments for the free-spirited woman. The designer sees this collection as a chance to explore and reconnect with herself after six years of designing with a partner:

"This is something that feels very soulful to me. So, I am looking at putting a lot of myself into these pieces using all of the energy and knowledge that I have from the last years and then sort of really making it just my soul."
~ 'F'

Designer 'F' envisions the clothing as being effortless for the wearer, with the goal of throwing on anything from the closet, running out the door, and knowing that you look fabulous. The garments are designed with a generous amount of ease to facilitate easy wear for any number of body types. Collections are created with the idea of mixing and matching for versatility in wear and are intended to look best when worn layered.

The designer co-owns, and acts as the main sales associate for, a boutique in Minneapolis which provides her continuous direct interaction with customers. The boutique sells multiple local slow-fashion brands, including the designer's own label. Slow-fashion brands focus on sustainable fashion and typically sell lower quantities of clothes throughout the year. Clothes are introduced to the store on a rolling basis so that there are always new designs available for customers to browse. Customers of the boutique range in age from late twenties to mid-forties, are physically fit, and are interested in fashion.

Designer 'F' has worked with sewing and pattern manipulation since she was a child. She has a Bachelor of Arts in Studio Art from Augsburg College. One year at school was spent in Florence, Italy studying fashion design. She learned the basics of patternmaking, grading, draping, and fashion illustration while in Florence from instructors who trained her to do everything with paper and pencil.

The design process begins with inspiration gathering and trend research. The designer is inspired by vintage garments, by travel, by seeing what other people are wearing, by

runway shows, and by fashion magazines. She looks for what styles are currently trending and considers what people want to wear. Inspiration and trend research are synthesized into sketches.

Pattern construction comes next with the designer either rubbing-off a vintage garment and modifying the pattern to suit her vision or draping directly on a dress form. All patterns are drafted by hand, and then the patterns are cut out in fabric and sample is sewn. The designer is the fit model for her business, stating that her body represents her target customer well, and that with the garments in such early stages of design using herself is the best resource she has. She would like to expand the fitting process away from herself in the future. Assessment and redesign of the garments moves slowly as the designer focuses on different parts of the garment each time she sews a new sample. For example, she may focus on the shoulder seams for one sample, and then the bust for the next.

The designer handles all manufacturing of the garments either in her home studio or in the store, where she keeps a home sewing machine. Even when the garments have been stocked in the boutique she is not finished with them. Seeing the clothes on her customers provides critical information on garment fit:

“I get to see what works. I get to see what doesn’t work. I get to see why it doesn’t work.” ~ ‘F’

Information which she uses to update the patterns so that each time she restocks the garment, the fit is improved. This improvement process is continuous, with designer ‘F’ updating her patterns several times a season. One difficulty designer ‘F’ encounters with this process is that she tends to modify the garments as she works on them and doesn’t always have time to update the patterns with the improvements. Since designer ‘F’ constantly updates her garments and sells the updated garments, if she sells a garment that she has not updated patterns for, then she loses her progress and has to start again.

Designer ‘F’ regularly stocks two sizes in her store: small/medium and medium/large. On occasion she stocks size extra-small, and on request she will sew size large for a customer. If she is out of stock she will sew the size requested by the customer. If no size works for the customer she will sew them a custom garment based off of their bust

circumference or inseam length, though custom work is rare. Dimensions for the sizes are based in part on the body measurements of the designer and in part on inspiration garments. For bodices the designer uses a three-centimeter grade between the small/medium and medium/large sizes. While the designer has used more defined grade rules in the past, for this collection she says that making one just slipped away from her and she uses her intuition to determine if the garment is size appropriately.

To communicate her sizing to customers, the clothes are labeled with size designations. There is no size chart. Designer 'F' states that her customers know what their sizes are and she trusts them to find the right size for them by trying on the garments. She will suggest other sizes based on her knowledge of the construction and fabrication of specific garments, but lets her customers dictate what size they want. She has noticed that some women feel great anxiety regarding the size designation of a garment, though she has no such compulsion and takes a relaxed attitude towards the sizing of her clothes.

When asked what would make designing easier, she stated that she would like more information on garment construction techniques, especially finishing techniques. She is interested in learning more about apparel craftsmanship and desires more design tools. When asked what would make sizing easier, she said that having a functional size chart would be helpful.

Thematic Analysis Research Question 1: What influences apparel sizing practice in small womenswear businesses?

Three main themes regarding sizing developed from analysis of the interviews: Financial Resources, Experience, and Designer Mindset (Table 2). Financial resources primarily influenced the size range chosen by the businesses. Experience with grading impacted the ways most of the businesses approached creating their sizing systems. Two distinct designer mindsets appeared during analysis – outward-focused and inward-focused – which influenced sizing practice in various ways.

Table 2: RQ1 Themes - Comparisons between businesses

	Financial Resources	Experience	Designer Mindset
A	Size range – can’t expand it; Fit model – use staff & friends	Grading education didn’t prepare her for making sizing system	Outward-focused; competitor sizing + target market body assessment
B	Size range – obtainable; Fit model – not a pro; Pre-production – does own grading; Production – materials prep	Grading skill doesn’t match design skill	Inward-focused; looked at size charts of brands she admires & tested fit of their clothes on herself
C	Size range – stopped at 6X; Base size – covers 2 functions – fitting & marketing	Changed business strategy to gain control over grading for consistency	Outward-focused; picked size range b/c no one offered it 23 years ago; surveyed market to make size chart w/real measurements
D	Size range – inventory & production costs	Grading took 30 years to figure out – trial & error	Inward-focused; is fit model & grades based off of her body dimensions
E	Size range – what she can afford to produce, can’t expand it	Not trained in technical design; hired technical designer to set base size, grade rules & to make basic blocks	Outward-focused; competitor sizing + target market needs
F	Fit model – uses herself; Production – makes everything herself	Too busy to implement grading strategies learned in school; Size range – sales role at boutique revealed sizes most purchased	Inward-focused; designs are more important than sizing; designing = a soul-searching journey

Theme A: Financial Resources

Limited financial resources influenced sizing practice in small womenswear businesses primarily through the chosen size range and secondarily by the fit model chosen by the business. All of the businesses use alpha sizing, which is traditionally used for size designations of knitted apparel (i.e. XS, M, 3X, etc.), even if they offer garments in woven fabrics. Business ‘B’ offers the smallest size range with three sizes: Small, Medium, and Large. Business ‘C’ offers the largest size range with seven sizes: extra-large, 1X, 2X, 3X, 4X, 5X, and 6X; and is the only business to offer plus-sizes. Businesses ‘A’, ‘D’, and ‘E’ offer five sizes: extra-small, small, medium, large, and extra-large. Business ‘F’ offers four sizes (XS, S/M, M/L, and L), though she only stocks the S/M and M/L; the other two sizes can be produced upon request.

