

**Style Preference and Benefits Sought by Women for Customized Swimwear Based on Body Shape, Age, and Dress Size**

by

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## Abstract

The purpose of this study was explore possible relationships between the body shapes, ages, and dress sizes of adult female consumers of customized swimwear and the preferences they have for swimsuit styles, what body parts a swimsuit emphasizes or de-emphasizes, and what benefits they seek from how a swimsuit fits and looks on their body. An entrepreneurial business (Company A) that uses mass customization strategies to produce customized swimwear provided the data for this research on the condition that the company and the customers remain anonymous. Data came from a convenience sample of 463 women aged 19-101 who were 2007-2009 customers; data consisted of body shape designation, age, self-reported dress size, swimsuit style preference, three body areas selected for emphasis and three for de-emphasis, and three benefits sought from the swimsuit design.

The company identified each customer's body shape through proprietary software that was used in association with a 3D body scan, which also provided measurements. The body shape categories were rectangle, hourglass, inverted triangle, circle, and triangle. Customers completed a questionnaire that included the information on preferences, age and dress size. The options for swimsuit style were bikini, tankini, and one-piece. For body emphasis and de-emphasis areas, customers chose from the following list: arms/legs, bust, hips, seat, thighs, tummy, and waist. Their choices for swimsuit benefits were minimize full hips and thighs, provide tummy control, enhance bust, support bust, minimize bust, visually lengthen torso, visually shorten torso, deemphasize full arms, deemphasize full legs, and accentuate waistline.

Body shape, age, and dress size were the independent variables, and swimsuit style, body areas of emphasis and de-emphasis, and benefits sought were the dependent variables.

More than half of the subjects had rectangle and hourglass body shapes, were aged 30-59, and reported wearing dress sizes 6-12. Quantitative analyses of style preference were two-way chi square statistics with follow-up cross tabulations. Descriptive statistics (frequencies and percentages) were used to investigate body area emphasis and de-emphasis preferences and benefits sought.

Swimsuit style preference was significantly related to body shape, age, and dress size. Approximately half of each of the body shape groups preferred a single style over the other two. A desire for body coverage increased with age and dress size. Descriptive statistics revealed that most respondents sought emphasis and de-emphasis in similar body areas, but the relative degree of their preferences varied with their body shape, age, and dress size. Overall, arms and legs, bust, and waist were the most commonly selected areas of emphasis, and hips, thighs, and tummy were the focus for de-emphasis. The subjects' swimsuit benefit preferences related to both emphasis and de-emphasis choices. Examples include tummy control (de-emphasize tummy) and enhance bust (emphasize bust).

This study's findings can inform ready-to-wear swimsuit companies and potentially provide insights into female customers' preferences for other body revealing garments. The research was limited, however, by the fact that all data came from a single company, relied on that business's designation of body shape, and the customers' self reporting of dress size. The research results suggest that more study of these variables for different garment types could be fruitful.

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## CHAPTER 1: INTRODUCTION

In January 2009, a nationwide survey found that 46% of women and 36% of men spent less money on apparel than they had six months before the survey. Even though apparel spending had decreased, “high quality, stylish and unique” attributes were considered important in an apparel purchase. Overall, 68% of women felt quality was more critical than style. Forty percent of women indicated that purchasing items that brought them satisfaction was the best part of shopping. Compared to home décor, electronics, travel, entertainment, cosmetics, and dining out, apparel was the one area in which spending decreased the least (Silverman, 2009).

Although several factors determine whether an apparel purchase will be made, one study showed that 69% of women claimed fit was the most important (Cotton Incorporated, 2002). When a woman enters a dressing room, tries on several garments, and only one fits, she will only purchase the one item that fits. Sales that are lost due to lack of fit are unknown to retailers (Gardyn, 2003). An accurate set of measurements is needed to produce clothing to fit consumers as they prefer. One method for arriving at a precise set of measurements is by using three-dimensional (3D) body scanning technology (Istook & Hwang, 2001). Body scanning technology has been making an impression on the apparel industry since 1985 (Simmons & Istook, 2003). Bye, LaBat, and DeLong (2006) described a body scanner as “an instrument designed to create a dimensionally accurate computer image of the body” (p. 73).

Anne Eisenberg (1998), writer for The New York Times, claimed that “even if body scanning is slow to spread to mass markets, accurate information on body shape could have a effect on the clothing industry.” Body scanners have the capability to reduce the problems

individuals experience with clothing (DesMarteau, 2005). Women often have issues with garments not fitting their body according to their expectations or desires. Farmer and Gotwals (1982) defined fit as individuals' concept of how a garment appears on their body and feels to them. One reason women have clothing fit issues is because the current ready-to-wear sizing system is outdated (Xu, Huang, Yu, & Chen, 2002).

In the late nineteenth century, ready-to-wear became more prevalent for women for several reasons, including convenience and lower cost (Ashdown, 2007). Compared to tailor made clothing, the new process of mass produced apparel was unable to match the accuracy of fit for everyone. Instead of creating apparel to fit everyone, the most common body size at the time was mass produced (Tamburrino, 1992). Ingham and Covey (2003) claimed that due to the current ready-to-wear system individuals are unable to find apparel that fits with few or no alterations. Consumers are not usually fitted for their clothing. Thus, women tend to experience fit problems with ready-to-wear (Cotton Incorporated, 2002).

For women, choosing a clothing size it is often confusing because of wide variations in fit models and sizing labels. Designers often use fit models to represent the consumer for their apparel line development. The problem with fit models is that they often symbolize the ideal customer instead of the average one (Cotton Incorporated, 2002). Manufacturers and retailers can also label clothing sizes differently from one another. For example, the dimensions of a size 6 in one brand may be a size 4 in another one (Chase, 2004). The system creates a daunting task for consumers searching for the correct size. Retailers offer sizes 0-20 with available sizes represented by even numbers (Chase, 2004). Women may wear a different size in each store, depending upon the brand they select. An increase of size without weight gain could negatively affect how women view their body (Chase, 2004; Textile and Clothing Technology Corporation

[TC]2, n.d.). The size label creates inconsistency between the consumers' actual size and the size on the label. In the past, women might have molded their bodies to the attire they wore because body shape could be altered when women wore a corset, which women might use to display an hourglass body shape (Fashion Era., n.d.). Women today expect garments they wear to fit their body.

Producing clothing to fit a woman's body becomes an overwhelming task when women who wear the same size have completely different body shapes (Cotton Incorporated, 2002). Advice on identifying swimwear that fits and flatters particular body types is sometimes offered by manufacturers and retailers, as well as more generally in the popular press. August (1981) created a system for women to analyze their body types. The system provided fit checkpoints for women to identify their body type. The checkpoints included a brief description of the body type, followed by questions about the way ready-to-wear fits their body. Swimwear design details and styles that complemented each body type were suggested. Straps, gathers, belts, vertical strips, and horizontal strips were a few of the design details which were included. Each detail aimed to minimize, conceal, or maximize parts of the body. Women were encouraged to use the design details and styles to maximize smaller parts of their body to create balance with the rest of the body.

The reason for different body shapes among women is unknown, although periods in life when bodily changes commonly occur have been identified. Le Pechoux and Ghosh (2002) found distinct body shape differences among different ethnicities. For instance, some African American women may carry more weight in the lower half of their body in comparison to Caucasian women, and Caucasian women tend to be taller than Hispanic and Asian women (Garyn, 2003). In addition to the body shape differences among ethnicities, women also

experience bodily changes throughout their life; some, such as pregnancy and aging, affect their body shape. The shape of women's breasts change after pregnancy to be longer and flatter (Easy Baby Life, n.d.). As the body ages, fat tissue can increase around the center by as much as 30%. It is also likely that an individual may become shorter later in life. After the age of 40, people lose 1 cm on average every 10 years (New York Times, n.d.). Because of the constant change and existing fit problems with clothing, fit researchers continue to analyze the body types and shapes of women (BBC News, 2000).

The measurements used to label clothing sizes are based on the body shapes and measurements of a sample of women from the early 1940's and are outdated (Le Pechoux & Ghosh, 2002; Simmons, Istook, & Devarajan, 2004; Cornell University, 2006b). A lack of anthropometric data and varied body sizes and shapes were reported as two reasons that apparel companies struggle to resolve the problems of inconsistency with the way clothing fits consumers' bodies (Ashdown & Loker, 2005). Because missing information leaves consumers, manufacturers, and retailers unsatisfied, new technological methods are being used to collect data on bodies today to help correct fit problems. Some designers and retailers are using body scanning technology in various ways to develop clothing that provides a custom fit which is pleasing to the consumer.

There is one apparel designer and entrepreneur who has developed a mass customization strategy to offer a solution to the individual fit, preference, and design issues women encounter with mass produced swimwear. As requested, the company name and business owner will remain anonymous. <sup>1</sup> Company A creates customized swimwear based on their customers' 3D body scan measurements, their body shapes, and their responses to questions about the features they desire in a swimsuit design (Personal communication, 2008).

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<sup>1</sup> Hereafter, Company A will refer to the business name that is being withheld by request of the owner.

Before the endeavor began for the business owner, an industry analysis examining women's swimwear purchasing habits was conducted. The results indicated that, from 1998 to 2000 over 60% of all swimwear sold was the one piece swimsuit style and 75% of all styles sold were misses and plus sized. The largest purchasing group consisted on women between the ages of 34-54. The smallest purchasing groups were ages 13-17 and 55+. In 2001, factors determined to influence future swimwear choices were: tummy control panel (over 50%), waist minimizers 48%, hip minimizers (38%), bust enhancers (18%), and plus sizes (28%) (Personal communication, 2009).

The process Company A uses to develop customized swimsuits is unique. It begins by taking a 3D body scan of each customer with a [TC]<sup>2</sup> 3D whole body scanner. This particular body scanner uses white light, creates high quality images, is user-friendly, and is low cost ([TC]<sup>2</sup>, n.d.). The body scanner is able to gather an unlimited number of body measurements in less than a minute. Over a 140 body measurements are used to create a customized swimsuit. After the customer is scanned, the business owner's proprietary software categorizes body shapes on the basis of mathematical circumference ratios of the bust, waist, hips, stomach, and abdomen in relation to one another (Personal communication, 2009). The primary body shapes identified by the software are: hourglass, oval, triangle, inverted triangle, and rectangle. Because of the realistic variation in body shapes, it is expected that twenty to thirty secondary body shapes could be identified, as well (Company A, 2003).

Each customer completes a questionnaire addressing whether they want various parts of their body emphasized or de-emphasized and what body enhancing design features they would like. The software gives customers swimsuit options that will best compliment her body shape. The customers have choices for fabrics, color, bra type, lining type, hardware, and strap size.

Company A uses Xtra Life Lycra<sup>®</sup>, SilkSkin Lining, PowerMesh, and high quality trim fabrics in her swimwear (Company A, 2008). The Xtra Life Lycra<sup>®</sup> can sustain its shape up to 10 times more than unprotected elastane (Invista, 2008; Lycra, n.d.).

The design options that are provided to the customers come from the complaints the business owner heard in one of the focus groups they conducted. Women described how they visited several stores and tried on numerous swimsuits, only to settle for one suit that was not the color, style, or fit they desired (Company A, 2008). This was the stimulus to begin Company A; the business owner wanted to eliminate the stress women encounter when shopping for swimwear. The business owner's personal experience is supported by industry statistics. More than 50% of women experience problems with the way clothing fits their body (Xu, et al., 2002). A National Panel Data (NPD) study reported that 9 of 13 women claimed fit and comfort were the most important characteristics in a swimwear purchase. The swimwear attributes they rated as extremely or very important were as follows: fit (99%), comfort (96%), quality/durability (84%), price (72%), style (60%), fiber/fabric (58%), and brand (51%). One consumer stated that swimwear styles appeared to be appealing to teens or senior citizens with a gap in styles for ages 25 to 70 (NPD, 2001).

Horovitz (2004) reported that the average woman owns four bathing suits, but only wears two on a regular basis. The peak selling season for swimwear is short. Thus, women have a relatively brief window in which to buy new swimwear. In fact, some women hold on to their swimsuits from the previous year because they are unable to find a swimsuit which meets their expectations (Feitelberg, 2001). The business owner's findings in a focus group agreed with industry statistics. Women, the her focus group, claimed to have tried on as many as 20 suits and visited up to 10 different stores only to settle for a suit that was not exactly right or not make a

purchase at all. Additionally, the women reported their willingness to wear a suit which was not comfortable, but was flattering (Company A, 2003). A national survey of 1,000 adults indicated that half of the respondents would rethink attending social events which involved them dressing in swimwear because of self-conscious feelings they experienced (Shedden, 2009).

### Statement of the Problem

Business-sponsored research has demonstrated some of the common issues adult female consumers have concerning swimwear. These are fitted, body revealing garments that are the only choice for their purpose. Adult female consumers indicate a willingness to buy swimwear along with great frustration at not being able to find desirable choices that fit. Academic and industry research have pointed out the mismatch between the realities of today's consumers sizes and shapes and the long established patterns of women's sizing. Ready-to-wear fit problems exist for all kinds of apparel.

