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Fashion: Hedonic vs. Utilitarian

A Study of Fit Issues of Women’s Ready to Wear and an Examination of the Technology Acceptance Model for Consumer Adoption of 3D Body Scanning for Improved Fit of Denim Pants.

by

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Thesis

Submitted to the School of Technology Studies

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MASTER OF SCIENCE

in

Apparel, Textiles, and Merchandising

Thesis Committee:

Subhas Ghosh, PhD, Chair

Professor Julie Becker, Committee Member

November 14, 2011

Ypsilanti, Michigan
Dedication

For my Grandfather Frank,
my style inspiration...

...and for fashion majors everywhere,
because we are smart too.
Acknowledgements

None of this would have been achieved without the support of those who know me best.

A majority of the credit in any of my achievements must be awarded to my parents, who have always provided the best for me from day one. I am lucky and grateful for their constant belief in my pursuits.

None of my goals would be set, let alone reached, if not for the examples set by my sister Sara. Thank you for blazing the trail, setting the bar high, and giving me big shoes to fill.

The faculty and students in the Apparel, Textiles, and Merchandising Department at Eastern Michigan University have all played a part in cultivating my education, especially Dr. Subhas Ghosh and Professor Julie Becker. Thank you for your guidance and patience during the research process.
Abstract

This study exposes the problems women face in the ready to wear (RTW) apparel sizing system and also investigates the idea that 3D body scanning technology can be used to eliminate ill-fitting apparel for consumers, in this case denim pants (jeans). In order to investigate why consumers have not yet adopted this technology, a survey was conducted using principles from the Technology Acceptance Model (TAM) to understand the motivations of females aged 18-35 towards adopting this new technology. Two hypotheses were formed: non-adoption is caused by hedonic motivation, or non-adoption is caused by utilitarian motivations. It can be concluded from the study that consumers are more hedonically motivated towards adoption of fashion products and demonstrate a willingness to adopt three-dimensional body scanning technology for better fitting jeans.
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CHAPTER 1: INTRODUCTION

Introduction, Problem Statement, and Background

In the United States’ ready to wear (RTW) industry, women are facing issues concerning fit. Market researchers have found that fifty percent of women in the U.S. cite difficulty finding clothing that fits (Connell, 2006). The population is made up of a variety of body shapes (pear, apple, rectangle, inverted triangle, etc.) yet manufacturers use fit models of perfect hourglass proportion for patternmaking and grading (Petrova, 2008). Grading is then based on incremental changes in measurements, not in body shape (Connell, 2006). The National Institute of Standards and Technology (part of the U.S. Department of Commerce) updated product standard PS 42-70 in 1970 which made standards for clothing sizing voluntary for manufacturers, a contributing factor to consumer fit issues. Brands are not restricted to following a standard grade rule or size chart for clothing, so consumers are finding themselves falling into multiple size categories because of changing size charts and vanity sizing. Each brand or designer can dictate what measurements constitute each size. This leads to confusion for customers, and freedom for manufacturers to utilize vanity sizing practices. Vanity sizing is also used for brands to target one shape and alter patterns to fit that niche and create brand loyalty amongst consumers (Petrova, 2008). The marketplace is not only guilty of inconsistencies among brands, it is overcrowded. In an oversaturated marketplace, companies must find a niche to stay afloat. The niche for companies is variation in fit from competitors using vanity sizing and their own unique size chart. In Mintel’s 2008 denim report, the list of denim manufacturers is flooded by premium labels, boutique labels, moderately priced labels, old labels transforming themselves, organic labels
Sizing became what we refer to as standardized in the 1940s with a comprehensive study of body measurements in the military (Connell, 2006). Although the average body type changed over time due to rising obesity, sizing did not. From 1998 through 2001, Society of Automotive Engineers (SAE) International collected anthropometry data of civilian males and females aged 18-65 in a study named Civilian American and European Surface Anthropometry Resource (CAESAR). This resource was the first mass measurement of human bodies since the initial military study in the 1940s. While these data are useful for sizing in clothing, they were also used for furniture design, automotive design, and many other applications involving the human body and its fit needs. Following the CAESAR data collection, a company in Cary, North Carolina, TC2, developed a study titled “Size USA.” This study incorporated three dimensional body scanning technology (3DBS) and measured 11,000 Americans in 12 locations across the country to complete the most accurate and up-to-date data on human anthropometry in the U.S. The implications from these sizing surveys and consumer issues with fit led researchers to believe that the three-dimensional body scanning technology can create better fitting garments for the American consumer. Companies such as high end retailer of fine tailored garments Brooks Brothers and iconic denim brand Levi’s have incorporated the body scanning technology into their product offering. Brooks Brothers offers “digital tailoring” via 3D body scanners at its flagship store in Manhattan for clients looking for custom fit. Clients are measured in 12 seconds and can then create their own garment choosing their own fabrics and prints. Levi’s used the body scanner and acknowledged the consumer issue of fit in 2010 with its “Curve ID,” campaign.
The denim brand studied 60,000 3D body scans from around the world and consulted with real consumers about their problems with fit of denim. Fifty four percent of these women said that they had to try on at least ten pairs of jeans before finding one that offered a “somewhat suitable” fit. Research led the company to find that eighty percent of women around the world could be put into three shape categories, and thus the company created the “slight curve,” “demi curve,” and “bold curve,” fits, while using the slogan “It’s about shape, not size.”