The size ranges for businesses ‘A’, ‘D’, and ‘E’ are limited by the costs to produce the garments. All three businesses use manufacturers for garment production and distribute the garments from their studio locations. Inventory of the stock-keeping units was cited as difficult to deal with once the size range expanded past five sizes for both businesses ‘A’ and ‘D’. Businesses ‘A’ and ‘E’ would like to expand their size ranges to include more potential customers. Business ‘A’ wants to add petite and tall as well as plus-sizes, while ‘E’ wants to expand to the 2X size. They cannot currently expand due to a lack of financial resources, though they hope to garner enough profits to allow for expansion in the near future:

“And we would love to expand that and we've talked about expanding it, but one of the biggest things for us is we do relatively small runs already, so when you're doing a small run and you have six sizes, you only have so many of each size and the more sizes you add to that, the more scattered it gets and then, yeah. So that's been our conflict there.” ~ ‘A’

“<Sigh> Well, a lot of it had to do with financial ability to produce [...]. And the idea was to roll out 2X the next year, but you have to have a lot of money to do that. So financially you have to figure that out.” ~ ‘E’

The size range for business ‘C’ covers most of the plus-size market though not all of it. The original decision to include sizes up to 6X stemmed from the fact that there were

no businesses providing activewear for women who wore those sizes. The decision to stop at 6X was based on diminishing returns, as it was not worth the extra costs to the business to serve such a small percentage of the market:

“Well, it's just by the time you get out to six there's just not that many people, and especially when you're doing a catalog it's a numbers game. You have to have enough people to mail to make it worthwhile, yeah. It's just beyond that point there's just not enough people.” ~ ‘C’

The second main way in which sizing practice was influenced by limited financial resources was in the choice of fit model. None of the businesses use a professional fit model, though they all discussed the importance their fit model played in the fit of their clothes. Businesses ‘A’, ‘B’, ‘C’, and ‘F’ all chose fit models based on what they could afford. Business ‘F’ uses herself as her fit model, stating that is what is possible for her and that while she works well as the medium size she would like to have someone else act as fit model in the future.

Business ‘A’ started with their female co-founder as their original fit model, which dictated the body type for the brand. Other fit models have come from staff members in the business as well as friends, though business ‘A’ tries to ensure that the fit model matches the dimensions for the size medium and is not too different in body type from the target market. Even with their best efforts to ensure consistency in their fit model, using a convenience sample of fit models from the employee pool can introduce the factor of body form variability into the fitting process and cause inaccurate or unreliable conclusions to be made about garment fit (Branson & Nam, 2007). Business ‘A’ noted that the constant switching of fit models has slowed their design process considerably, though they did not share specific issues with garment fit stemming from the switches.

Business ‘B’ wants to use a professional fit model but cannot currently afford one. Instead she made sure to find a woman who matched her vision of the ideal female body. She did not want to use any available body as her fit model indicating she understood the importance of matching her fit model to her target customer:

“I actually found my fit model at the gym, which seems sketchy because we were working out. And I asked her to be my fit model. But I really just

needed-- I didn't have the budget to pay a professional fit model. And I really wanted to have integrity about who my fit model was as in not just finding friends who have a short torso or long legs. I was really looking for somebody who just-- like I said, just proportionate, [...]” ~ ‘B’

Business ‘C’ uses a fit model who matches the base size 1X, which is the second smallest size in the business’ size range. This was a financial decision in that business ‘C’ determined they could save money by using the sample garment from fit sessions as the photoshoot sample for marketing campaigns:

“Well, it's a good sample size because it's also a good size for a photoshoot sample, so we can get double-dip usage out of that.” ~ ‘C’

Findings from the Financial Resources theme suggest that small womenswear businesses deal with limitations in finances by keeping their size range small and using non-professional fit models. Ideally, businesses would have the funds to finance all parts of their business at the highest level of quality, but small businesses have to prioritize where their financial resources are spent so that the entire business runs smoothly. Offering fewer sizes is simply the price these businesses must pay to operate at all. Using non-professional fit models may suggest that businesses do not value the benefits gained by using a professional fit model, but it more likely suggests that businesses need to use those financial resources somewhere else in the business. This indicates that the fit model may be a lower priority for businesses than other areas such as of production and selling.

Theme B: Experience

Grading was cited as the most difficult aspect of sizing practice by all of the businesses. While each business had slightly different circumstances surrounding their difficulties with grading, they shared the same underlying factor: none of the designers were prepared to apply the grading skills learned in school to their own businesses. Designers stated they were unprepared to develop a sizing system and grade rules from scratch, as illustrated by the following quote from designer ‘A’:

“Well, I went to school for apparel design, so obviously, like, I took grading in school and so I know how to create a grade but matching that

to a customer base and creating it from something that was nonexistent, you know, like, I had never had any experience with that.” ~ ‘A’

When Designer ‘D’ dropped out of school in her sophomore year one of her instructors gifted her a standard grading book and told her she could learn everything she needed from the book and ample practice. This particular gift suggests that it may be the technical design skills that ensure success in apparel businesses rather than the creative design skills more commonly emphasized in apparel curricula. It has taken designer ‘D’ 30 years of trial and error to settle on a grading scheme that works for her business, something she wishes she could have done at another business’ expense.

When discussing changes in their sizing practice, business ‘C’ stated:

“When we were a cataloger we would buy off of other people’s lines, and sometimes they would have a line that only went up to like 1X or 2X, and they would grade up from that, and when they graded up they used their grade rules, which created a fair bit of inconsistency in fit, so we have changed that over time. We don’t do that anymore.” ~ ‘C’

It was unclear from the discussion if the current sizing system and grade rules were created prior to or after the shift described above, though it would make sense if the sizing system was designed after the frustration of inconsistent fit. Regardless, due to scant information on the plus-size customer’s body dimensions and body type, as well as no grading or patterning textbooks devoted solely to the plus-size customer (Christel, 2016), and little research on proper size system formation twenty-three years ago it is impressive that business ‘C’ had the foresight to utilize statistical analysis to devise their size chart. They are the only business to requisition a body measurement database and analyze it statistically, which is the recommended way to form a body sizing system.

Owner ‘C’ has no training in apparel design and focused on this target market because she saw a market opportunity. As an entrepreneur rather than a designer, she hired individuals with the skills that she lacked. To ensure consistent fit and proper application of business ‘C’s grade rules, the owner ‘C’ hired an in-house technical designer to work with contracted freelance designers and to develop their technical specification packages. It should worry academics that the only business to most properly

construct a sizing system from scratch was driven by a woman with no training in apparel design.