Applications of 3D body scanning technology are building knowledge about body sizes and shapes that can be applied to apparel development to help resolve the difficulties women often experience with the fit of multiple garment types (Ashdown, et al., 2004; Simmons et al., 2004; DesMarteau, 2005). Lack of information about anthropometric data and varied body sizes and shapes limits apparel companies' capability to resolve the problems with their sizing system (Ashdown & Loker, 2005). Fitting a body in the objective sense and achieving the particular fit and look an individual prefers are not necessarily the same thing. Consumers can differ from "fit experts" in their personal fit preferences. Limited research has been conducted on the fit preferences of women in relation to swimwear.



## Purpose and Research Questions

The purpose of this study is to explore the possible relationships that customers' body shape, age, and dress size have with (a) the type of swimsuit they prefer and (b) the body concealment and emphasis benefits they seek in swimwear. The research will be implemented by examining data collected by Company A. In Company A procedures, consumers are given a questionnaire to complete after their bodies are scanned. This questionnaire requires them to identify what type of swimsuit they prefer (bikini, tankini, and one-piece), what parts of the body they want or do not want emphasized/de-emphasized (arms/legs, bust, hips, seat, thighs, tummy, and waist), and what other features they want their swimsuit to possess (minimize full hips and thighs, provide extra tummy control, enhance bust, support bust, minimize bust, visually lengthen torso, visually shorten torso, deemphasize full arms, deemphasize full legs, and accentuate waistline).

The research questions are as follows:

1. Is there a relationship between body shape and swimsuit style preference?
2. Is there a relationship between body shape and body area emphasis preference?
3. Is there a relationship between body shape and body area de-emphasis preference?
4. Is there a relationship between body shape and swimsuit benefits sought?
5. Is there a relationship between age and swimsuit style preference?
6. Is there a relationship between age and body area emphasis preference?
7. Is there a relationship between age and body area de-emphasis preference?
8. Is there a relationship between age and swimsuit benefits sought?
9. Is there a relationship between dress size and swimsuit style preference?
10. Is there a relationship between dress size and body area emphasis preference?

11. Is there a relationship between dress size and body area de-emphasis preference?

12. Is there a relationship between dress size and swimsuit benefits sought?

#### Definition of Terms

Body scanning technology- Equipment that is able to obtain hundreds and thousands of human body measurements and produce a 3D image of a human body.

Circle/oval body shape- “Upper body appears larger than lower body, hips measure the same or smaller than bust and are square in form, and full waist and tummy sometimes measure larger than bust or hips” (Personal communication, November 4, 2009).

Fit- The way a garment lies on the individual’s body.

Fit preference- The way individuals prefer apparel to lay on their body such as: tight, loose, or semi-loose.

Hourglass body shape- “Both hips and bust are proportionate in size, well-defined waist, and slim or average legs with curvy thighs” (Personal communication, November 4, 2009).

Inverted triangle body shape- “Shoulders and bust are broad in comparison to waist and hips, narrow waist and hips, slim or muscular arms and legs, and often professional or highly trained athletes” (Personal communication, November 4, 2009).

Ready-to-wear- Mass produced clothing in standard sizes

Rectangular body shape- “Straight to moderate curves, square hips and waist, upper and lower torso equally proportioned, and arms and legs are slim in proportion to the rest of your body” (Personal communication, November 4, 2009).

Style preferences- Design details an individual desires in their apparel. The fabric, color, bra type, lining type, hardware, and strap size individuals desire in their custom made swimwear (Company A, 2008).

Triangle body shape- “Shoulders and bust are proportionately smaller than hips, average-sized or larger legs, and often long-waisted, and shapely waist” (Personal communication, November 4, 2009).

## CHAPTER 2: LITERATURE REVIEW

The purpose of this study was to determine if there is a relationship among body shape, age, benefits sought in swimwear, and swimwear style preferences. The review of literature provides background for these variables by exploring the following topics: mass customization, body scanning technology, body shape, age, fit, fit problems, fit preferences, and clothing benefits sought.

### Mass Customization

Mass customization has been defined differently by researchers:

- Eastwood (1996) defined mass customization as “giving every customer a product tailored specifically to his or her needs” (p.1).
- Silveira, Borenstein, and Fogliatto (2000) summarized mass customization as a process that provides individually designed products to the consumer.
- Pine (1993) described mass customization as the process of manufacturing products that are individually customized using mass production technology.

Connell, Ulrich, and Brannon (2002) studied consumers’ interest towards mass customization using focus groups. From their findings, a conceptual model was developed. The model reflected female consumers’ suggestions on features mass customization could offer which would interest them. These included: clothes clones (e.g., copies in different fabrics of preferred garments), totally custom (garments customized in design and fit), co-design (customizing design with access to professional advice), and design options (picking from a menu of garment component options). Brooks Brothers is a company currently offering one of

the customization features in the model. The company allows their consumers to co-design their apparel product. The consumers select from the fabrics, suit styles, and design options offered by the company (personal communication, September 16, 2009).

Ulrich, Connell, and Wu (2003) studied consumer's reactions to co-design for mass-customization. Participants were able to customize a jacket, skirt, and blouse by choosing the style, details (collars, buttons, belts, pockets, and zippers), and colors. From the scenarios, participants expressed high levels of satisfaction with the design and comfort of the process and they had an interest in co-designed products.

### Body Scanning Technology

#### *Body Scanners Development and Accuracy*

Body scanning technology has made its way from use in the movies, medicine, and the military to the apparel industry (D'Apuzzo, 2007). Textile and Clothing Technology Corporation ([TC]<sup>2</sup>) developed one of the first body scanners for apparel industry applications. This organization conducts research and development activities, does technology demonstrations, and provides educational programs about the apparel industry. The [TC]<sup>2</sup> body scanner was one of the research and development products. It was made commercially available in 1998, with the ability to capture hundreds of body measurements, body shape, and body volume in a matter of seconds ([TC]<sup>2</sup>, n.d.). This contrasted the time consuming process of obtaining an individual's body measurements by hand. In a 1988 anthropometric survey of U.S. Army personnel, it took more than four hours to measure each person (Paquette, 1996).

The data collected from a body scanner provide the opportunity to gather detailed information about a single person or many individuals' bodies. In 2003, using 3D body scanning, [TC]<sup>2</sup> conducted a national sizing survey sponsored by the U.S. Department of

Commerce and selected apparel industry companies. The SizeUSA survey gathered measurements with a 3D body scanner from over 10,000 individuals. Survey results suggested that the population overall had become taller and larger than previous statistics indicated. Data also indicated that grade rules used by manufacturers did not match SizeUSA participants' body shapes or body measurements ([TC]<sup>2</sup>, n.d.).

Body scanners have been shown to be a valid and reliable method for obtaining measurements; they are highly accurate. Research studies have shown that body scanned measurements are more accurate than those taken by hand. Yoon and Radwin (1994) determined that body measurements taken by hand can be off by 6 cm. The [TC]<sup>2</sup> body scanner has a point accuracy rate of <1mm and a circumferential accuracy of <3mm ([TC]<sup>2</sup>, n.d.).

McKinnon and Istook (2001) compared measurements of dress forms taken by hand and two body scanner models. The dress forms were measured three times by each method. The results were that both body scanning system measurements were more accurate across the back and for crotch circumference. The hand measurements were more accurate than the body scanners in shoulder length, chest circumference, and armpit depth. There are some limitations to body scanning technology. It is often difficult to obtain accurate measurements from shaded areas of the body such as the armpit, crotch, and areas covered by human hair (McKinnon & Istook, 2001; Simmons, 2002).

In 2003, the SizeUK national sizing survey compared the accuracy of scanned and hand measurements. For each of the approximately 11,000 individuals who were measured, the study extracted 130 measurements electronically (with a [TC]<sup>2</sup> body scanner) and 8-10 manually. It was concluded that electronic measurements were more reliable than manual measurements. The reason suggested for the greater reliability of non-contact (scanned) measurements was that

individuals were in a more relaxed position because they were not being measured by another person (Sizemic, n.d.).

In 2007, research was conducted to test the reliability and accuracy of body measurements extracted from a 3D BVI body scanner in comparison to body measurements taken by hand. The study involved 80 patients; each one was measured twice at the waist and hip by hand and with a 3D body scanner. The research examined the variance in manual and body scanned measurements. There was a greater variation in the hand measurements. The mean differences for the waist measurements were 3.01 cm (manual) and 1.1 cm (body scanned). The mean differences for the hip measurements were 2.81 cm (manual) and 0.9 cm (body scanned) (Medical News Today, 2009).

#### *Body Scan Applications in Apparel*

Since a body scanner is able to capture a large number of measurements, companies could use it to mass customize garments that would accommodate a wide variety of body shapes and sizes (Istook & Hwang, 2001). Body scanning technology has helped some apparel companies to improve the way their clothing fits their consumers' bodies by providing information about differing figures, shapes and sizes (Ashdown et al., 2004; Simmons, et al., 2004; DesMarteau, 2005; Cornell University, 2006a). Apparel companies can make use of 3D body scanners and scan data for a variety of purposes, including the following: made-to-measure, virtual try-on, garment size selection, size surveying, anthropometric mannequins, (D'Apuzzo, 2007), personal shopper services, custom pattern development for home sewers, co-design mass customization, custom made apparel, apparel sizing standards development, 3D product development, body shape analysis (Simmons, 2002; [TC]<sup>2</sup>, n.d.), and research (Loker, Ashdown, Cowie, & Schoenfelder, 2004). The objective of any of these applications is to produce apparel

that is more pleasing to the consumer. A limited number of companies have actually purchased 3D body scanners, perhaps because of the high cost to purchase one. Currently the cost of a [TC]<sup>2</sup> scanner, the additional equipment, installation, and training tools is \$35,000 (K. Davis, personal communication, August 17, 2009).

Brooks Brothers and Benchmark Clothiers are two companies that now use a 3D body scanner to develop custom made clothing to fit their consumers (Dillavou, 2008; [TC]<sup>2</sup>, n.d.). Brooks Brothers has been using the [TC]<sup>2</sup> scanner for almost a decade. The company now offers shirts, suits, trousers, sport jackets, and vests in their custom program. Consumers can choose the following details of their garments: collar, cuff, pleats, pockets, slim fit or full cut, and fabric. Joanne Martorelli, Technical Design/Product Development Manager, stated that the body scanning process at Brooks Brothers has received positive feedback from consumers (personal communication, September 16, 2009). Benchmark Clothiers also uses 3D body scanning to develop custom made suits. The company says that its manufacturing and computerized ordering systems enable it to create these more quickly than a majority of custom companies (Bench Mark Retailer, n.d.).

Consumers may find the quickness and the privacy of body scanning to be a benefit (Le Pechoux & Ghosh, 2002). Traditional hand measurements can be an invasion of personal space (Bye et al., 2006). However, not all consumers are knowledgeable about the body scanning process and may be unwilling to use the technology. To determine consumers' willingness to use 3D body scanning technology and its commercial applications, Loker et al. (2004) researched women's interest in it. After each person was body scanned, she was provided with a questionnaire that contained scenarios about virtual try-on, size prediction, custom fit, personal shopping, co-design, pattern/development, and research. For each scenario, participants



indicated their level of interest in using the commercial application related to body scanning. More than half of the participants expressed great interest in using all of the commercial applications. Among the selections, virtual try-on was rated as the most appealing (Loker et al., 2004). Virtual try-on enables individuals to gain a realistic view of the garment on a virtual model (Protopsaltou, Luible, Arevalo, & Magnenat-Thalmann, n.d.)

### Body Shapes

Clothing not only covers the body but also has an intimate personal meaning to the individual wearing the garment. When constructing a garment to meet the needs of an individual, one must be knowledgeable about the characteristics of the human body (Douty, n.d.). There are infinite ways in which two human bodies differ from one another. It has been suggested that no two are precisely the same (Sheldon, 1940). Sheldon (1940) sought to know more about differences among human bodies. He examined the physical aspects of college aged men for psychological purposes by studying 4,000 photographs. From the study, three body types were revealed: endomorphy, mesomorphy, and ectomorphy. Endomorphy describes a body that is soft and round. Mesomorphy is a body comprised of muscle, bone, and connective tissue. Ectomorphy is a linear and fragile body. Although Sheldon (1940) related individuals' body types to human personality characteristics, he also provided this system of classification for the varieties that exist among individual bodies.

### *Somatometry*

Douty (1968; 1970; n.d.) studied body shapes from an apparel perspective. She used somatographs to label body types and shapes and to provide clothing producers, designers, and manufacturers with more accurate information about the human body in relation to clothing (Douty, n.d.). Somatology is originated from soma, which means body, and logia, which means

study. Somatographs were used to study human body shapes to gather more in depth knowledge of body shape, sizes, and types for the apparel industry. Somatographs were the product of graphic somatometry which was a means to obtain a visual measurement of the human body on a graph. The process involved a source of light placed on the left side of the translucent grid screen. A camera was placed in front of the grid screen, and the person stood behind the grid screen. A picture was taken, and the black and white photograph became the somatograph (Douty, 1970).

To classify a body by using graphic somatometry, the body must be examined as a whole. Using graphic somatometry, Douty (1968) created a body build scale and used categories to classify the body as a whole. The categories for the Douty Body Build Scale ranged from thin to heavy (See Figure 1). Each of the five body builds contained a list of characteristics a person needed to possess to be placed in a particular group. Individuals only needed to have more of the features for one body in comparison to the others to be placed in a category on the scale. The body build scale contained different sizes but not different shapes of a woman's body. The only shape on the body build scale was the hourglass figure (Douty, 1968). The body build scale was not based on height but, rather, on size and weight (Douty, n.d.). Douty (1968) noted that visual somatometry could further assist in researching body characteristics.



