PLUS-SIZE WOMEN'S SATISFACTION WITH SKIRTS PRODUCED BY USING TWO PATTERNMAKING PROGRAMS AND ONE SERVICE

by

Tiffany Mai-Sum Wan

A Thesis
Submitted to the Faculty of Graduate Studies
In Partial Fulfillment of the Requirements for the Degree of

MASTER OF SCIENCE

Department of Clothing and Textiles
University of Manitoba
Winnipeg, Manitoba

© Tiffany Mai-Sum Wan, August 2002

National Library of Canada
Bibliothèque nationale du Canada

Acquisitions and Bibliographic Services
Acquisitions et services bibliographiques

395 Wellington Street
Ottawa ON K1A 0N4
Canada

395, rue Wellington
Ottawa ON K1A 0N4
Canada

Your file Votre référence

Our file Notre référence

The author has granted a non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of this thesis in microform, paper or electronic formats.

L'auteur a accordé une licence non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de cette thèse sous la forme de microfiche/film, de reproduction sur papier ou sur format électronique.

The author retains ownership of the copyright in this thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without the author's permission.

L'auteur conserve la propriété du droit d'auteur qui protège cette thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

0-612-80076-8

Canada

THE UNIVERSITY OF MANITOBA

FACULTY OF GRADUATE STUDIES

*****

COPYRIGHT PERMISSION

Plus-Size Women's Satisfaction with Skirts Produced by Using Two Patternmaking Programs and One Service

BY

Tiffany Mai-Sum Wan

A Thesis/Practicum submitted to the Faculty of Graduate Studies of The University of Manitoba in partial fulfillment of the requirement of the degree

of

MASTER OF SCIENCE

Tiffany Mai-Sum Wan © 2002

Permission has been granted to the Library of the University of Manitoba to lend or sell copies of this thesis/practicum, to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film, and to University Microfilms Inc. to publish an abstract of this thesis/practicum.

This reproduction or copy of this thesis has been made available by authority of the copyright owner solely for the purpose of private study and research, and may only be reproduced and copied as permitted by copyright laws or with express written authorization from the copyright owner.

Acknowledgments

I would like to take this opportunity to thank the following people:

My advisor, Dr. Nelma Fetterman, for her leadership, patience and support.

My committee members, Dr. Lena Horne and Dr. George Porozny, for their guidance and reassurance.

The Canadian Home Economics Association Foundation for their support and financial contribution through the Margaret Speechly Stansfield Memorial Award.

The companies, Wild Ginger Software and Unique Patterns, for their contribution and cooperation.

My research assistant, Michelle Gilbert, for lending me her talents and saving me from drowning in a sea of skirts.

The plus-size women who participated in this study, for their interest, time and support. I could not have completed my research without their help.

My Vancouver and Winnipeg friends for their support and enthusiasm. Special thanks to Valerie, Louise, Danielle, Tina, Winnie, Jennis and Amanda for their encouragement, acting as proof-readers and for keeping me sane.

My Winnipeg families, The Cadieux and The Gilberts, for their patience, generosity and making sure I was typing on my beloved laptop.

And saving the best for last, my family, Dad, Mom and *mui mui*, for their encouragement and patience. I am deeply grateful and could not have finished this adventure without their love and support.

Abstract

Plus-size women are continuously seeking clothes in their sizes and in the same styles as their smaller peers. Fashion designers and clothing companies are relying on computer technology to speed up the design processes in order to meet the apparel demands of plus-size women. Low-budget patternmaking software for professional and home sewers is now available to enable them to produce custom-fitted patterns on their personal computers. Pattern drafting services are available for individuals who have no patternmaking skills, the time to create patterns, or access to software. Since this technology is relatively new, few studies have focused on the use and satisfaction with the fit of clothing produced when using patternmaking software and/or services among plus-size women.

The main purpose of this study was to examine if plus-size female consumers were satisfied with the fit of skirts produced by using two computer patternmaking programs and a pattern drafting service. This research also compared features of the selected software and service and identified guidelines for selecting these companies to produce customized patterns. Data were collected through pen and paper questionnaires, focus group sessions and face-to-face interviews. Individual body measurements of the 13 participants were recorded and entered into the programs and mailed to the service for the production of the skirt patterns. After the skirts were constructed, each participant tried on three skirts and evaluated the fit of each.

The results from this research demonstrated that neither the software nor service could provide skirt patterns that, when constructed, would satisfy all five specific fit areas of the lower body of plus-size women with varying figure types. Each product was able to accommodate some areas of the lower body; thus, with repeat use of the software and service and minor modifications to the patterns, consumers will be able to achieve a custom fitted skirt that flatters their physique.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE

INTRODUCTION

Plus-size female consumers are a unique population with special apparel needs. Currently, the average female individual is a size 12 instead of a size 8; thus, women are not as slim as they used to be (Making it big, 1992; Shim & Kotsiopulos, 1990; Tice, 1990). In the 1950s, a young woman who wore a size 14 had a bust-waist-hip measurement of 36-26-36 inches (91.4-66-91.4 centimeters) (Feldman, 1992). By the 1990s, a size 14 corresponded with body measurements of 39-29-40 in. (99.1-73.7-101.6 cm). A size 14 in the 1950s would be equivalent to a size 8 in the 1990s; thus, the female body has been increasing in size over the decades.

In order to achieve a satisfactory fit, ready-to-wear apparel sometimes has to be altered to accommodate variations in the plus-size physique. For example, consider two 30-year-old plus-size consumers who are similar in height but differ in body shapes. One of the 30 year old plus-size consumers may have fuller hips and thighs while the other has a fuller bust. In another scenario, some consumers have a longer torso and shorter legs while other plus-size shoppers have a short torso and longer legs.

This developing plus-size market has three segments: petite, average and tall. Petite females are less than 64 in. (163 cm) in height. Average consumers are between 64 in. (163 cm) and 68 in. (173 cm) while tall individuals are 68 in. (173 cm) and taller

(Coldwater Creek Summer Catalog, 2001; Lands' End Summer Catalog, 2001; Yoo, Khan, & Rutherford, 1999). Plus-size apparel is currently aimed towards the average height while petite and tall individuals are slowly gaining attention (Yoo et al., 1999).

As the average clothing size of women is increasing, there is an escalating demand for plus-size apparel. To meet this demand, computerized patternmaking technologies have emerged in the apparel industry. Programs which generate patterns using the home-based computer are becoming increasingly accessible in the market. These programs enable the user to input individual measurements or select from standard sizes. In addition, individuals can select specific garment details or choose preset designs from the computer programs.

Purpose

The purpose of this research was to examine the degree of satisfaction of plus-size female consumers with the fit of skirts produced by using selected current technological developments. Skirts produced from patterns developed using two home-based computer patternmaking programs and a pattern drafting service were compared to determine the suitability of the fit.

Objectives

The objectives of the research were:

1. To determine plus-size female consumers' satisfaction with the fit of skirts developed using:

a. Two home-based computer patternmaking programs, Dress Shop® 4.0 and Pattern Master™ Boutique 2.0, and

b. One pattern drafting service, Unique Patterns Design Limited™

2. To compare features of the programs and service which may enable selected plus-size women to achieve custom fitted garments.

3. To develop general guidelines for the selection of programs or services which produce custom drafted garment patterns.

Justification

The researcher had difficulty locating relevant research that related to plus-size female consumers' satisfaction of apparel fit in regards to the use of home-based computer-aided design (CAD) programs or pattern drafting services. There was literature pertaining to the satisfaction of ready-to-wear apparel for larger women dating back to 1982 and as current as 1990. These studies were conducted specifically among plus-size women in the areas of problems with purchasing apparel (Slusher, 1988), identifying needs and availability (Baines-Love, 1982), evaluating satisfaction with ready-to-wear (Chowdhary & Beale, 1988), and designing apparel for plus-size petite consumers (Tice, 1990). Literature regarding CAD focused on user satisfaction with CAD programs or services (Wu, 1998; Coelho, 1994). Other researchers used CAD programs to produce patterns for test garments for dwarfs (Katzenberger, 1997), flightsuits for pilots (Tan, Crown, & Capjack, 1998), and for testing the perception of fit among females (Ashdown & DeLong, 1995). Since then CAD programs and

services have entered the market but the practicality of these programs and services for plus-size consumers has yet to be studied. Results of this research may provide insights for plus-size consumers in their efforts to obtain properly fitted apparel through the use of current technological developments.

Definitions

1. Plus-size females: are females 20 to 35 years of age with measurements that are compatible with the Canadian Standard Size (CSS) 42.
2. Satisfaction with fit: refers to satisfaction with each of the prototype skirts in this research according to the participants' perceptions and the overall appearance of the skirts when worn. To determine the fit of apparel, the overall appearance evaluation is based on five elements: grain, set, line, balance, and ease.
3. Home-based computerized patternmaking programs: are programs developed for home-based pattern makers to be installed on personal computers.
4. Computer-aided pattern drafting service: a service that provides custom drafted patterns and offers design consulting.

Delimitations

The geographical area was delimited to the city of Winnipeg in Manitoba, Canada. This research was delimited to skirts for plus-size females whose

measurements for the lower body fell within the CSS size 42 range and whose ages were between 20 and 35 years.

Limitations

This research was limited to a small number of volunteers who showed an interest in this study. The findings from this study will apply only to the participants in this research and cannot be generalized beyond this population. Also, the results apply to the two programs and one service selected for this study.

CHAPTER TWO

LITERATURE REVIEW

This chapter contains literature related to apparel for plus-size women, figure types, satisfaction with fit, patternmaking programs and theoretical framework.

Apparel for Plus-Size Women

The plus-size apparel market is a niche with special needs and these ample figured women warrant the same attention for style, design and fit as other consumers. Plus-size women are stereotyped as fat and dreary individuals who have not conformed to society's ideal image of being thin (Chowdhary & Beale, 1988). However, plus-size women are as fashion conscious as other female consumers and are exposed to the same media, fashion trends and activities. The clothing and fashion interests among plus-size consumers are no different from those of other non-plus-size females (Shim & Kotsiopulos, 1990). Plus-size women would like to purchase apparel that makes them feel distinctive and would like to keep their wardrobe updated (Chowdhary & Beale, 1998).

The plus-size apparel industry is a booming market for fashion designers, manufacturers and retailers. There was a time when ample figured petite, average or tall women could not find many clothes to wear but now plus-size women are one of the

fastest growing market segments in the apparel industry in North America. The need for specialty apparel was explored in the mid-1970s and the demand has been steadily increasing since then (Yoo et al., 1999).

The statistics in Canada and the United States are astounding on the obesity rate and change in average size. It is estimated that over 50% of the North American adult population are considered overweight (Cote, 2000). The Canadian Community Health Survey (CCHS) reported a growth of 24% in the number of obese adults from 1994/95 to 2000/01 (Bueckert, 2002; Statistics Canada, 2002). During those six years, the proportion of obese adults increased from 13% to 15% (Statistics Canada, 2002). The number of obese adults aged 20 to 34 grew by 7% (from 646,000 to 690,000). CCHS reported an increase of obese men (23%) and a decrease of obese women (-9%) between 20 to 34 year olds. However when looking at the age group 20 to 34 years, even though there was a drop in the number of obese Canadian women, they still represent 23.2% of the obese adult female population. By 1992, about 60% of American women were a size 12 or larger (The plus size shopper, 2001; Making it big, 1992). Today, about 50% of all women wear a size 14 or bigger and one-third of American women wear a size 16 and larger (The plus size shopper, 2001; Plus-size finds, 1998; Making it big, 1992).

It has been found that plus-size sales in the United States totaled $10 billion in 1992 which is a substantial increase from $6 billion spent in 1986 (Feldman, 1992). A study conducted by the NPD Group in Port Washington, NY, found that sales of

women's plus-size apparel in the U.S. increased by 42% between 1990 and 1995 (Sales of women's, 1995). Total women's plus-size apparel sales in 1996 were $21.1 billion and increased to $28 billion in early 2001 (The plus size shopper, 2001; Plus sizes, plus sales, 1998).

Today petite, average and tall plus-sized clothing can be found in department stores, specialty boutiques and catalogs accessible by mail or on the Internet. Research by NPD Group found that plus-size sales increased by 55% among specialty stores but only by 13% in department stores between 1990 and 1995 (Sales of women's, 1995). Baines-Love (1982) found that consumers preferred plus-size specialty stores to department stores due to the availability of diverse sizes and trendy styles.

Some women have turned towards mail order or online catalogs as their channel for purchasing apparel. The study by Yoh (1999) reported that there had been a surge in Internet apparel shopping compared to findings from previous research. However, some respondents were hesitant to shop online but were more encouraged to do so if Internet companies offered incentives. These incentives included free products with purchase while greater customer services ranged from easier merchandise return procedures, views of how the apparel will look based on a virtual model with the same body type and an increase in security policies for credit card users. Tall, average and petite plus-size female consumers preferred to order clothing from mail-order catalogs (Shim & Kotsiopulos, 1990). Mail-order and Internet catalog users prefer the use of their personal computer equipment any time of the day especially in

their own familiar surroundings. Thus, many companies were revamping their catalogs and methods of catering to the plus-size market (Making it big, 1992). A majority of online shoppers also preferred the comfort of their home when trying on clothes.

Figure Types

When designing for the heavier-than-average females, designers must realize that plus-size consumers may be top heavy or bottom heavy (Brown & Rice, 1998). Plus-size women can be generalized into four figure types according to Nanfeldt (1996) and Zangrillo (1990): (1) hourglass, (2) rectangle, (3) apple and (4) pear (Appendix A). An hourglass body's overall shape is curved. Her hips and shoulders are approximately the same width while her waist is well defined. The waist is smaller than the hips and bust by about 9 in. (22.9 cm) or more. On the other hand, a rectangular body type has similar measurements at the waist, bust and hips. This results in an undefined waist. The waist differs by 1 in. to 8 in. (2.5 to 20.3 cm) from her hip and bust measurements. Females with a round shaped body are classified as apples. These women have a full bust, waist and upper back including a prominent tummy area and are considered top heavy. The apple body's bust is no more than 2 in. (5.1 cm) larger than her hips. Alternatively, individuals who have a pear shape body have a bust that is about 2 in. (5.1 cm) smaller than the hips. The hips and thighs of the pear figure female are wider than her shoulders and bust while her curvy lower hips and derrière are the largest part of her body.

Each body type requires different apparel designs to flatter the body. Looking for similarities rather than differences in body types will assist the plus-size female consumers in determining styles that compliment their figure. Consumers with an hourglass body should accent their curves without adding too much bulk around the hip and shoulder areas. Vertical lines, tailored dresses and set-in waists and belts are ideal for the hourglass types. Rectangle body shape individuals should select clothing that drapes smoothly over their midriff, giving an illusion of a defined waist. Hip huggers, one piece dresses and the monochromatic looks are suitable for the rectangular females. For apple shaped individuals, attention should be directed to the shoulder/neck/face area or hip/thigh area rather than to the torso. Ideas for this body type are long blouses, narrow skirts and neck accessories. Individuals with a pear shaped body need to accentuate their upper torso and midriff. This can be achieved with color, line, detail and shoulder pads for the upper body and dark, flowing draped skirts for the lower body. Set-in waists, belts, and separates are suggested for the pear figure (Nanfeldt, 1996).

Satisfaction With Fit

"Good fit is crucial to customer satisfaction" (Brown, 1992, p. 260). All consumers, especially plus-size individuals hope to find apparel that fits the contours of their body. Five elements determine the fit of apparel as described by Brown and Rice (1998) and Erwin and Kinchen (1974). The five elements are grain, set, line, balance

and ease. These elements are interrelated but have their own unique contributions to good fit.

Grain involves the lengthwise and crosswise yarns in a woven fabric. Depending on the type of garment, the lengthwise grain should be perpendicular to the floor at three locations: (1) center front (CF), (2) center back (CB), and (3) down the center of the arm from shoulder to elbow. Crosswise grain at CF and CB should be parallel to the floor at the bustline and hipline. Bias consists of a diagonal line or cut across the fabric and affects the drape of the fabric. The garment will not hang straight if the fabric is off-grain.

Set indicates the presence or absence of undesirable wrinkles. The item of clothing should fit smoothly on the body and if wrinkles appear the garment is too small (tight) or too big (loose).

Line refers to whether or not the garment is hanging properly. The alignment of the garment should complement the natural lines of the body. Side, CF and CB seams should hang straight and be perpendicular to the floor.

Balance is achieved when the garment drapes over the body symmetrically. The garment's left and right, and front and back halves should be balanced.

Ease refers to the extra fabric that is used beyond that needed to cover the body (DeLong, Ashdown, Butterfield & Turnbladh, 1993). Ease can be measured in terms of fit and design. Fit ease allows room for free movement and prevents clothing from

gathering at specific locations. Design ease is the ease on top of fitting ease and depends on the style of garment.