Three dimensional body scanners are proving to be a reliable resource for research, as well as a viable solution to consumer issues with garment fit. The technology can take anywhere from 600,000 to 1,000,000 points of measurement of the human body, takes up the same amount of space as a regular dressing room (4’ X 5’), translates to Computer Aided Design (CAD) software, and costs around $40,000 per machine (Petrova, 2008).

Both companies and consumers acknowledge that fit issues exist for US women’s RTW, and the 3D body scanning technology is proving itself to be on the forefront of creating suitable fit for the average consumer. This begs the question of why the technology is not being put to widespread use in the clothing industry, specifically in the women’s denim market. Using the Technology Acceptance Model (TAM), the cause of slow adoption may prove to be consumer attitude towards the 3D body scanners. The TAM aims to explain consumer behaviors and can be applied in this case towards consumer attitudes and beliefs when adopting new technologies (Watchravesringkan, 2010). If consumers have a favorable attitude towards 3D body scanning for better fit, they will be more apt to adopt the technology and create a need for widespread use. This will aid in better sizing on the manufacturers’ part. Conversely, if consumers have no motivation to use the product, it will
be a costly venture for the clothing manufacturers that will not result in profit, preventing companies from making the technology widely available. This will also perpetuate poor fit in the apparel industry. While the TAM will explore attitudes and beliefs towards body scanning technology, it will also incorporate themes of consumer buying behavior such as motivation, product involvement, and the purchase decision making process.

**Purpose of Study**

The proposed research aims to result in providing insight and understanding to a common problem amongst most female consumers, while also seeking a solution based on this understanding. Through the research, an explanation of the background of American RTW, standardized sizing as we know it, and where it went wrong will be exposed. This brief history is followed by overviews of the current body shapes of US women and the 3D body scanner. The most in-depth explanations will be given to vanity sizing and its resulting brand loyalty and niche marketing, as well as the Technology Acceptance Model. Most importantly covered under the TAM will be the motivations of consumers being utilitarian versus hedonic. Consumer fit issues and the usage of fit models and grading will also have coverage. A survey will be conducted on the consumer end of the problem statement to gain an understanding of feelings towards using 3D body scanning for the purchase of clothing with better fit. Ultimately, the research will conclude with providing an explanation as to why body scan technology is not widely adopted by consumers, with much aid from the TAM.

**Justification and Significance**

As explained earlier, fit issues in the RTW market plague most women. Therefore, it seems necessary to put research into these issues and develop a plan for solution. A research
report by Mintel in 2008 found that seventy percent of participants stated it is “very difficult” to find a proper fitting pair of denim, and that forty-five percent expressed concern about sizing variance. This finding is applied to all adult age ranges for women, but the concern was not equally felt by men, thus the reason to study women in this paper’s research. The exposure to this problem gives reason to explore deeper the solution in 3D body scanning and why such technology is not readily available to alleviate consumers’ frustrations with fit.

Exploring these issues will provide contribution to studies in apparel merchandising as well as apparel design. The business of apparel will find solutions to marketing a better product to consumers, while the production and design end of apparel will discover a better manufacturing practice for women’s RTW denim. Those in the apparel field have an opportunity to examine consumers’ issues and provide solutions to make a better product for their customers. Consumers can also learn that a solution exists to eliminate fit issues, and no anxiety need be felt towards it. More exposure to 3D body scanning technology will be of use to the manufacturing field as well as consumers and students.

**Research Questions and Hypothesis**

The women’s RTW denim market is plagued with fit issues despite the advanced technology of 3D body scanning which is proven to aid in better fit. This paper asks the question, why has 3D body scanning not been adopted by consumers for achieving better fitting denim pants?

Hypothesis 1: Most consumers are more hedonically motivated towards fashion technology products, and the 3D body scanner does not possess high enough levels in perceived usefulness preventing adoption.
Hypothesis 2: Most consumers are more utilitarian in motivation towards fashion technology products, and the 3D body scanner does not have high enough levels of perceived ease of use and perceived usefulness, preventing adoption.

**Methodology**

The qualitative study is supported by the literature review as well as a consumer survey. Consumers selected for the survey were females aged 18-35. Participants were contacted for the study via e-mail and social networking and were asked to follow a link to the online survey from website SurveyMonkey.com. The first part of the survey includes a brief description of the study for the participants. The second part is composed of statements regarding consumer willingness to use body scanning technology, feelings towards body scanning technology, fit issues, and shopping for denim pants. Of most importance will be feelings towards use of the technology in order to measure hedonic and utilitarian motivations. Participants in the study were given a set amount of time to complete the survey once it was made available to them. Confidentiality of participants will be guaranteed in compliance with Eastern Michigan University’s agreement for conducting research involving human or animal subjects.