Shen and Huck (1993) compared two bodice flat pattern development methods using somatography and body measurements. The researchers took 27 body measurements by hand from 12 participants. Then front and side views of the participants' upper torsos were photographed to develop somatographs. The somatographs were calibrated to the body measurements. The two flat pattern methods using somatography and body measurements were experimental and traditional. The experimental pattern development method used a combination of 27 somatograph measurements and four physical measurements, which included: bust circumference, waist circumference, bust point to bust point, and center front length from neck to waist. The traditional pattern development method used only the 27 body measurements. A panel of judges evaluated the fit of the constructed garments, developed from the two pattern methods, on the participants. Based on the fit evaluation, it was concluded that the experimental method using the somatograph method to measure the body with a combination of body measurements had a better fit than the traditional method. The authors also noted that the female upper torso could be the most difficult area of the body to fit with flat pattern methods.

### *Body Shape Analysis*

Research using somatographs evaluated whole bodies and used measurements taken from somatographs to investigate ways to improve fit. More recent research has used body scans to classify women's body shapes. In 2002, Simmons conducted a study analyzing body shapes using 3D body scanning. The objective in her research was to develop software that could use data from a 3D body scanner and categorize the bodies based on measurements, proportions, and shape. As a result, the Female Figure Identification Technique (FFIT<sup>®</sup>) software was developed. FFIT<sup>®</sup> obtained body measurement data from a 3D body scanner and identified certain body traits from the measurements. Body measurements for shape identification were gathered from

the bust, waist, hips, high hips, abdomen, and stomach. Mathematically combining the ratios and differences of the body measurements, the six measurements were used to categorize each individual's body into one of the nine shape groups. The nine body shapes found and their definitions (Simmons, 2002) were the following:

- Hourglass- has a smaller defined waist with a larger bust and hips. The bust-to-waist and hip-to-waist measurements are almost equal.
- Bottom hourglass- has a defined waist, slightly larger hips than bust, and there is significance between the bust-to-waist and hip-to-waist measurement ratios.
- Top hourglass- has a defined waist, slightly larger bust than hips, and there is significance between the bust-to-waist and hip-to-waist measurement ratios.
- Spoon-when bust-to-waist ratio is lower than hourglass and waist-to-hip ratio is higher; has a large circumferential difference in hips and bust and a defined waist.
- Rectangle- when the bust and hips have the same proportion with a small waist definition.
- Diamond- has stomach, waist, and abdomen measurements larger than the bust.
- Oval- when the upper and lower parts of the body are thin and the majority of the weight is located in the bust and belly area.
- Triangle- when most of the weight is located in the buttocks and hips; the shoulders and bust area are thinner than the lower part of the body; the hip-to-waist ratio is small.
- Inverted triangle- is considered to have wider shoulders and smaller hips; the bust-to-waist ratio is small.

Six of the FFIT<sup>®</sup> shapes were found among body scans of 222 participants. Of these, 40% were bottom hourglass, 21.6% hourglass, 17.1% spoon, 15.8% rectangle, 3.6% oval, and 1.8% triangle. None of the participants were found to have an inverted triangle, diamond, or top hourglass body shape. This body shape classification system was created to aid in the production of better clothing fit for consumers. Based on the evaluation of women's various body shapes, it was determined that the current apparel sizes do not adequately match the body shapes of women today (Simmons, 2002).

Connell, Ulrich, Brannon, Alexander, and Presley (2006) also studied 3D body scans to develop a scale for assessing female body shapes. They visually analyzed 42 body scans of women ages 20 to 55 using 14 female whole and component body shape scales that had been found in the literature to assess front and side views of adult females. A total of nine modified scales were developed and included in the Body Shape Assessment Scale. These nine BSAS<sup>®</sup> scales were: body build, body shape, hip shape, shoulder slope, front torso, bust shape, buttocks shape, back shape, and posture. Hourglass, pear, and rectangular and inverted triangle whole body shapes were defined from a frontal perspective based on the relationships between shoulder, waist, and hip widths. The graphic scales can be used to visually identify female whole and component body shapes from a body scan. Software was developed based on the BSAS and can be applied to assess scan files.

Alexander (2003) and Fu (2004) used BSAS<sup>®</sup> software to identify female body shapes. Alexander (2003) studied the size and shape of over 500 females between the ages of 19 and 55. The incidence of whole body shapes was 45.4% pear, 33.6% hourglass, 15.7% rectangular, and 0.6% inverted triangle. Fu (2004) used BSAS<sup>®</sup> software to analyze and understand the clothing preferences and problems of overweight and obese women. The research used two different

samples of women. The first sample (Study 1) consisted of 189 women and the second (Study 2) of 510 women. Results revealed that the pear body shape was dominant in both samples. The rectangular body shape was the second most common shape except for overweight women in Fu's first sample; hourglass was their second most common shape.

Lee, Istook, Nam, and Park (2007) concluded that approximately 50% of women in the U.S. have a rectangular body shape. When asked to self-describe their body shape, more than half of the African-American women in Manuel's (2000) study self reported the hourglass body shape. Ma (2003) found that experts' analysis of her sample's body shapes could differ from what they self-reported. It is important to study body shapes because they are directly related to the satisfaction experienced with clothing fit (Lee et al., 2007).

#### Age

Over the years, women experience physical changes regardless of their fitness level. Bodily changes over time increase the differences among women's body shapes. After the ages of 14 or 15, females have a growth in hip width and begin to develop the distinctive female silhouette. The buttocks and head may continue to grow until the age of 25. During adolescence a female's growth consists of more fat than muscle compared to males (especially in the buttocks and thigh areas). The thigh and hip area is where the majority of fat is stored. As women age, changes occur in their lower limbs and hip area, which increase the stooping look (Croney, 1971). Also as women age, their abdomens become higher and their buttocks tend to become smaller (Morris & McCann, 1998). Since individuals experience a variety of body changes, so must their clothing.

In different studies, researchers found correlations between women's body shapes and their age. Pisut and Connell's (2007) research showed that self-reported hourglass figures tended

to be more predominant in the 19-35 age group. They suggested that this might be because as women become older, they tend to gain weight, and their bodies transform to a more rectangular or pear shape. Alexander, Connell, and Presely (2005) conducted similar research, which revealed that a large proportion of women between the ages of 18 and 28 have an hourglass body shape.

Ashdown and Na (2008) studied upper body postural variation in two groups of women ages 19 to 35 (younger) and 55 and older (older). The body changes found among the two groups were in the following areas: upper torso, bust, neck, and head. In the upper torso, older women were longer in the back and shorter in the front. For the bust area, older women were lower, fuller, and their bust points were located further from one another. The neck and head of older women moved forward more. Also and in comparison to younger women, the following areas were larger on older women: cervical fossa angle, anterior cervical angle, and posterior cervical angle. Differences in body changes based on age require clothing variations. For instance, older women may require apparel with a longer hem in the back of a top; a shorter length in the front of a top; a neckline which is higher in the back and lower in the front; and a different dart placement based on bust points. Thus, it is important to understand the changes a woman's body experiences as she ages.

#### Fit, Fit Problems, and Fit Preferences

Researchers have defined fit in different ways. The following two descriptions suggest that there are different perspectives to address when discussing fit.

- Ingham and Covey (2003) defined a good fit as the garment being equally proportionate on each side of the body lying evenly across the body without wrinkles or excess fabric hanging off the body.



- Morris and McCann (1998) stated that in order to find a good fit, an individual should select a style that reflects their body shape.

### *Fit Problems*

Shim and Bickle (1993) measured the level of fit satisfaction in female catalog shoppers who were 55 and older. The following ready-to-wear categories were studied: blouses/sweaters, pants, skirts/dresses, and jackets. A comparison was made between the level of satisfaction and the participant's size category (petite, medium, or tall). The level of satisfaction in each group overall was low. However, the petite group showed the lowest level of satisfaction in each ready-to-wear group. Fit and sizing were the major issues indicated by the participants as the most unsatisfactory qualities in ready-to-wear.

Goldsberry, Shim, and Reich (1996) surveyed women aged 55 and older to examine their level of satisfaction with ready-to-wear. Their national survey found only 31% of participants to be satisfied with ready-to-wear. The participants were classified into a figure type category (Junior, Junior Petite, Misses Petite, Misses, Women, Miss Tall, and Half-Size) based on their body measurements to determine if they purchased clothing that matched their figure type. It was discovered that women in the study tended to shop in a figure type category that did not match their body. The findings revealed that participants classified as Junior tended to purchase Misses and Misses Petite the most. Those classified as Junior Petite tended to purchase Misses and Misses Petite. Participants categorized as Misses tended to shop in their designated category. Participants categorized as Women's tended to purchase Misses more frequently than other figure types. Participants categorized as Misses Tall tended to purchase Misses most often. Participants categorized as Half-Size tended to purchase from the most categories (Misses, Women, Misses Petite, and Half-Size). They tended to purchase from the Half-Size category the

least. Women in their study also indicated the most problematic areas in a garment were length in pants, dresses, and sleeves.

In Manuel's (2000) study, respondents indicated that 25% of their ready-to-wear clothing required alterations after purchase. Size UK, a national sizing survey similar to SizeUSA, found that more than 60% of individuals experienced problems with locating apparel with a satisfactory fit (Sizemic, n.d.). Ashdown et al. (2004) found women who wore sizes 4 and 6 rated the crotch and below the buttocks as unacceptable areas of fit. Women who wore sizes 12 and 14 experienced fit problems in the waist, abdomen, and hip.

Alexander et al. (2005) studied the problems and fit preferences of females aged 18 to 29. The respondents reported having experienced fit problems with apparel in the following areas: bust (50%), waist (46%), hip (46%), dress length (46.5%), pant length (60.5%), thigh (30%), sleeve length (31.4%), and crotch (26.5%). The problematic fit areas were directly related to the women's body shapes. The respondents self reported their body shapes as hourglass, pear, rectangular, or inverted triangle. The waist, hips, dress length, and pant length were indicated as the most problematic areas of fit for hourglass and pear body shapes in comparison to rectangular and inverted triangle body shapes. The bust area was a more problematic fit area for rectangular, pear, and hourglass body shapes than it was for inverted triangle body shapes. It was suggested that the fit of apparel plays an important role in the confidence and comfort that consumers experience.

Otieno, Harrow, and Lea-Greenwood (2005) found that women who wore a size 16 or larger found it more difficult to locate a satisfactory fit in clothing than women who wore smaller sizes. At home, sewers encountered similar issues with commercial sewing patterns. When

LaBat, Salusso, and Rhee (2007) surveyed experienced home sewers, 95.2% of the respondents claimed that they made adjustments to their sewing patterns at least sometimes or more often.

### *Fit Preferences*

LaBat and DeLong (1990) concluded that good fit is based on an individual's own perception. For example, one individual might prefer tightly fitted clothing while another might want loosely fitted clothing. Farmer and Gotwals (1982) suggested that fit preferences varied among age groups. For example, teenagers might find short skirts acceptable while elderly adults might not.

Fu (2004) used body shape analysis to understand the fit preferences and problems of overweight and obese women. Results indicated that there was no relationship between clothing fit preference and whole body shape in women who were overweight. However, there was a relationship between body shape and fit preference in women who were obese. Obese women who had a pear body shape preferred loosely fitted clothing, but obese women who had an hourglass body shape gave the lowest rating to loosely fitted clothing. Overweight women experienced more fit problems in the hips and buttocks. Women with pear body shapes had more fit issues than rectangular and hourglass body shapes in the hips and buttocks, and from the waist down.

In their study of women's body size and preference for aesthetic attributes in clothing, Chattaraman and Rudd (2006) found that women with a larger body size preferred clothing that concealed their body more than individuals with a smaller body size. Women with a larger body size also preferred loosely fitted clothing, and women with smaller body sizes preferred fitted clothing.

In 2007, Pisut and Connell reported a study of female fit preferences. More than 20% of participants experienced dissatisfaction with ready-to-wear. The most common reason given for dissatisfaction with fit was tightness. Participants self reported their body shape as rectangular, pear, hourglass, or inverted triangle. They chose the type of fit they preferred in a jacket from three drawn images, e.g., a fitted, semi-fitted, and loosely fitted jacket. Results revealed that women with hourglass and inverted triangle body shapes preferred fitted garments, while women with rectangular and pear shaped bodies were less prone to want fitted garments. Almost half of all the respondents preferred semi-fitted, and loosely fitted was the second most common choice. Pisut and Connell also studied participants' body cathexis scores and found that participants with inverted triangle body shapes had the highest scores, and pear body shapes had the lowest body cathexis scores. The participants with higher body cathexis scores preferred more fitted clothing. In conclusion, the researchers noted that gaining a better understanding of fit preference, could provide an improved way to develop apparel sizes for different target markets.

#### Clothing Benefits Sought

Clothing serves different purposes, which makes it important to understand what all consumers desire in their apparel. Lee and Burns (1993) studied clothing purchase criteria. Participants rated their most recent clothing purchase based on the following 13 attributes: fashionability of garment, attractiveness, style or design, fabric design, garment color, fiber and fabric type, construction quality, quality of fasteners, comfort, durability, ease of care, price, and brand name. Participants who had high public self-consciousness found fashion, attractiveness, and fabric design to be important attributes in a clothing purchase.