Designer 'E' learned the basics of writing technical specifications and grading stylized blocks by spending considerable time with the technical designers and patternmakers at her previous corporate jobs. When she started her business, designer 'E' knew her limited technical skills were not enough to build a sizing system for such a variable population from scratch. Designer 'E' contracted a freelance technical designer to help generate the measurements for the base size (medium), the grade rules, the basic blocks, and the critical points of measurement for the patterns. When asked about her apparel education, designer 'E' stated emphatically that she was not prepared for the technical aspects of her job:

E: So, I have a degree in textile science and apparel-- an Associate in Applied Science in Apparel Design from FIT and so that was part of the curriculum was doing fit and technical design. So yeah, I have a little bit, but that was years ago. More practical knowledge came from the people who I worked with.

R: Do you feel like your education prepared you well for--

E: No.

R: No? <laughs>

E: No, no, no. Not at all. No. Even at FIT, it did not.

While businesses 'C' and 'E' worked with technical designers to develop their sizing system and grade rules, the remaining businesses tended to handle the majority of the technical aspects of design themselves, even though they may not have the necessary skillset. For example, since Designer 'B's grading skill does not match her design skills, she copes by changing her designs to more easily produce them:

"But I'm working on making product that is more simple, like I said. [...] it's just a lot easier to produce. So, once my styles get simpler, then the grading also gets simpler. And that has been something that has been

really important for me is finding that balance of what can I produce well. And it really has affected my kind of designing mindset where kind of less is more.” ~ ‘B’

When Min and Wilson (2018) interviewed seven emerging apparel designers on how personal, environmental, and sociological factors influenced their entrepreneurial experiences, they found that many of their participants were hampered because they did not know how to hire employees or contract out work. While this study did not focus on the broader difficulties of running an apparel design business, the findings contradict Min and Wilson in that the businesses never mentioned that particular difficulty. The findings in this study suggest that some small womenswear business designers may see themselves as obligated to handle both the creative and technical aspects of design, even when they are inadequately prepared to.

Findings in the Experience theme suggest that academia does not adequately prepare students to become small womenswear business entrepreneurs. Findings in a mixed-methods study where portfolios for internships and entry-level jobs were discussed by industry personnel suggest that students are not adequately prepared to take on industry jobs, especially in the areas of technical design (Romeo, 2017). One striking quote from a participant in the Romeo (2017) study encapsulates the issue: “Need more technical packets consisting of measurement sets, BOM’s, fit comments, pictures, pattern work, sketches, and construction details all for the same garment. It seems all portfolios are creative design oriented coming out of college.” (p. 115).

All of the designers interviewed in this study focused on creative design rather than technical design, which may partially account for why they are weaker in the technical skills of sizing and grading. In any case, the businesses in this study all had difficulties with grading, and the designers all stated that they were inadequately prepared for the technical design aspects of running a small womenswear business. This coincides with the findings of Romeo (2017) that industry personnel believe students are ill-prepared for work in the apparel industry. Therefore, this indicates that apparel design programs need to alter the ways that students are taught technical skills such as sizing and grading.

Theme C: Designer Mindset

Table 3: RQ2 Theme C - Differences in sizing practice organized by designer mindset

	Inward-Focused	Outward-Focused
Target Market	Believe that they are representative of their target market.	Identified a market gap & decided to serve that target market
Inspiration	Based on what they want to wear and synthesis of trends	Based on solving a problem for a specific target customer group.
Size Range	Based on their own body measurements and intuition	Based on grades compiled through competitive market analysis ('A' & 'E') and target market body measurements ('C')
Ease	Loose rather than fitted	More fitted than loose
Fit Model	'D' & 'F' use themselves; 'B' uses someone who matches her vision of the ideal female body	Match the base size of the size range & body type of target market
Pre-production & Production	All maintain control of all pre-production; 'B' controls material prep in production; 'F' manufacturers the clothes	Use professional services for patterning, grading & manufacturing
Communication	'B' has a size chart 'D' & 'F' don't have size charts, customer has to try things on	All have size charts; 'C' also has 'how-to measure' guide & trained customer service staff

Two distinct groups emerged from hermeneutical analysis of the data: an inward-focused group and an outward-focused group. While all of the businesses ultimately focused on the needs of their customers, the researcher was struck by differences in the language used by the interviewees. Assessment of the language suggested to the researcher that half of the interviewees saw themselves as part of the target consumer group, while the other half used language suggesting they separated themselves from the target consumer. The two groups made different decisions for most facets of sizing practice: target market selection, sources of inspiration, dimensions for each size, design ease, fit model selection, control over pre-production and production, and communication of the sizing system to customers (Table 3).

The inward-focused group consisted of businesses 'B', 'D', and 'F'. The language used by these businesses during the interviews was more inward-focused, with participants focusing on expressing their own needs. Language focused heavily on

terminology such as “I”, “me”, “my needs”, “mine”, and “myself”, which suggested to the researcher that the mindset of the interviewee was focused on their own needs. Interviewees tended to start their businesses for personal reasons and used those reasons as inspiration for design. The following quote typifies the language used by these three businesses:

“As far as scaling it from a fiscal standpoint or anything like that, my goals are less about that and more about being able to maintain a lifestyle like this myself and see success mostly with people resonating with my message and my products. So, I’m just kind of keeping that as the focus.”
~ ‘B’

The outward-focused group consisted of businesses ‘A’, ‘C’, and ‘E’. The language used by these businesses during interviews was more outward-focused, with participants focusing strongly on the needs of their customers. Language focused heavily on terminology such as “them”, “they”, “she”, “the customer”, “her needs”, which suggested to the researcher that the mindset of the interviewee was focused on determining others’ needs. Even when the interviewee started the business for a personal reason, businesses displaying an outward-focused designer mindset focused on fulfilling the needs of those outside themselves by interacting with and listening to customers. The following quote typifies the language used by these three businesses:

“I think it's meeting customer need, right, so if we hear from a customer she wants something we listen to that very carefully.” ~ ‘C’

Target Market

The outward-focused group started their process differently from the inward-focused group through different methods of identifying their target market. The outward-focused group utilized market analysis to identify market gaps to serve; they created profiles of their target customers and sought them out. The inward-focused group tended to see themselves as representatives of a market segment and assumed that their needs were the same as other women with similar lifestyles, as illustrated by the following quote:

“So, I really view my client base as kind of being me. I am my client. And so, if something's missing in my wardrobe, if I'm yearning for something or jonesing after something then I figure probably other women are, too. I feel like a lot of women probably live a lifestyle that's probably similar to mine. I don't have a lot of extra time or desire to dry clean my clothes. I want easy care. I want to be comfortable. I want to look pretty well put together every day and look kind of cute every day. I want to look feminine. I don't want to iron things if at all possible. I literally probably pull out my iron twice a year, and I want things that if I'm traveling I want easy travel. So, it's all of those things that I kind of-- it's not even a thought behind it. It's just the way I do things just because that's the way I live and I design for the way I live.” ~ ‘D’

Inspiration

The difference in whether the business saw themselves and their needs as representative of their customer informed the way they approach gathering inspiration. The outward-focused group focused on solving specific, generally more function-driven and technically challenging problems for their customers. Time was spent with customers to understand their needs, as illustrated by the quote from business ‘E’ below. The inward-focused group focused on synthesizing trends through their own design aesthetic into everyday clothing for their customers, as illustrated by the quote from business ‘B’.