The concept of fit is also affected by garment suitability to the consumer's body shape. Appropriate clothing can enhance an individual's body image (Chowdhary & Beale, 1988). Suitable garments camouflage flaws or minimize body irregularities (Brown, 1992). Consumers choose the most satisfactory or comfortable size from the availability of clothing offered by each company or manufacturer. LaBat (1988) suggested that dissatisfaction with fit is due to the variety of sizing systems and lack of styles that flatter the different body types. Consumers are able to find acceptable colors, styles and prices more easily than clothing with a good fit. Fabric, fashion, selection, size and style should always be considered when designing for plus-size women (Chowdhary & Beale, 1988). Garments that fit properly have two results; firstly, they look appealing on the body and secondly, they produce a level of comfort for the wearer. Both perception and acceptance of fit largely depend on the individuals and their bodies (Ashdown & DeLong, 1995). Consumers perceive clothing that does not fit as a problem with their body and not with the manufactured clothes. This altered body image or perception in turn leads to negative feelings towards the body and oneself (LaBat & DeLong, 1990).

As society begins to accept the image of healthy plus-size females, manufacturers and retailers are attempting to satisfy the demand for plus-size apparel. Studies have shown that designers have not yet fully understood the diversity of fit of

ready-to-wear among plus-size females (Wu, 1998; Shim & Kotsiopulos, 1990; Tice, 1990; Chowdhary & Beale, 1988; Baines-Love, 1982). Chowdhary and Beale (1988) believed that apparel manufacturers and retailers are approaching the industry from a marketing perspective rather than a consumer based perspective. The industry has identified the plus-size apparel market as a profitable investment but has not met the demands based on the needs of these women. In general, manufacturers do not ask their clientele for feedback on their satisfaction with apparel being offered (Ashdown & DeLong, 1995).

There is a limited selection of trendy and fashionable apparel for the plus-size physique (Shim & Kotsiopulos, 1990). Plus-size women are demanding clothes in the same styles offered in regular retail stores but in their plus sizes (Plus-size finds, 1998). Manufacturers who attempt to cater to the plus-size clientele offer only a small range of color or style choices due to the expense involved (Brown & Rice, 1998). Various retailers tend to offer plus-size apparel in the basic styles and colors. If the retailers carry fashionable plus-size clothes, they stock a limited quantity (Plus-size finds, 1998). Designers are realizing that plus-size women spend less money on clothes because they are unable to find suitable or fashionable apparel. Consumers are willing to pay more money for better quality clothes (Chowdhary & Beale, 1988).

Although companies have been catering to the specialty markets, the clothing needs of plus-size females are not being satisfied (Shim & Kotsiopulos, 1990). In some cases, consumers tend to purchase smaller or larger size garments just so they can

accommodate their body. The results of the study by Shim and Kotsiopulos (1990) showed that plus-sized consumers were less satisfied than their average sized counterparts with the diversity of clothing stores catering to them, the size ranges available and the overall fit of clothes. They also found that plus-size women were less confident when choosing suitable clothes for themselves.

Fit and size tend to be the most common problems experienced by plus-size consumers (Chowdhary & Beale, 1988). In some personal interviews with plus-size women, it was found that they have more problems fitting into bottoms than with tops. There was less satisfaction with fit of ready-to-wear skirts than pants among plus-size women (Chowdhary & Beale, 1988). The research is further justified by LaBat and DeLong (1990) who indicated in their study among females in a University clothing course that participants were less satisfied with apparel fit in the lower body than in the upper and total body. Fit was specifically unsatisfactory at the thighs and hips (LaBat & DeLong, 1990; Baines-Love, 1982).

Being comfortable reflects an individual's well-being as well as social acceptance. Personal preferences are influenced by fashion trends, cultural factors, age, sex and lifestyle (Ashdown & DeLong, 1995; Brown, 1992; Davis, 1984). These preferences can affect how an individual's personality, self-confidence and self-acceptance are perceived (Katzenberger, 1997; Slusher, 1998; Davis, 1984). Fashion designers want their creations displayed and marketed on attractive and desirable figures (LaBat & DeLong, 1990). This constant portrayal of an ideal figure enhances

the consumers' awareness of self-confidence and self-acceptance. Female consumers are continuously comparing themselves to social female icons who are not considered plus-size. Society and the apparel industry create the image of an ideal body that consumers strive to attain. Nonetheless, this ideal body image is gradually changing as larger-sized celebrities and models are portrayed favorably in the media through advertisements, commercials, movies, television and in catalogs.

Patternmaking Software and Services

By the 1960s, manufacturers were using CAD technology for designing and styling within the apparel industry (Wilhelm, 1983). Designers were able to speed up the design and construction processes (Heisey, 1984). CAD technology was used in response to speed up production processes due to consumer demands for apparel that suited their everyday needs and personality. Since then, consumers have become more aware of their clothing needs and have become more demanding when it comes to shopping for apparel. There are now more choices and better means of comparison especially with the aid of the Internet.

Some designers in the apparel industry were hesitant to use CAD software to produce patterns. They preferred the traditional method of using pencil and paper to create patterns. Designers and companies decided it took too much time to produce patterns and that the computer would inhibit their creativity. Others may have been affected by high levels of computer anxiety and chose to avoid using up-to-date technology; thus, they lacked the confidence in mastering new CAD technology

(Istook, 1992). The study by Frey (1995) among University students, found that as individuals with high levels of anxiety increased their interaction with the computer, CAD technology and creativity could coexist.

The apparel industry's CAD technology costs thousands of dollars to purchase especially when including the cost of software, hardware and training personnel. By the 1990s, low-budget patternmaking software for home and professional sewers has become available on the market. At the beginning, home-based programs were rigid but the line between industry standard CAD software and home-based software is blurring (Heim, 1997).

There are two types of home-based patternmaking software: (1) individuals can create patterns by digitizing a basic sloper and manipulating the patterns on the computer screen, and (2) individuals can input measurements into the computer and select from a variety of pattern styles that have been preset into the programs. The former type of program was developed for the skilled patternmaker while the latter requires an individual to have little to no patternmaking skills. This type of low-cost home-based patternmaking program retails from US$49 to $800. Custom-drafted patterns offered by pattern services cost from CDN$50 to $150 depending on the garment specifications.

Currently there are several patternmaking programs and services available for home-based individuals or companies. Programs that require little to no patternmaking skills are Dress Shop® by LivingSoft Inc., Patternmaker by Patternmaker Software,

Personal Patterns by Water Fountain Software, Pattern Master™ Boutique by Wild Ginger Software Inc., and Modulate by Optitex (Heim, 1997; Bennett, 1995). Carefully taken body measurements are entered into the computer, basic patterns are selected and then the user is able to choose different design details depending on the garment style. Finished pattern designs created by the home user can be printed in sections and taped together.

Patternmaking programs such as Symmetry by Wild Ginger were developed for the skilled home-based patternmaker. These programs required the patternmaker to digitize and modify the patterns in the computer. Patterns drafted by services such as FASHIONMARK Solutions Inc., Unique Patterns Design Limited™, and Pattern Works International are for individuals who prefer not to purchase CAD software.

Other versions of patternmaking programs are available such as CADTERNS, ApparelCAD and PC Pattern™. These systems are based upon AutoCAD®, the computer-aided design technology developed for engineers and architects. Claims have been made suggesting these systems can increase efficiency of developing the design and patternmaking tasks but this is viable only if the user has mastered AutoCAD skills necessary to conduct these tasks (Frey, 1995). Therefore, these software programs are not within the scope of this study.

As patternmaking programs and services become more readily available in the market, researchers are able to use current technological developments within their studies. Researchers are able to develop test patterns more quickly than when using

traditional drafting pencil and paper methods. Ashdown and DeLong (1995) tested a method to measure the perception of fit. They used an advanced CAD system to draft test pants based on the participants' measurements. A custom-fitted control test pant was designed for each participant. Additional test pants were modified on the computer to test for variations in the perception of fit. The use of a CAD system was beneficial to the study and researchers because the study required four control test pants and 52 modified versions.

In the study by Tan et al. (1998), the researchers' objectives were to design and evaluate a variety of thermal protective flightsuits. Through focus group interviews with flight personnel and viewing of videotapes and photographs, the design specifications of the flightsuits were established. The prototype flightsuits were designed and manipulated on the computer using AutoCAD and PCpattern software.

Katzenberger (1997) looked at designing well-fitted apparel for dwarfs by using home-based patternmaking software. Personal Patterns, Dress Shop® and Fittingly Sew were the three software programs used in this study. Katzenberger compared the capability of each program in accommodating the dwarfs' physique. Upon completion of the test garments, the study also determined which home-based patternmaking software was optimal in designing apparel suitable for dwarfs.

The current technological developments to be used in this study are 1) Dress Shop® 4.0 by Livingsoft Inc., 2) Pattern Master™ Boutique by Wild Ginger Software Inc., and 3) drafting services by Unique Patterns. Dress Shop® was used in

Katzenberger's (1997) study and the program was also evaluated by Bennett (1995) and Heim (1997). The former evaluations discussed the program features but did not address fit. Wild Ginger's Symmetry software, for experienced pattern drafters, has a reputation of being similar to apparel manufacturers' CAD software at very reasonable prices without having to spend thousands of dollars (Heim, 1997).

Since this study will be focusing on home-based patternmaking software, Pattern Master™ Boutique was chosen from Wild Ginger's software products. The Canadian based company, Unique Patterns, is one of the first companies to offer pattern drafting services across the globe.

LivingSoft, Inc. offers Dress Shop®, a pattern drafting system. Dress Shop® 2.0 and 2.5 were user friendly even for people with little to no patternmaking skills (Heim, 1997; Bennett, 1995). The new version of Dress Shop® 4.0 was released in July 2001, and no formal evaluation of the program has been conducted since its short time frame in the market. All versions of Dress Shop® involve entering individual measurements into the program. This program requires over 50 body measurements which Bennett (1995) considered too many. The user chooses a garment pattern and then selects from different options for the neckline, collars, sleeves, cuffs and other features. After the design details are settled on, the user is able to determine wearing ease, seam allowances, dart depths, lengths, hem type and closure placements. The program then produces a custom-fit pattern ready to print. If the user runs into

technical problems, Dress Shop® consumers are able to contact them by electronic mail or telephone.

The full Dress Shop® package is US$199.95 which includes 34 pattern sets for pants, dresses, skirts and shirts. Alternatively, for US$49.95 the consumer is able to purchase individual sets. A demonstration of the software and upgrade options for Dress Shop® 4.0 is available through the website: www.livingsoft.com. The Windows version is compatible with Windows 3.1, 95 or 98. Machine requirements for this software are a minimum of 386DX 50MHz with 4 Mb of RAM and 10Mb of hard disk space. The Macintosh version requires a system 6 or better.

Wild Ginger Software Inc. specializes in producing software and hardware for producing patterns. Wild Ginger offers a range of software catering to the high-end mass customization manufacturers and the low-end system for the home sewers. The low-budget home-based product, Pattern Master™ Boutique Version 2 was developed for individuals who have little to no patternmaking skills and hands on experience. In Pattern Master™ Boutique, 24 measurements are required to produce patterns in this software. The user is able to change pre-existing patterns for the female adult by selecting different design details such as neckline, tummy and derriere shapes. Pattern Master™ Boutique users are able to choose from a wide variety of garment styles.

For Pattern Master™ Boutique to operate efficiently, an individual needs a Pentium/133 CPU, 85Mb of hard disk space, CD-ROM drive, 32Mb of RAM and a mouse. This software can run on Windows 95/98 or Virtual PC for the Macintosh.

Home sewers are able to purchase Pattern Master™ Boutique Version 2 for US$195.00 and a demonstration is available through their website: www.wildginger.com. For technical support, Pattern Master™ Boutique consumers are able to contact Wild Ginger by electronic mail or telephone.

Unique Patterns offers commercial drafting services to designers, manufacturers, theater groups and other groups who need similar customized garments. Designers sketch their ideas on paper or select a standard pattern from the catalog and Unique custom drafts the patterns with the aid of technology. Over 60 body measurements are taken according to Unique's requirements and sent along with the design details. The measurements include measuring the right and left side of the body for more accurate results. If there are no differences between the right and left sides of the body only 52 measurements are needed. Initial costs start around CDN$20 for the measurement kit for each individual to be measured. Prices for custom-fitted patterns vary between CDN$17 to $32 and increase in price according to the individual's specific needs and garment styles.

Theoretical Framework

Designing clothes for plus-size women is a complex process. Jones (1981, 1970) proposed a design strategy that involved searching for the design followed by an analysis of the search pattern. Jones (1981, 1970) describes the self-organizing design systems as a three-stage process: (1) divergence (analysis), (2) transformation (synthesis), and (3) convergence (evaluation). These stages can be viewed as "breaking

the problem into pieces, putting the pieces together in a new way, and testing to discover the consequences of putting the new arrangement into practice" (Jones, 1981, p. 63). The first stage, divergence, acts as a brainstorming session in analyzing the stable and unstable points of the situation. Value judgments of these points are assessed in the next stage. The process of the second stage, transformation, involves creativity and the synthesis of the pattern. During the second stage, internal and external factors are considered. The designer processes technical details as well as political, economical and functional aspects. At this stage the problem is defined, variables are identified, objectives are agreed upon and boundaries are outlined. The third stage, convergence, evaluates and eliminates uncertainties until a suitable design solution is identified.

Orlando's (1979) method of developing a functional apparel design process stemmed from Jones' (1970) design methodology. Functional clothing design is viewed as "objectifying the design process to make the resulting design meet specific needs" (Orlando, 1979, p. 127). These special needs include clothing for sports, thermal protective gear, space suits, diving suits and other functional apparel. Orlando (1979) broke down Jones' (1970) design process into seven stages: (1) request for the design (divergence), (2) design situation explored (transformation), (3) problem structure perceived, (4) specifications described, (5) design criteria established, (6) prototype developed, and (7) design evaluation. The clothing design process begins with a request for the design. All aspects of the problem are considered with no value judgments implicated. The next step is to explore the design situation and identify the critical

factors of the problem. At this stage, the literature search becomes a crucial component in narrowing the factors. The third stage requires a market and observation analysis to define the problem structure. Critical factors identified in the previous stage are assessed and the clothing specifications are described in stage four. Areas of the assessment involve body movement, activity pursued and social-psychological aspects. The fifth stage establishes the design criteria and the specifications are prioritized. This sets the criteria for the next stage, which is developing the prototype. In this case, the patterns are produced and the garment is constructed. The prototype design is evaluated at the final stage. Subjective and objective forms of evaluation are used in order to determine if the specifications were satisfied.

Tan et al. (1998) followed Jones' (1981, 1970) and Orlando's (1979) method of functional apparel design. The study by Tan et al. (1998) was to design and evaluate alternative thermal protective apparel for Canadian Forces flight personnel. Tan et al. (1998) grouped Orlando's (1979) seven stages into four stages: (1) general request for the design, (2) exploration of design situation and problem structure, (3) development of design criteria and specification, and (4) prototype development and evaluation. The general request for the flightsuit design involved focus group interviews among the pilots. Participants identified their likes and dislikes of current and past flightsuits. Tan et al. also carried out a literature search and observed videos and photographs as part of exploring the design situation. At this stage, a movement analysis was conducted. Pilots had to act out their everyday activities and were videotaped for assessment. The

third stage identified the principal criteria and specifications of the design. All garment specifications were weighted and prioritized. Some criteria were omitted due to conflict while other specifications had to be modified to accommodate the overall design. The final stage in the research by Tan et al. (1998) was the development of the flightsuit prototype and evaluation of the garment. Pattern pieces from a previous flightsuit were digitized into a computer using AutoCAD® and PCPattern® software. The patterns were manipulated and modified in the computer. New experimental patterns were developed resulting in the construction of the flightsuits made out of muslin. The flightsuits were then evaluated and minor adjustments were made to improve fit. Upon completion of the changes, the computer generated patterns for the flightsuits were sent to a local manufacturer and produced for the Canadian Forces.

Summary

In this review of literature, the researcher sought to investigate alternative ways plus-size women are able to acquire apparel for themselves. As plus-size women begin to understand their bodies and figure type, they will demand clothes that fit them. Studies have indicated that consumers, when purchasing plus-size apparel, have shifted their spending habits from department stores to specialty stores, mail-order catalogs and online catalogs. Through the emergence of the Internet, consumers are able to gain more information about plus-size apparel. Because satisfaction with fit is found to be important to plus-size females, current developments of computer patternmaking

programs and pattern drafting services may be used to achieve the desired goal of good fit.

The findings from previous studies have identified that plus-size females have fit concerns with the lower body. However, we do not know if these findings can be associated to Canadian women in the Winnipeg, Manitoba area. By using the functional apparel design framework according to Tan et al. (1998), the researcher will be able to assess the critical factors in developing the skirt design. This framework will also aid the researcher in determining if plus-size Winnipeg females have problems with fit at five specific body locations: waist, abdomen, hip, derrière and skirt length.

There are few studies pertaining to plus-size women, satisfaction with fit and computer patternmaking programs and services. Research studies have focused on plus-size females in general and petite plus-size women. CAD related studies have looked at the idea and anxiety of using CAD services or programs. Recently, the market has seen a growth in home-based computer patternmaking programs and services. Very few studies regarding the performance of these programs and services have been conducted, especially among plus-size female consumers.