Shim and Bickle (1994) researched the benefits women seek in clothing, and found that three groups of benefits sought emerged. Each group varied in regards to the benefits segments

of psychographics, patronage behavior, and demographics. Group one was labeled “Symbolic/Instrumental user of clothing.” It was the largest group, comprising 51% of the sample. In this group, apparel was a means of identity in social class, profession, and role in life. It consisted of younger and more upscale shoppers in comparison to the other two groups. Group two was referred to as “Practical/Conservative users of shopping.” These consumers were focused more on the comfort of clothing than a fashion forward appearance. They tended to be more middle class and older than the consumers in the first group. Group three was named “Apathetic users of clothing.” They were the smallest group, consisting of only 14% of participants. Clothing was immaterial to this group. Shim and Bickle concluded that consumer characteristics affect the benefits consumers seek in a product.

Alexander et al. (2005) included the benefits consumers seek in clothing in their study of fit preferences and body cathexis. The clothing benefits scale included six-subcales that measured fashion image, figure flaw compensation, sex appeal, clothing preferences, fashion innovativeness, and satisfaction with ready-to-wear (RTW). Participants who placed importance on fashion innovativeness and satisfaction with RTW preferred a fitted jacket. Women who were not satisfied with their body preferred a looser fit.

## CHAPTER 3: METHODOLOGY

This was an exploratory study that examined women's swimsuit style preference, what areas of the body they seek to emphasize and de-emphasize, and what benefits they seek in customized swimwear in relation to their body shape, age, and dress size. The goal is to learn more about garment preferences of women ages 19 and older with varied body shapes and sizes.

### Sample and Data

#### *Sample*

The study consisted of women who purchased customized swimwear; this was assumed because they have difficulty finding swimwear that fits, flatters their body, and they like. The ages of the women were 19 and older. Body scans and data from questionnaires of 463 women who were customers of Company A from 2007-2009 served as the convenience sample.

#### *Data Source*

For the scan, customers were instructed to remove all loose objects (such as jewelry or glasses) before entering the body scanner. During the scanning process, customers wore their own closely fitted, nude colored undergarments. The customer entered the scanner alone, making it a private process. The scanner automatically scanned each subject three times in case the first or second scan was not acceptable. The body measurement locations extracted from the body scan were defined by the company.

After the body scan, the consultant captured customers' body measurements, assigned body shape, and front and side printed views of their body scan.

Proprietary software, developed by the business owner, informed the consultant of each customer's body shape based on five to six variables found in the body scan. A customer's body shape was identified from the following selections (Personal communication, November 4, 2009):

- H-Rectangular - "Straight to moderate curves, square hips and waist, upper and lower torso equally proportioned, and arms and legs are slim in proportion to the rest of your body"
- X-Hourglass - "Both hips and bust are proportionate in size, well-defined waist, and slim or average legs with curvy thighs"
- V-Inverted Triangle - "Shoulders and bust are broad in comparison to waist and hips, narrow waist and hips, slim or muscular arms and legs, and often professional or highly trained athletes"
- O-Circle - "Upper body appears larger than lower body, hips measure the same or smaller than bust and are square in form, and full waist and tummy sometimes measure larger than bust or hips"
- A-Triangle - "Shoulders and bust are proportionately smaller than hips, average-sized or larger legs, and often long-waisted, and shapely waist"

After body shape was determined, completion of a questionnaire was administered by a consultant in an open area of the store. Responses to the questionnaire informed Company A of what the customer desired in their customized swimsuit. The consultant filled out the questionnaire for the customer based on their responses. The customer indicated up to three

areas of her body that she wanted emphasized and up to three areas that she wanted de-emphasized while wearing a swimsuit. Then, the customer selected up to three benefits she desired in her swimsuit. Next, the customer self-reported her typical dress size in ready-to-wear. Lastly, the customer selected the type of swimsuit she preferred. A combination of the customer's body shape and objectives sometimes prompted the consultant to suggest a type of swimsuit.

Four hundred and sixty three responses, to only the data variables which were being analyzed, by women ages 19 and older were emailed, in an excel file, to the researcher for analysis. The data were used to analyze the relationship that swimwear benefits sought in swimwear, areas of emphasis, areas of de-emphasis, and swimwear style preference had with body shape, age, and dress size.

#### *Variables*

The questionnaire was developed by the business owner. It included demographics, body shape, desires in swimwear, shopping habits, and ready-to-wear information. The researcher examined one demographic (age), body shape, dress size, and goals for swimwear. Age was the only demographic provided to the researcher in order to protect customers' confidentiality.

Body shape, actual age, and self-reported dress size were the independent variables in this study. The body shapes that could be assigned by Company A were as follows:

- H-Rectangle
- X-Hourglass
- V-Inverted Triangle
- O-Circle



- A-Triangle

The dependent variables were: type of swimwear style preference, body area emphasis and de-emphasis preferences, and benefits sought in swimwear. The customer chose from the following selections:

- Bikini
- Tankini
- One-piece

Up to three body areas for emphasis and up to three for de-emphasis were selected by customers from the following options (with a fill in the blank option under emphasis):

- Arms/Legs
- Bust
- Hips
- Seat
- Thighs
- Tummy
- Waist
- Additional areas of desired emphasize \_\_\_\_\_

Up to three benefits sought in swimwear were chosen from the following selections:

- Minimize full hips and thighs
- Provide extra tummy control
- Enhance bust
- Support bust
- Minimize bust

- Visually lengthen torso
- Visually shorten torso
- Deemphasize full arms
- Deemphasize full legs
- Accentuate waistline

### Data Analysis

The data for body shape, swimsuit style preference, body area emphasis and de-emphasis, and swimsuit benefits sought were numerically coded using a key. The data were separated into 26 variables in the data based and named according to the nature of the selection. When a respondent did not select three areas of emphasis/de-emphasis and swimsuit benefits sought, the data cell was left blank to indicate no data. Age and dress size were clustered into groups. Age was clustered by decade as follows: 19-29, 30-39, 40-49, 50-59, and 60-70. Dress size was clustered as: x-small (2-4), small (6-8), medium (10-12), large (14-16), and x-large (18-20+). The coded data were entered into the Statistical Package for the Social Sciences (SPSS) for analysis. The data were analyzed according to each research question.

#### *1. Is there a relationship between body shape and swimsuit style preference?*

A two-way chi square analysis and a follow-up cross tabulation were used to determine if there was a relationship between swimsuit style preference and body shapes. Additionally, three chi square one-way analyses and a follow-up non parametric were performed to determine the statistical significance. The alpha level was .05. The independent variable was body shape and the dependent variable was swimsuit style preference.

2. *Is there a relationship between body shape and body areas of emphasis preferences?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between body shape and body area emphasis. The independent variable was body shape and the dependent variable was body areas of emphasis preferences.

3. *Is there a relationship between body shape and body areas of de-emphasis preferences?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between body shape and body area de-emphasis. The independent variable was body shape and the dependent variable was body areas of de-emphasis preferences.

4. *Is there a relationship between body shape and swimsuit benefits sought?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between body shape and swimsuit benefits sought. The independent variable was body shape and the dependent variable was swimsuit benefits sought.

5. *Is there a relationship between age and swimsuit style preference?*

A two-way chi square analysis and a follow-up cross tabulation were used to determine if there was a relationship between swimsuit style preference and age. Additionally, three chi square one-way analyses and a follow-up non parametric were performed to determine the statistical significance. The alpha level was .05. The independent variable was age and the dependent variable was swimsuit style preference.

6. *Is there a relationship between age and body areas of emphasis preferences?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between age and body areas of emphasis. The independent variable was age and the dependent variable was body areas of emphasis preferences.

*7. Is there a relationship between age and body areas of de-emphasis preferences?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between age and body areas of de-emphasis. The independent variable was age and the dependent variable was body areas of de-emphasis preferences.

*8. Is there a relationship between age and swimsuit benefits sought?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between age and swimsuit benefits sought. The independent variable was age and the dependent variable was benefits sought.

*9. Is there a relationship between dress size and swimsuit style preference?*

A two-way chi square analysis and a follow-up cross tabulation were used to determine if there was a relationship between swimsuit style preference and dress size. Additionally, three chi square one-way analyses and a follow-up non parametric were performed to determine the statistical significance. The alpha level was .05. The independent variable was dress size and the dependent variable was swimsuit style preference.

*10. Is there a relationship between dress size and body area emphasis preference?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between dress size and body areas of emphasis. The independent variable was dress size and the dependent variable was body areas of emphasis preferences.

*11. Is there a relationship between size and body area de-emphasis preference?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between dress size and body areas of de-emphasis. The independent variable was dress size and the dependent variable was body areas of de-emphasis preferences.

*12. Is there a relationship between size and swimsuit benefits sought?*

Descriptive statistics frequencies and percentages were used to determine if there was a relationship between dress size and swimsuit benefits sought. The independent variable was dress size and the dependent variable was benefits sought.

## CHAPTER 4: ANALYSES AND RESULTS

The purpose of this research was to analyze the possible relationships that women's body shape, age, and dress size have with their preferences for swimsuit style, areas of their body which they seek to emphasize and de-emphasize, and benefits they seek in customized swimwear. A business owner, who creates customized swimwear for individuals, provided anonymous customer data to implement the study. At the business, a 3D body scanner was used to determine the customer's body shape. Following the body scanning process, the customers completed a questionnaire informing the company of what they sought in their swimwear. The portions of the questionnaires completed that were relevant to the research were emailed in an excel file to the researcher. The customer data were categorized by their body shape, age, and dress size by the researcher.

### Sample

Subjects were customers who purchased custom made swimwear from 2007 to 2009. A total of 463 completed questionnaires were received from the company for analysis. Tables 1, 2, and 3 reveal the frequencies and percentages of customers' body shape, age, and dress size. The majority of respondents had a rectangle or hourglass body shape. About  $\frac{3}{4}$  of the women were between the ages of 30-59. The two dress size groups which more than 60% of respondents fell into were 6-8 and 10-12.

Table 1

*Body Shapes Frequencies and Percentages*

Rectangle	Hourglass	Inverted Triangle	Circle	Triangle
161 (35%)	125 (27%)	25 (5.40%)	94 (20%)	38 (12.50%)

Table 2

*Ages Frequencies and Percentages*

19-29	30-39	40-49	50-59	60-69	70-101
65 (14%)	120 (25.9%)	129 (27.9%)	(102) 22%	32 (6.9%)	15 (3.20%)

Table 3

*Dress Sizes Frequencies and Percentages*

Size (0)	Size (2-4)	Size (6-8)	Size (10-12)	Size (14-16)	Size (18-24)
10 (2%)	93 (20.10%)	159 (34.30%)	121 (26.10%)	65 (14%)	15 (3.20%)

## Findings

*Research Question 1: Is there a relationship between body shape and swimsuit style preference?*

A two-way Chi square analysis and a follow-up cross tabulation were used to examine the relationship between swimsuit style preference and body shapes (see Table 4). Then, three Chi square one-way analyses and a follow-up non parametric were performed to determine the statistical significance between three swimsuit style options and five body shape options (see Table 5).

The Cross-tabulations for body shape and style preference shown in Table 4 revealed a significant Chi square value ( $\chi^2 (8) = 78.224 p = .000$ ), indicating that a relationship existed between swimsuit style preference and body shape. The results of both Tables 4 and 5 show that nearly half of rectangle and inverted triangle body shapes preferred the bikini style swimsuit. The rectangle and inverted triangle were respectively the largest and smallest body shape groups. The inverted triangles were found to only have significant preference for the bikini style over the one piece style while the rectangle shape subjects significantly preferred the bikini style over the one piece and tankini styles.

The tankini style was preferred the most by hourglass and triangle body shapes with the highest preference shown by nearly 60% of triangle shapes. Hourglass body shapes only showed significant preference for the tankini style over a bikini style. No significant preferences were found in hourglass body shapes for the tankini over the one piece style or the one piece over the bikini style. Triangle body shapes, however, significantly preferred the tankini style over both of the other styles.



The one piece style was highly preferred by over 50% of circle body shapes. They significantly preferred the one piece over the tankini and bikini style, plus the tankini over the bikini style. The bikini style was the least preferred by less than 10% of circle body shapes.