A five-point Likert scale was used for the statements with the answers: Strongly Agree, Agree, Neither Agree or Disagree, Disagree, and Strongly Disagree. The questions were evaluated using SPSS software. The survey also includes a brief introduction to the general study, as well as an agreement for honest compliance with the survey so as to not skew the results.
CHAPTER 2: REVIEW OF RELATED LITERATURE

U.S. Ready To Wear

Unless consumers have garments custom constructed from scratch by a seamstress, tailor, or their own hand, they are purchasing ready to wear (RTW) garments. These garments are mass produced by apparel manufacturers in a variety of sizes referred to as “standardized.” This term makes an overall attempt to provide apparel fit to a vast majority of our population (Pisut, 2006). While this system has been in practice for decades, it is not without many faults that are leading to poor fit for consumers. These standards were created in the early part of the 20th century and continue to be the basis for apparel sizing today, although it has been suggested that body measurement charts need to be revised at least every ten years to stay current (Brunn, 1983). For the current consumer population, the garment sizing system is unreliable and inapplicable. The statistics on consumer body shape and size are far too outdated to accurately size apparel consumers and give proper fit (Tamburrino, Apparel sizing issues, Part 2, 1992b). Tamburrino (1992b) in fact, gave an estimated figure that eighty percent of current RTW clothing does not properly fit those purchasing it.

Changes in the populations’ lifestyle and diet, as well as a more diversified ethnic population, have caused a dramatic shift in body shapes (Tamburrino, Apparel sizing issues, Part 1, 1992a). At the time of the original body shape assessment used to create size standards in 1942, the majority of those measured were of hourglass body shape (Pisut, 2006). In 2003, Alexander conducted a study of 520 3D body scans and found that forty-five percent were pear shaped, while only thirty-three percent maintained the hourglass body proportion that used to be the standard for American women (Connell, 2006). Despite this fact, apparel
manufacturers are developing patterns based on an hourglass shape and those who do not fill the hourglass category are left with a difficult path to finding proper fit (Pisut, 2006).

Changes in the landscape of body shapes have led to poor fit of RTW clothing, but other factors have contributed to the abomination of the current RTW sizing system.

Anthropometry of the human body is not identically replicated from one person to another, so it is absurd for apparel manufacturers to expect that apparel be standardized and still yield a proper fit. Most apparel size charts only use the bust, waist, and hip circumference measurements to dictate garment size, which is insufficient to accurately measure the human form (Chun-Yoon, 1996). From these three measurements, patterns are finished based on assumptions of proportional body relationships in order to fill in the gap for other body measurements necessary to create a whole garment (Ashdown, 1998). The current population, with large variation in body proportion and shape will not fit in the clothing produced in this system (Ashdown). Poorly served customers are left disenchanted, in need of alterations, and spending more money on a garment than originally intended (Faust, 2006).
Amongst an apparel manufacturers’ own products exists much discrepancy. A study found that order initiators do not follow standards, leading to a wide range of variance. Three out of five manufacturers do not follow order initiators specifications, while only one out of fifty do follow standards set forth by order initiators. Garments of the same size from the same manufacturer were found to have as much as three inches in variance. The study concluded that order initiators do not adhere to standard size charts, and garment manufacturers are either unable or unwilling to produce garments that meet order initiator specifications (Faust, 2006). Order initiators are given outdated standards which are inadequate to create garments and are therefore forced to create a sizing system of their own (Workman J., 2000; Yoo S. K.-B., 1999). Each order initiator takes liberty at choosing a model size to base all garments on, which may vary depending on age, occupation, origin, or socio-economic group which they aim to serve (Beazley, Size and fit: formulation, 1998). This creates variance in size and proportion from one line of clothing to another, which can lead to confusion and frustration on the part of the consumer. In order to alleviate consumer
frustration it would seem ideal to create a national standard that was not only adhered to by all companies, but also based on current size data. However, researchers have stated that industry wide adoption of new standards is unlikely (Stamper, 1991). The environment is clearly fragmented and competitive with little adherence to proposed systems for a national standardization of sizes for a largely diverse population (Tamburrino, Apparel sizing issues, Part 1, 1992a). Order initiators are given this liberty with apparel sizing because the standards for sizes set forth by the government are strictly voluntary (United States Department of Commerce, 1971).

**Body Shapes of US Women**

As discussed, not only is the current population made up of women who differ from the outdated sizing system, these women differ from each other in shape and garment fit preference. An increased effort to understand women’s fit preferences coupled with their body shapes has the potential to help manufacturers understand better methods to sizing development and increase fit satisfaction (Pisut, 2006). The Center for Disease Control of the United States has confirmed that the U.S. population is growing larger due to factors such as change in diet, and the anthropometry of bodies is changing, causing an outdated standards system that is still in use. Figure 2 shows the four most common body shapes.
The hourglass proportion pictured on the far right demonstrates the figure idealized in most designers’ size charts, while the majority of the consumer population is accurately depicted in the figure second from the left, the pear shape. Standardized clothing such as denim jeans are therefore difficult for the majority of the population to fit into properly. Garments need to be larger in the hip to accommodate the hip measurement, but will fit improperly in other dimensions without additional alterations.

**US Department of Commerce Standard PS 42-70**

In 1941 the National Bureau of Standards proposed a voluntary apparel sizing standard to be used as a guide for apparel manufacturers to create mass produced clothing, currently known as RTW. According to the United States Department of Agriculture (1941), the study was conducted as follows:

Sponsored and supervised by the Bureau of Home Economics from July 14, 1939, to June 30, 1940, under a Federal-project grant of the Work Projects Administration…the *Women’s Measurements for Garment and Pattern Construction*
study was conducted as a series of State Work Projects Administration projects in eight states or districts with the cooperation of local universities and other educational institutions. The women included in the study (14,698) that helped develop the first standards charts were white residents of 18 years of age or older, both native and foreign-born and most lived in urban areas.