CHAPTER THREE

METHOD

This chapter contains descriptions of the data collection procedures and method of data analysis. Data collection procedures include a description of the sample, pilot test, initial interviews, focus group interviews, skirt prototype assembly and fit assessment interviews. Method of data analysis describes the processes used to analyze the quantitative and qualitative information.

Data Collection Procedures

The Sample

The recruitment of participants was carried out upon receiving approval from the Joint-Faculty Research Ethics Board (Appendix B). Participants were recruited by word-of-mouth, through advertisements placed in local community newspapers, and posted flyers (Appendix C). The advertisements appeared during the weeks of November 7 and 21, 2001 in The Herald, The Lance, The Metro and The Times. The flyers were posted on notice boards throughout the University of Manitoba campus and stores of a plus-size retail chain throughout Winnipeg.

Interested individuals were asked to call the researcher. When interested individuals contacted the researcher, specific questions were asked to determine

whether or not the callers met the selection criteria (Appendix D). Those who were eligible to participate were sent a letter of introduction outlining the purpose and procedures of the study (Appendix E). A follow up call to the participants enabled the researcher to obtain verbal consent to meet with each participant at a mutually convenient time and location.

Twenty-two respondents displayed an interest in the study and were screened over the telephone. Seven (31.8%) respondents were ineligible since they did not meet the specified criteria after being screened over the telephone. After the initial interview, two respondents were found ineligible since their waist or hip measurement did not meet the sizing standards for size 42 of the Canadian Standard Sizes for Women's Apparel – Trade Sizes (Canadian General Standards Board (CGSB), 1987). A size 42 was selected for this research as its waist and hip measurements were found to be a popular size in the plus-size retail clothing outlet. Four of the nine ineligible respondents were randomly selected to participate in the pilot test. Henceforth, 13 respondents formed the final sample of plus-size women.

Pilot Test

Pre-testing of the pen and paper questionnaire (Appendix F) and focus group interview schedule (Appendix G) was necessary to aid the researcher to refine the questionnaire and schedule. Four plus-size participants who initially showed an interest in this study were contacted and notified of the purpose of the pilot test. A pilot test was conducted using these four respondents as they are able to relate to plus-size

apparel issues. Upon receiving verbal confirmation from the pilot test participants, a letter of introduction was sent to them. These participants were then contacted by telephone to gain their verbal consent to meet at a mutually convenient time and location. The pen and paper questionnaire and focus group schedule were administered to the participants and upon completion, the participants were asked to evaluate the clarity of the questions. Participants were asked to suggest changes to the questions if they interpreted them to be confusing, offensive or unnecessary. Adjustments and modifications to data collection instruments incorporated the suggestions offered by the four participants.

Initial Interview

At the initial meeting with each of the 13 subjects comprising the sample for this study, the purpose and procedures were reviewed, and the consent form (Appendix H) was signed to confirm participation. Participants were advised that they were able to withdraw from the study at any time without prejudice or consequences. The next step involved recording the participant's body measurements (Appendix I). To be eligible for an interview, female participants had to have the following characteristics:

1. interest in the fit of clothing
2. between the ages of 20 to 35 years
3. a waist measurement of 38.1 to 40.1 in. (97 to 102 cm) or a hip measurement of 44.3 to 46.3 in. (112.5 to 117.5 cm)

Prior to the initial meeting, participants were advised to wear close fitting lower body garments and socks or be barefooted for the measurement portion of the study. The researcher took measurements of each participant at key body points according to each company's measurement chart. For this study, anonymity of the programs and service was maintained from the participants; thus, the researcher combined the mandatory measurements to draft skirt patterns from all three measurement charts into one combined chart (Appendix I). The majority of the required lower body measurements were identical among the three companies. Upper body measurements were not required by for this study and were not included in the combined measurement chart.

The waist and hip girths were the two key horizontal controls required for designing garments for the lower portion of the body (CGSB, 1987). Waist girth was "at the natural waistline between the top of the hip bone (iliac crests) and the lower margins of the lowest ribs" (CGSB, 1987, p. 4). Hip girth was "the maximum horizontal girth of the body at the seat level" (CGSB, 1987, p. 5). To determine their natural waistline, binding ribbon was tied around the waist and measured with a dressmaker's measuring tape. Other key points were measured according to the pattern making software and drafting service measurement charts such as side seam length, waist to floor, floor to ankle, floor to knee, and floor to preferred height of skirt. Each subject's height was measured with a meter ruler from the floor to the top of the head while the participant stood with her back against a wall. All body measurements were

"measured without constriction and with the subject standing normally" (CGSB, 1987, p. 4).

To conclude the interview, participants were asked to provide demographic information including age, education, income level, occupation, clothing size and height in the pen and paper questionnaire (Appendix F). After the initial meeting, each participant was classified according to one of the four figure types: hourglass, rectangle, apple or pear (Appendix A).

Focus Group Interviews

As prescribed in Tan et al.'s (1998) second stage in the method of functional apparel design, the researcher further explored the design situation and problem structure during the focus group interviews. At this stage, common fitting problems with skirts were identified and the design situation of the skirt prototype was defined (Appendix G). These interviews took place at the Fort Garry campus of the University of Manitoba. The number of subjects participating in these interviews ranged from two to four. Led by the researcher, the focus groups provided a forum for the participants to express their views regarding fit. Exploration of the design situation allowed participants to verbalize their likes and dislikes regarding the fit of garments for the lower body, particularly skirts.

Skirt Specifications

In accordance with the third stage of the functional apparel design method outlined by Tan et al. (1998), the common fit problems encountered by the participants

and the design specifications of the prototype skirt were identified from the analysis of the focus group interviews. The researcher analyzed the contents of the tape recorded focus group interviews. The qualitative data gathered from the interviews were used to define the skirt prototype details.

The final design was an ankle length straight skirt with two side slits that ended around knee level (Figure 1). The 8-in. (20.3 cm) lapped zipper closure was placed at CB. A straight waistband was cut from woven polyester fabric and a lightweight non-woven interfacing was fused onto the wrong side of the fabric. To complete the waistband, a hook was sewn on the overlap and an eye was sewn on the extension. All but one skirt had eight darts totally: four in the front and four in the back. One skirt had six back darts to accommodate the individual's curvature in her spine.

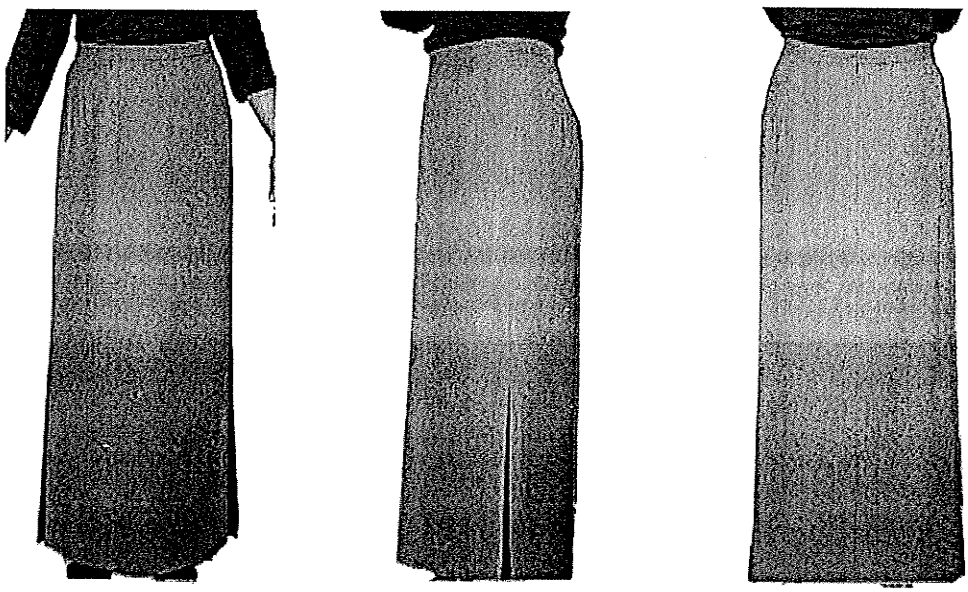


Figure 1. Skirt prototype (front, side and back views).

Skirt Prototype Assembly

The final stage of the apparel design process was the development of the skirt prototype. Skirt prototypes were developed according to each individual's body measurements. One prototype from each method of pattern development for each participant was constructed. Each of the 13 participants tried on and evaluated three skirts; hence, a total of 39 skirts were produced for this study.

The skirt prototype assembly took place in two phases: (1) development of the skirt pattern pieces and (2) construction of the skirts. Development of the skirt patterns involved the installation of the two patternmaking programs, Dress Shop® 4.0 and Pattern Master™ Boutique 2.0, on an IBM compatible personal computer. Participants' body measurements were recorded and entered into the software. In accordance with the results from the focus group interviews, the skirt details were selected in the programs. After visually approving each pattern piece, the patterns were printed on an inkjet printer. Pattern pieces were printed on 8.5 x 14 in. (21.6 x 35.6 cm) paper and then taped together. Measurements and design details were mailed to the pattern drafting service. Full-size patterns were drafted by Unique Patterns, plotted on durable 36 in. (91.4 cm) width paper and mailed back to the researcher.

To ensure the testing was valid, careful control of the skirt prototype assembly was necessary. Prototype skirts were constructed out of medium weight woven 100% polyester fabric. Each pattern piece had a 0.5 in. (1.3 cm) seam allowance. Notches on the fabric pieces were carefully matched to ensure accurate construction was

maintained. Each of the 39 skirts was labelled with the participant's assigned identification number and symbol which corresponded to the method used to develop each of the three skirts. The symbol, participant's identification number, and washing instructions were illustrated on a label which was sewn on the inside of the waistband at CB. Dress Shop® 4.0 skirts was represented by a square; Pattern Master™ Boutique 2.0 skirts had a triangle symbol; and Unique Patterns was represented by a circle.

Fit Assessment Interviews

As soon as the three skirts were constructed, each participant was contacted by telephone and an appointment was made for the fit assessment interview (Appendix J). The interviews took place at the University of Manitoba in the Human Ecology building. The room was equipped with chairs, tables, mirrors, and a fitting room. To ensure participant's privacy when changing into the skirts, the fitting room had drapes that segregated it from the rest of the room. Participants were asked to change into the circle skirt and were asked open and closed-ended questions about that skirt. Photographs of front, back and side views were taken to document the fit of the skirts. This procedure was repeated with the square and triangle skirts. To minimize bias, the order in which the participants tried on the skirts varied. All interviews were tape recorded and later transcribed by the researcher.

During the fit assessment interview, the skirts were evaluated objectively and subjectively. The researcher followed the fit quality checklist by Brown and Rice (1998) which incorporated the five elements associated with the fit of apparel (Appendix J).

Only points relevant to evaluating the fit of a skirt were identified from the original checklist. The objective evaluation commenced the first part of the interview which was conducted by the researcher. Participants were asked to subjectively evaluate the fit of the skirts in the second portion of the interview. They were encouraged to move, sit, walk, and emulate motions they would perform when wearing a skirt. Each participant evaluated the three skirts independently of each other at specified fit areas: around the waist, around the abdomen, around the hips, around the derrière, and the length. Closed-ended questions were used to make participants choose descriptors which best described their satisfaction with the fit of the skirts. The satisfaction with the fit was evaluated on a 5-point scale ranging from 1 for very dissatisfied to 5 for very satisfied. These closed-ended questions were used as a method of grouping the responses which enabled the researcher to make comparisons of the evaluations.

Following the indication of the participants' satisfaction or dissatisfaction with each of the customized skirts, they were asked to explain their reasoning through open-ended questions. At this time, participants were asked to elaborate on their chosen level of satisfaction with the fit of the skirts. After evaluating the overall fit of each of the three skirts, the participants were asked to identify which one of the three skirts they were more satisfied with. Upon completion of the fit assessment interview participants were given the option of keeping one, two or three of the customized skirts.

Guidelines for Selecting Software and/ or Service

This study also identified numerous factors to consider when purchasing patternmaking software or selecting a pattern drafting service. These general factors were accumulated from articles found in trade publications during the literature review. A list of guidelines was outlined by Ross (1995) for purchasing CAD software and by Kufahl (2000) for obtaining pattern drafting services. Bennett (1995) and Fanning (1999) offered some guidance when selecting home-based software. The researcher recorded the process of selection and usage of the software and service for this research. The accrued guidelines from the literature review and researcher's experiences formed the guidelines to consider when selecting a patternmaking software and/or pattern drafting service.

Data Analysis

This research derived both quantitative and qualitative data. The quantitative data from the pen and paper questionnaire were analyzed using SPSS. Descriptive statistics were used to organize and describe participants' demographic characteristics through frequency tables. Closed-ended responses from the focus group and fit assessment interviews were analyzed through frequency tables and cross tabulations. The qualitative data from the open-ended questions from the focus group interviews were subjected to content analysis.

Content Analysis

Participants' responses to the open-ended questions asked in the focus group interviews were transcribed from tape to paper and two people participated in the coding of the responses to the open-ended questions. The researcher and researcher's advisor independently read a random selection of responses for pre-coding purposes. During this time, each coder established tentative categories for the responses. The coders met to compare and discuss their method of categorization. If a disagreement arose, the coders had to explain their interpretation. Upon hearing the explanation, the two coders either agreed or disagreed. A compromise was made between the two coders if there continued to be a disagreement. To verify inter-coder reliability numerical notation was made of the coding agreements and disagreements. This pre-coding session resulted in a coding scheme for this study. The coders proceeded to code all the cases independently using the established coding scheme. After all the responses were coded, the coders met to compare their interpretations.

CHAPTER FOUR

RESULTS

Two commercially available computer patternmaking programs and one pattern drafting service were tested to determine how well each could accommodate the lower part of the plus-size physique. Thirteen participants evaluated the fit of three skirts based upon patterns developed to their measurements using Dress Shop® 4.0 represented by a square, Pattern Master™ Boutique 2.0 represented by a triangle, and Unique Patterns represented by a circle.

In this chapter, the results are presented under the major headings of demographic characteristics, focus group interviews, pattern development and participants' satisfaction with each of the three prototype skirts produced according to their measurements.

Demographic Characteristics

Participants' ages ranged between 20 and 35 years with a mean of 26.5 years. Approximately 46.2% of the respondents were 24 years and younger; 23.1% were between the ages of 25 and 29 years; and 30.8% were between 30 and 35 years of age.

All participants had received some post secondary education or higher. Over 61.5% had attended a post-secondary institution such as a college or a university.

Approximately 38.5% of the sample had received a bachelor's degree and completed some graduate work. The majority of respondents worked part-time (about 61.5%) and 15.4% worked full-time. Three participants were unemployed at the time of this study. Of the 13 participants, 46.2% had a net income level below $10,000; 23.1% earned between $10,000 and $14,999; and 30.8% earned more than $15,000.

The height of the participants ranged from 62 to 71 in. (157.5 to 180.3 cm) with the average height of 67.1 in. (170.4 cm). One participant was identified to be in the petite category of 63 in. (160 cm) and shorter; 46.2% were average height between 63 to 67 in. (160 to 170.2 cm); and 46.2% were 67 in. (170.2 cm) and taller.

Participants were also categorized into four different figure types: hourglass, rectangle, apple, and pear. Over half of the participants had a pear shaped body (53.8%). Approximately 23.1% were identified with a rectangle figure, 15.4% with an hourglass body and one individual had an apple figure.

Participants' waist and hip measurements were classified according to Canadian Standard Sizing (CSS) for Women's Apparel – Trade Sizes size 42 (Canadian General Standards Board (CGSB), 1987). To be a size 42, females had to have a 39.1 in. (99.3 cm) waist circumference and a 45.3 in. (115.1 cm) hip circumference. The tolerance accepted for the waist and hip girth measurement was +/- 1 in. (2.5 cm). Thus, according to CSS a size 42 had a waist measurement between 38.1 to 40.1 in. (91 to 102 cm) and a hip measurement between 44.3 to 46.3 in. (112.5 to 117.5 cm). Qualified participants had to have either a waist or hip measurement that was within the specified

CSS range. Therefore, in this sample when the hip measurement met CSS specifications, waist measurements ranged between 34 to 40 in. (86.4 to 101.6 cm). Hip measurements ranged between 45 to 52 in. (114.3 to 132.1 cm) when the waist measurement met the size 42 standards.

During the data collection period, 12 of the 13 participants stated that they wore skirts. About 53.8% wore skirts one to five times from September to January and 38.5% wore skirts six or more times. Participants commented that during the colder season they were less likely to wear skirts plus they claimed that it was hard for them to find comfortable and fashionable plus-size skirts. More than one-third of the respondents indicated that they had purchased skirts from more than one size category. Skirts that were purchased from clothing retail stores ranged in size from 14 to 22. A size 42 in the Women's body measurements was comparable to a size 22 in the Misses' range. Misses and Women's figures are about the same height and differ it that Women's are a larger and more fully matured figure than Misses.

Six of the 13 participants sewed their own clothes or had clothes custom made. From these six, four sewed their own clothes, one had garments professionally made and one had dresses custom designed by a friend. Two other participants knew how to sew casual garments such as sweatpants and underclothes for themselves. Formal wear and pants were most commonly custom made followed by skirts, casual wear, undergarments, athletic wear and dance costumes.