“So, I stay on forums and I'm part of the Minnesota Breastfeeding Coalition and I just, that's who you surround yourself with and you ask questions. And I do presentations and we talk. I talk to the people who come to my presentations.” ~ ‘E’

“[...] for me it's been looking like "What are products that I really would like to wear and that I've seen in the marketplace?"” ~ ‘B’

Size Range

The origin of the dimensions for the sizes in the sizing system differed between the two groups. Two members of the outward-focused group used competitive market

analysis of direct competitors sizing and grading schemes while the third member used body measurements taken from the target market via a survey. All of the dimensions in the size range were determined via careful analysis of the market and aimed at fitting the broadest range of the target market:

“So, we did a brand comp, so we looked at as many maternity and nursing wear brands as we could. I'm trying to think of how many we looked at. We probably looked at 12. [...] We took garments, and we measured them out across-- so that's a big difference, when you take the size range of a basic garment and you measure it all, and you take all points of measure. [...] So, we started to make pattern pieces, and then we drew the grading on the pattern pieces and thought "How would that fit?" and then we mocked-up the internal pieces and, okay, so then how that translated and how I verified that was I actually had those pieces made. [...] We compared it to what we wanted it to be. And I had a number of fit models come in and just try things on, but, again, it wasn't tracked. It was more like "Okay, well, is this working? Is this something you're comfortable in?"” ~ ‘E’

“Way at the beginning of the company [...] we did a study. We did a survey, and we asked people what their measurements were, and we just did a study, and from that we created our own size chart and then grading system.” ~ ‘C’

The inward-focused group used their own body measurements, experience with the market, and intuition to determine their sizing system. Designer ‘D’ used her body as the starting point and graded up based on years of trial and error informed by intuition and a mix of customer and wholesaler feedback. Business ‘F’ used a combination of her body measurements and measurements taken from inspiration garments to generate the sizing for her garments. Business ‘B’ did a competitive market analysis to determine her size range and grading scheme that followed a similar pattern to businesses ‘A’ and ‘E’. But, instead of focusing on competitors that her target market might shop at, business ‘B’ used businesses that she personally liked the fit of:

“I found my size chart from just doing research about competitor brands. And then I just found-- honestly, I saw what clothing I liked and what fit me well and if there was consistency in the size charts of those labels that I really liked. And there was. And then I just built my size chart based on size charts that I had already liked.” ~ ‘B’

Ease

While all six businesses used knits as a primary material for the construction of their garments, the two groups used the properties of the material a little differently. The outward-focused group tended to design clothes a little more on the fitted side and utilized the properties of knitted materials to allow for a range of body types to fit into a single garment that would maintain its design intent, as illustrated by the quote from business ‘C’ below. The inward-focused group tended to add more ease into the design of the garments, creating more oversized apparel. The design intent of the garments changed depending on the size chosen by the inward-focused groups’ customers.

“[...] our fabrics have good stretch so that if somebody is larger in the thigh or larger in the hip or something like that that they could still wear that item, that there's a range of plus or minus at least two inches on all dimensions that are going to be comfortable.” ~ ‘C’

“So, I mean just for example, so here is a newer blouse, right, and it's just a loose cut and it's supposed to fit loose and this is supposed to be kind of like a loose shirttail, right? I designed that on me and that's how it fits and it looks really cute over a skinny bottom, right, and that's how it's supposed to look. So many of our women will size down in this even though it'll gap here <referring to bust> because they don't want that extra fabric. They want it tighter, and I'm like "Well, it's not a tight blouse though." We have blouses that are more body conscious, but you can't convince somebody. You know what I mean? It's just like they're going to do what they're going to do.” ~ ‘D’

Fit Model

The fit model for the outward-focused group represented the target customer to the best ability of the business and was chosen after the sizing system was created. These businesses measurements and body type matched the target market and fit the base size of each business's sizing system. The fit model represents only one person and as these businesses cater to a wide variety of body types they get a good general fit to the model and then consider how the clothes would fit the wider target market, as illustrated by the following quote from business 'A':

"And then we really do think about our target customer and once we get it to fitting to our fit model, we try to take into account how this is going to fit the masses per se. So, just because it fits her doesn't necessarily mean it's the best decision." ~ 'A'

The fit model for two members of the inward-focused group was the designer herself, while the fit model for the third member represented that designer's vision of the ideal female form. Fitting exactly to the fit model's body and fit preference was important to this group, as illustrated by the following quote from business 'D':

"[...] because I want to know how it fits me. I want to know how something feels, if it's exactly the way I want it. Before I go up from there, and that has always worked for us." ~ 'D'

Pre-production & Production

Control over the pre-production and production stages varied between the two groups. The outward-focused groups all used professional services for patterning, grading, and manufacturing. The inward-focused groups all maintained control of the pre-production processes of patterning and grading. Business 'B' also maintained control of the material preparation aspect of production, and business 'F' maintained control of the entire production process, manufacturing the clothes in her shop and home sewing studio. This may suggest that the inward-focused group felt a need for direct control over the execution of their designs. It may also suggest that the inward-focused group felt they were responsible for more areas of the design process than the outward-focused group.

Communication

All of the businesses stated that communication of sizing was difficult, especially for e-commerce. The outward-focused group had a more robust system for communicating sizes than the inward-focused group. All of the outward-focused groups had size charts. In addition to the size chart, business 'C' trained their customer service staff to walk customers through measuring themselves and applying those measurements to the size chart to find the best-fitting size. Business 'C' also has a detailed 'how-to measure' guide on their website, and business 'A' is in the process of updating their size charts to include the same type of guide.

Two members of the inward-focused group did not have size charts at all, stating that customers can just try things on to figure out what fits them best, as illustrated by the quote from business 'F' below. The third member, business 'B' has a size chart and intends to update her website with a 'how-to-measure' guide as well as garment fit information on the product pages to help customers determine which size will fit them in the way they want best.