Initial intent for the study was to facilitate the female consumer’s identification of her body type and size from the array of existing body types and to enable her to identify her single best fitting size regardless of price, type of apparel, or manufacturer of the garment (Glock, 2000). While the product standard provides a “guide” of sorts for manufacturers to develop clothing, adoption of any product standard is strictly voluntary (Pisut, 2006; United States Department of Commerce, 1971). As a result, sizing and fit have become two major selling tools used by the manufacturers of women’s apparel to create product differentiation and competitive advantage in the industry (Workman, 1991). This product differentiation is also leading to variation among fit between brands, when standards set forth by the government were meant to aid customers in identifying the garments that would provide them with the most reasonable fit, defeating the purpose of having standards at all (Beazley, Size and fit: Procedures, 1997). In one research study, size 8 prototypes were tested among 16 manufacturers industry wide. Among them, bust dimensions varied by 3.5”, waist dimensions by 3”, and hip dimensions by 4” (Tamburrino, Sized to sell, 1992c). One dress form company emerged with data that showed thousands of size 8 measurements from a variety of clothing manufacturers (Cyberform Coporation, 1998).
Vanity Sizing, Brand Loyalty, and Niche Marketing

As stated by Workman, the result of a voluntary sizing standard has led sizing and fit to be used as selling tools for apparel manufacturers (Workman, 1991). Marketing tactics have evolved into three concepts for this particular situation: vanity sizing, brand loyalty, and marketing to a niche.

Vanity sizing is a highly debated topic among the apparel industry, but research proves its existence. This growing trend is seen by apparel companies as a way of gaining a competitive edge (Biderman, 2003). Vanity sizing by definition can be described as apparel companies adjusting the measurement specifications for each size to enable consumers to fit into smaller sizes (Pisut, 2006). The concept brings psychology into marketing a fashion product. Society pushes a constant need to feel thin, so manufacturers feel motivated to increase dimensions within a size and produce garments that fit 2 to 4 sizes larger than they did 10 years ago (Tamburrino, Apparel sizing issues, Part 1, 1992a). Studies in this field have shown the progression of desired size for industry fit models. Size 8 fit model specifications were found to have larger dimensions in 1997 than in 1986. While both were nearly hourglass, in 1986 the mean for a size 8 fit model was 35” bust, 26” waist, 37” hip, however, in 1997 the mean for a size 8 fit model increased to 36” bust, 28” waist, 38” hip (Workman, 2000). It was also found that the mean hip measurement for a 1976 size 10 measured the same as the mean hip measurement for a size 8 in 1986 (Workman, 1991). This measurement - size correlation confusion goes back even farther. A woman wearing a size 16 in 1950 measured the same as a woman who wore a size 10 in 1994 (Galles, 1994). While men’s apparel has always taken a logical approach to sizing, sizing for women has
always been more of a marketing scheme promoting the thought that “If a woman can wear a smaller size, she will be more likely to buy” (Bynum, 1993).

Adjusting fit to play to consumers’ vanity is the first step to another marketing tool, niche marketing. A niche market has customers with a distinct set of needs who will pay a premium price to a firm which best satisfies those needs. The niche is not likely to attract competitors, making way for the firm to gain economies through specialization and have potential for size, profit, and growth (Kotler, 2003). Ailing US apparel and textile companies have the ability to potentially secure a future by developing and implementing a niche market strategy (Parrish, 2005). As competition in the market intensifies, a “shake out” of sorts will occur, leaving only the strongest firms. Those firms catering to a niche will remain among the healthy survivors due to strong relationships with consumers, providing customer retention and profitability (Dalgic, 1994). Proven success in profitability has been demonstrated by companies who choose this product focus as their strategy (Porter, 1998a). Such firms know their customers so well that they are able to better cater to their needs and, as a result, can charge a significant price over cost (Kotler, 2003). The strategy can be exemplified as follows: if company A wishes to enter the market of denim for women, which is currently saturated, a smart way to enter would be to find a niche that is not being served, such as women who are under 5’6” tall and fall into the pear-shaped body shape. With the market being underserved, there is room for such a firm and ability to charge a significant price over cost. Also, since sizing standards are voluntary, the firm can create its own size chart tailored to its target consumer. Once portions of the niche are serviced, reputation becomes a key aspect, because the niche market strategy will rely on word-of-mouth references (McKenna, 1988). Those women who fall into the niche and are early
adopters of company A will be apt to speak highly of the brand to other members of the niche who have not yet adopted the product, creating potential growth in sales for company A.