None of the participants in this study had used computer-aided design pattern drafting programs or services to produce custom made garments for themselves. Five respondents were aware of pattern drafting programs offered in the apparel market while the other eight had not heard of any programs or services.

Focus Group Interviews

Participants provided information about the fit of skirts in the focus group interviews. The responses were summarized in Appendix K. The participants identified fit problems encountered when trying on skirts, areas of the lower body that created fitting problems, preferred types of skirts, and lengths that suited their bodies.

The qualitative data from the focus groups were subjected to content analysis. From 107 applicable attributes, there were 104 coding agreements between the two coders. Thus, the coefficient of reliability was 97.2%. Both coders were able to maintain a high level of consistency during the coding process.

Problems Encountered When Shopping for Skirts

Fit

Waist to hip ratio, and hip and thigh circumferences were fit problems associated with the lower body. Participants found that skirts either fit at the waist and were too tight around the hips or the waistband was too big and the area around the hips fit perfectly. Some skirts with little ease had horizontal wrinkles form at the hips which caused the skirt to shorten in length. In these instances, the participant could be purchasing a skirt that was a size too small for the hip and thigh circumferences.

Straight and tapered skirts were reported to flare out at the bottom, especially at the sides and back. Participants believed that the skirts did not accommodate their ample derrières and full hips.

Design

Problem areas encountered by participants depended on the design of the skirt: the overall style, length, type of waistband and closure placement. For example, skirts that were peg shaped, being too narrow at the hem, restricted their movements. Other skirts 'poofed out' or flared out at the hem in an unflattering manner. In addition, skirt lengths were noted for being too short for the average and tall individuals or too long for the petite women.

The type of waistband was also a deciding factor in consumer purchases. The participants preferred not to wear or purchase lower body garments with elastic waistbands. Skirts with elasticized waistbands not only caused discomfort to the wearer but also made the skirt hang in an unflattering way. Waist closures were addressed and participants had problems with how the zipper closure lay. However, when worn, the zipper puckered when the closure was located at the CF, side or CB seam.

Fabric

Skirts made of heavyweight fabric were reported to hang and drape in a more pleasing manner than those constructed from lightweight material. Lightweight garments tended to bunch up more easily when worn.

Other

Participants stated that they had problems with waistbands when in a sitting position. Waistbands of certain lower body garments gaped at CB, thus exposing more skin than necessary.

Styles and Types of Skirts That Suit the Body

When asked what style of skirt flattered their bodies, the majority of participants preferred straight skirts followed by A-line and tapered silhouettes. Individuals reported that they preferred skirts to be either long or knee length. Over half of the respondents wore long skirts with slits on the sides or back for increased ease in movement. Heavier weight fabric in darker solid colors was thought to be appropriate for plus-size women.

The participants favored waistbands with no elastic or partial elastic at the back. Those who liked elastic in their waistbands preferred it in the back of the band or sewn in sections at the sides. They also preferred the zipper closure to be at the side seam or CB seam.

Pattern Development

Obtaining the Patterns

Entering data

During the process of drafting the pattern pieces, prior to constructing the skirts, several similarities and differences were noted. Each program and the pattern drafting service required a specific number of measurements in order to develop a custom fitted garment. Of the 56 measurements in the square program, 16 entries were

compulsory for the skirt to be custom drafted. Eight lower body measurements were essential to create a skirt in the triangle software; otherwise, the program required 24 measurements to produce garments for the whole body. For the two programs used in this study, the number '1' was entered into all the unnecessary measurement slots in order to process the lower body measurements. If a number was not entered into a slot, a measurement coach message box would appear on the screen notifying the user of potential measurement problems. Thus, the user was unable to continue until the problems were fixed. The third skirt, the circle skirt, required 20 lower body measurements including measurements for both the right and left side. The remaining 43 measurements for the bodice and pants were left blank.

In order to be consistent with recording the measurements, the two computer programs had diagrams that illustrated the body location that was to be measured. For example, when recording the waist measurement, a measuring tape would appear around the model's waistline. The pattern drafting service measurement kit included a measurement video and detailed figures in their catalog to aid the consumers in taking their body measurements. After viewing the diagrams, many of the required lower body measurements from all three companies were identical; thus, the measurements were combined into one chart. In all three cases, taking accurate measurements required two people: one person to take the measurements and the second whose measurements were to be taken.

After taking the participants' measurements, two participants were identified as having an asymmetrical lower body caused by one high hip. One waist to ankle side measurement was longer than the other side due to one hip being larger, as seen in Figure 2. The measurement chart for the circle skirt required data entries for the right and left outseam and gave the user the option of identifying body types and anomalies including one high hip. The chart for the square skirt and triangle skirt allowed the user to enter a left or right waist to floor measurement but the researcher was not required to specify if there were body anomalies. Ankle length skirts were evaluated in this study; thus, a waist to ankle measurement had to be added to the circle skirt measurement chart.

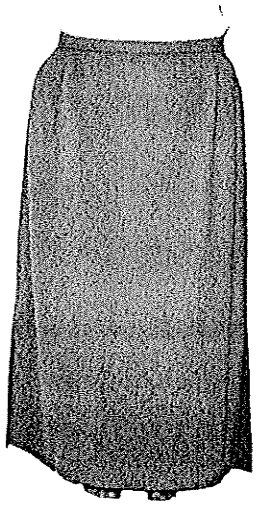


Figure 2. Uneven hemline due to one hip higher than the other.

Incorporating the skirt details

Pattern details in the two computer programs were presented as flat patterns, hence referring to the patterns in halves as opposed to the full complete skirt. Creating

the skirts according to the results from the focus group sessions required some manual adjustments to the printed patterns. There were limited skirt selections that paralleled the desired skirt specifications in the triangle and square skirt programs. The skirt details incorporated from the square program were ankle length, back zipper closure, fitted waist with two darts in the back, two darts in the front, and square hem finish features. On the other hand, details of the triangle skirt incorporated a straight silhouette with two front and two back darts, zipper closure at CB, straight hemline sweep, one inch waistband and a specified waist to hem length. The triangle skirt had one knife pleat at CB and the researcher did not have the freedom to specify the location nor the type of slit. For designing flexibility, the initial printed triangle skirt pattern had a CF seam. To be consistent with the other designs the skirt front was manually altered to be cut on the fold at CF and the knife pleat at the CB seam eliminated.

The researcher had to search through the circle skirt's catalog to select a standard Butterick pattern with similar skirt characteristics. After identifying the skirt pattern number, a detailed list of alterations was included with each individual's measurements and mailed to the pattern drafting service. The circle skirt had two front darts, two back darts, a center back zipper, and side slits. Changes made to the skirt for research purposes required the service to modify the slit to end two inches below the knee and to lengthen the skirt.

The same body measurements were used with all three skirt development methods; hence, the variations in fit were inherent to the programs. All three skirts were classified as semi-fitted. Since the programs used in this study were for individuals with little to no patternmaking skills, the researcher did not change the pre-programmed standard ease measurements. Both computer programs had the option of indicating the amount of ease at critical areas such as the waist and hip. The triangle and circle skirts had a waist ease of 1 in. (2.5 cm). There was a hip ease of 5 in. (12.7 cm) for the triangle skirt and 3.5 in. (8.9 cm) for the circle skirt. In the square skirt chart, an option was given to increase or decrease the ease. After measuring the square skirt and comparing the pattern measurements to the actual body measurements, the square skirt had a waist ease between 1 to 2 in. (2.5 to 5.1 cm) and a hip ease of about 2 in. (5.1 cm). The circle skirts drafted by the pattern service had a standard ease measurement according to the skirt style selected. This ease measurement was confirmed upon reading the notes on the patterns.

Printing the patterns

The option of printing a design sheet was given in the program for the triangle skirt but not for the square skirt. The design sheet included a flat drawing of the skirt front with a list of the individual's measurement. The circle skirt patterns arrived in a Butterick envelope; thus, the skirt design was sketched on the envelope. The triangle skirt program included an option to view all the pattern pieces at once which allowed the user to manipulate the pieces for maximum paper efficiency. The user had a choice

of printing the pattern pieces for the triangle skirt all at once or individually. Alternatively, each square skirt pattern piece had to be printed individually involving more of the user's time in continuously clicking on the print button to print each piece. After unsuccessful attempts to print the skirt patterns on a plotter, all pattern pieces were printed on 8.5 x 14 in. (21.3 x 35.6 cm) white paper and individually taped together.

Constructing the Skirts

The overall shape of the completed skirt had a CB length 1 to 2 in. (2.5 to 5.1 cm) longer than CF. By raising the waistline at CB the drafted pattern was able to accommodate the plus-size women's ample derrières. The drafting service also took into consideration that the participants had a prominent abdomen and so designed the hem of the circle skirt to hang 1 in. (2.5 cm) lower at CF than the side seams. There was some difficulty in sewing the hem of the circle skirt while trying to maintain the specified 2 in. (5.1 cm) hem allowance. Any noticeable puckers were easily steamed and pressed out of the fabric. In eight situations, the lowered front hem was beneficial, otherwise the skirt appeared to be too long at the front.

The waistbands for the triangle and circle skirts were cut as one piece from the woven fabric and notches marked for CB, CF and side seams. For the square skirt, the researcher was instructed to cut two pieces of the waistband and sew a seam down the center. There were no markings on the waistband pattern piece to identify the centers, side seams and extension for the hook and eye. No solution was given although several

attempts were made to contact the square company's technical support. The researcher had to compare the actual waist measurement and waistband length followed by calculating the difference in circumference. Upon comparing these two measurements among all 13 square skirt waistbands and participants' waistline, the extension was calculated to by 1.5 in. (3.8 cm).

These computer programs are constantly being upgraded. For instance Dress Shop® 4.0 upgrade version 4.69 corrected the problem of drafting the waistband to be consistent with the full waist circumference. Since Version 4.69 was not released until June 2002, the waistbands used in this study were manually modified to be cut on the fold because they were originally half the full waist circumference.

Satisfaction With Skirts at Specified Fit Areas

The skirts were evaluated objectively by the researcher and subjectively by the plus-size participants. The researcher followed the checklist by Brown and Rice (1998) to evaluate the fit of the skirts. The checklist took into account the five elements that relate to the fit of apparel. Each skirt had a balanced design and was cut on grain to avoid bias influences. During the objective evaluation, careful consideration was given to the set, line, and ease elements of the skirt.

Fit Around the Waist

As shown in Table 1, the fit of 29 of 39 skirts was evaluated as being satisfactory or very satisfactory around the waist. Of the 29 skirts rated in the satisfactory range, seven were circle skirts, six were triangle skirts, and four were square

skirts. Approximately 30.8% of all three skirts tried on by the participants were evaluated as being very satisfactory at the waist. The waistband fitted the bodies well and did not bind or roll. There was no strain at the closure and participants were very satisfied that there was no gaping at CB waist when they tested the fit of the skirt in a sitting position. The figure types that evaluated the fit around the waist of all three skirts as neutral and higher were hourglass, rectangle and apple. The pear shaped participants were satisfied with 14 out of 21 of the skirt prototypes. Of the remaining seven skirts tried on by the pear figures, five skirts were rated as dissatisfactory or less and two skirts were evaluated as neutral.

Table 1

Satisfaction With the Fit of the 39 Skirts Around the Waist

Skirt	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
Square	1	2	2	4	4
Circle	0	1	1	7	4
Triangle	1	0	2	6	4
Total	2	3	5	17	12

The fit around the waist was evaluated as dissatisfactory (5.1%) and very dissatisfactory (7.7%) among all three skirts. The four participants who were unhappy with the fit around the waist with five of the skirts were pear shaped women. Of the

four pear shaped participants, one woman was dissatisfied with two skirts: one triangle and one square. This dissatisfaction with the skirts was due to the waist circumference being either too loose or too tight. The main reason for the skirts being too loose was the participants experienced a weight loss between the initial and final meeting. In other instances, horizontal wrinkles at CB waist signified that there was not enough ease at the waist (see Figure 3). Ten of 39 skirts (25.6%) displayed some of these horizontal wrinkles and the participants evaluated the fit around the waist of these skirts as satisfactory, neutral or dissatisfactory. These wrinkles could be reduced by adding ease to the waist measurement or decreasing the back dart width.

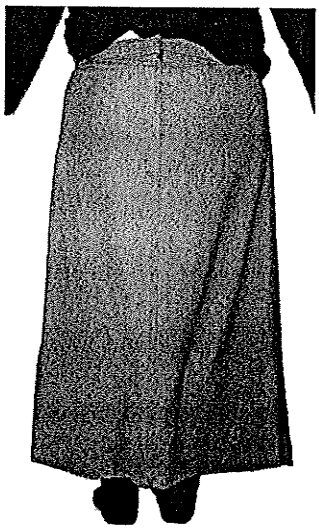


Figure 3. Participant wearing skirt with visible horizontal wrinkles at CB waist.

Fit Around the Abdomen

Two participants were very dissatisfied with the fit of the triangle skirt around the abdomen, as shown in Table 2. Among all three prototypes, 15.4% of the skirts were evaluated by the participants as having dissatisfactory fit around the abdomen and

six individuals were neutral in their decision. Of those participants who were dissatisfied with the fit of the skirts around the abdomen, the majority of them had a pear shaped body followed by rectangle and hourglass figured women. Dissatisfaction with the skirts was due to the appearance of diagonal wrinkles. Diagonal wrinkles were visible on the skirt front angling from the side seam near the waistline down towards the dart points. These wrinkles appeared due to stress or tightness over the upper side seams and darts. The darts on these skirts were too narrow for the curvature of the body. One participant had diagonal wrinkles pointing to her abdomen which caused the skirt front to fall against her legs instead of hanging straight down, as seen in Figure 4.

Table 2

Satisfaction With the Fit of the 39 Skirts Around the Abdomen

Skirt	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
Square	0	3	2	4	4
Circle	0	1	2	5	5
Triangle	2	2	2	5	2
Total	2	6	6	14	11

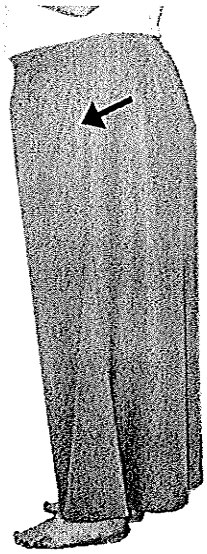


Figure 4. Diagonal wrinkles pointing to a bulge causing the skirt to hang poorly.

Darts in seven of 39 skirts were too wide for the individuals' body curves, thus, excess fabric showed at the dart points. This problem occurred mainly at the front of the skirts (12.8%) and about 5.1% were at the back. Some participants' skirts (28.2%) had vertical folds a few inches below the waist between the pairs of front and/or back darts.

Participants were more satisfied than very satisfied with the fit of the skirt around the abdomen. Fourteen of 39 skirts had a satisfactory fit around the abdomen and participants were very satisfied with 11 of the skirts. Approximately 64.1% of the time, the drafted skirt design was able to accommodate the plus-size woman's abdomen satisfactorily. The 25 skirts that were evaluated as having a satisfactory or better fit around the abdomen were distributed among all four figure type participants.

Fit Around the Hips

All four figure types were more satisfied with the fit around the hips of the square skirts (20.5%) than with the circle (10.3%) and triangle (7.7%) skirts. Ten of 39 skirts were evaluated as neutral (Table 3). At the other end of the scale, respondents were more dissatisfied with the circle skirts (15.4%) than with the triangle (12.8%) and square (7.7%) skirts. Some hourglass and pear shaped participants thought the fit of all three skirts dissatisfactory around the hips.

Table 3

Satisfaction With the Fit of the 39 Skirts Around the Hips

Skirt	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
Square	0	3	2	3	5
Circle	0	6	3	1	3
Triangle	2	3	5	2	1
Total	2	12	10	6	9

Dissatisfaction with the circle, triangle and square skirts resulted from vertical folds occurring below the hipline around the side seams on 33.3% of all the skirts (Figure 5). There was ample ease around the hips with each skirt. In three cases, the one side of the skirt hem flared out and the hemline was not parallel to the floor. This problem was associated with the two participants having one hip larger than the other.

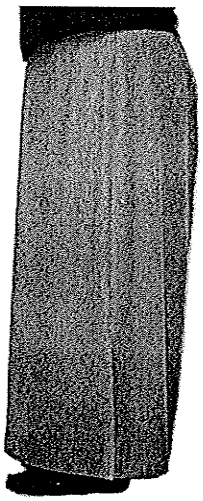


Figure 5. Vertical folds visible at the side seam.

Fit Around the Derrière

The fit of 28 of 39 skirts was evaluated as being satisfactory or very satisfactory fit around the derrière, as reported in Table 4. All of the figure types rated most of the skirts as having a satisfactory fit. No one was very dissatisfied with the circle skirt but one square and two triangle skirts were indicated by the participants as having very dissatisfactory fit. The two triangle skirts were evaluated as dissatisfactory by rectangle and pear shaped individuals, and one pear figured participant was very dissatisfied with a square skirt. Participants of the pear and hourglass figures were dissatisfied with 7.7% of the 39 skirts. Three participants expressed their dislike of surplus fabric around their lap when sitting due to excess ease around the hip circumference.