"I think that people tend to gravitate towards the size that they feel is right for them. Just-- you know what I mean? I think they just tend to pick up, "Oh, I'm not an extra small. I'm a medium," or whatever." ~ 'F'

"So, something that I'm going to be working on doing with my sizing is kind of listing the measurements, and some companies already do this but having a variety of models all model the same clothing in different sizes and then say their height and their measurements and "This model's wearing a small" so that people can kind of make their own judgment about how they want it to fit on them." ~ 'B'

Research Question 1 Summary

None of the businesses follow the Apparel Design Framework (Lamb & Kallal, 1992) exactly, though the outward-focused mindset group follows it more closely than the inward-focused mindset group. The inward-focused mindset group mostly follows the Fashion Design Process (Calderin, 2009, Mbonu, 2014), which is the more commonly taught design process in apparel design curricula. Romeo and Lee (2016) found that of

their 86 subjects, 42% had no previous exposure in their apparel classes to any theoretical model related to apparel design. After exposure to the Apparel Needs and Expectations Model (ANE) developed by Romeo and Lee for the project, students reported that following the model allowed them to logically evaluate the needs and expectations of their target market, to identify social and environmental forces they wouldn't have considered otherwise, and to produce a final product that was better suited to their target market.

All of the businesses appear to serve their target markets well, indicating that both foci have a place in the apparel industry. What is clear from the data is that the inward-focused businesses took much longer to identify the target markets that best suited them and their sizing systems. Using theoretical frameworks such as the ADF or ANE to work through the design process may save businesses years of trial and error, even though the cost of using them is more time spent upfront identifying the market and its body dimensions.

What is missing from frameworks such as the ADF and the ANE is the voice of the designer. What is missing from the fashion design process is the voice of the target customer. Combining these two frameworks into a single cohesive apparel design process where the target customer is the center of the design system, but the voice of the apparel designer is strongly incorporated brings the strongest assets of both processes. Apparel designs should always stem from the needs and desires of the target customer, but this does not mean that an individual designer's worldview should be ignored. An individual's worldview provides them with the ability to design things that no one else will design and should be encouraged rather than eliminated from the design process. On the other hand, when the individual's worldview makes it impossible for them to understand the worldviews of others, that becomes problematic and restricts the designer's ability to design for anyone other than themselves. A new framework should be considered that allows for designers to share their unique worldview, but ensures that they do so while respecting and supporting the worldviews, needs, and desires of specific target customers.

Thematic Analysis Research Question 2: How are decisions about sizing incorporated into the apparel design process?

Three themes emerged from analysis of the interviews: Timing of Decisions, Fit Model, and Design Intent. The timing of decisions surrounding sizing system formation was split between the six businesses with half developing sizing systems prior to engaging in the brainstorming phase of the apparel design process. The fit model is a reflection of the use of the target body that plays a regular role in the apparel design process. Design intent impacted the sizing system of three businesses through ease and fabric choice which allowed the businesses to lower the number of sizes offered but maximized the number of customers they could serve.

Theme A: Timing of Decisions

The timing of decisions surrounding the creation of the sizing system varied among the participants. Half of the small womenswear businesses created their sizing systems prior to engaging in the brainstorming phase of the apparel design process. Meaning that before any garments were brainstormed the business focused on developing the sizing system and grade rules that they would use once they did start brainstorming garment designs. The other half of the participants created their sizing systems after the brainstorming, editing, and prototype development phases of the apparel design process. Meaning that the sizing system and grade rules were developed after the garment design features were decided on. The timing of when the sizing systems were created appears to correspond with the intent of the system. Sizing systems created prior to designing the garment focused on body measurements, while sizing systems created after designing the garment focused on garment measurements.

Businesses 'B', 'C', and 'E' created their sizing systems prior to engaging in the design process. Businesses 'B' and 'E' engaged in competitive market analysis to create the rules for their sizing systems while business 'C' conducted a survey of specific body dimensions from plus-sized women in the United States. The intent of these sizing systems appears to have been to establish the body size chart, grade rules, and critical measurements for pattern drafting of the basic blocks.

“I worked with a technical designer when I was first conceptualizing it in North Carolina, which was about four years ago, so it was two years before I launched [...] and we worked on general measurements and grading but not how things were constructed. [...] we wanted to establish what would be our medium, what would be our critical points of measure, and then how would we grade it out from an extra-small to an extra-large, and so we worked on those grade rules.” ~ ‘E’

The body size charts are important for communicating with the customer, especially for the businesses that sell primarily through e-commerce. Business ‘C’ trains their customer service staff to help the customer measure themselves and interpret their measurements in light of the dimensions in their sizing system:

“So, what we tell them is "Go back to the body chart. Trust the body chart. It's our job to make sure that the item fits that body size.” ~ ‘C’

Businesses ‘A’, ‘D’, and ‘F’ drafted their sizing systems after deciding upon garment design features. Business ‘A’ conducted competitive market analysis to develop grade rules for each type of garment developed (i.e. outerwear, top, pant). This resulted in multiple garment sizing systems that have different dimensions corresponding to the same size designation. For example, the outerwear sizing system bust dimension range for the extra-small is 32.5” to 33.5” while the top sizing system bust dimension range for the extra-small is 32” to 33”.

“[...] we kind of try to go and find similar silhouettes and try things on and- kind of figure out, like, where we want our size range to be. And we went into a dressing room and we had a million pairs of pants of, like, every size and we had them out and we were looking at them. [...] And we were just trying them on and seeing how the different fits laid out and you could kind of get a picture of the grade by looking at what the size differences were. But, yeah, and then we kind of landed on what we thought was, like, the best fit for our extra-large and then when we had our, like, sample size that we had started with and then when we were

doing the size set, we got our extra-small and our extra-large and kind of filled out the grade from there.” ~ ‘A’

Businesses ‘D’ and ‘F’ have long histories designing apparel and their sizing systems reflect this experience. Both businesses operate by trial and error, using experimentation to develop their grade rules. Business ‘D’'s sizing has changed over 30 years based on her intuition, as well as feedback from wholesalers, sales representatives, and customers, while business ‘F’'s sizing has focused more on the strategy of ‘one-size-fits-all’.

“I started I was 21 and I was tiny and [...] So I just did small, medium, large and it was only one-inch difference, one-inch circumference difference between a small, a medium, and a large. And I remember, I don't know whether it was my husband who was my boyfriend at the time or it was probably some retailers who were like <laughs> "You know Lee, not everyone is little and you have to figure out your sizing." That was just trial and error.

From the very beginning definitely because it was just too small of a size grade, and then when we did the missy market that was just different. And so, like because we were doing junior sizing. And so, for missy I'm sure the size grading did change, I just don't know what it was. And then really when we kind of returned to more of a contemporary market it was probably just a tweaking of in between a junior and a missy type of sizing,”
~ ‘D’

“I would do a lot of things that were one-sized. I’ve kind of fluctuated from that over the years. I’m going back to some one-size things. But I also have a small/medium, medium/large. I find that that that kind of works well for people.” ~ ‘F’

The current sizing system for business ‘D’ is founded upon dimensions for the extra-small size which match the designer’s body dimensions. Grade rules are garment dependent, changing upon the design intent for any given garment. Sizes for all garments are checked across the range through fit analysis of the design on other staff members.