Table 4

*Cross-tabulations Body shape and Style Preferences*

Style Preference		Body Shape					Total
		rectangle	hourglass	inverted triangle	circle	triangle	
One-piece	Count	38	37	4	54	11	144
	% within style preferences	26.4%	25.7%	2.8%	37.5%	7.6%	100.0%
	% within Body shape	23.6%	29.6%	16.0%	<b>57.4%</b>	19.0%	31.1%
tankini	Count	46	55	9	34	34	178
	% within style preferences	25.8%	30.9%	5.1%	19.1%	19.1%	100.0%
	% within Body shape	28.6%	<b>44.0%</b>	36.0%	36.2%	<b>58.6%</b>	38.4%
bikini	Count	77	33	12	6	13	141
	% within style preferences	54.6%	23.4%	8.5%	4.3%	9.2%	100.0%
	% within Body shape	<b>47.8%</b>	26.4%	<b>48.0%</b>	6.4%	22.4%	30.5%
Total	Count	161	125	25	94	58	463
	% within style preferences	34.8%	27.0%	5.4%	20.3%	12.5%	100.0%
	% within Body shape	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Bold indicates the most frequent selections made by each group.

$$\chi^2 (8) = 78.224 \quad p = .000$$

Table 5

*Chi square One Way Analysis for Body Shape and Swimsuit Style Preference*

Body Shapes	One piece and bikini $\chi^2(1) =$	One Piece and tankini: $\chi^2(1) =$	Tankini and bikini: $\chi^2(1) =$
Rectangle	13.226, $p = .000$	.762, $p = .383$	7.813, $p = .005$
Hourglass	.229, $p = .633$	3.522, $p = .061$	5.500, $p = .019$
Inverted Triangle	4, $p = .046$	1.923, $p = .166$	.429, $p = .513$
Circle	38.400, $p = .000$	4.545, $p = .033$	19.6, $p = .000$
Triangle	.167, $p = .683$	11.756, $p = .001$	9.383, $p = .002$

*Research Question 2: Is there a relationship between body shape and body areas of emphasis preferences?*

Frequencies and percentages were used to qualitatively analyze apparent relationships between emphasis and body shape. Table 6 shows each of the body shape groups' preferences as to what areas of their body to emphasize while wearing a swimsuit. The three selections most commonly chosen by respondents are highlighted (in bold) in Table 6 and will be discussed on that basis.

Arms and legs, bust, and waist were three areas most frequently chosen across all shape groups. The hips, seat, thighs, and tummy were the areas which emphasis was not commonly sought by all shape groups. Inverted triangle and circle body shapes showed a higher preference for emphasis in the arms and legs than the other shapes. Rectangle and triangle body shapes preference for chose emphasis in the bust was higher than the other groups. Over 30% of

hourglass and triangle body shapes chose more emphasis in the waist in comparison to the other shape groups.

The arms and legs and bust were the most frequently preferred areas of emphasis. Inverted triangles indicated the highest preference for emphasis in their arms and legs while the remaining shape groups sought the most emphasis in their bust area.

The second most commonly chosen areas, by all shape groups, included each top selection (arms and legs, bust, and waist). The difference between the most commonly selected area of emphasis and the second most commonly selected area of emphasis for hourglass, inverted triangle, and circle body shapes was less than 6%. The waist was the second most commonly preferred area of emphasis for rectangle, hourglass, and triangle body shapes. Arms and legs were the second most common choice for circle body shapes. The bust area was shown the least preference by inverted triangle body shapes.

The waist was a third most common selection for circle and inverted triangle body shapes. The remaining body shapes (rectangle, hourglass, and triangle) picked arms and legs as their third most common area of emphasis.

Table 6

*Emphasis and Body Shape*

	Rectangle	Hourglass	Inverted Triangle	Circle	Triangle
Arms/Legs	<b>39 (16.6%)</b>	<b>36 (17.8%)</b>	<b>12 (31.6%)</b>	<b>38 (30.4%)</b>	<b>11 (13.4%)</b>
Bust	<b>110 (46.8%)</b>	<b>76 (37.6%)</b>	<b>10 (26.3%)</b>	<b>42 (33.6%)</b>	<b>40 (48.8%)</b>
Hips	5 (2.1%)	1 (.5%)	4 (10.5%)	3 (2.4%)	0
Seat	9 (3.8%)	12 (5.9%)	3 (7.9%)	8 (6.4%)	2 (2.4%)
Thighs	4 (1.7%)	0	1 (2.6%)	2 (1.6%)	1 (1.2%)
Tummy	8 (3.4%)	4 (2%)	3 (7.9%)	0	3 (3.7%)
Waist	<b>60 (25.5%)</b>	<b>73 (36.1%)</b>	<b>5 (13.2%)</b>	<b>32 (25.6%)</b>	<b>25 (30.5%)</b>

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 3: Is there a relationship between body shape and body areas of de-emphasis preferences?*

As for Research Question 2, frequencies and percentages were used also used to analyze notable relationships between de-emphasis and body shape. The areas of the body which respondents sought to de-emphasize are shown in Table 7. The top three selections in each shape group are also shown in bold.

The top three areas of the body chosen for de-emphasis overall included: bust, hips, thighs, tummy, and waist. The areas which the fewest respondents, across all groups, sought to de-emphasize were seat and arms and legs. Overall, the tummy was the one area that was in the top three choices of all shapes. Thighs were also a commonly selected area by all shapes except circle. In fact, de-emphasis in the tummy and thighs were preferred by almost each of the body shape group except for circle for thighs.

Nearly half of circle body shapes preferred de-emphasis in their tummy more than any other area. It was also the top pick for de-emphasis of the rectangle and inverted triangle body shapes, although by approximately 30% of each of those groups. Slightly fewer of the hourglass group also selected de-emphasis in their tummy (26.8%), but thighs (28%) were their most common choice (28% for the later and 26.8% for the former). Fewer shapes showed interest in de-emphasizing their hips, but of those, triangle (30.4%) body shapes did the most.

Thighs were the second most common area where de-emphasis was sought by the rectangle, inverted triangle, and triangle body shapes. Hourglass body shapes only preferred de-emphasis in their tummy (26.8%) slightly less than de-emphasis in their thighs (28%). Just 13-15% of circle body shapes preferred de-emphasis in areas other than the tummy (waist and bust).

The bust was third most commonly preferred by both inverted triangle and circle body shapes. The hips were the third most commonly chosen area of de-emphasis by rectangle and hourglass body shapes. De-emphasis in the tummy area was least preferred by triangle body shapes.

Table 7

*De-emphasis and Body Shape*

De-emphasis	Rectangle	Hourglass	Inverted Triangle	Circle	Triangle
Arms/Legs	15 (5.3%)	15 (5.7%)	4 (9.3%)	2 (1.1%)	5 (4%)
Bust	18 (6.4%)	18 (6.9%)	<b>7 (16.3%)</b>	<b>23 (12.9%)</b>	0
Hips	<b>47 (16.4%)</b>	<b>53 (20.3%)</b>	5 (11.6%)	19 (10.7%)	<b>38 (30.4%)</b>
Seat	32 (11.4%)	25 (9.2%)	4 (7%)	6 (3.4%)	20 (16%)
Thighs	<b>74 (26.4%)</b>	<b>73 (28%)</b>	<b>8 (18.6%)</b>	21 (11.8%)	<b>36 (28.8%)</b>
Tummy	<b>82 (29.3%)</b>	<b>71 (26.8%)</b>	<b>13 (30.2%)</b>	<b>81 (45.5%)</b>	<b>24 (19.2%)</b>
Waist	13 (4.6%)	8 (3.1%)	3 (7%)	<b>26 (14.6%)</b>	2 (1.6%)

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 4: Is there a relationship between body shape and swimsuit benefits sought?*

Frequencies and percentages were used to evaluate the probable relationships that exist between benefits sought and body shape. The benefits sought by each body shape are shown in Table 8. The three selections most frequently identified by respondents are in bold and will be discussed on that basis.

The top three chosen across all shape groups were to minimize hips and thighs, tummy control, enhance bust, support bust, and visually lengthen torso. Visually shorten torso, de-emphasize full arms, de-emphasize full legs, and accentuate waistline were the least frequently selected. Tummy control was the only benefit that was highly preferred by all body shapes. Circle body shapes showed the highest preference for tummy control. Support bust was also frequently sought by all shape groups with the exception of triangle. Approximately 30% of hourglass and inverted triangle shapes favored support bust more frequently. Rectangle body

shapes sought more benefits in bust enhancement. Triangle body shapes preferred to minimize hips and thighs the most.

The second most commonly preferred benefits were sought in the bust and tummy areas. The next most highly preferred benefit by rectangle, hourglass, and triangle body shapes was tummy control; approximately 20% of each group picked it. Enhance bust was the second most frequently selected benefit by inverted triangle body shapes, although by less than 15%. Support bust was the second most highly sought benefit by circle body shapes.

Support bust was the third most commonly chosen benefit by rectangle body shapes. Hourglass body shapes' third main selection was minimize hips and thighs. Less than 10% of circle body shapes sought benefits in the waist as their third top choice. Triangle body shapes third top selection was enhance bust.

The body shapes with the most similar selections were rectangle and inverted triangle. Both body shapes sought the most benefits in their upper and mid-drift body (tummy control, enhance bust, and bust support). Hourglass and circle body shape also chose similar benefits in their swimwear with nearly 60% seeking tummy control and bust support.



Table 8

*Benefits Sought and Body Shape*

	Rectangle	Hourglass	Inverted Triangle	Circle	Triangle
Minimize Hips and thighs	57 (15.7%)	<b>58 (18%)</b>	6 (10.2%)	19 (8.2%)	<b>43 (29.7%)</b>
Tummy control	<b>66 (18.1%)</b>	<b>66 (20.4%)</b>	<b>7 (11.8%)</b>	<b>76 (32.6%)</b>	<b>30 (20.7%)</b>
Enhance bust	<b>77 (21.2%)</b>	24 (7.4%)	<b>8 (13.5%)</b>	15 (6.4%)	<b>27 (18.6%)</b>
Support bust	<b>61 (16.8%)</b>	<b>86 (26.6%)</b>	<b>18 (30.5%)</b>	<b>64 (27.5%)</b>	15 (10.3%)
Mini. Bust	9 (2.5%)	6 (1.9%)	3 (5.1%)	15 (6.4%)	2 (1.4%)
Visually lengthen torso	31 (8.5%)	22 (6.8%)	2 (3.4%)	<b>20 (8.5%)</b>	10 (6.9%)
Visually shorten torso	9 (2.5%)	4 (1.2%)	1 (1.7%)	0	0
deemphasize full arms	6 (1.6%)	4 (1.2%)	2 (3.4%)	5 (2.2%)	3 (2.1%)
Deemphasize full legs	14 (3.8%)	17 (5.3%)	6 (10.2%)	5 (2.2%)	7 (4.8%)
Accentuate waistline	34 (9.3%)	36 (11.2%)	6 (10.2%)	14 (6%)	8 (5.5%)

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 5: Is there a relationship between age and swimsuit style preference?*

The relationship between style preference and age was evaluated by performing a two-way Chi square analysis and a follow-up cross tabulation (see Table 9). Three Chi square one-way analyses and a follow-up non parametric were also performed to determine the statistical significance between the three swimsuit style options and six age groups (see Table 10).

The Cross-tabulations for age and style preference shown in Table 9 revealed a significant Chi square value ( $\chi^2 (10) = 148.760 p = .000$ ), which suggested that a relationship does exist between swimsuit style preference and age. Table 10 identifies the specific association each age group has with swimsuit style preference. More than 70% of women aged 19-29

selected the bikini style swimsuit. They showed a significant preference for the bikini style over the one piece and tankini styles. Additionally, they preferred the tankini over the one piece style. Only a small number of women between the ages of 30-39 chose the tankini (n= 50) over the bikini (n= 48). Thus, significant preference for the tankini and bikini styles compared to the one piece style was shown by about 80% of women aged 30-39. The tankini style was preferred by half of the women aged 40-49, and that preference was significant in comparison to the other two styles.

At increasing rates 55-80% of women over the age of 50 favored the one piece. Among the 102 50-59 year old women, just 11 picked a bikini. None of the women aged 60 or over did. The 50-59 year olds showed a significant preference for the one piece over the other two styles and for the tankini over the bikini. Women 60 and older significantly preferred a one piece over the tankini style.

Table 9

*Cross-tabulations Age and Style Preferences*

Style Preference		Age					Total	
		19-29	30-39	40-49	50-59	60-69		70-101
one piece	Count	3	22	29	56	22	12	144
	% within style preferences	2.1%	15.3%	20.1%	38.9%	15.3%	8.3%	100.0%
	% within Age	4.6%	18.3%	22.5%	<b>54.9%</b>	<b>68.8%</b>	<b>80.0%</b>	31.1%
tankini	Count	15	50	65	35	10	3	178
	% within style preferences	8.4%	28.1%	36.5%	19.7%	5.6%	1.7%	100.0%
	% within Age	23.1%	<b>41.7%</b>	<b>50.4%</b>	34.3%	31.3%	20.0%	38.4%
bikini	Count	47	48	35	11	0	0	141
	% within style preferences	33.3%	34.0%	24.8%	7.8%	.0%	.0%	100.0%
	% within Age	<b>72.3%</b>	<b>40.0%</b>	27.1%	10.8%	.0%	.0%	30.5%

Bold indicates the most frequent selections made by each group.  $\chi^2 (10) = 148.760, p = .000$

Table 10

*Chi square One Way Analysis for Age and Swimsuit Style Preference*

Age	One piece and bikini: $\chi^2(1) =$	One Piece and tankini: $\chi^2(1) =$	Tankini and bikini: $\chi^2(1) =$
19-29	38.720, $p = .000$	8.000, $p = .005$	16.516, $p = .000$
30-39	9.657, $p = .002$	10.889, $p = .001$	.041, $p = .840$
40-49	.563, $p = .453$	13.787, $p = .000$	9.000, $p = .003$
50-59	1.30.224, $p = .000$	4.846, $p = .028$	12.522, $p = .000$
60-69	None	4.500, $p = .034$	None
70-101	None	5.400, $p = .020$	None

*Research Questions 6: Is there a relationship between age and body areas of emphasis preferences?*

Frequencies and percentages were used to study the relationship between emphasis and age. Table 11 shows the areas of the body that each age group preferred to emphasize while wearing a swimsuit. The three most frequently selected areas of emphasis are highlighted (in bold) in Table 11 and will be discussed accordingly.