Companies in an oversaturated apparel market such as denim can also choose to create brand loyalty among their consumers based on size designation and fit. Brand equity, a set of assets and liabilities linked to a brand that add or subtract from the value provided by a product or service to a firm and/or that firm’s customers, has been one of the most important marketing concepts since the 1980s (Aaker, Managing Brand Equity, 1991; Jung, 2008). This concept is also linked to brand loyalty, brand association, and perceived quality (Aaker, 1991). In the case of women’s denim apparel, if a consumer wears a size 12 in company B jeans, but can wear a size 8 in company C’s size chart, the consumer will find added value in purchasing jeans from company C. This added value will be reiterated when the consumer needs to make another purchase and will return to company C, becoming loyal to the brand and the sizing it provides. Consumers of company C see a perceived quality, an awareness of the product’s superior quality in relation to other products, in the product that is not provided among other brands (Aaker, Managing Brand Equity, 1991). At the point of repeat purchase, brand association, anything linked in memory to a brand and therefore affecting consumer purchase decision based on recall, comes into play (Aaker, 1991; Keller, 1998). The consumer associates the brand with wearing a smaller size and having a higher body cathexis, and repeats the purchase. Such a cycle will continue and lead to brand loyalty, measured by the attachment that a consumer has to a brand and through their number of repeat purchases (Keller, 1998). Brands that achieve these components of brand equity are given a competitive advantage due to the fact that the brand has the power to capture and hold onto a larger share of the market and to in turn sell at prices with higher profit margins.
A three-dimensional model for brand equity was validated based on a multidimensional study of consumer-based brand equity as a scale for measuring brand equity. Highly positive relationships were found between brand equity and purchase intention, meaning as brand equity in a consumer increased, so did the purchase intention (Yoo B., 2001). Therefore, as a consumer's brand equity in company C increases, the more likely they are to purchase, proving that vanity sizing is gaining market share for apparel companies.

**3D Body Scanning Technology and Mass Customization**

In order to better understand current human anthropometry, the use of 3D body scanning has become a common practice. This system of digital measurement allows for more complicated angles such as shoulder angle and waist angle, to be accurately calculated (Honey, 2007). Precise measurements of every part of the human body have numerous implications for the apparel industry, one being a possible panacea to the sizing issues facing women today (Istook, 2002). Both spectrums of the supply chain could see benefits from widespread use of 3D body scanning. Technology company TC2 is the world leader in 3D body scanning technology. The company's website boasts that the model NX-16 scanner takes 400 unique measurements in a matter of seconds, creating a virtual human figure to be used for creation of apparel. Such avatars are created with the company’s ImageTwin software, already in use by apparel firms such as Thimbler, a denim apparel company. Manufacturers could use studies conducted by firms like TC2 to gain access to massive, up-to-date databases of human scans and measurements, lending a hand in creating size charts that would better suit and benefit consumers (Istook, 2002). On the converse, there also
exists the opportunity for manufacturers to make size charts obsolete and convert the industry to mass customization (Istook, 2002).

![Scanning booth and scan image](image_url)

Figures 3. Scanning booth and scan image (Loker, 2004)

Mass customization can be defined simply as a large quantity of goods being manufactured using automated processes but each item is customized in the process (Hye, 1998). In terms of the apparel industry, it implies that each consumer can have a garment from a manufacturer cut to his or her own body specifications for a better fit than ready to wear can provide. This concept has become increasingly possible due to advances in technology, specifically meaning 3D body scanning paired with made to measure functions in CAD pattern drafting programs (Hye, 1998; Workman J. a., 2000). Thus, consumers could be scanned and keep their specifications on file digitally, and submit these
specifications to an apparel brand for purchase of a desired garment. As opposed to mass production, mass customization creates variety and customization through its flexibility and quick responsiveness compiled with the voice and needs of the consumer (Senanayake, 2010). More and more companies today are becoming attracted to the mass customization model for business, but it is not a guaranteed success. Success depends on the ability to effectively handle the extent of customization in apparel design, development, production, and delivery (Senanayake, 2010).

**The Technology Acceptance Model (TAM)**

In order to comprehend consumers’ intentions to readily adopt 3D body scanning, it would be helpful to put the TAM into practice, a model that has gained popularity as being capable of explaining and predicting an individual’s behavioral intention and actual behavior (Davis F. B., 1989). This model was developed through the Theory of Reasoned Action (TRA) first proposed by Fishbein & Ajzen in 1975 in order to explain consumers’ acceptance of information systems (Davis F., 1989). Mainly, the objective of the TAM is to provide an explanation for the underlying determinants of behavior (Davis F., 1989). In theory, it claims that an individual’s system usage is predicted by internal beliefs and attitudes toward system usage. Internal beliefs are viewed as motivational factors that drive an individual to achieve a goal (MacInnis, 1991).

Motivation, an internal psychological state that stimulates an individual to become involved in a particular task and is central to the explanation of each individual’s conscious choices among different alternatives, can either be extrinsically or intrinsically initiated (Brown S., 1994).
If a consumer is extrinsically motivated, he or she is likely to perform an activity because it is perceived to be instrumental in achieving a valued outcome distinct from the activity itself (Mitchell, 1971). A consumer’s perception involves intervening internal processes involving perceptual, physiological, feeling, and thinking activities that help consumers convert stimuli (product) into meaningful information and then utilize them to comprehend benefits they may gain in using the product before making any decisions (Bagozzi, 1986). It has been proposed that these perceptions of using the product are critical to decision making because these motivate consumers to either engage in or shy away from certain behaviors (Davis F., 1989). Perceived ease of use and perceived usefulness are two extrinsic motivators that influence an individual’s acceptance and attitudes towards use of a system (Davis F.). Perceived ease of use demonstrates the degree to which a consumer believes that the use of the system/product is free of effort while perceived usefulness explains the degree to which the individual believes that the use of the product will help them to perform certain tasks (Davis F.). TAM postulates that the latter has a direct effect on consumer’s behavioral intention to use a system or product (Davis F.).