Table 4

Satisfaction With the Fit of the 39 Skirts Around the Derrière

Skirt	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
Square	1	1	2	3	6
Circle	0	1	1	6	5
Triangle	2	1	2	7	1
Total	3	3	5	16	12

Satisfaction With the Length

Participants responded with higher levels of satisfaction with the length of the square skirt. As seen in Table 5, seven of the 13 square skirts were evaluated by the participants as very satisfactory and five skirts had a satisfactory length. All figure types rated the length of the square skirts as satisfactory and higher except for one pear shaped participant who stated that the square skirt was too long and was dissatisfied with the length. Less than half of the participants with hourglass, rectangle and pear figures rated the circle skirts as either satisfactory or very satisfactory. Among the remaining evaluations of the seven circle skirts, four participants of rectangle and pear shapes had a neutral response and three apple and rectangle shaped participants were either dissatisfied or very dissatisfied. Approximately 21% of the triangle skirts were rated satisfactory or higher and 12.8% were neutral or lower regarding the length of the

skirts. Pear shaped participants were more satisfied with the length of the triangle skirts than with the circle and square skirts.

Table 5

Satisfaction With the Length of the 39 Skirts

Skirt	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
Square	0	1	0	5	7
Circle	1	2	4	2	4
Triangle	1	2	3	3	4
Total	2	5	7	10	15

Satisfaction With the Skirt Overall

Approximately 56% of the circle, square and triangle skirts evaluated by the participants were satisfactory or very satisfactory in the overall fit of the skirts (see Table 6). The square skirt was favored more by the participants. Eight circle skirts were evaluated in the satisfactory range among hourglass, rectangle and pear shaped individuals. Satisfaction with the overall fit of the triangle skirt ranged from very dissatisfied to very satisfied. None of the participants was very dissatisfied with the overall fit of the square and circle skirts. Those who were very dissatisfied with the triangle skirts had a pear shaped body.

Table 6

Satisfaction With the Overall Fit of the 39 Skirts

Skirt	Very dissatisfied	Dissatisfied	Neutral	Satisfied	Very satisfied
Square	0	3	1	6	3
Circle	0	2	3	5	3
Triangle	2	3	3	3	2
Total	2	8	7	14	8

After the three skirts were tried on and independently evaluated, the participants were questioned as to which skirt they were more satisfied with when compared with the others. In terms of satisfaction with the three skirts, one method of skirt development was favored more by the participants. Approximately 53.8% of the participants were most satisfied with the square skirt, 30.8% with the circle skirt and two participants were most satisfied with the fit of the triangle skirt. These evaluations correlated with the individual ratings for the specific fit areas. When comparing the cumulated total of the satisfactory and higher responses of the fit around the waist, abdomen, hips, derrière, and with the length and overall fit, the square skirts were evaluated more satisfactorily followed by the circle skirts and then the triangle skirts.

Summary

In summary, the 13 participants indicated in the focus groups that they preferred ankle length skirts with a straight waistband and a slit at the side or back seam. Each individual's body measurements were taken and entered into the patternmaking programs or sent to the pattern drafting service. The participants were categorized into one of the four figure types: hourglass, rectangle, apple or pear. After the patterns were created, 39 skirts were constructed and evaluated by the plus-size women. Participants of the rectangle, pear and hourglass figures indicated higher levels of satisfaction with the overall fit of the square skirt. Greatest satisfaction with the square skirt was with the length of the skirt and the fit around the hips. The square skirt had the least amount of hip ease incorporated into the pattern. The circle skirt prevailed with the fit around the waist, abdomen and derrière. The triangle skirt had the lowest levels of satisfaction with the overall fit of the skirt. Participants were especially dissatisfied with the fit around the abdomen, hips and derrière of the triangle skirt.

CHAPTER FIVE

DISCUSSION

The plus-size market has been developing for over 20 years. Over 50% of the North American adult population is overweight (Cote, 2002). The convenience of fast food and lack of physical activities have increased the obesity rate in Canada (Bueckert, 2002). The proportion of obese adult Canadians rose from 13% to 15% from 1994/95 to 2000/01 (Statistics Canada, 2002). About one-third of American women wear a size 16 or larger (Plus-sizes, plus sales, 1998). Plus-size women's apparel sales are soaring and exceeded the $28 billion mark in 2001 in the United States (The plus-size shopper, 2001). Manufacturers and designers have been trying to keep up with demands to produce stylish clothes that accommodate the plus-size figures (Feldman, 1992; Making it big, 1992; Baines-Love, 1982). Many plus-size women have tolerated the designs offered to them in retail stores but they are always craving for more variety.

Plus-size consumers are seeking alternative solutions to finding apparel that fits their unique bodies at reasonable prices. Once the plus-size women find good quality apparel that suits their body, they are willing to pay a higher price (Chowdhary & Beale, 1988; Baines-Love, 1982). To satisfy some of their clothing needs, some individuals have nurtured their sewing abilities or relied on others to produce custom fitted garments. A means to assist pattern drafters in designing and developing custom made

patterns is the use of home-based computer patternmaking programs and services available in the market.

The main purpose of this research was to discover whether the use of two computer patternmaking programs and one pattern drafting service to produce patterns for skirts that, when constructed, would accommodate the lower body of a plus-size woman. The researcher followed the four stages in the method of apparel design as outlined by Tan et al. (1998): (1) general request for the design, (2) exploration of design situation and problem structure, (3) development of design criteria and specifications, and (4) prototype development and evaluation. In the first stage, the general request for plus-size clothing designs that fit the lower body involved a literature search related to the plus-size apparel industry. Stage two encouraged the participants to express their design requirements and fit problems with skirts during the focus group sessions. In the third stage, the researcher determined the development of the skirt design criteria and fit specifications. The final skirt design was an ankle length straight skirt with two side slits, a straight waistband and a zipper closure at CB. Skirts were constructed according with each of the three companies' body measurement requirements. To distinguish the skirts produced by each of the three pattern development methods, a symbol was assigned. Pattern Master™ Boutique 2.0 was represented by a triangle, Dress Shop® 4.0 had a square symbol, and skirts produced using patterns from Unique Patterns were represented with a circle. The fit of three custom drafted skirts for each of the 13 participants was evaluated at five specific fit

areas: waist, abdomen, hips, derrière and length. Quantitative data were analyzed using descriptive statistics including frequencies and cross-tabulations. Qualitative data obtained from the focus group sessions and fit assessment interviews were subjected to content analysis.

Satisfaction With Specific Areas of the Skirt

Thirteen women between the ages of 20 and 35 years whose waist or hip measurement was within the Canadian Standard Sizing (CSS) range 42 participated in this study. Analysis of the focus group sessions indicated common fitting problems among these plus-size women. These fit problems occurred around the waist, abdomen, hips, and derrière, and with the length. Participants also noted that they had trouble finding skirts that accommodated their smaller waist and fuller hips. These findings were consistent with Baines-Love (1982) who noted that large-size women had fit problems in the length, waist, and hips with length and hips rated as being the most common problems. LaBat and DeLong (1990) also found their subjects were dissatisfied with the fit around the waist and thighs.

Fit Around the Waist

The plus-size women in this study expressed dissatisfaction with the fit around the waist of ready-to-wear skirts. The waistline of the skirts was either loose or tight and was thought to be uncomfortable. Loose waistbands would gape at CB when the women were sitting. This fit problem around the waist was predominately associated with the fit around their hips. If the waistband fitted the body's waistline comfortably,

the fit around the hips was too snug and vice versa. The waist and hip relationship problem was thought to be solved when participants tried on skirts that fitted around the hips and had an elastic waistband. Those who had tried wearing skirts with an elasticized band preferred the waistband to have little or no elastic. This study accommodated the participants by custom designing a straight waistband with a hook and eye closure according to their waist circumference.

After the participants tried on the skirts, the majority of them were pleased with the fit around the waist of all three skirts. The semi-fitted straight waistband did not bind or roll at the waistline and the participants were able to tuck their tops into the skirts comfortably. A few of the women were unfamiliar with the hook and eye closure because their previous waistbands had either a button and buttonhole or an elasticized waistband. No participants reported gaping at CB while sitting. The apple, rectangle, and hourglass shaped participants were satisfied with the fit around the waist. Participants with pear figures were unhappy and stated the waistband was too loose. This was partially due to weight loss experienced by the women between the initial measurement process and the final skirt evaluation meeting. Otherwise, pear shaped individuals who did not lose a few pounds were happy with the fit at the waist of the three skirts.

Fit Around the Abdomen and Hip Areas

Ample hips and prominent abdomens were common body features of these plus-size women. These features were considered parts of the participants' lower body

that created fitting problems for them. Stress marks such as diagonal wrinkles that pointed to bulges were visible around the abdomen area on skirts tried on in retail stores. Participants reported that some skirt manufacturers assumed that the wearer has large hips; thus, the skirt appeared baggy around the hips. The idea of a custom made skirt was to minimize fit concerns around the abdomen and hip areas. Concern with fit in these two areas also affected the placement of the closure. The zipper was placed at the CB seam where it was thought to be the least curved location of the lower body.

Even though the same body measurements were input into the programs and service for each participant, the final flat pattern measurements of the three skirts for each participant differed in the amount of ease. These ease variances were noted by the participants and affected the satisfaction with fit especially around the abdomen and hip areas. Special consideration must be given to dart width, length and distance between the CF and CB of the skirt pattern pieces. Darts aid in the transformation of a flat fabric into a three-dimensional shape that allows the fabric to conform to the wearer's body. Some participants were not aware of the purpose of darts in the skirts and wanted them removed. Dart placements on the circle skirts were further from CF which some participants noted and were satisfied with the appearance of the skirt around the abdomen area.

Excess ease was visible mainly at the dart tips of the skirt front. On some skirts, the surplus ease caused vertical folds to extend from the dart tip to the hem of the skirt; affecting the fit of the skirt around the abdomen and hip areas (see Figure 6). This

problem can be solved either by changing measurements or by manually draping the fabric on the body. An experienced sewer should conduct the latter. If working with a paper pattern rather than fabric, then any adjustment to the pattern involves changing the measurements or the amount of ease in the programs.

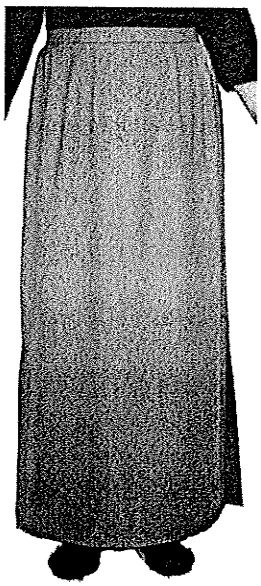


Figure 6. Vertical folds due to excess ease around the abdomen and hips.

Over half of the skirts fit satisfactorily around the abdomen. All hourglass figures were very satisfied with the fit around the abdomen of the circle and square skirts. These individuals with well-defined waists were also very satisfied with the fit around the hips of the square skirt but were less satisfied with the circle and triangle skirts. Figure types with the rectangle and pear silhouettes had a variety of responses. Thus, none of the three skirts excelled in fitting the abdomen and hip areas.

Fit Around the Derrière

Some participants with a fuller lower body had fit problems around the derrière when either sitting or standing. When sitting, some participants noticed and felt strain around the derrière, hip and thigh area. Ready-to-wear skirts may look like they fit but when the wearer decided to sit down the lower body expanded width wise. The plus-size women in this research identified two main skirt problems that occurred while standing that affected their satisfaction. Due to the participants' ample derrière, some long skirts tapered in at the lower legs and flared out at the hemline. A result of the skirt flaring out, which leads to the second problem, caused the skirt back to shorten in length (Figure 7). A way to alleviate these problems was that all three pattern development methods required a waist to floor measurement at CB, CF and side seam.

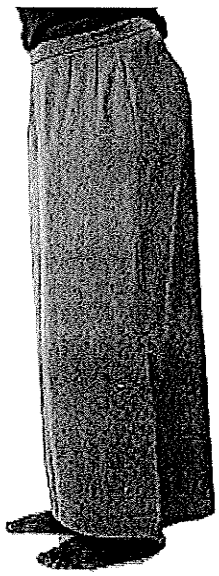


Figure 7. Skirt flaring out at back hemline due to poor fit.

Hourglass, rectangle, apple and pear physiques reported similar evaluations of the three skirts around the derrière. All the participants were able to sit comfortably while wearing the skirt. If there was dissatisfaction with the skirts during the sit evaluation, it was due to unattractive folds on the lap area. This problem occurred on skirts that had too much ease around the abdomen and hips. Of the 13 circle skirts being evaluated across the derrière, 12 were found to be within the satisfied range. Thus, the participants were more satisfied with the circle (92.3%) skirts in the derrière area than with square (76.9%) and triangle (61.5%) skirts. The circle and square skirts were able to accommodate all four figure types more readily than the triangle skirt.

Satisfaction With the Skirt Length

A common fit problem with skirts has to do with the length of the skirts. The plus-size participants found ready-to-wear skirts were either too short or too long. Tall and average height individuals complained that skirts were too short and petite women stated the opposite. Most of the participants stated that they preferred longer skirts that flatter their lower body. Thus, the skirts in this study were custom drafted to be ankle length.

Satisfaction with the skirt length was associated with the width at the bottom of the skirt. Walking while wearing long skirts was a problem commented on by the participants. Some peg style long skirts that tapered in at the hem restricted the participants' stride. Other participants who have larger calves found straight and tapered skirts restricted their movements. To accommodate movement, some skirt

designs incorporated slits into the CB or side seam. Slits have both a functional and design purpose. The wearer was able to take longer strides while looking fashionable at the same time. The women in this study were not afraid to expose their lower legs and a few of the participants requested a slit to reach mid-thigh. Skirts with slits were considered sexy clothing and plus-size women would wear clothing that revealed their legs (Slusher, 1988). For this study, two side slits were incorporated in the skirt's design. A settlement between the requests for either short or long slits resulted in knee length slits.

Each skirt pattern's algorithm varied in determining the length of the ankle length skirt. The measurement differed by about 0.2 to 3.5 in. (0.6 to 8.9 cm) at the side seams of the three skirts custom designed for each participant. Approximately two-thirds of pear and apple shaped individuals thought the length of the three skirts was either too long or too short (Figure 8). The majority of the hourglass and rectangle figures were satisfied with the ankle length skirts. Participants were more satisfied with the length of the square skirt (92.3%) than with the triangle (53.8%) and circle (46.2%) skirts. Dissatisfaction with the length of the circle skirt was partially due to the curved front hemline incorporated into the skirt design. Other skirts when tried on appeared too long because the participants were in their socks or had bare feet. For optimal satisfaction with the length of some of the skirts, participants had envisioned themselves wearing dress shoes. It did not matter if the participant was considered

petite, average or tall in height, satisfaction with the skirt lengths varied. Satisfaction with the lengths depended on the preference of the participants.

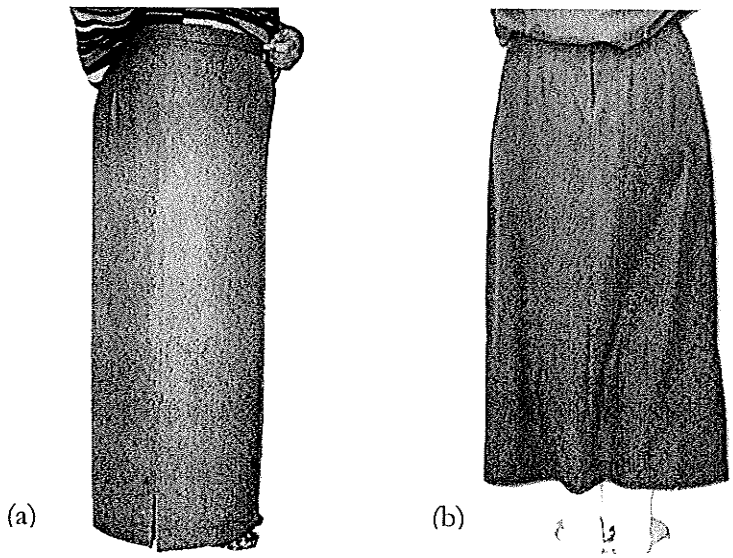


Figure 8. Skirt length either too long (a) or too short (b).

The majority of plus-size women in this study was somewhat familiar with how a properly fitted skirt should appear. When trying on commercially purchased skirts, if they noticed minor folds or wrinkles especially between the waist and hips they would solve this problem by wearing an upper body garment that would hang below the waist; thus, temporarily solving the problem. Since this was a recurring problem, some participants had learned to accept these minor problems. In another scenario, a few participants were unable to distinguish between a dart and a pleat. Plus-size women should be made aware of how a skirt should shape to their body and learn the basic construction terminology. It was interesting to note that none of the participants mentioned whether they preferred knit versus woven fabrics. They discussed the

weight of fabrics deciding that heavier weight fabric would hang better than lighter weight material.

Patternmaking Software and Pattern Drafting Service

More home-based sewers and businesses have been taking advantage of technology that may give them the upper hand over their competitors (Shanley & Koza, 1996). Designers are able to respond faster to demands with the aid of low-budget patternmaking software or by obtaining the assistance of pattern drafting services. There are a few patternmaking programs and pattern drafting services available on the market for home and professional sewers.