The arms and legs, bust, and waist were the three areas of the body where the most emphasis was sought across all age groups. Less than 10% of respondents from each age group showed interest in emphasizing their hips, seat, thighs, and tummy. The bust and waist were the most selected areas of emphasis by more than 40% of all respondents. Women 59 and younger chose more emphasis in the bust, while women 70 and older sought more emphasis in the waist.

Each top chosen (arms and legs, bust, and waist) area was a second most common selection for each group. The waist was also the second most commonly preferred area of emphasis for age groups 19-29, 30-39, 40-49, and 60-69. Arms and legs were shown the highest preference by ages 50-59 and it was their next most frequently chosen area of emphasis. Respondents 70 and older selected the bust as their second most common area of emphasis.

Among the top three selections, arms and legs were the least preferred by all age groups except ages 50-59. Instead, ages 50-59 preferred slightly less emphasis in the waist than in their arms and legs.

Table 11

*Emphasis and Age*

	19-29	30-39	40-49	50-59	60-69	70-101
Arms/Legs	<b>19 (18.6%)</b>	<b>35 (20.3%)</b>	<b>37 (18.5%)</b>	<b>37 (26.6%)</b>	<b>6 (13.6%)</b>	<b>3 (16.6%)</b>
Bust	<b>42 (41.2%)</b>	<b>73 (42.4%)</b>	<b>80 (40%)</b>	<b>60 (43.2%)</b>	<b>18 (40.9%)</b>	<b>5 (27.8%)</b>
Hips	3 (2.9%)	3 (1.7%)	3 (1.5%)	2 (1.4%)	2 (4.5%)	0
Seat	10 (9.8%)	11 (6.4%)	8 (4%)	3 (2.2%)	1 (2.3%)	1 (5.6%)
Thighs	0	1 (.6%)	4 (2%)	1 (.7%)	1 (2.3%)	1 (5.6%)
Tummy	3 (2.9%)	8 (4.7%)	5 (2.5%)	2 (1.4%)	0	0
Waist	<b>25 (24.5%)</b>	<b>41 (23.8%)</b>	<b>63 (31.5%)</b>	<b>34 (24.5%)</b>	<b>16 (36.4%)</b>	<b>8 (44.4%)</b>

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 7: Is there a relationship between age and body areas of de-emphasis preferences?*

An examination of how de-emphasis and age are related was conducted by analyzing the results of the frequencies and percentages. The areas of the body where de-emphasis was preferred by each age group are shown in Table 12. The main three areas where de-emphasis was sought by each age group are indicated in bold and will be discussed on that basis.

All age groups had the same top three areas favored for de-emphasis; these were the hips, thighs, and tummy. Arms and legs, bust, seat, and waist were the areas of the body that respondents chose less often for de-emphasis. Thighs were the top selection of women aged 49 and younger; approximately 30% of them identified thighs, and 19-27% of them picked the tummy for de-emphasis. The two most common choices of women aged 50-59 were switched in comparison to the younger women, with tummy being their most frequent selection and thighs second most frequent. Their desire for tummy de-emphasis increased from 27% (50-59) to 43% (60-69) to 56% (70+). Hips were the third most common choice for de-emphasis for women under age 60, except for the 30-39 age group. Thighs were the third overall pick for ages 60 and older. Selections for de-emphasis across body areas were more evenly distributed for women less than 60.

Table 12

*De-emphasis and Age*

	19-29	30-39	40-49	50-59	60-69	70-101
Arms/Legs	8 (6.9%)	10 (5.1%)	11 (4.5%)	8 (5.2%)	4 (6.3%)	0
Bust	13 (11.2%)	16 (8.1%)	21 (8.7%)	11 (7.1%)	3 (4.8%)	2 (8%)
Hips	<b>17</b> <b>(14.7%)</b>	<b>48</b> <b>(24.2%)</b>	<b>50</b> <b>(20.7%)</b>	<b>32</b> <b>(20.6%)</b>	<b>11</b> <b>(17.5%)</b>	<b>4 (16%)</b>
Seat	8 (6.9%)	25 (12.6%)	30 (12.4%)	20 (12.9%)	4 (6.3%)	0
Thighs	<b>35</b> <b>(30.2%)</b>	<b>59</b> <b>(29.8%)</b>	<b>71</b> <b>(29.4%)</b>	<b>34</b> <b>(21.9%)</b>	<b>9 (14.3%)</b>	<b>3 (12%)</b>
Tummy	<b>31</b> <b>(26.7%)</b>	<b>38</b> <b>(19.2%)</b>	<b>56</b> <b>(23.1%)</b>	<b>42</b> <b>(27.1%)</b>	<b>27</b> <b>(42.9%)</b>	<b>14 (56%)</b>
Waist	4 (3.4%)	2 (1%)	3 (1.2%)	8 (5.2%)	5 (7.9%)	2 (8%)

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 8: Is there a relationship between age and swimsuit benefits sought?*

In order to determine the relationship between age and benefits sought in swimwear, descriptive statistics frequencies and percents were analyzed. The benefits sought by each age group are show in Table 13. The three most commonly selected options are highlighted in bold and will be discussed accordingly.

Minimize hips and thighs, tummy control, enhance bust, support bust, visually lengthen torso, and accentuate waistline were the most commonly sought benefits across the age groups. Support bust was one of the only selections that made the list of top three choices of women of all ages. Tummy control was a common preference by all age groups except for 19-29.

Minimize bust, visually shorten torso, de-emphasize full arms, and de-emphasize full legs were selected by less than 10% of all age groups.

Women aged 19-29 most commonly sought bust support. Nearly the same number of women 30-39 identified bust support and minimization in the hips and thighs. Beginning at age 40, the top choice of the most women was tummy control. Proportionally more women 50 and older sought the tummy control benefit than those 40-49.

Connecting to their most frequent benefit sought, the 19-29 groups' second most common choice as enhance bust. Support bust was the second most commonly preferred benefit for women 30 and older, consisting of approximately 20-24% of them. The benefits sought third most frequently varied more across groups. Accentuate the waistline was the third most common selection by women aged 19-29, although it was less than 15% of them. They were the only age group to have accentuate the waistline as one of the top choices. Tummy control was the third preference of the 30-39 age group. Minimization in the hips and thighs was the third common selection for ages 40-49 and 60-101 (although only 10.8% of the oldest group). The 50-59 year olds were different; 10.5% of them picked enhance bust, and visually lengthen torso.



Table 13

*Benefits Sought and Age*

	19-29	30-39	40-49	50-59	60-69	70-101
Minimize Hips and thighs	16 (10.8%)	<b>60</b> ( <b>20.4%</b> )	<b>64</b> ( <b>18.7%</b> )	26 (9.9%)	<b>13</b> ( <b>16.3%</b> )	<b>4</b> ( <b>10.8%</b> )
Tummy control	18 (12.2%)	<b>49</b> ( <b>16.7%</b> )	<b>74</b> ( <b>21.6%</b> )	<b>80</b> ( <b>30.4%</b> )	<b>27</b> ( <b>33.8%</b> )	<b>11</b> ( <b>29.7%</b> )
Enhance bust	<b>26</b> ( <b>17.6%</b> )	48 (16.3%)	42 (12.2%)	<b>28</b> ( <b>10.6%</b> )	4 (5%)	3 (8.1%)
Support bust	<b>38</b> ( <b>25.7%</b> )	<b>58</b> ( <b>19.7%</b> )	<b>70</b> ( <b>20.4%</b> )	<b>53</b> ( <b>20.2%</b> )	<b>16</b> ( <b>20%</b> )	<b>9</b> ( <b>24.3%</b> )
Mini. Bust	5 (3.4%)	9 (3.1%)	7 (2%)	8 (3%)	4 (5%)	2 (5.4%)
Visually lengthen torso	10 (6.6%)	18 (6.1%)	28 (8.1%)	<b>28</b> ( <b>10.6%</b> )	5 (6.2%)	5 (13.5%)
Visually shorten torso	6 (4.1%)	4 (1.4%)	2 (.6%)	2 (.8%)	0	0
De-emphasize full arms	1 (.7%)	3 (1%)	3 (.9%)	8 (3%)	5 (6.2%)	0
De-emphasize full legs	8 (5.4%)	14 (4.8%)	16 (4.7%)	8 (3%)	2 (2.5%)	1 (2.7%)
Accentuate waistline	<b>20</b> ( <b>13.5%</b> )	31 (10.5%)	37 (10.8%)	22 (8.4%)	4 (5%)	2 (5.4%)

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 9: Is there a relationship between dress size and swimsuit style preference?*

A two-way Chi square analysis and a follow-up cross tabulation were used to investigate the relationship between swimsuit style preference and dress size (see Table 14). Three Chi square one-way analyses and a follow-up non parametric were then performed to establish the statistical significance between three swimsuit style options and six dress size groups (see Table 15).

The Cross-tabulations for dress size and style preference shown in Table 14 revealed  $\chi^2(10) = 142.666, p = .000$ , indicating that there is a relationship between swimsuit style preference and dress size. To conclude the specific relationship each dress size group had with swimsuit

style preference, the results of the one way analysis must be examined. Table 15 shows the results of each one way analysis between dress size and swimsuit style preference.

The results shown in Tables 14 and 15 show that the women with the smallest dress sizes (0-4) chose the bikini style more frequently than those who identified dress sizes larger than that. Women who wore over a dress size 4 indicated a higher preference for the tankini and one piece styles than the bikini style. Whereas 74-80% of the size 0 and 2-4 groups preferred a bikini, one person out of 65 women who wore 14-16 and none of the sizes 18-24 group wanted a bikini. Conversely, preferences for a tankini and one piece generally increased from the smaller to the larger sizes.

Besides a significant preference for a bikini in comparison to a tankini or one piece suit, the size 0 and 2-4 groups both showed no difference in the preference for a one piece compared to a tankini style. Dress size groups 6-8, 10-12, 14-16, and 18-24 selected the tankini style most frequently (43-60% within each size group). Women who wore dress sizes 6-8 had a significant preference for the tankini compared to the bikini, but not the tankini compared to the one piece. Dress sizes 10-12 and 14-16 significantly preferred the tankini and one piece styles over the bikini style. More of those who wore 10-12 selected a tankini than a one piece, but more of those who wore 14-16 selected a one piece, but neither comparison was significant. The women who wore at least a size 18 picked a tankini (60%) or one piece (40%), but their choices were not significantly different.

Table 14

*Cross-tabulations Dress Size and Style Preferences*

Style Preference		Dress Size						Total
		0	2-4	6-8	10-12	14-16	18-24	
one-piece	Count	1	12	47	45	33	6	144
	% within style preferences	.7%	8.3%	32.6%	31.3%	22.9%	4.2%	100.0%
	% within dress size	10.0%	12.9%	29.6%	<b>37.2%</b>	<b>50.8%</b>	40.0%	31.1%
tankini	Count	1	12	69	56	31	9	178
	% within style preferences	.6%	6.7%	38.8%	31.5%	17.4%	5.1%	100.0%
	% within dress size	10.0%	12.9%	<b>43.4%</b>	<b>46.3%</b>	<b>47.7%</b>	<b>60.0%</b>	38.4%
bikini	Count	8	69	43	20	1	0	141
	% within style preferences	5.7%	48.9%	30.5%	14.2%	.7%	.0%	100.0%
	% within dress size	<b>80.0%</b>	<b>74.2%</b>	27.0%	16.5%	1.5%	.0%	30.5%

The bold indicates the 3 most frequently selected areas in each group.  $\chi^2(10) = 142.666, p = .000$

Table 15

*Chi square One Way Analysis for Dress Size and Swimsuit Style Preference*

Dress Size	One piece and bikini $\chi^2(1) =$	One Piece and tankini: $\chi^2(1) =$	Tankini and bikini: $\chi^2(1) =$
Size 0	1. 5.444, $p = .020$	.000, $p = 1.000$	5.444, $p = .020$
Size 2-4	40.111, $p = .000$	.000, $p = 1.000$	40.111, $p = .000$
Size 6-8	.178, $p = .673$	6.036, $p = .14$	4.172, $p = .041$
Size 10-12	9.615, $p = .002$	1.198, $p = .278$	17.053, $p = .000$
Size 14-16	30.118, $p = .000$	.063, $p = .803$	28.125, $p = .000$
Size 18-24	None	.600, $p = .439$	None

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 10: Is there a relationship between dress size and body area emphasis preference?*

The relationship between emphasis and dress size was examined by frequencies and percentages. Table 16 reveals each of the dress size groups' preferences for emphasis on areas of their body while wearing a swimsuit. The three selections most frequently chosen by respondents are highlighted in bold and will be discussed on that basis.

The arms and legs, waist, and bust were the main areas where emphasis was preferred. The hips, thighs, and tummy were chosen by fewer than 10% of all dress sizes. The arms and legs and the waist were the two areas that were most commonly selected by women in each dress size group. The third area, the bust, was among the top three choices of all dress sizes except for the 6-8 size group. Except for the subjects' who wore a dress size 6-8, 31-50% of all other groups, selected the bust area for emphasis, making it their most common choice. The size 0 women, however, picked arms and legs as often as they picked the bust. The women who wore

sizes 6-8 differed from the others in that half of them identified a preference for emphasis on their waist, and less than 10% picked the bust,

The second most frequently preferred areas of emphasis were the arms and legs and waist. The waist was the second most common selection for the 2-4 and 14-16 size groups (about one-quarter of each group). The arms and legs were the second most commonly chosen areas of emphasis for the 6-8, 10-12, and 18-24 size groups (27-31% of each group).