Intrinsic motivation pushes the individual to perform an activity because of a desire to perform the activity that comes from within them not from apparent outside reinforcement; the activity is performed for pleasure (Berlyne, 1966). When the motivation is towards adopting a new product, multiple variables are of import. Possession of newness, the degree to which a consumer believes the product possesses important attributes of innovation such as newness and uniqueness, is a reflection of the consumer’s perception of the product and the product itself (Kleinschmidt, 1991). While a product may possess newness, the level of innovativeness also plays a part. Product innovativeness conveys excitement and interest;
therefore, consumers can be intrinsically motivated to exhibit tendencies to consume such products as well (Blyth, 1999; Venkatraman, 1991). Perceived fashionability of a new product is also crucial in consumers’ intrinsic motivations. A new product’s perceived fashionability is critical to determining an individual’s behavior because such perception provides a direction of new fashion awareness as it may be related to brand or trends (Law, 2004).

It has been found that consumers’ intentions to adopt highly technological fashion products (HTFP) are driven by the multidimensional nature of consumers’ extrinsic and intrinsic motivation (Watchravesringkan, 2010). Groups of consumers like Generation Y are likely to seek immediacy and instant gratification when consuming products and services, are early adopters, and are active users of technological fashion products (Roberts, 2006). Significant empirical support proves that these attitudes and characteristics of consumers have significant influence on their behavioral intentions, such as intent to purchase or utilize a product (Ajzen, 1991; Ajzen, 1980; Bruner, 2005; Davis, 1992). A positive attitude is likely to encourage a consumer to purchase a product, this stems from two distinct dimensions: utilitarian and hedonic (Voss, 2003). Both utilitarian and hedonic attitudes play into perceived ease of use as well as perceived usefulness. A product with a high degree of perceived usefulness and a high degree of perceived ease of use will react well with utilitarian attitudes which focus on cognition, reasoning, and goals (Babin, 1994; Dhar, 2000; Davis F. B., 1989). Such a product that is perceived as easy to use is valued because utilitarian-minded consumers will assess the amount of effort they could spend in learning to use a product to enhance their task performance as well as improve task efficiency (Davis F. B., 1989). Hedonic attitudes will give favor to products with high perceived usefulness
because of the promise of pleasure and fun with frequent product usage (Holbrook, 1982; Batra, 1990). High perceived ease of use will indulge hedonic attitudes because ease of use will enhance enjoyment of using the product, although it has a greater effect on utilitarian attitudes (Davis, 1992).

**Denim Market in the U.S.: Oversaturated**

Today’s apparel retailers are operating in an environment that is filled with intense rivalries and a highly saturated market that is under slow growth in sales and price competition that is reaching new heights (Standard and Poor's, 2004a). Firms that do not initiate new ways to compete in a marketplace will see a decline in competitive advantage that will be severely detrimental to future success against competitors (Plunkett Research Ltd., 2004a). Many trends among the industry are contributing factors, but in the denim retail industry, the most prevalent players are the market saturation of the specialty store (denim boutiques) and product homogeneity (similar products, in this case jeans, found at multiple price levels; Plunkett Research Ltd., 2004a; Standard and Poor's, 2004b). Today’s apparel consumers can find multiple brands of denim at every price point, so it is the job of the retailers and manufacturers to differentiate their products in order to gain market share. Ultimately, the goal of creating product differentiation is to create such a product that is perceived by the consumer and the industry as unique or providing superior attributes or consumer value (Aaker, 1998). In this instance the differentiation created would be sizing and fit. Brands use vanity sizing and the ease of the voluntary product standard to create a fit that will capture a market segment and therefore create brand loyalty and a piece of market share. It has been well stated that companies use market strategies to improve sales and create a brand that stands out among the competition (Jung, 2008). Most firms competing in
a homogeneous market will adopt a business model with severe cost cutting objectives in order to stay competitive in the price category (Dolan, 1996; Porter, 1998a). Acting on cost-cutting measures can be difficult for many firms to adapt to, as cost-cutting can go only so far (Porter, 1998a). As such, it may be implied that markets such as the denim apparel market would rather adopt size differentiation as a means to stay competitive. Cost-cutting would be hard to initiate due to rising wages in China, where most apparel is manufactured, and the notion that most raw materials costs are fixed. If apparel brands can use size as a differentiation, the brand equity that is created will increase consumer confidence in their purchasing decision, therefore strengthening the emotional attachment to the purchase and the brand, creating greater chances for repeat purchases (Aaker, 1998). In 2008, Mintel produced an expansive report on the current state of the denim apparel market. As stated in the report, “Jeans makers want to groom long-term consumers who may not necessarily be happy with their particular body shape. Because fitting into jeans is universally difficult, manufacturers are creating and promoting brands that not only feature cuts that accommodate bigger body shapes due to U.S. obesity trends…, but many also now feature stretching material promising flatter stomachs and trimmer hips.” Thus, companies are creating insurance of some sort through the “value” of the fit of jeans. The same report found these figures on the current state of competition in the denim market:
Figure 4. Total retail sales of Women’s jeans at current prices 2007-12 (Global Consumer, Product and Market Research - Mintel, 2008)