Current sizing for business ‘F’ is founded upon the designer’s body dimensions coupled with dimensions from inspiration garments.

Neither business ‘D’ nor ‘F’ has a size chart available for their customers; both believe the best way for the customer to know their size is to try the clothes on and assess the fit on their own bodies. The fact that their sizing systems are garment sizing systems rather than body sizing systems may account in part for not providing a size chart to customers as garment grades can vary more widely than body grades. The sizing systems for these two businesses tie into their retail models which use prior customer experience with garment fit and sizing to drive sales.

There is no research documenting this finding, though sizing best practice suggests that a business should have both body and garment sizing systems. The body sizing systems should be developed prior to brainstorming garment designs so that style blocks (made from basic blocks) start with the target market’s body dimensions. Garment sizing systems should be developed after garment design features are decided upon so that grade rules reflect the intended fit of the final garment across the size range. None of the six small womenswear businesses had both body and garment sizing systems, which may make it difficult for these businesses to express their design intent and fit their markets properly.

Theme B: Fit Model

The point at which sizing is incorporated into the apparel design process most frequently is through the fit model. The fit model is the physical representation of the base size of a sizing system; thus, any decisions regarding how garments fit her affect how the garment fits the rest of the size range. Using a fit model that corresponds to the actual target market body type was important for all of the businesses because it helped to ensure the clothes would fit the intended customer, as illustrated by designer ‘B’s statement on her fit model:

“Our fit model right now is a size medium. And she is like right in the middle of the size chart. She’s much more curvy than other fit models we’ve had. And I think that that’s been really helpful in just trying to make our product a little bit more compatible with actual bodies of women.”

~ ‘B’

All six businesses used a fit model who corresponded to the businesses base size. Businesses ‘A’, ‘B’, ‘E’, and ‘F’ use fit models whose body dimensions correspond to their medium, which is the middle size in their size ranges. Business ‘C’ uses a fit model who conforms to the size 1X, which is the second smallest size in their size range (out of seven sizes). Business ‘D’ uses a fit model that conforms to the extra-small size, which is the smallest size in their size range (out of five sizes). Bye, LaBat, McKinney, and Kim (2008) state that the fit model should represent no more than five sizes in total so long as the fit model represents the middle size in the range as garment measurements fail to adhere to design intent outside of this range. By using fit models that correspond to their smallest sizes, businesses ‘C’ and ‘D’ may lose design intent at the larger sizes.

Designer ‘E’ regularly uses multiple fit models for one design. With fewer, more technically difficult garments offered to a target market with high variation in body types, the use of multiple fit models was seen as a necessity to ensure the fit of each garment works for the market:

“[...] when you're actually applying it to instead of one fit model you're using a lot of different people, you can see how it changes and you can see what is reliable and what isn't.” ~ ‘E’

In contrast, business ‘C’ uses one fit model to ensure consistency across their designs, stating:

“[...] we generally use one because it's very important to get to know your fit model, so every time she comes in we measure her to understand if she's gained weight or lost weight, and we'll keep using her, but if somebody's gained two inches around the waist and you're fitting a pant and it's a little tight you go "That's okay, because she's a couple inches higher this month.”” ~ ‘C’

The use of a single fit model by business ‘C’ shouldn’t be misconstrued as fitting to a single body type though. The fit model is just a starting point to ensure the basic design is appropriate for their customers. The designer and technical designer work together to adjust the base design at critical locations (ex. upper arm, stomach, thigh, upper back) to

accommodate different body configurations so that the majority of their customers can find something to wear in business 'C's collections.

"Well, we just make sure on our fit model that-- because we know we have to adjust we want to make sure-- for example, our fit model might not have a very large upper arm, but we know some of our customers do, so when we put it on our fit model we just want make sure there's enough ease to accommodate more than our fit model. So, we know there are certain critical measurements that we just need to be aware of for people, and we try to kind of hit the middle ground on that." ~ 'C'

Designer 'F' is her own fit model, as she believes she is a true representation of the middle size of her customers. She is the only designer to conduct extensive fit sessions via wear tests. These are a new technique for her to test her garments and she is excited by the idea of seeing how well her garments work over a couple weeks of time.

"I think it's going to show me things that are flawed, or that are really good, or that I would now shift or change, quicker." ~ 'F'

These findings suggest that the fit model is the single most important design tool for these small womenswear businesses because it is the only location at which all six businesses incorporate sizing into the design process. All of the participants use a fit model that corresponds to their target customer, and all of the participants believe that the use of a fit model is critically important in ensuring customers receive properly fitted garments. This finding contradicts the finding from the first research question that the fit model is not a monetary priority. The discovery that all six businesses rely on the fit model to accurately represent their target market suggests that of all the things a business can spend their financial resources on, the fit model should be at the top of the list. Since the fit model is the physical representation of the target market, it behooves a small womenswear business to spend the proper amount of time and financial resources to recruit a woman (or multiple women) who accurately match the target market.

Theme C: Design Intent

The design intent of the business impacted the overall garment fit, which allowed three participants to fit a wider market with fewer sizes. In most cases, the participants made these design decisions to accommodate multiple body types. Ease and material were the two primary ways in which these accommodations were made. Ease resulted in different garment fits, as evidenced by the quotes from businesses ‘C’ and ‘E’.

“Well, because we offer sizes all the way to 6X we have a highly variable body shape. It's not like your typical missy or smaller sizes, so we design for a flexible fit. For example, all of our pants are very well elasticized, but then we also offer some different fits. We have a pant that we call our pear pant, which is quite different in fit than our regular fit, and so that's a very popular pant, so we have a lot of variety in sizing, and we try to accommodate that through sensitive, flexible patterning and design.”
~ ‘C’

“I have seven items, and this is why I have different fits, different types of clothing, because one item may appeal to some people, and one item may appeal to others. It's just like any other business, but that's how I have addressed just different body types, body shapes.” ~ ‘E’

Business ‘D’ designs looser fitting silhouettes for woven fabrics and uses knit fabric for more form-fitting silhouettes. As such, one size can stretch to cover more body dimensions, hence the need for fewer sizes. Business ‘E’ also uses knit fabric to ensure that the fit of all her garments can more easily accommodate the variety of body types across her market, but also the changes that occur over the course of the first six months after the birth of a child.

“[...] because most of our things stretch or have some type of ease to them it makes sense just to do less sizes” ~ ‘D’

“And how I approached fit was really, one, start out with knit before you know more.” ~ ‘E’

These findings suggest that fit and sizing cannot be divorced from each other, even when the focus of inquiry is on only sizing. Garment fit impacts garment sizing. When businesses create only garment sizing systems, garment fit will vary widely. Changes in ease and material will more directly impact sales than when sizing is based on target market body measurements (assuming that the body measurements come from a survey of the total population and not a single individual).