Computer customized patterns are more accurate than patterns drafted manually, thus, there are fewer sewing alterations and faster production runs. Patterns created by using the computer can be electronically stored and retrieved anytime for repeat use. The ease of retrieving stored measurements and patterns decreases the initial setup procedures and increases the speed to produce new patterns. Once a properly fitted pattern has been produced, modifications to the style can be readily made.

Although the two computer patternmaking programs had some design flexibility, neither produced an ideal skirt pattern based on the skirt specifications gathered from the focus groups. Some modifications were done to the skirts created from the programs to obtain the desired straight skirt design. The researcher provided

the circle skirt company with a detailed list of modifications to be made to their standard Butterick pattern.

To produce the skirt patterns, all three companies required numerous body measurements. The basic measurements were taken at the waist, abdomen, hips, hip depth, waist to ankle, CB and CF waist to floor. The circle skirt pattern required 20 measurements including hip circumference measurements every 2 in. (5.1 cm). Eight measurements were necessary to draft the skirt pattern using the triangle skirt software. On the other hand, it was mandatory to distinguish between the front and back measurements for the square skirt; thus, these patterns required double the number of measurements the triangle skirt needed. Even though the circle skirt required more measurements around the hip, participants were more satisfied with the fit around the hips of the square skirt which needed only front and back hip measurements and which incorporated less ease.

This researcher considered the possibility of constructing the actual skirt without sewing a test garment. In some cases, the skirts fit the plus-size women and in others, there were visible fit problems. Thus, a prototype garment made from inexpensive material should be sewn first and then modified to minimize horizontal wrinkles, vertical folds and diagonal wrinkles. Producing a prototype garment will give a user with little to no patternmaking knowledge a chance to familiarize themselves with the computer software. If consumers are dissatisfied with the fit of the finished garment from the pattern drafting service, the service will make any necessary

measurement adjustments and resend the modified pattern. In most cases, reported problems with patterns from the pattern drafting service were due to inaccurate measurements. Adjustments to the garment involved measurement changes made in the measurement screen or in the ease option area.

The two programs and one service did not cater to individuals with body anomalies. One participant with a curved spine was dissatisfied with all three skirts. There were vertical folds at the skirt front which signified excess ease and fabric around the abdomen, hips and side seam areas. She had a downward waist tilt where her waist started high at CB and tapered down towards CF. This was due to her curvature in the spine and was noticeable because the skirt front hemline was closer to the ground than the back hemline. The pattern drafting service had an option to identify body anomalies including curved spines but the final skirt was not able to accommodate this type of body. Attempting to accommodate unusual body geometries by producing computerized patterns was unsuccessful in this study. This was consistent with the findings from the research by Katzenberger (1997) where patterns were drafted by computer patternmaking programs to see if the garments would fit dwarfs. For a comparative summary of the selected features of the two programs and one service, please refer to Appendix L.

Selection of Patternmaking Software and/or Pattern Drafting Service

Determining which patternmaking software to purchase or pattern drafting service to use can be a challenging decision. There are numerous factors to consider

when acquiring apparel patternmaking products or services. These factors were software and service costs, computer system requirements, company history, knowledge of pattern drafting and sewing skills, ease of use and helpfulness of technical service, time allowance, availability and customer satisfaction. Articles found in trade publications provided some insight in selecting home-based patternmaking software and pattern drafting services. To aid home and professional sewers, these factors were adapted from guidelines offered by technology consultants for the sewn product industry and gathered from the researcher's experiences in selecting the software and service used in this study.

Factors for selecting home-based patternmaking software

Cost of software. The cost for home-based software starts around US $50 and goes as high as US $800. The price depends on the type of garments the consumer would like to create such as ladies' wear, men's wear or children's wear. It also depends on the level of flexibility the user requires in designing the garments. The cost increases as the user demands more from the software. Patternmaking companies are continuously creating new programs and upgrades. Inquire if the upgrades will cost extra money or not. Also, determine what methods of payment the company will accept.

Computer system requirements. Most of the software requires a minimum of Windows 3.1 or later and a 386 or better processor. Find out the operating system that is needed such as DOS, Windows or Macintosh and the RAM that is required to run

the software on the personal computer. Determine which file formats the software uses. This may be useful if the consumer needs to exchange or share pattern information with other programs. When printing, can patterns be printed on a desktop printer or is a plotter required? If a desktop printer is used, does it have to print color or is a black ink printer acceptable? Also, some companies have online technical support and downloadable upgrades; thus, a modem would be beneficial to the user.

Company's history. When selecting a supplier, the consumer should be well-informed about the company, especially about the company's history and policies. How many years has the company been in business? How much experience do the pattern drafters have? What is the company's return policy and are they able to supply references?

Level of knowledge of pattern drafting and sewing skills. There are two types of home-based computer patternmaking software: (1) one type enables the user to digitize basic sloper patterns into the computer and to modify the patterns on the screen, and (2) the other type enables the user to choose from a variety of garments and is limited to pattern styles that have been preprogrammed into the software. The latter software requires the user to have little to no pattern drafting skills while the former software requires the user to have some knowledge in pattern drafting. Thus, it is important to know the level of patternmaking and computer skills needed to use the software. Another skill to consider is the ability to sew the garments after preparing the patterns.

Ease of use and helpfulness of technical service. In order to use the software are there manual and/or additional learning aids? It is useful to know if there are instructions for using the software, the construction process and troubleshooting. In cases of troubleshooting or for inquiries, what are the company's technical service hours of operation? What kind of technical support system does the company maintain? There are a few support methods when acquiring assistance from companies such as phone, fax and online. Some companies have a 1- 800-phone number to assist their clientele. Online support options are emailing the company or chatting online with other software users.

Availability and customer satisfaction. Is the consumer able to purchase the software in Canada? And how are other users reviewing the software?

Factors for selecting a pattern drafting service

Cost of service. Numerous factors influence the cost of the pattern drafting service. Some of these factors are the cost of the measurement kit, measurement video guide, basic pattern development, additional design requirements, sewing instructions and shipping. Does the company require a deposit fee and is there a minimum charge to use their service? It is useful to know what forms of payment the company accepts.

Company's history. When was the company established? How many years of experience in pattern drafting do the pattern makers have? "Quality of pattern work is directly related to the skill level of the pattern maker" Kufahl (2000).

Ease of use and helpfulness of technical service. What information does the company need to produce the patterns? Which body measurements does the company need and is there a video, online demonstration or diagrams that outline how to take measurements? Some companies require the consumer to send sketches of their designs or a sample of the garment. One company provides their customers with a catalog of basic patterns and the customer is able to select the desired pattern and/or give a detailed list of garment modifications. After receiving the pattern, does the company supply step-by-step sewing instructions?

What are the hours of operation for technical support and what kind of support do they offer such as by phone or Internet? What happens if the garment does not fit properly? This would also be a good time to inquire about their return policy.

Time allowance. It is also very important to know how long it will take the company to produce and ship the patterns. The pattern drafting service may need about 10 to 60 days time allowance to create patterns according to the consumers' specifications. Leaving enough time between receiving the pattern and the final deadline is ideal. There is a chance that the pattern is flawed and needs some adjustments, thus, more time should be alloted for the pattern drafting service to identify the problem, redraft the pattern and mail it again.

Availability and customer satisfaction. What do other pattern drafting users think about the company? Which geographical locations does the service cater to? Location of the service also affects the amount of time needed.

CHAPTER SIX

CONCLUSIONS AND FUTURE IMPLICATIONS

Conclusions

The first objective of this research was to determine if computer generated patterns were able to provide properly fitted skirts when constructed for plus-size consumers. Two patternmaking programs, Dress Shop® 4.0 and Pattern Master™ Boutique 2.0, and one pattern drafting service, Unique Patterns, were used to produce custom fitted skirts. Thirteen plus-size women aged 20 to 35 years participated in the study. The results from the pen and paper questionnaire indicated that the majority of the participants wore skirts and have not used home-based patternmaking software and services to produce custom garments for themselves. After determining the skirt design specifications gathered from the focus groups, body measurements were taken and entered into the two programs and mailed to the service. After the skirts were constructed, each of the participants tried on and evaluated each of the three ankle length skirts made from a woven polyester fabric.

The findings showed that the participants were most satisfied with the square skirt that was created in Dress Shop® 4.0. Rated second for most satisfied with the overall fit was the circle skirt that was developed by the drafting service, Unique Patterns. The plus-size women were least satisfied with the overall fit of the triangle

skirt which was generated in the Pattern Master™ Boutique 2.0 software. None of the methods of skirt development was consistent in fitting the participants' lower body when associated with the four different figure types. It was found that pear shaped individuals had more trouble fitting their lower body due to a larger difference in measurement between the waist and the hips. The three products incorporated features which permitted the development of patterns which accommodated the lower body of the plus-size physique. Each of the companies was able to fit some areas of the lower body. None of the software nor the service tested in this study could directly achieve a properly fitted skirt for the plus-size women.

The second objective was to compare the features of the patternmaking software and the pattern drafting service which enabled plus-size individuals to obtain custom fitted garments for themselves. All three companies required a specific number of body measurements, ranging from eight to 20 measurements, in order to produce a skirt. Unique Patterns offered the option of identifying body irregularities; otherwise, the two software programs relied solely on body measurements. In order to take proper body measurements, diagrams and/or measurement video guides were available for the consumers. The findings suggested that with repeated use of the software and the service consumers could become aware of the specific measurements to use and styles that accommodated their plus-size bodies. Selecting the garment details followed the procedure of entering the measurements into the software or mailing information to the service. Unless the user manually modified the pattern, there were limited skirt

style choices in the software. In this study, some human intervention was required; thus, the user needs to have some knowledge in pattern drafting. Knowledge in patternmaking aids in recognizing when a pattern needs some truing. Some pattern pieces needed to be adjusted for proper alignment or shape to fit correctly. Trained pattern drafters employed by the service would foresee these adjustments.

The convenience of using computer patternmaking software at home allowed the researcher to print pattern pieces on a desktop printer at any time of the day. Upon printing the pieces, the patterns were individually taped together and construction of the skirts ensued. Patterns developed by the service are printed on 36 in. (91.4 cm) wide plotter paper.

During the wear tests, there were noticeable ease variations especially around the waist and hips. All three semi-fitted skirts followed each company's standard ease measurements. Waist ease ranged between 1 to 2 in. (2.5 to 5.1 cm) and hip ease had a span of 2 to 5 in. (5.1 to 12.7 cm). As a result, the fit between the waist and hip varied greatly which affected the level of satisfaction with fit among participants.

The third objective was to identify general guidelines for selecting computer patternmaking software or pattern drafting services. It is essential to research background information about the software or service company such as knowing the company's history, pattern drafters' experiences, product or service costs, ease of use, support systems and service locale. Some patternmaking software companies offered a variety of products depending on the purchasers' level of knowledge of pattern drafting

and sewing aptitude. There was software available for Windows or Macintosh users; hence, an inquiry about computer system requirements is suggested. An important factor to consider when using a pattern drafting service was time allowance. More time is needed since individuals are relying on postal services to send and receive the pattern. Also, modifications to unsatisfactory patterns require additional time and shipping costs.

The results from this research may provide insights for home-based sewers and clothing companies who design and draft patterns for plus-size women using current technological developments. Better selections of customized garments arise from using technological developments; thus, designers are able to satisfy their particular clientele. Using a computer patternmaking software or pattern drafting service offers plus-size women an alternative method of obtaining custom fitted apparel. Individual and professional home-based sewers who are associated with theatre groups, dance groups and costume departments in movie productions may find the results beneficial. Plus-size women are able to identify with the results from the study and realize there are many individuals with the same concerns in regards to the fit of skirts. Also, small apparel companies are made aware of common fit problems with skirts encountered by plus-size women. Consumers representing themselves or companies can also consider these findings if they are deciding to purchase patternmaking software or using pattern drafting services.

Implications for Future Research

Additional studies should be conducted to provide more information to apparel companies and consumers regarding the identification of plus-size women's clothing needs and usage of computer pattern drafting software and services. Based on the results from this study, the following suggestions are implications for future research.

The plus-size market has been flourishing for the past few decades and for the purpose of this research delimitations were set in regards to the city of study, age and apparel size. This research was delimited to the geographical locale of the city of Winnipeg, Manitoba. The apparel size of the sample was delimited to participants aged 20 to 35 years and whose body measurements were comparable to the Canadian Standard Size 42 range. Studies that include larger samples of plus-size women of wider age and size ranges should be conducted to compare if these women encounter similar or different experiences with the regards to the fit of skirts. Since there is limited Canadian information and studies in regards to plus-size apparel, studies should be conducted in a variety of Canadian cities to augment the knowledge of the plus-size apparel market.

The satisfaction with the fit of custom made skirts produced from current technological developments was evaluated in this study. Further insight in determining if such technological developments are capable of producing other types of garments that accommodate the plus-size figure is recommended. For example, the evaluation of

other apparel such as pants, tops, dresses, and women's suits should be conducted in future studies.

This study examined the levels of satisfaction with the fit of skirts worn by female plus-size consumers. Men and children also wear plus-size apparel; thus, research similar to the current study should be repeated in evaluating the satisfaction with fit of different garments among plus-size men and children.

New technological developments that assist individuals in producing custom drafted garment patterns are continuously emerging. Another technological development to consider is body scanning technology that has been established in the United States and awaits its arrival into Canada. Body scanners are capable in digitally recording a three-dimensional map of an individual's body measurements. From the results of the body scan, custom made garments are constructed. Problems with the patterns produced by the patternmaking software and service were mainly due to inaccurate measurements; thus, the use of digitally recorded data may be more accurate than manually using a tape measure to record body measurements. Since the body scanning technology is relatively new, studies should be conducted in determining the satisfaction of fit of customized plus-size apparel produced from using body scanning technology.

REFERENCES

Ashdown, S. P., & DeLong, M. R. (1995). Perception testing of apparel ease variation. *Applied Ergonomics, 26*(1), 47-54.

Baines-Love, C. J. (1982). *Women's large-size ready-to-wear: Needs and availability.* Unpublished master's thesis, Texas Woman's University, Denton.

Bennett, S. (1995, August/September). Can a computer solve your fitting problems? *Threads, 60*, 40-43.

Brown, P. (1992). *Ready-to-wear apparel analysis.* New York: Macmillan.

Brown, P., & Rice, J. (1998). *Ready-to-wear apparel analysis* (2nd ed). New Jersey: Prentice Hall.

Bueckert, D. (2002, May 9). We're getting fatter. *Winnipeg Free Press*, p. B1.

Canadian General Standards Board. (1987). *Canada standard sizes women's apparel – trade sizes* (CAN/CGSB-49.203-M87). Ottawa: Canadian General Standards Board.

Chowdhary, U., & Beale, N. V. (1988). Plus-size women's clothing interest, satisfactions and dissatisfactions with ready-to-wear apparel. *Perceptual and Motor Skills, 66*, 783-788.

Coelho, L. O. (1994). *Garment enterprise owners' perceptions of a computer-aided design service.* Unpublished master's thesis, University of Manitoba, Winnipeg, Manitoba, Canada.

Coldwater Creek Summer Catalog. (2001).

Cote, M. (2000, December). Get off the fat track. *CA Magazine, 133*(10), 68.

Davis, L. L. (1984, March). Clothing and human behavior: A review. *Home Economics Research Journal, 12*(3), 324-339.

DeLong, M., Ashdown, S., Butterfield, L., & Turnbladh, K. F. (1993). Data specifications needed for apparel production using computers. *Clothing and Textiles Research Journal, 11*(3), 1-7.

Erwin, M. D., & Kinchen, L. A. (1974). *Clothing for moderns* (5th ed.). New York: Macmillan.

Fanning, R. (1999). Comparing bodice drafts: Part one patternmaking software [Electronic version]. *The Creative Machine, 9*(3). Retrieved November 28, 2000, from http://www.wildginger.com/pr/creative%20machine.htm

Feldman, A. (1992, March 16). Hello, Oprah, good-bye Iman. *Forbes, 149*(6), 116-117.

Frey, D. K. (1995). Assessing students' responses toward computer-aided design of apparel. *Perceptual and Motor Skills, 80*, 435-443.

Heim, J. (1997, February). A hard look at software [Electronic version]. *Sew News*, 52-56.

Heisey, F. (1984, Fall). The future of apparel production and construction. *Journal of Home Economics, 76*, 8-13.

Istook, C. S. (1992). *Computer-aided design (CAD) in the apparel industry: An exploration of current technology, training, and expectations for the future.* Unpublished doctoral dissertation, Texas Woman's University, Denton.

Jones, J. C. (1970). *Design methods.* London: Wiley Interscience.

Jones, J. C. (1981). *Design methods: Seeds of human futures.* New York: John Wiley & Sons.

Katzenberger, J. A. (1997). *Analysis of computer patternmaking systems: Fit of apparel for dwarf females.* Unpublished master's thesis, Colorado State University, Fort Collins.