The third most commonly chosen areas of emphasis were different for each of the three smallest size groups. Twelve and a half percent of the size 0 subjects identified the waist; 16% of those who wore sizes 2-4 picked arms and legs; and less than 10% of sizes 6-8 chose the seat. The waist was the third most commonly preferred area of emphasis for dress sizes 10-12 and 18-24. Nearly as many of the size 10-12 women wanted to emphasize the waist as the arms and legs; just three of the sixteen women who wore sizes 18-24 picked the waist. The arms and legs were the third most commonly selected place to emphasize by the size 14-16 group.

Table 16

*Dress Size and Emphasis*

	Size (0)	Size (2-4)	Size (6-8)	Size (10-12)	Size (14-16)	Size (18-24)
Arms/Legs	<b>5 (31.2%)</b>	<b>25 (16.4%)</b>	<b>41 (27.2%)</b>	<b>45 (28.3%)</b>	<b>16 (18.4%)</b>	<b>5 (31.2%)</b>
Bust	<b>5 (31.2%)</b>	<b>64 (41.8%)</b>	10 (6.6%)	<b>62 (39%)</b>	<b>36 (41.4%)</b>	<b>8 (50%)</b>
Hips	1 (6.3%)	4 (2.6%)	3 (2%)	2 (1.3%)	3 (3.4%)	0
Seat	2 (12.5%)	11 (7.2%)	<b>11 (7.3%)</b>	3 (1.9%)	7 (8%)	0
Thighs	0	2 (1.3%)	2 (1.3%)	2 (1.3%)	2 (2.3%)	0
Tummy	1 (6.3%)	7 (4.6%)	8 (5.3%)	2 (1.3%)	0	0
Waist	<b>2 (12.5%)</b>	<b>40 (26%)</b>	<b>76 (50.3%)</b>	<b>43 (27%)</b>	<b>23 (26.4%)</b>	<b>3 (18.8%)</b>

The bold indicates the 3 most frequently selected areas in each group.

*Research question 11: Is there a relationship between size and body area de-emphasis preference?*

The relationship between areas of de-emphasis and dress size was determined by the analysis of frequencies and percentages. The areas of the body which were selected to be de-emphasized by each dress size group are shown in Table 17. The three selections most frequently identified by respondents are highlighted in bold and will be discussed on that basis.

The three most commonly selected areas of de-emphasis were the hips, seat, thighs, tummy, and waist. The arms and legs and bust were the least preferred areas to de-emphasize. The hips, thighs, and tummy were a common selection for all dress size groups.

Four of the size groups identified the tummy more than any other area, and the other two groups selected the thighs more than other areas where de-emphasis was sought. Dress size groups 0, 6-8, 10-12, and 14-16 most frequently sought de-emphasis in their tummy, with the highest preference (50%) shown by the 0 group and somewhat less (down to 30%) by the other ones. A similar percentage (30-32%) of women who wore dress sizes 2-4 and 18-24 most often preferred de-emphasis of their thighs.

Thighs were the second most commonly sought area of de-emphasis for the 0, 6-8, and 10-12 size groups. One-quarter of the women who wore sizes 2-4 favored de-emphasis in their tummy. The hips, thighs, and tummy were an equal, second most common selection of the sizes 18-24 group. The second most common choice of the women who wore sizes 14-16 was the hips, but that represented fewer than half the number who identified the tummy. The hips ranked as the third most common choice for de-emphasis by the women in the 0-12 size groups, although those who wore 2-4 selected the seat just as often. The third ranking choices of the 14-16 size group were the thighs and waist.

Table 17

*De-emphasis and Dress Size*

	Size (0)	Size (2-4)	Size (6-8)	Size (10-12)	Size (14-16)	Size (18-24)
Arms/Legs	1 (3.6%)	7 (4.7%)	12 (3.8%)	8 (3.2%)	11 (8.3%)	5 (11.3%)
Bust	2 (7.1%)	13 (8.8%)	19 (6.1%)	21 (8.4%)	13 (9.8%)	0
Hips	<b>3 (10.7%)</b>	<b>20 (13.5%)</b>	<b>67 (21.3%)</b>	<b>43 (17.3%)</b>	<b>21 (15.8%)</b>	<b>8 (18.2%)</b>
Seat	0	<b>20 (13.5%)</b>	31 (9.9%)	26 (10.4%)	9 (6.8%)	1 (2.3%)
Thighs	<b>6 (21.4%)</b>	<b>45 (30.4%)</b>	<b>80 (25.5%)</b>	<b>57 (22.9%)</b>	<b>14 (10.5%)</b>	<b>14 (31.8%)</b>
Tummy	<b>14 (50%)</b>	<b>37 (25%)</b>	<b>93 (29.6%)</b>	<b>79 (31.7%)</b>	<b>51 (38.3%)</b>	<b>8 (18.2%)</b>
Waist	2 (7.1%)	6 (4.1%)	12 (3.8%)	15 (6%)	<b>14 (10.5%)</b>	<b>8 (18.2%)</b>

The bold indicates the 3 most frequently selected areas in each group.

*Research Question 12: Is there a relationship between size and swimsuit benefits sought?*

Frequencies and percentages were used to explore the possible relationships between benefits sought and dress size. The benefits sought by each dress size group are show in Table 18. The three selections most commonly sought benefits by each group are highlighted in bold and will be discussed on that basis.

The dress size groups' top selections for benefits sought in swimsuits were to minimize hips and thighs, provide tummy control, enhance the bust, support the bust, visually lengthen the torso, and accentuate the waistline. Visually shorten torso, de-emphasize full arms, and de-emphasize full legs were the least sought benefits. A desire for bust support was the only main selection all groups had in common. The three most common choices of the smallest dress sizes (0-4) were generally different than the sizes larger than them. Women wearing sizes 0-4 sought to enhance their bust more than anything else. Those who were in the 6-8, 10-12, and 14-16 size

groups identified a preference for tummy control the most often. The largest size group most commonly picked bust support.

The second most common selections of the size 0 women were for bust support and visually shortening the torso. Those wearing sizes 4-6 picked accentuate waistline the second most commonly; bust support was their third most frequent choice, whereas accentuate the waistline was the third most common choice of the size 0 group. Next to tummy control, the women wearing sizes 6-8, 10-12, and 14-16 identified bust support as desirable. The second most common choice of the sizes 18-24 group was to minimize hips and thighs, which was the third most frequent selection of those who wore sizes 6-16. Within the largest size group, only one less person picked tummy control than picked minimize hips and thighs.



Table 18

*Dress Size and Benefits Sought*

	Size (0)	Size (2-4)	Size (6-8)	Size (10-12)	Size (14-16)	Size (18-24)
Minimize Hips and thighs	1 (5.3%)	29 (12.5%)	<b>68 (17.5%)</b>	<b>51 (17.1%)</b>	<b>23 (13.4%)</b>	<b>11 (25.6%)</b>
Tummy control	1 (5.3%)	26 (11.2%)	<b>87 (22.3%)</b>	<b>82 (27.5%)</b>	<b>46 (26.7%)</b>	<b>10 (23.3%)</b>
Enhance bust	<b>5 (26.3%)</b>	<b>54 (23.3%)</b>	59 (15.1%)	23 (7.7%)	11 (6.4%)	2 (4.7%)
Support bust	<b>4 (21%)</b>	<b>32 (13.8%)</b>	<b>74 (19%)</b>	<b>70 (23.5%)</b>	<b>45 (26.2%)</b>	<b>13 (30.2%)</b>
Mini. Bust	1 (5.3%)	13 (6%)	11 (2.8%)	10 (3.3%)	10 (5.8%)	1 (2.3%)
Visually lengthen torso	<b>4 (21%)</b>	28 (12.1%)	25 (6.4%)	14 (4.7%)	11 (6.4%)	3 (7%)
Visually shorten torso	0	4 (1.7%)	6 (1.5%)	2 (.8%)	2 (1.2%)	0
deemphasize full arms	0	0	3 (.8%)	5 (1.7%)	9 (5.2%)	1 (2.3%)
Deemphasize full legs	0	10 (4.3%)	18 (4.6%)	13 (4.3%)	7 (4%)	1 (2.3%)
Accentuate waistline	<b>3 (15.8%)</b>	<b>36 (15.5%)</b>	39 (10%)	28 (9.4%)	8 (4.6%)	1 (2.3%)

The bold indicates the 3 most frequently selected areas in each group.

The majority of respondents chose the same top selections for areas of emphasis, de-emphasis, and benefits sought. Overall, the most commonly sought emphasis areas were bust and waist, the most frequently sought de-emphasis areas were tummy and thighs, and the most highly preferred benefits were bust support and tummy control. Since there were variations in which the options were preferred, relationships were found among each of the groups and the objectives they sought in swimwear.

## CHAPTER 5: SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

The purpose of this research was to assess women's selection preferences for customized swimwear based on their body shape, age, and dress size. The subjects were customers of Company A in 2007-2009. The convenience sample consisted of 463 women aged 19-101. Each respondent walked into the store, received a body scan, filled out a questionnaire, and ordered a swimsuit. The body scan informed the company of the customer's body measurements and body shape. Proprietary software developed by the business owner identified the body shape from the following options: rectangle, hourglass, inverted triangle, circle, and triangle body shape. Company A provided the researcher with anonymous customer data, including age, body shape, self-reported dress size, and preference choices for swimsuit style, body area emphasis and de-emphasis, and swimsuit benefits sought.

The sample was separated and examined by the researcher according to body shape, age (categorized as 19-29, 30-39, 40-49, 50-59, 60-69, and 70-101) and dress size (categorized as 0, 2-4, 6-8, 10-12, 14-16, and 18-24). Rectangle and hourglass were the most common shapes in the study, amounting to approximately 60% of participants. These shapes have been defined as equally proportionate in upper and lower body with either a defined waist and curves (hourglass) or moderate curves and no defined waist (rectangle). The demographic information revealed that the age groups with the most subjects were 30-39 and 40-49, and the most often reported dress size groups were 6-8 and 10-12.

The instrument used to probe customers' selections was a questionnaire developed by the business owner. Respondents indicated the type of swimwear they preferred (one piece, tankini, or bikini); up to three areas of their body where they sought benefits (options being minimize full hips and thighs, provide extra tummy control, enhance bust, support bust, minimize bust, visually lengthen torso, visually shorten torso, de-emphasize full arms, de-emphasize full legs, and accentuate waistline); and up to three areas of the body where they preferred emphasis and de-emphasis (choices being arms/legs, bust, hips, seat, thighs, tummy, and waist) while wearing a swimsuit.

The data were secondary and analyzed using a two way Chi-square analysis with cross tabulation follow-up, three one way Chi-square analyses with non-parametric follow-up, and descriptive statistics (frequencies and percentages). The results from the quantitative analyses indicated that body shape, age, and dress size did have a relationship with swimwear preferences. The results from the qualitative (descriptive statistics) analyses suggested some relationships between those same variables and body areas desired for emphasis and de-emphasis, as well as benefits sought from swimwear.

## Summary

### *Style Preferences*

The bikini style was preferred more by customers with rectangle and inverted triangle body shapes. The women with rectangle body shapes were more likely to choose the bikini than either of the other two styles, but those who were inverted triangle preferred it primarily in comparison with the one piece suit. Customers with hourglass and triangle body shapes preferred the tankini style; the hourglass women selected it particularly in comparison with the

bikini. The women with a circle body shape preferred the one piece and tankini styles rather than a bikini.

The bikini and tankini style were chosen more often than the one piece by ages 39 and younger. Of the two age groups (19-29 and 30-39), the youngest mainly preferred the bikini style while the next older group was practically impartial. Ages 40-49 favored the tankini style more than other age groups. After the age of 50, respondents largely sought the one piece style. None of the women 60 and older selected a bikini style. As a whole, the older the respondents were, the more they preferred the one piece style and the less they chose the bikini style. The opposite was true for women who were younger.

The bikini style was selected more than the other two styles by dress sizes 4 and smaller. Dress sizes 6 and larger were more likely to pick the tankini or one piece style with the exception of sizes 14-16, whose preference was for the tankini style. Dress sizes 6-8 particularly preferred the tankini style over the bikini style. In general the larger the dress size, the smaller the preference became for the bikini style and the larger the preference became for the tankini style.

### *Emphasis*

Women of all body shapes tended to seek emphasis of the arms and legs, bust, and waist. The bust area was the most frequently selected area for emphasis except for inverted triangle customers, who by definition had a larger or wider upper body and most often chose to emphasize their arms and legs. Most of the rectangle, hourglass, and triangle body shape subjects preferred emphasis of the bust and waist. Of those, the hourglass group, with defined waist and balanced top and bottom shape, chose the bust and waist in similar proportions, whereas the rectangle and triangle body shapes, with less defined waists (rectangle) or relatively larger lower halves (triangles) chose the bust more commonly than the waist. Women with a

circle body shape also sought to emphasize their bust, but their second and third choices of arms and legs and waist were selected in only slightly lower proportions.