Conclusion

This chapter presented narratives describing sizing practice for six small womenswear businesses as well as thematic analysis and discussion organized by the two research questions. Three main themes were found that influence sizing practice in small womenswear businesses: Financial Resources, Experience, and Designer Mindset, with Designer Mindset having seven subthemes. Decisions about how sizing was incorporated into the apparel design process were explored through three themes: Timing of Decisions, Fit Model, and Design Intent.

Chapter 5 Conclusion

Introduction

This study explored sizing practice in six small womenswear businesses with the goal of understanding how academia can best serve the apparel industry. The purpose of this phenomenological study was to describe small womenswear business' experiences regarding apparel sizing practice and answer two research questions:

1. What influences apparel sizing practice in small womenswear businesses?
2. How are decisions about sizing incorporated into the apparel design process?

The following section presents two narratives of the experiences of six small womenswear businesses, demonstrating what they do and how they do it. Two narratives were chosen to illustrate the two design mindsets discovered during analysis. The first narrative will share the combined sizing practices of businesses 'A', 'C', and 'E', while the second narrative will share the combined sizing practices of businesses 'B', 'D', and 'F'. Actionable items for the education system and small womenswear businesses are presented after the narrative, followed by limitations and suggestions for future research.

Shared Narratives

Outward-Focused Design Mindset Group

The group of small womenswear businesses with an outward-focused design mindset produced functionally-driven, technically difficult garments that aimed to solve specific challenges for their target market. Market analysis was utilized to identify market gaps, providing these businesses with specific needs to fulfill for a specific customer. Garments were often described as more fitted, though ease and material were utilized to ensure that a range of body forms could comfortably fit into any single garment.

The design process for these businesses tended to more closely follow the Apparel Design Framework (Lamb & Kallal, 1992). Specific design criteria were often identified for the garments based on the needs of the market, which fed directly into the ideations and design refinement stages of the model. Prototypes were usually conducted in the form of sketches until a final idea coalesced; this was then sewn-up as a sample garment by a manufacturer and subjected to formal fit testing by the business. Non-professional fit models who fairly accurately represent the body form of the target customer and who

were not also the designer were used during fit sessions. Care was taken to consider the way the garment fit not just the fit model's body but also the way it would fit the wider target market. While some technical work was done in-house by all three businesses, the majority of pre-production was handled by professional patternmakers hired through sample houses or manufacturers. All production was handled by manufacturers.

The origin of the dimensions for the sizing system came more directly from the wider target market than from the individual designer. All dimensions were determined via careful analysis and aimed at fitting the broadest range of customers within the target market. These businesses had at least five sizes and all expressed interest in expanding the size ranges to accommodate more customers. Patterns were graded to reflect changes across the range that may not have correlated with standard grade rules, resulting in non-traditional looking nested patterns. The focus for sizing within these businesses could be considered body-sizing, as each business determined a target customer to sell to and worked to create sizing systems around that target customers' body dimensions.

Communication of sizing was difficult for each business, especially for e-commerce. All three businesses have sizing charts for the customer to use while shopping online and utilize customer service to ensure customers receive their best fitting size.

Inward-Focused Design Mindset Group

The group of small womenswear businesses with an inward-focused design mindset produced casual womenswear intended for daily living that aligned strongly with ready-to-wear market trends. Members of this group viewed themselves as their customer and projected their wants and needs onto other women who they perceived as living similar lifestyles. Garments were generally designed with more ease, creating oversized silhouettes that would fit a broad number of customers easily.

The design process for these businesses tended to more closely follow the fashion design process (Calderin, 2009; Mbonu, 2014). Inspiration focused on synthesizing current trends through the designer's own personal design aesthetic to solve problems that the designer personally encountered with clothing. Initial ideations were conducted via sketching and were refined via prototyping. The number of samples made by this group was quite high, with five to 10 not being unheard of. Preproduction processes were conducted in-house, allowing the businesses to maintain more control over prototype

refinement. Fit models were used during each prototype test and focus during fit sessions centered on whether or not the garment met the design intent of the designer, who was also usually the fit model. Once the final design was approved, these businesses handled patterning and grading. The level of production covered by each business differed, with one business producing all the garments, another preparing materials but contracting out the sewing, and the other having all production processes handled by a manufacturer.

The origin of the dimensions for the sizing system came from the designer's own body measurements, their experience with their target market, and their intuition about what grades between sizes should be. These businesses had the smallest size ranges with five sizes constituting the largest range. Dimensions for sizes are in constant flux as these businesses utilize trial-and-error to determine sizes on a garment-by-garment basis, indicating they use garment sizing systems. Feedback from customers on garment fit has a direct impact on changes made to future iterations of designs.

Communication of sizing for these businesses tended to focus on getting customers to try-on the clothes so that customers could decide if they liked the fit or not. These businesses placed special emphasis on customer fit preferences, treating fit preference as more important than the size designation attached to the garment.

Conclusion

Education System

While there is little that academia can do to increase the financial resources of small womenswear businesses, it is possible to provide guidance on the most valuable use of those resources. The two main places that these small womenswear businesses compromised were in the number of sizes produced and the fit model used. Producing and distributing more than five sizes was difficult for most of the participants, though many stated they wanted to be able to produce more sizes to cover more body types. Educators can help address this by teaching the basics of demand forecasting to creative and technical design students rather than just merchandising students. Incorporating demand forecasting into non-traditional classes, such as technical design where fit and sizing are the priority may help meld the two concepts together.

The belief among these participants seems to have been that any person can suffice as a living dress form, which is actually not the purpose of a fit model. Professional fit

models are useful for a number of reasons, not least of which include the requirement to maintain their body form and weight, and their training in how to assess a garment's fit. Without a properly trained fit model, businesses run the risk of inconsistent fit across the lifespan of the company and may lose out on valuable insights into the fit and comfort of a garment. Bringing in a professional fit model to discuss their job with students in patternmaking classes may provide students with a better understanding of why spending money on a professional fit model will ensure higher-quality garments. Emphasis should be placed on how to interview a fit model and how to analyze their body form for how well the fit model matches the intended target market.

Regarding the experiences of small womenswear businesses with the technical skills of sizing and grading, academia could employ a couple different strategies to improve student knowledge and confidence. Basic technical skills ought to be taught throughout early courses in the same way that basic creative design skills are. For example, in introductory sewing classes students can combine practice in sewing with practice in assessing where those sewing applications are best suited in garments, writing small sections of technical specification packages to illustrate where to include specific seams and edge finishes. In fashion illustration classes students should spend at least an equal amount of time on technical flats as on fashion croquis, with the technical flats related to a specific, realistic target customer body, which may be provided via body scanning technology. Early merchandising classes can discuss the benefits and challenges of stocking different ranges of sizes, asking students to develop strategies that incorporate production and design criteria for specific target markets. Beginning patterning classes should incorporate grading for varied target markets and should explain the basic differences between body sizing and garment sizing so that students can move onto more complex patterning and grading schemes as they advance in the program.