<table>
<thead>
<tr>
<th>Year</th>
<th>Sales at current prices</th>
<th>% change 2002 = 100</th>
<th>Index 2007 = 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>5,754</td>
<td>100</td>
<td>68</td>
</tr>
<tr>
<td>2003</td>
<td>5,937</td>
<td>103</td>
<td>70</td>
</tr>
<tr>
<td>2004</td>
<td>6,516</td>
<td>113</td>
<td>77</td>
</tr>
<tr>
<td>2005</td>
<td>7,060</td>
<td>123</td>
<td>83</td>
</tr>
<tr>
<td>2006</td>
<td>7,853</td>
<td>136</td>
<td>93</td>
</tr>
<tr>
<td>2007</td>
<td>8,463</td>
<td>147</td>
<td>100</td>
</tr>
<tr>
<td>2008 (fore)</td>
<td>8,811</td>
<td>153</td>
<td>104</td>
</tr>
<tr>
<td>2009 (proj)</td>
<td>9,218</td>
<td>160</td>
<td>109</td>
</tr>
<tr>
<td>2010 (proj)</td>
<td>9,765</td>
<td>170</td>
<td>115</td>
</tr>
<tr>
<td>2011 (proj)</td>
<td>10,350</td>
<td>180</td>
<td>122</td>
</tr>
<tr>
<td>2012 (proj)</td>
<td>10,893</td>
<td>189</td>
<td>129</td>
</tr>
</tbody>
</table>

Figure 5. Sales of leading jeans manufacturers 2006 and 2007 (Global Consumer, Product and Market Research - Mintel, 2008)

<table>
<thead>
<tr>
<th></th>
<th>2006 $million</th>
<th>%</th>
<th>2007 $million</th>
<th>%</th>
<th>Change 2006-07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Levi Strauss &amp; Company</td>
<td>4,190</td>
<td>26.6</td>
<td>4,400</td>
<td>26.4</td>
<td>4.0</td>
</tr>
<tr>
<td>VF Corporation</td>
<td>2,780</td>
<td>17.5</td>
<td>2,897</td>
<td>17.3</td>
<td>3.0</td>
</tr>
<tr>
<td>The Gap</td>
<td>4,006</td>
<td>25.3</td>
<td>3,986</td>
<td>23.9</td>
<td>-0.5</td>
</tr>
<tr>
<td>Tommy Hilfiger Corporation</td>
<td>465</td>
<td>2.9</td>
<td>437.1</td>
<td>2.6</td>
<td>-6</td>
</tr>
<tr>
<td>Liz Claiborne, Inc.</td>
<td>1,654</td>
<td>10.4</td>
<td>2,200</td>
<td>13.2</td>
<td>23</td>
</tr>
<tr>
<td>Jones Apparel Group, Inc.</td>
<td>1,146</td>
<td>7.2</td>
<td>996</td>
<td>5.9</td>
<td>-13</td>
</tr>
<tr>
<td>Polo Ralph Lauren Corporation</td>
<td>1,559</td>
<td>9.8</td>
<td>1,743</td>
<td>10.4</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15,800</strong></td>
<td><strong>100.0</strong></td>
<td><strong>16,659</strong></td>
<td><strong>100.0</strong></td>
<td><strong>5.4</strong></td>
</tr>
</tbody>
</table>

Most of these top companies in the denim game are composed of smaller brands and act as a representation of a larger piece of the denim pie. For example, the VF Corporation is home to 13 denim brands, including Lee and premium brand 7 For All Mankind. Liz Claiborne, Inc., houses Juicy Couture, Lucky Brand Jeans, and DKNY Jeans. For each organization, there exists a full house of denim brands not only competing against each other, but the brands of other umbrella organizations.
Fit Issues of Consumers

When trying on denim apparel, women reported the following, shown in Figure 6, to Mintel:

<table>
<thead>
<tr>
<th>Issue</th>
<th>All</th>
<th>Male</th>
<th>Female</th>
<th>18-25</th>
<th>25-35</th>
<th>35-45</th>
<th>45-55</th>
<th>55-65</th>
<th>65+</th>
</tr>
</thead>
<tbody>
<tr>
<td>It’s very difficult to find a pair that fits properly</td>
<td>56</td>
<td>40</td>
<td>70</td>
<td>63</td>
<td>55</td>
<td>56</td>
<td>57</td>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td>Sizes vary too much so I never know what size to get</td>
<td>33</td>
<td>19</td>
<td>45</td>
<td>41</td>
<td>31</td>
<td>31</td>
<td>36</td>
<td>29</td>
<td>29</td>
</tr>
<tr>
<td>Most jeans are too long</td>
<td>29</td>
<td>20</td>
<td>35</td>
<td>27</td>
<td>34</td>
<td>25</td>
<td>24</td>
<td>33</td>
<td>27</td>
</tr>
<tr>
<td>The store is usually out of my size</td>
<td>21</td>
<td>22</td>
<td>21</td>
<td>24</td>
<td>23</td>
<td>22</td>
<td>20</td>
<td>19</td>
<td>17</td>
</tr>
<tr>
<td>Most jeans are too short</td>
<td>12</td>
<td>9</td>
<td>16</td>
<td>18</td>
<td>9</td>
<td>16</td>
<td>12</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>None of the above</td>
<td>21</td>
<td>33</td>
<td>11</td>
<td>13</td>
<td>19</td>
<td>23</td>
<td>20</td>
<td>25</td>
<td>36</td>
</tr>
</tbody>
</table>

*Figure 6. Problems with the way jeans fit, by gender and age, December 2007 (Global Consumer, Product and Market Research - Mintel, 2008)*