Women of all ages typically chose emphasis of their arms and legs, bust, and waist. From the main areas of selection, ages 19-69 indicated the highest preference for emphasis of their bust area and somewhat less preference for emphasis of their arms and legs and waist. The youngest (19-39) and middle (50-59) age groups chose emphasis of their arms and legs and their waist to nearly the same degree. On the other hand, ages 40-49 and 60-69 indicated a much higher preference for emphasis of their waist area compared to arms and legs. The greatest desire for emphasis of the waist area was shown by the oldest age group (70-101).

Common emphasis selections, when looked at from the perspective of dress size groups, also were arms and legs, bust, and waist. However, there seemed to be no clear pattern between the options chosen and dress size as the latter changed. Across all dress size groups, the bust was where the emphasis was most commonly sought except for dress sizes 6-8; they most preferred emphasis of their waist. Additionally, dress size 0 indicated an equal preference for their arms and legs as for their bust. Arms and legs and waist were second and third selections, with only slight differences in preference, for dress sizes 10 and larger.

### *De-emphasis*

Overall, women with different body shapes similarly preferred de-emphasis in their midriff and lower body (tummy, hips, and thighs) more than in other locations. Rectangle, hourglass, and inverted triangle favored de-emphasis in their tummy and thighs more than the other areas. Shapes with square hips and waist (rectangle) or muscular legs and possibly an athletic build (inverted triangle) chose to de-emphasize the tummy more. Those shapes defined as having curvier thighs (hourglass) tended to have a somewhat higher preference for de-

emphasis of the thighs. The triangle body shape, which is described as having a lower body that is larger in proportion to their upper body, preferred the most de-emphasis in their hips and thighs, with a slightly higher preference for de-emphasis of the hips. The shape defined as having a full tummy and waist (circle) desired the most de-emphasis in the tummy and waist, but considerably more preference was indicated for the tummy area. As a whole, body shapes that were larger in the lower body commonly preferred de-emphasis in their hips and thighs, whereas those who were larger in their upper body sought more de-emphasis in their tummy area.

Across age groups de-emphasis was commonly sought for the hips, thighs, and tummy areas, and particularly for the latter two. Women aged 49 and younger selected thighs most frequently, and women 50 and older chose the tummy most frequently. With decreasing or increasing age, their preferences became stronger. The younger the women were, the more they sought to de-emphasize the thighs; the older women were, the more they sought to de-emphasize the tummy. Hence, the three common selections among women ages 30-59 were fairly proportionate in comparison to the younger and older age groups.

Customers of all dress sizes wanted to de-emphasize their tummy, hips, and thighs. Of those, the two most frequently chosen areas were the tummy and thighs, but there did not appear to be a relationship to dress size. The tummy was picked more often than the thighs by those wearing sizes 0 and 6-16, but the thighs more by sizes 2-4 and 18-24. The choices of the smallest and largest size women showed a difference in concentration. One-half of the size 0 customers identified the tummy as the area to de-emphasize, and less than half of them identified the thighs; no other size group had such a concentrated choice. The most common choice of the size 18-24 customers, the thighs, represented 31% of them, and an equal proportion of women (18%) picked the tummy, seat and waist.

### *Benefits Sought*

The two benefit selection choices of enhance bust and tummy control suggested that a more curvy appearance was desired by rectangle body shapes, which by definition have more square bodies. Women with a larger upper body and full tummy (circle) chose the benefits, tummy control and support bust, presumably to detract attention from larger areas. Bust support was preferred the most by shapes that tended to be more broad in their bust (inverted triangle) or fairly proportionate in their bust and hip areas (hourglass). Those who were larger in their lower body in proportion to their upper body (triangle) and often had curvy thighs (hourglass) selected minimize hips and thighs more than the other shapes; a higher preference was shown by triangle body shapes.

The benefits most frequently chosen across all age groups were support bust, tummy control, and minimize hips and thighs. The youngest age group seemed to focus more on the bust than all other age groups. Ages 30-49 showed similar preferences for all three of their most frequent selections, as the youngest group did. The option of minimize hips and thighs was favored the most by ages 30-39, and tummy control was preferred more by ages 40-49. Women 50 and older indicated the greatest preference for tummy control. Support bust was the second most commonly sought benefit by women 50 and older, and it appeared to become more desirable with age.

The two smallest dress size groups (0, 2-4) preferred bust enhancement the most. Dress sizes 6-16 primarily sought the benefits of tummy control and support bust, with a higher preference for tummy control. Dress sizes 18-24 indicated the greatest preference for support bust and slightly lower preference for minimize hips and thighs and tummy control. For the most part, smaller dress sizes (0-4) desired to enhance and accentuate, middle to large dress sizes

(6-16) favored control and support, and the largest dress sizes (18-24) preferred to have support and minimize features of their body.

## Conclusions

### *Style Preference*

Overall, the tankini was chosen more frequently by respondents than the one piece and bikini styles, suggesting that it was the most commonly preferred style. However, about half of each shape group preferred one style in particular, leading to the conclusion that style preference was related to body shape. The most common selections implied that women with a full waist and tummy (circle) prefer the most coverage (one piece suit) in their swimwear, whereas those with more moderate curves (rectangle) and broader upper bodies (triangle) prefer less coverage (bikini). Pisut and Connell (2007) found that women with inverted triangle body shapes were more satisfied with their bodies than those with other shapes, which could explain the bikini preference. The shapes with a defined waist and fuller legs (hourglass and triangle) are more likely to prefer coverage that can be more revealing (tankini) than a one piece suit.

Some specific relationships were also found to exist among preferences in relation to age and dress size. Younger women and those who reported smaller dress sizes had a stronger preference for a bikini, that is, more body revealing swimwear. It was observed that a preference for less body revealing swimwear (tankini and one piece) increased with age and dress size. These findings are similar to the results of two other studies that analyzed garment preference related to age and size. Lee's study (2005) found that as women age, their preferences in apparel become more conservative. Chattaraman and Rudd (2006) concluded that women with a larger body size prefer clothing that conceals the body more than individuals with a smaller body size.



### *Emphasis, De-emphasis, and Benefits Sought*

Overall, most subjects sought emphasis and de-emphasis in the same limited set of body areas. They most commonly wanted to emphasize the arms and legs, bust, and waist. The de-emphasis choices were directly related to the emphasis choices in that the least preferred areas of emphasis were the most commonly preferred areas of de-emphasis. The hips, thighs, and tummy were the areas for which most respondents sought de-emphasis. These are areas which have been found to store more fat (Croney, 1971). The benefits that subjects sought in their swimsuits were a reflection of their emphasis and de-emphasis selections. Respondents appeared to select benefits that related to the areas of their body that they wanted to emphasize or de-emphasize. Subjects appeared to prefer to emphasize areas of their body to which they wanted to draw attention, for instance if they were smaller than desired (e.g., the bust), or areas where they wanted less attention because they were troublesome or larger, e.g., the hips, tummy or thighs.

#### *Body shape.*

Women with a rectangle shape, defined as having moderate curves and well proportioned upper and lower torso, most sought emphasis in their bust and de-emphasis in their tummy and thighs. The most commonly sought benefits were in the same areas as common emphasis and de-emphasis selections, i.e., the bust and tummy. From their selections, it seems they desire a curvy appearance by emphasizing their upper body and de-emphasizing their midriff and lower torso.

Women with triangle shapes, who were larger in their lower torso in proportion to their upper, wanted more emphasis in their bust than all other shapes. They favored nearly the same de-emphasis in their hips and thighs. The benefit selections of minimize hips and thighs and tummy control were associated with their most highly sought areas of de-emphasis. Based on

these selections, triangle shapes seek to be more proportionate by minimizing areas of their body where they are wider and highlighting areas of their body that appear relatively smaller.

Women with circle body shapes sought emphasis for their three most commonly selected areas to about the same degree. These were the bust, then arms and legs, and waist. They chose the tummy for the most de-emphasis. The most commonly selected benefits of tummy control and support bust were a combination of the most frequently sought emphasis and de-emphasis areas,. The circle shape is known for having a full tummy, sometimes to the point that it may measure larger than the bust. Thus, women of that shape may prefer to push their bust up and out more in order to minimize attention to their mid-section.

The hourglass body shape, with its proportionate bust and hips, slender and well defined waist, and curvy thighs, sought two areas of emphasis and de-emphasis the most. The bust and waist were where the most emphasis was selected, and the hips and tummy were where more de-emphasis was desired. Thus, they sought to emphasize their assets and camouflage what they may have perceived to be their larger areas. The benefits chosen by the hourglass were related to their emphasis and de-emphasis selections. To emphasize their bust they wanted to support it, and they wanted features to control and minimize the hips and thighs and tummy.

Women having an inverted triangle shape were described as having more slim or muscular arms and broad bust. They most commonly preferred emphasis of their arms and legs. They also chose to emphasize their bust, and supporting and enhancing the bust were preferred benefits sought. These women sought the most de-emphasis in their tummy. Since the inverted triangle has a narrow waist and hips in comparison to their bust, perhaps they think that their tummy area appears larger; therefore, their goal may be to accentuate their assets and diminish perceived trouble areas.

### *Age.*

Until age 70, these women most often wanted to emphasize their busts; the older group most commonly preferred that emphasis be on the waist. Morris and McCann (1998) reported that during women's aging process, abdomens become higher, which would seem to conflict with a well defined waist. However, these consumers who were at least 70 must have viewed the waist as more of an asset than other possible choices. Perhaps that is connected with the finding that women 50 and older preferred to de-emphasize their tummy, whereas women who were younger preferred to focus on their thighs for de-emphasis. For the most part, benefits sought by older groups seemed to be desired for the purpose of deterring attention from particular areas of their body; beginning with age 40, the women often sought the benefit of tummy control. Women under age 30 seemed to think more in their benefits choices about showing off their assets. They wanted to enhance their bust or accentuate their waistline. The women in their thirties, like those 40 and older, wanted to minimize an area, but it was the hips and thighs rather than the tummy.

### *Dress size.*

Across sizes, the greatest consistency in preferences was in terms of de-emphasis and focused on the tummy and thighs. Women wearing sizes 0-12 commonly picked those two areas. The choices of those who wore larger sizes were more concentrated on one of those areas, the tummy (sizes 14-16) or the thighs (sizes 18-24). For the opposite choices, emphasis, women across the sizes focused on the arms and legs, bust, and waist to varying degrees. Surprisingly, the two most common choices of the size 0 and the sizes 18-24 women were the arms and legs and the bust. In the middle (sizes 10-12), those two areas plus the waist were nearly equally selected.

Because of the similarities in the emphasis and de-emphasis choices, perhaps the greatest insights can be drawn from the benefits women of different sizes sought. Those who wore the smallest sizes (0-4) wanted to enhance their bust; perhaps their small dress sizes reflected comparatively small bust lines. Women who wore the middle sizes of 6-12 most wanted tummy control. The sizes 14-16 group wanted tummy control, too, but also desired to support for their bust lines. Finally, the group wearing the largest sizes most identified bust support as a needed benefit in their swimsuits.

### Limitations

The data for this research was secondary and included the following limitations: non-random sample, varied group (body shape, age, and dress size) sizes, unverifiable accuracy of body shape, possible inaccuracy of self-reported dress sizes, and limited demographic information. The respondents participating in the study formed a convenience, non-random sample of women over the age of 18 who had recently purchased customized swimwear from Company A, thus limiting the diversity of consumers. Because the body shape, age, and dress size group numbers were uneven, information for smaller groups was more limited to support conclusions.

Body shape identification was established through proprietary software that was developed by the business owner. Reliability tests were unable to be performed on the software. Therefore, the researcher accepted the business definition of body shapes. Dress size was also a variable which could have potentially been inaccurate because it was self reported by the subjects and could depend on the brand and subject's choice.

Age was the only demographic provided and analyzed. The researcher was unable to obtain personal information about the respondents including geographic location, income, and

education, which restricted the knowledge about factors that contribute to consumers purchase decision.

### Implications and Recommendations

Industry statistics continue to point out the difficulty women experience with finding ready-to-wear to fit and suit them regardless of their body shape, age, or dress size. Therefore, it is beneficial for apparel companies to improve their understanding of consumer preferences in apparel. One particular area of research that is lacking is an examination of consumer preferences related to body revealing garments. The findings from this research could be used as a guide for swimwear companies to learn more about their specific target consumers. This is the first known scholarly study on women's swimwear, and it sets the cornerstone for future research studies to further explore consumer preferences related to swimwear. It is also one of the few studies on garment specific preference related to consumer characteristics.

Relationships were found for swimwear preferences in relation to body shape, age, and dress size; therefore, it is recommended that future research examine the following: preferences for other garment categories and in relation to other factors, such as BMI, income, and ethnicity. Other associations could exist, as well. Also, preferences could be compared among customers of different ready-to-wear companies or between customers of ready-to-wear and customized garments. Body size could be defined by BMI rather than by dress size in order to establish a more consistent descriptor.

Since demographic information often contributes to how the target market is defined, it is an important detail to analyze further. Since relationships to style and related features were found in this research, it seems likely that there could be more. The possibility that other demographic factors are also potential influences on swimwear choices and preferences exists.

A deeper assessment of the consumer and the choices which they make could contribute to the reduction of the problems they experience with ready-to-wear.

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