Higher level classes should incorporate experiential learning (defined as “an event that changes a person's judgments, feelings, knowledge, or skills, emphasizing the central role that experience has in the learning process” ~ Kozar & Hiller Connell, 2015, p. 4) such as problem-based learning projects to allow students to apply the technical skills learned earlier in their program. While many programs offer a technical design course where students design and manufacture a large quantity of a single item, the students

focus mostly on the manufacturing aspects of production and not on pre-production skills such as patternmaking, fit sessions, taking critical measurements of the item, developing and applying grade rules, or technical specification package development. A problem-based learning project that focuses on the technical aspects of developing a sizing system and grade rules, applying the system and rules to a collection of clothes, and conducting fit sessions with live models for an industry partner may allow the students more practice with pre-production technical skills.

Ensuring that students have foundational apparel design skills and the confidence to apply those skills in new and unique situations is the responsibility of apparel instructors. When teaching apparel design skills to students, academia segments students into one of two categories: creative design or technical design. This segmentation occurs because most students go on to work for large, established apparel businesses where employees specialize in one aspect of the apparel product development process and are supported by specialists in other areas. In a study of why students enroll in fashion programs, Hodges and Karpova (2009) discovered that 68% of their sample cited self-employment as their end career goal. This suggests that a third option ought to be provided for students interested in fashion design: apparel entrepreneurship.

Apparel entrepreneurship classes should combine all aspects of the apparel product development process with the skills necessary for running a small business, but should stress that it is impossible for a single individual to run every aspect of the business. Teaching students where to invest their time, energy, and financial resources will allow them to understand what aspects of the business they ought to be responsible for, and what aspects of the business they need to release control of. Results from this study show that some individuals may feel they are obligated to handle all aspects of the apparel product development process even when they are not equipped to do so. These results support the finding from Min and Wilson (2018) that fashion design entrepreneurs are unaware of how to hire employees or contract out work. An apparel entrepreneurship major can provide students with the opportunity to learn all the necessary skillsets for apparel product development, and can teach students when to hire employees or contract out work.

There is a disconnect between what educators with a research background in design want to teach students and what students are actually being taught regarding apparel design. Perusals of fashion design textbooks, such as Calderin (2009) or Mbonu (2014), show that the fashion design process, with its emphasis on the viewpoint of the designer and the production of conceptual designs, is the design process taught to apparel design students. The more research-based, customer-focused Apparel Design Framework (Lamb & Kallal, 1992) is not generally taught to students. Easy changes to curricula planning include either teaching methods such as the ADF instead of the fashion design process or teaching the ADF in addition to the fashion design process. If universities want to produce students who can tackle the wicked problems related to apparel, they will need to change the tools they provide them with.

Small Womenswear Businesses

This study provided an overview of the practices employed by six small womenswear business regarding the phenomenon of apparel sizing practice. Presented in this section are three projects small womenswear businesses can use that will immediately improve sizing practice for their businesses. In addition, an anthropometric database project is presented that will improve sizing practice for a business.

Businesses ought to use a professional fit model who matches the body form and other basic demographics of their target customer. This fit model must match the dimensions of the middle size in the size range and the body configurations of the target customer. For instance, if a business sells to women aged 55 and older, then the fit model ought to be from that age range because women aged 55 and older differ in body configuration from women aged 18 to 55 at the torso, buttocks, bustline, shoulder, and armhole (Goldsberry, Shim, & Reich, 1996). Research indicates that if the size range is greater than five sizes, multiple fit models are necessary to maintain correct fit across the size range (Bye et al., 2008), and if there are multiple body types or age ranges, then consideration must be given to using multiple fit models to match these differences. Professional fit models are better suited than friends or family as professionals are trained in how to properly assess garment fit and how to communicate that to the business. In addition, professional fit models have to maintain the physique, providing consistency to a business so that all clothing fits the same over time.

Businesses must always have a body size chart easily available for customers to reference when making purchase decisions. The body size chart ought to include a 'how-to-measure' guide with images or a video showing the process. In addition, customer service staff should be trained on how to walk customers through the size selection process. The body size chart must correspond to the body dimensions of the target market. An image and description of the body type used by the business would also help customers to identify if that business is appropriate for them or not.

Business must always have the finished garment measurements available on the product page for all sizes available for that product. While this will make it easier for competitors to see the garment grade rules used by the business, it will also make it much easier for customers to compare their body measurements to the garment measurements to determine if that garment is appropriate for them or not. The model's measurements, the size the model is wearing, and the difference between the model's measurements and the finished garment measurements will better allow customers to evaluate garment fit than just an image or just finished measurements.

Business may want to consider building an anthropometric database of a few key body measurements with the aim of creating a body sizing system that reflects the true body dimensions and body configurations of their target market. There are two ways to go about building an anthropometric database, and both are in reach for small womenswear businesses:

1. Ask customers to voluntarily send in key body measurements, and
2. Take customer's measurements when the opportunity allows.

By providing a comprehensive 'how-to measure' guide on the business' website and emailing requests to frequent customers, small womenswear businesses can elicit help from customers to improve their sizing systems. Customers may not be as accurate as a trained measurer, but if they are invested in the business, they may be willing to measure themselves and send that information to the business. When small womenswear businesses have the opportunity to meet customers in-person it would be prudent to have a measuring tape and data collection sheets on hand. Explaining that the business is working to improve their sizing so that the clothes fit shoppers well should elicit customers to want to help the business.

Limitations & Future Research

Due to the in-depth nature of qualitative research, far fewer stories than would perhaps be desired by the researcher can be explored at a single time. The limited scope of this project was the main limitation of the study. The number of participants in this study was adequate for a qualitative study, but still does not cover the full range of possibilities for sizing practice in the industry. Future research should consider expanding the scope of a study on sizing practice to include greater participation from the industry at all levels of the industry (i.e. designer, contemporary, mass-market, etc.) and all sizes of business (i.e. large, medium, and small).

Many studies may be generated from this one, including gathering details of job descriptions from industry members to better understand how each role in the industry fits into the design process and who has control over the sizing of garments. Some of the businesses interviewed stated that they used competitors' size charts to build their sizing system. Finding businesses that have done this and then cataloging and cross-referencing the businesses they used may lead to the discovery of market influencers and innovation leaders in sizing practice – a good place to start implementing changes into the sizing system. Lastly, recording and defining common terminology such as 'body type' and 'size' from the varied industry segments may help to standardize industry language, or at least ensure that designers have some taxonomy of language to turn to when faced with a new industry segment.

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