Kufahl, L. A. (2000, June). *Finding a CAD pattern making service to fit your manufacturing needs.* Retrieved July 9, 2002, from http://www.techexchange.com/thelibrary/pattern_CAD_service.html

LaBat, K. L. (1988). *Consumer satisfaction/ dissatisfaction with the fit of ready-to-wear clothing.* Unpublished doctoral dissertation, University of Minnesota, St. Paul.

LaBat, K. L., & DeLong, M. R. (1990). Body cathexis and satisfaction with fit of apparel. *Clothing and Textiles Research Journal, 8*(2), 43-48.

Lands' End Summer Catalog. (2001).

Making it big. (1992, April). *Catalog Age, 9*(4), 5, 49.

Nanfeldt, S. (1996). *Plus style: The plus-size guide to looking great.* New York: A Plume Book.

Orlando, J. Y. (1979). Objectifying apparel design. *Association of College Professors of Textiles and Clothing, Inc., Eastern, Central and Western Regional Meetings*, 127-132.

Plus-size finds support at retail. (1998, October 26). *Discount Store News, 37*(20), 17-19.

Plus sizes, plus sales. (1998, August 24). *Discount Store News, 37*(16), 27-28.

Ross, T. (1995, June). *CAD systems what to know before you buy.* Retrieved July 9, 2002, from http://www.techexchange.com/thelibrary/CADpurchase.html

Sales of women's plus-sizes outpace total apparel biz. (1995, June 11). *Discount Store News, 34*(21), 25-27.

Shanley, L. A., & Koza, D. T. (1996, July). *Pattern-making software selection: Advice for small apparel companies.* Retrieved November 28, 2000, from http://www.bobbin.com/media/96july/cad.htm

Shim, S., & Kotsiopulos, A. (1990). Women's physical size, body-cathexis, and shopping for apparel. *Perceptual and Motor Skills, 71*, 1031-1042.

Slusher, B. J. (1988). *The large-size female apparel market: Problems and opportunities.* Unpublished master's thesis, San Francisco State University, California.

Statistics Canada. (2002, May 8). Canadian community health survey: A first look 2000/01. *The Daily.* Retrieved July 9, 2002, from http://www.statcan.ca/Daily/English/020508/d020508a.htm

Tan, Y., Crown, E. M., & Capjack, L. (1998). Design and evaluation of thermal protective flightsuits Part I: The design process and prototype development. *Clothing and Textiles Research Journal, 16*(1), 47-55.

The plus size shopper: She is everyone. (2001, April 16). *Women's Wear Daily,* advertising supplement.

Tice, R. O. (1990). *Designing career apparel for short, larger-sized women.* Unpublished master's thesis, California State Polytechnic University, Pomona.

Wilhelm, W. T. (1983, December). CAD system update. *Bobbin, 4*, 156-158.

Wu, W. (1998). *Consumers' comfort and satisfaction with co-design of custom apparel using computer-aided-design.* Unpublished master's thesis, Auburn University, Alabama.

Yoh, E. (1999). *Consumer adoption of the Internet for apparel shopping.* Unpublished doctoral dissertation, Iowa State University, Ames.

Yoo, S., Khan, S., & Rutherford-Black, C. (1999). Petite and tall sized consumer segmentation: Comparision of fashion involvement, pre-purchase clothing satisfaction and clothing needs. *Journal of Fashion Marketing and Management, 3*(3), 219-235.

Zangrillo, F. L. (1990). *Fashion design for the plus-size.* New York: Fairchild.

www.wildginger.com

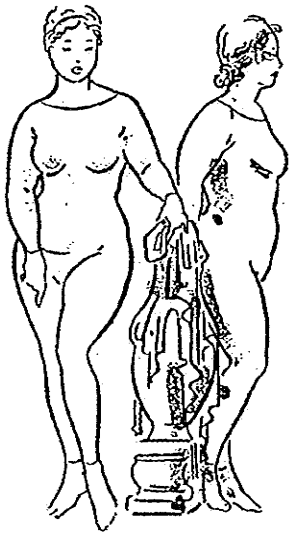
www.livingsoft.com

www.uniquepatterns.com

APPENDIX A

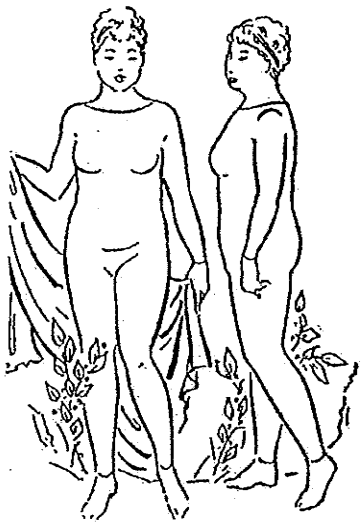
Figure Types

Figure Types[1]



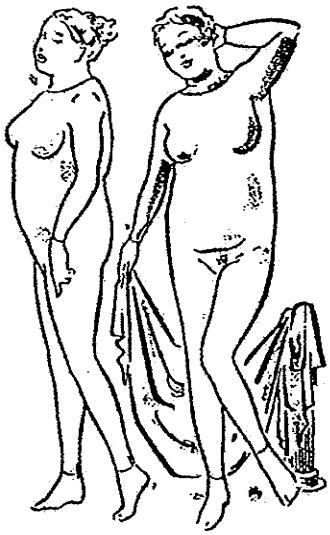
Hourglass Body

Overall curve shape
Hip and shoulders are approximately the same length
Profile of the waist is well defined



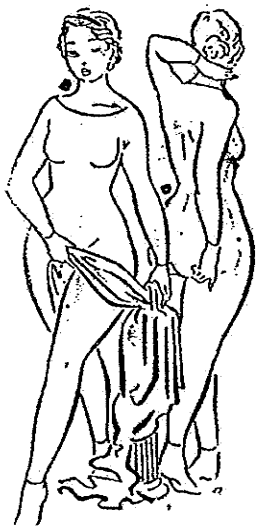
Rectangle Body

Undefined waist
Similar waist, bust and hip measurements
Hips more square than rounded



Apple Body

Rounded in shape
Full bust, waist and upper back
Prominent tummy area and top heavy



Pear Body

Hips and thighs are wider than shoulders and bust
Curvy lower hips and rear are the largest part of the body
Legs are average to large-size and face and neck are slender

[1]Nanfeldt, S. (1996). Plus style: The plus-size guide to looking great. New York: A Plume Book.

APPENDIX B

Letter of Approval From the Joint-Faculty Research Ethics Board

UNIVERSITY OF MANITOBA | Office of the President

Office of Research Services
244 Engineering Building
Winnipeg, MB R3T 5V6
Canada
Telephone (204) 474-8418
Fax (204) 261-0325

APPROVAL CERTIFICATE

25 October 2001

TO: **Tiffany Wan** (Advisor N. Fetterman)
Principal Investigator

FROM: **Wayne Taylor, Chair**
Joint-Faculty Research Ethics Board (JFREB)

Re: **Protocol #J2001:102**
"Tall Plus-size Women's Satisfaction with the Fit of Skirts produced using Two Computer Patternmaking Programs and One Service"

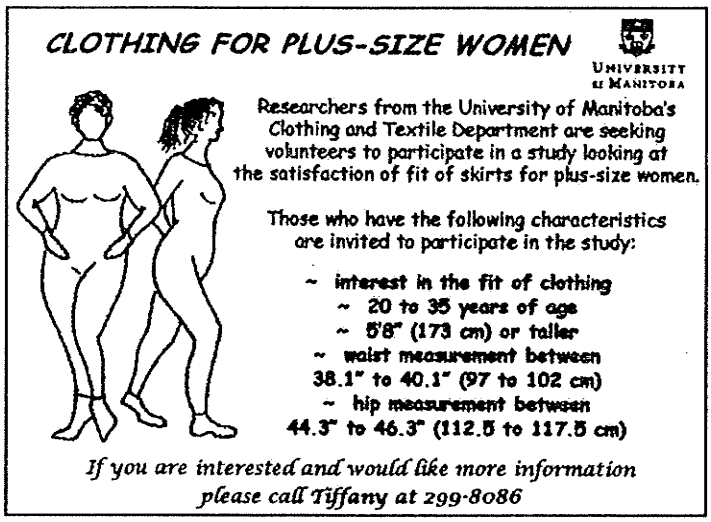
Please be advised that your above-referenced protocol has received human ethics approval by the **Joint-Faculty Research Ethics Board**, which is organized and operates according to the Tri-Council Policy Statement. This approval is valid for one year only.

Any significant changes of the protocol and/or informed consent form should be reported to the Human Ethics Secretariat in advance of implementation of such changes.

APPENDIX C

Advertisement and Flyer

Advertisement Placed in Community Newspapers



CLOTHING FOR PLUS-SIZE WOMEN

UNIVERSITY of MANITOBA

Researchers from the University of Manitoba's Clothing and Textile Department are seeking volunteers to participate in a study looking at the satisfaction of fit of skirts for plus-size women.

Those who have the following characteristics are invited to participate in the study:

- interest in the fit of clothing
- 20 to 35 years of age
- 5'8" (173 cm) or taller
- waist measurement between 38.1" to 40.1" (97 to 102 cm)
- hip measurement between 44.3" to 46.3" (112.5 to 117.5 cm)

If you are interested and would like more information please call Tiffany at 299-8086

Flyer

DO YOU KNOW SOMEONE WHO ...

... is 20 TO 35 years old ?

and

... is interested in clothing ?

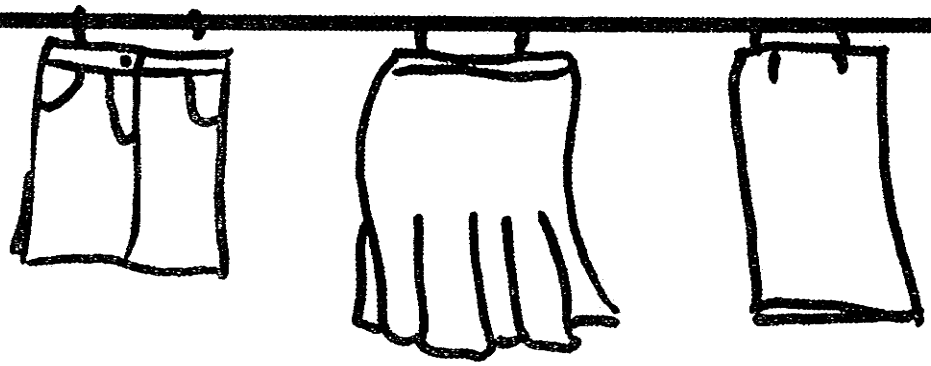
and

... has a waist measurement between 38.1" to 40.1" ?

or

... has a hip measurement between 44.3" to 46.3" ?

If so, please tell them that researchers from the University of Manitoba's Clothing & Textiles Department are seeking volunteers to participate in a study looking at the satisfaction of fit of skirts for women.



For more information call Tiffany at 299-8086

APPENDIX D

Telephone Screening Form

TELEPHONE SCREENING FORM

NAME: _____

PHONE: (H)_____(W)_____(CELL)_____

ADDRESS: _____ZIP CODE: _____

EMAIL: _____

	date	time	comments
Call received:			
1st call back:			
2nd call back:			
3rd call back:			

IF RESPONDENT IS NOT HOME AND VOICE MAIL IS ACTIVATED:

Hello, my name is Tiffany Wan and I am looking for (name of respondent). I would like to thank you for responding to my ad about the research on clothing for plus-size women. I will try to call you again or I can be reached at 299-8086. Thanks for your time and I will talk to you later.

IF RESPONDENT IS HOME:

Hello, my name is Tiffany Wan. I am a graduate student at the University of Manitoba. You had responded to my ad about the research on clothing for plus-size women.

Is this a good time to talk to you or would you prefer I call back another time?

As I indicated in the ad, I am looking for women who are interested in the fit of their clothing. Would you be willing to answer some questions so that I can see if you are eligible to participate in the study? No Yes

If no: Thank you for your time and have a good day. Goodbye.

If yes: The first question I have is

Are you between the ages 20 and 35 years? No Yes

Are you interested in the fit of clothing? No Yes

Could you tell me your approximate

waist measurement? _____ inches _____ cm

hip measurement? _____ inches _____ cm

Do you wear skirts? No Yes

If no, why not? _____

_____

Researcher's use only: ☐ *eligible* ☐ *not eligible*

Thank you for answering these questions. On the basis of your responses, you are (not) eligible to participate in the study.

If not eligible: Thank you for taking the time to talk with me today.

If eligible: Are you willing to participate in my study relating to the fit of a skirt? I would like to send you an information package. May I have your mailing address? Do you have an email address I can contact you at? I will call you in a week to set up an appointment to meet with you. Do you have any questions?

Researcher's use only:

Letter of introduction sent by ☐ mail ☐ email on _____

Date of meeting: _____

Location of meeting: _____

Thank you for your time and I'll talk to you later.

APPENDIX E

Letter of Introduction

UNIVERSITY
OF MANITOBA

Faculty of Human Ecology

Department of Clothing and Textiles

Winnipeg, Manitoba
Canada R3T 2N2
Ph: (204) 299-8086
Fax: (204) 474-7592
E-mail: wan_tiffany@hotmail.com

Date

Dear

I would like to introduce myself and tell you more about my project. My name is Tiffany Wan and I am currently a graduate student in the Department of Clothing and Textiles at the University of Manitoba. I received my bachelor's degree in Home Economics from the University of British Columbia. My interest in clothing stems back many years to a time when I was unable to find clothes that fit my body figure. This was also a common occurrence among many of my plus-size friends.

Over recent years, groups with special apparel needs have been receiving increased attention, especially plus-size consumers. About 60% of American women wear a size 12 or larger and nearly a third of them wear a size 16 or larger. There is little information about the Canadian plus-size market, thus, more attention must be focused on the satisfaction of fit among Canadian plus-size women.

For my master's thesis, I will be studying satisfaction with fit among plus-size females with respect to clothing produced using current technological developments. I am seeking the assistance of women who have an interest in the fit of their clothing, particularly skirts. Your participation will be very important to the success of my thesis.

I am looking specifically for women with the following characteristics: (a) interested in the fit of clothing; (b) between 20 to 35 years in age; (c) have a waist measurement between 38.1 to 40.1 inches (97 to 102 centimeters) or have a hip measurement between 44.3 to 46.3 inches (112.5 to 117.5 centimeters). If you have these characteristics, I would like you to participate in my study.

Participation in this study consists of two personal interviews and one focus group session. Each of these meetings should take about 60 to 90 minutes. The initial interview will

take place at a mutually convenient time and location. The focus group session and fit assessment interview will take place at the University of Manitoba, Fort Garry Campus.

During the initial interview, I will take your waist, hip and height measurements to confirm your eligibility to participate in the study. If you satisfy the criteria and agree to participate, I will continue recording the remaining body measurements. I will also ask you to fill out a pen and paper questionnaire. And in the focus group session, you will be encouraged to discuss with other participants your concerns regarding satisfaction with fit of skirts.

At our third meeting, the fit assessment interview, I will have three skirts for you to try on and would like to discuss your satisfaction with these skirts. I would like to take front, back and side view photographs of you wearing the skirts. Your face will not be photographed and your identity will not be revealed. If you do not want your photograph taken this will not affect your participation in this study. However, the photographs, if taken, will help remind me of the quality of fit.

With your permission, the focus group session and final interview will be tape recorded and later transcribed. This will allow me to record all data accurately. Your identity will not be revealed under any circumstances. All information will be stored in a locked file and upon completion of this study, all data and documents will be destroyed.

Your participation is completely voluntary and you may withdraw from the study at any time without prejudice or consequences. You do not have to answer questions with which you do not feel comfortable.

I would like to thank you for taking time to read over this letter. I will be calling you in a week to see if you would like to participate. If you have any questions, please call me or my thesis advisor, Dr. Nelma Fetterman

Sincerely,

Tiffany Wan
Clothing & Textiles Graduate Student

Dr. Nelma Fetterman
Clothing & Textiles Department Head

APPENDIX F

Pen and Paper Questionnaire

PEN & PAPER QUESTIONNAIRE

The following information about you is very important in describing the demographic information about the individuals who participated in this study. Please respond to the following questions with a check ☑ or fill in the blank.

1. What is your age? _____ years old

2. Which is your highest level of education completed?
   - ❑ Less than high school
   - ❑ High School
   - ❑ Some college/university
   - ❑ Bachelor's degree
   - ❑ Some graduate work
   - ❑ Graduate degree

3. What is your current employment status?
   ❑ part time ❑ full time ❑ unemployed

4. What is your occupation? _____

5. What is your net income level?
   - ❑ Below $10,000
   - ❑ $10,000 - $14, 999
   - ❑ $15,000 - $19,999
   - ❑ $20,000 - $24,999
   - ❑ $25,000 - $34,999
   - ❑ $35,000 - $49,999
   - ❑ $50,000 - $69,999
   - ❑ $70,000 - $89,999
   - ❑ $90,000 or above
   - ❑ no comment

6. What is your height? _____ feet _____ inches or _____centimeters

7. In the last three months, how often do you wear skirts?
   ❑ never ❑ 1 – 5 ❑ 6 – 10 ❑ 11 – 15 ❑ more than 15
   ❑ If never, why not?_____
   _____
   _____
   _____
   ❑ If yes, what size do you normally buy for yourself? _____

8. In the last 12 months, have you had clothes custom made for you?
   ❑ No ❑ Yes
   If yes, how many articles of clothing have been custom made?
   ❑ 1 - 5 ❑ 6 - 10 ❑ 11 –15 ❑ 16 - 20 ❑ 21 +

9. In the last 12 months, have you ever paid a professional dressmaker to custom make clothes for you? ❑ No ❑ Yes
   If yes, how many articles of clothing have been custom made?
   ❑ 1 - 5 ❑ 6 - 10 ❑ 11 –15 ❑ 16 - 20 ❑ 21 +

10. Do you sew your own clothes? ❑ No ❑ Yes
    If yes, in the last 12 months, how many articles of clothing have you sewn for yourself?
    ❑ 1 - 5 ❑ 6 – 10 ❑ 11 –15 ❑ 16 – 20 ❑ 21 +

11. What articles of clothing do you get custom made and/or sew for yourself?
    ❑ tops ❑ skirts ❑ pants
    ❑ casual dresses ❑ formal wear ❑ other:_____

12. Have you ever used computer software or a service to produce patterns for sewing garments to fit you? ❑ No ❑ Yes
    If no, are you aware of such software or service? ❑ No ❑ Yes
    If yes, please list the name of the software and/or service(s): _____
    _____
    _____
    _____

Thank you very much!

APPENDIX G

Focus Group Interview Schedule

FOCUS GROUP INTERVIEW SCHEDULE

INTRODUCTION:

Hello everyone! Thank you for coming out today. As you already know, I'm interested in the fit of skirts. This focus group session will give you all a chance to voice your thoughts and perhaps complaints about the fit of skirts. My goals for this session are to determine if you are satisfied with the fit of skirts and to find out your fit problems with them. Also, by the end of the session I would like to have compiled a list of your requests in regard to the design details of the skirt.

Let me remind you that your names will be kept confidential and that you may withdraw from the study without prejudice or consequences. Also, you do not have to answer questions with which you do not feel comfortable. This session will be tape recorded to ensure accurate recording of information.

Do you have any questions?

Okay, let's begin!

INTERVIEW GUIDE:

1) When shopping, what kind of fit problems have you encountered when trying on skirts?

2) What parts of your lower body create fitting problems for you?

3) From your past experiences, what style/type of skirts suits your body?

4) What length do you prefer your skirt to be?

APPENDIX H

Consent Form

UNIVERSITY
OF MANITOBA

Faculty of Human Ecology

Department of Clothing and Textiles

Winnipeg, Manitoba
Canada R3T 2N2
Ph: (204) 299-8086
Fax: (204) 474-7592
E-mail: wan_tiffany@hotmail.com

Date

Dear

Thank you for meeting with me. My name is Tiffany Wan and I am a graduate student in the Department of Clothing and Textiles at the University of Manitoba. For my master's thesis, I will be studying the satisfaction of fit of plus-size clothing produced by using current technological developments.

As discussed in our telephone conversation, I am interested in the fit of skirts for plus-size women. If you agree to participate, all that is required is two face-to-face interviews and one focus group session. Each of these will take between 60 to 90 minutes. During the first interview, I will ask you to fill out a pen and paper questionnaire and will then record your body measurements. At the next meeting, which will be the focus group session, you will be encouraged to discuss issues about plus-size clothing. At the final interview, I will give you three test skirts to try on and would like to discuss your satisfaction with the fit of the skirts. During the interview, I will take photographs of you wearing each skirt. Front, back and side views will be taken. Your face will not be photographed and your identity will not be revealed. All your photographs will be identified by numerical code. The interviews and focus group session will be tape recorded and later transcribed.

Your participation is completely voluntary and you may withdraw from the study at any time without prejudice or consequences. You do not have to answer questions with which you do not feel comfortable. Your identity will be kept confidential. Only my advisor, assistants and I will have access to the information that you are about to give us. All recorded documents and tape recordings will be kept in a locked file. Upon completion of this study, all documents and recordings will be destroyed.

The Joint Faculty Research Ethics Board has approved this study. However, any complaint regarding a procedure may be reported to the Human Ethics Secretariat at 474-7122.

If you have any questions regarding this project, please call me ; or my thesis advisor, Dr. Nelma Fetterman ;

I agree to participate in the above mentioned study. I have read and understood the terms and conditions of my involvement in this study.

_____ _____

Participant's Signature Date

_____ _____

Tiffany Wan Date

APPENDIX I

Measurement Chart

MEASUREMENT CHART

PARTICIPANT #						
Figure Type:						
	total	**front**	**back**		**left**	**right**
waist				side length		
abdomen depth		x	x	floor to waist side		
abdomen				floor to hip		
hip depth		x	x	waist to hip		
hip				floor to knee		
hip full at	2"	4"	6"	waist to knee		
	8"	10"	12"	floor to ankle		
crotch depth		x	x	waist to ankle		
crotch length				floor to hem length		
				waist to hem length		
waist tilt	x					
bust		x	x	thigh circumference		
				knee circumference		
height		x	x	calf circumference		
waist to floor	x					

APPENDIX J

Fit Assessment Schedule

PARTICIPANT # _____

FIT ASSESSMENT SCHEDULE

Instructions:

First I would like to verify your measurements. During this interview, I would like to get you to try on three skirts. I encourage you to simulate the movements of a situation in which you would be wearing the skirt such as walking around and sitting down. During the wear test, the skirt will be evaluated objectively and subjectively. Remember, you do not have to answer any questions with which you do not feel comfortable.

I would like to tape the interview so that I will be able to refer back to it later on in the study. May I tape record our interview? (If yes, will turn on tape now).

Let us start with ■ / ● / ▲ SKIRT. I will objectively evaluate the skirt on you through the following questions …

	No	Yes
1. Does the skirt set on the figure smoothly without wrinkling?	☐	☐
2. Do the lines of the skirt follow the lines of the body?		
i. does the side seam hang straight down the side?	☐	☐
ii. does the center back seam hang straight down?	☐	☐
3. Is the skirt well balanced?	☐	☐
4. Does the skirt have adequate ease without having too much?	☐	☐
5. Do the hips of the skirt fit smoothly and comfortably without pulling or riding up?	☐	☐
6. Raise your arms up and down. Does the waist fall at the desired waist level?	☐	☐
7. Does the skirt length flatter the wearer?	☐	☐
8. Does it bind or roll at the waistline?	☐	☐
9. Is there strain at the closure?	☐	☐
10. Are there horizontal wrinkles at the waist area?	☐	☐
11. Are there horizontal wrinkles at the abdomen area?	☐	☐
12. Are there horizontal wrinkles at the hip area?	☐	☐
13. Are there horizontal wrinkles at the thigh area?	☐	☐
14. Are there diagonal wrinkles that point to body bulges?	☐	☐

Now I will be asking you how you feel about ■ / ● / ▲SKIRT. A few of your answers will require you to select from a scale, otherwise, all other questions require short answers. The first question I would like to ask is …

15. Referring to the different features of ■ / ● / ▲SKIRT, can you tell me how satisfied/dissatisfied you are with each of the following areas. Using this scale (SHOW SCALE), please indicate your response.

i. you are very dissatisfied
ii. you are dissatisfied
iii. you are neutral
iv. you are satisfied
v. you are very satisfied

A. around the waist (when standing)
i) _____ ii) _____ iii) _____ iv) _____ v) _____
B. across the abdomen (when standing)
i) _____ ii) _____ iii) _____ iv) _____ v) _____
C. around the hip (when standing)
i) _____ ii) _____ iii) _____ iv) _____ v) _____
D. across the derrière (when sitting)
i) _____ ii) _____ iii) _____ iv) _____ v) _____
E. the length of the skirt (when standing)
i) _____ ii) _____ iii) _____ iv) _____ v) _____

16. How satisfied are you ■ / ● / ▲SKIRT? (SHOW SCALE)
i. very dissatisfied _____
ii. dissatisfied _____
iii. neutral _____
iv. satisfied _____
v. very satisfied _____

17. You said you were satisfied/dissatisfied with the skirt. What was it about the skirt that you found satisfactory/unsatisfactory?

18. Do you have any comments about ■ / ● / ▲SKIRT?

19. Which of the three skirts were you more satisfied with?
■ SKIRT _____ ● SKIRT _____ ▲ SKIRT _____

(Continue with questions 1 to 19 for ● and ▲ skirts. After all three skirts have been evaluated, the researcher will complete the interview with the questions below.)

20. Are there any other comments you would like to make about the three skirts that you tried on?

This completes the questions I have for you today. Thank you very much for assisting me with my master's thesis.

Do you have any questions? Would you like to keep the skirts?

SCALE CARD

i. very dissatisfied

ii. dissatisfied

iii. neutral

iv. satisfied

v. very satisfied

APPENDIX K

Focus Group Responses

1) When shopping, what kind of fit problems have you encountered when trying on skirts?

FIT: WAIST AND HIP RATIO

Between the hip and the waist; how the skirt falls it seems to bulge between here [hip and waist].

Bulging is at the side; it looks like the person is not as long in the body.

I find that I get sagging at the hips.

I seem to get these puckers [hip area].

Or if you pull it past your waist line but then it's not comfortable.

The waist does not fit my hips; like if it goes over my hips it doesn't fit my waist.

Waist to hip is either too short or too long.

Waistbands are too tight, they make your hips look big.

Waists will just fit and at the hips will be too tight or too baggy; you can never get the right fit just right around the hips.

FIT: HIP CIRCUMFERENCE

The waist is too big compared to the hips.

FIT: THIGH AREA

Skirts bunch at seat/hip area.

Skirts look funny. They're too tight around my thigh area.

FIT: OTHER

Ample behind – too short in the back so the skirt sticks out at the back. With straight skirts it becomes fish like.

Gaping at the waist back when sitting.

I find when I try them on it's the bottom that doesn't fit right. Like on most women the skirts are flat at the back. I find I get this part that sticks out. Just below my behind at the back of my legs and it bags out.

DESIGN OF SKIRT: STYLE

Bell shaped skirts, they poof some what.

Cargo skirts.

Pockets & pleats placements are unflattering; it can destroy the fit.

They sometimes don't come to right length at the knee. I find them sometimes a little bit too short. And I think that they are designed to be really short but they're ...what am I saying?

DESIGN OF SKIRT: LENGTH

A good example of a store is Cotton Ginny plus, they have big sizes but they don't have the long length.

They are not accommodating for the length of our legs because we are so tall. They realize that yes we are bigger women but no we are not taller.

They seem to make a lot of clothes, the same for pants and skirts, they seem to assume when they make the clothing that if you're plus size you're probably also short. Like they seem to make the clothes for people who are 5'2" and 5'5". So they should get beyond that. Everything is plus-size and petite at the same time.

They're too long because I'm a midget [petite].

They're too short.

Too short.

Unless the dress is cut for a tall person then they are usually too short they usually come above the knee instead of at the knee. Or I find that get too narrow, they don't give you enough room to walk..

DESIGN OF SKIRT: WAISTBAND

[waistband] they are getting harder to find; to find a more tailored look for plus-size I think is hard to find; something without an elastic band, pleats, plaids. To find a good like business type suit is hard to find.

Elastic bands make skirts hang funny. It doesn't hang right.

Do not like elastic waistband; like the regular waistband.

I don't like elastic waistbands. They are bad. I don't mind if there is a little bit.

I don't like the elastic on the front because it doesn't fit properly. I don't mind it at the side towards the back.

I don't mind the elastic in the back. I wouldn't wear them with casual wear like denim pants.

It's not too bad [regular waistband in the front and elastic in the back].

DESIGN OF SKIRT: CLOSURE

Zipper in the back bulges [does not lie flat].

I don't like front zippers and I prefer them in the back.

Side zippers are okay. As long as they don't pucker.

FABRIC CHOICE

It [skirts] don't fall nice unless it's a heavy material.

It doesn't lay nice unless it's blue jean or some sort of heavy material.

Other kinds of skirts have to be a heavier material because a lot of time if you get thinner material for a plus-size women the waistband can roll and flip over. Otherwise, they bunch up and they get pushed up from the hips to the waist.

2) What parts of your lower body create fitting problems for you?

FAT

My fat.

ABDOMEN

My pouch, abdomen, tummy.

My problem area are my stomach like just below my waistline. There is a pot [belly] there. And that's kind of hard to accommodate because if I find that if I find something that fits my rear end and my hips and it won't sit properly at my stomach. It gets too tight. You know like you get those stress marks [diagonal wrinkles] I get those. So I have to buy stuff one size higher.

Tummy [abdomen].

CALVES

My calves because they are muscular.

My calves; that's why I don't like anything in between; it either has to show all of it or none of it; anything in between it really distorts the shape of it; don't like the hem to be halfway between the calves; I would look better if it's above or ends at the ankle.

HIP & WAIST RATIO

Hip & waist ratio.

My biggest problem is having the smaller waist and having big hips. If I have to accommodate my hips then it's too big in the waist and it'll kind of falls down and its my hips

keeping my skirt up. I'm thinking back, when I did wear skirts a lot for band concerts my mom would alter all my skirts. She always had to pull it in the waist a little a bit so it would stay up. If I don't alter it I would use a pin or find a top that would go over far enough so you would not see the top of the skirt so you won't see the pin.

Waist & hip don't match.

HIPS

Hips.

Saddle bags.

THIGHS

Thighs.

When it fits too tightly you get that bubble and bulge around the hips.

DERRIÈRE

Behind.

Butt.

3) From your past experiences, what style/type of skirts suits your body?

SILHOUETTE

A-line or fitted; I got 6 skirts the exact same.

I like straight, casual, comfortable clothes.

I prefer more tapered skirts because I have a bigger stomach. Straight skirts make me look big all the way down. My legs aren't big at all. My legs below my knees are pretty skinny. So if I keep that straight look I feel that it looks too big. Or if it even just goes to my knees and then I have these skinny little legs below my knees coming out of this wide skirt. So I prefer the more tapered but it's harder to find.

I prefer straight skirts.

Mine has been more tailored, more fitted suit skirts.

Straight.

Straight cut cargo type.

Straight or A-line.

Tapered skirts so it won't look too big on me.

Straight

LENGTH

Ankle length.

I don't wear skirts but if I had to I would wear long ones.

Long or knee length.

SLIT

I like slits on the skirt if they are not on flowing material.

I prefer the slits on the side. But it also depends on the style.

If there are two side slits that fine; if there's one on the side it hangs funny and sticks out.

Like long side slits.

Like slits in the back.

Slit below the knee.

With a slit on either side to give you that extra freedom especially when you have big calves.

CLOSURE

I like back zipper.

Likes button up skirts.

Likes side zippers.

Side zippers are nice too.

Zipper in the back.

FABRIC CHOICE

Black.

Darker colors, solids.

Grey.

Heavier weight materials so that the weight of them pulls them down so the skirt falls flatter or smoother.

Heavier woven fabric.

WAISTBAND

Don't mind elastic waistbands for skirts.

I have had a waistband with elastics at the sides, a section of it so then it hugs the body.

I like skinny waistbands or no waistband at all; I have a skinny elastic waistband on a skirt that I really like.

Like waistbands with buttons

No waistband.

DISLIKES OF SKIRT STYLES/TYPES

But with no embellishment such as no pockets, no slits, no frills, no belts just the waistband and that's it.

Darts- do not like front darts.

Do not like long skirts with slits in the back.

Do not like section of elastic at the sides [waistband].

Don't like waistbands with sections of elastics because it reminds me of when I was younger.

Hate waistbands.

I find back slits are confining because when I wear them they make the skirt bottom stick out.

I'm not too picky with waistbands but I do not like waistbands with a regular front and elastic back.

Pockets and pleats add too much bulk.

Yeah! I don't want to regress to age four [waistbands with sections of elastic].

4) What length do you prefer your skirt to be?

MID THIGH

I prefer them to be a little bit shorter like mid thigh; it's hard to find plus-sizes in thigh range; to find a knee length it's not so bad but to find a shorter skirt it's hard.

THIGH

I prefer knee length skirts so when I sit the skirt just comes above the knee.

Little above the knee.

Short – right at the knee or below it a little.

LONG

Long.

Long over short; if short then it should be knee length.

Sometimes I find that they don't give you enough leg room when you're sitting down and then your skirt rises up. You have to think about it when you bend over and have to pick something up. So I prefer long over short. Not comfortable wearing short ones.

APPENDIX L

Comparative Summary of Selected Features

of the Two Patternmaking Programs and One Pattern Drafting Service

	Unique Patterns	Dress Shop 4.0	Pattern Master Boutique 2.0
Number of body measurements	20	16	8
Measurement aid	Video, diagrams	Diagrams	Diagrams
Identify body anomalies	Yes	No	No
Skirt Modifications	Slits, skirt length	Slits, waistband	Slits, CF seam
Paper size	36"	8.5" x 14"	8.5" x 14"
Preset ease measurement **Waist** **Hip**	 1" 3.5"	 1" – 2" 2"	 1" 5"
Knowledge of patternmaking	None	Basic	Basic