Seventy percent of all females reported that it is “very difficult” to find a pair of jeans that fit properly. Amongst a product that has so many different brands, it would seem that consumers would have many choices of proper fitting garments; however, this is not the case and it is a poor reflection of the sizes provided in ready to wear garments. This statistic also provides a case for mass customization through the use of 3D body scanning technology. Fit, the dimensions of the product in relation to the body and or the way the product fits the body, is subjective (Senanayake, 2010; Brown J., 1992). Garment fit is affected by characteristics such as comfort, aesthetics, personal choice, current trends, cultural influence, age, sex, body shape, and lifestyle (Brown J., 1992). Due to a large number of characteristics that play into what a consumer may see as “proper fit,” it should also be mentioned that women are often wearing the wrong size. A study of 282 3D body scans found significant differences between
distributions of reported dress sizes and best fit sizes. Of all scans, only three participants were wearing a correct size, ten percent best fit into one size larger than reported, fifty percent needed two sizes larger, thirty-three percent needed three sizes larger, five percent needed four sizes larger, and one woman needed five sizes larger than reported (Honey, 2007). While the most common “best fit” sizes were 16 and 14, the most common reported sizes were 12 and 14 (Honey, 2007). These figures make an even stronger case for mass customization through 3D body scanning in order to give all consumers the proper fit.

**Fit Models, Pattern Making, and Grading**

As previously discussed, the majority of women today are of pear body shape, while most clothing is cut to specifications of the more traditional hour glass shape. This body shape is used for creation of size charts which are based on fit models. In order to make apparel size designations for any given company, the manufacturer chooses a fit model to fit their garments to and size their styles accordingly on a grading system (Fellingham, 1991). Most manufacturers choose this fit model to represent body dimensions which a company has determined will provide proportional relationships needed to achieve the “company fit,” which allows the company to differentiate itself from competitors (Workman J. a., 2000). Company fit is achieved by choosing fit models that are perceived to be physically similar to the target customer, which contributes to sizing variance from brand to brand (Frings, 1999). This fact was exemplified in a study which sought models with measurements of bust 36, waist 24, and hip 34, height of 5’8” and weight of 115 pounds. Six different size 8 sheaths were tried by the models, and the visual evidence showed a high magnitude of difference in fit and lack of consistency (Fellingham, 1991).
Once a manufacturer has obtained the ideal fit model for company fit, patterns are drafted and graded for each garment based on the fit model specifications. Garments are graded up and down based on increments that maintain the shape of the garment as measurements increase or decrease (Pisut, 2006). Fit inconsistency can also result from the grading process. Grading depends on the discretion of the pattern maker and grader and can be influenced by his or her experience or lack thereof (Faust, 2006). Some manufacturers use cost cutting in production and inventory by trying to fit the maximum number of customers with the minimum number of standard sizes (Price, 1996). This is only furthering issues with consumer fit. For example, if a consumer finds that the size 10 jeans are too tight but the size 12 are too large, the only option is to have tailoring done to either pair, a cost on top of the cost of the garment. If manufacturers created the size in between, problems with fit may be alleviated to some small degree. Of course, 3D body scanning would also serve as an adequate option for consumers as well as manufacturers.
CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

For the purposes of this research, the population studied consisted of an all-female group of participants. In order to make the results more accurate, the age group of 18-35 was selected as the second parameter for participation in the study. According to a Mintel report forecasting the denim market in 2008, denim manufacturers were aggressively pursuing a younger, more trend-obsessed market (Mintel International Group Limited, 2007). This information created the need to study a younger market because of their appeal to denim manufacturers. Also, it was hypothesized that a younger market would be more willing to be early adopters of new technology and therefore more willing or eager to participate in the study. Older age groups no doubt have concerns with fit as well, but may be less eager to investigate and eventually use new technologies.

An initial survey was created and revised twice after two test participants completed the survey. These test participants were not included in the final survey participation due to their previous exposure to the study and the material. The researcher used these test surveys to revise questions and develop the final survey seen in Appendix A. Before the survey was distributed to participants, approval was given by Subhas Ghosh, Ph.d., of Eastern Michigan University (EMU) and the University Human Subjects Review Committee (UHSRC) of EMU.

The final approved survey was sent to two groups of women with essentially random sampling used. Group 1 consisted of 303 women aged 18-35 reached through social networking website facebook.com, a website widely used by the age group that was tested in this project. This method was chosen for the ease of accessibility the site offered, coupled with the frequency of use by the test subjects. Potential participants were messaged
individually using the site’s “message” function with the letter seen in Appendix C. Included in the message was a link to the website surveymonkey.com, where the survey could be completed. This group was given nine days to respond to the survey, but the majority answered within the first 48 hours.

Participation dramatically slowed down after the first 48 hours. In order to gain more information, a second group was given access to the survey. This group consisted of 101 Apparel, Textiles, and Merchandising students from Eastern Michigan University, provided by Dr. Subhas Ghosh. Group 2 fit the all-female criteria, but no age group was provided, so everyone was contacted and asked to participate only if they fell into the proper age group. One potential participant responded to the researcher that she would have participated but did not fall into the proper age requirement. This group was contacted through email with the message seen in Appendix D, a message similar to the one received by Group 1 with a link to the online survey tool. This group was given four days to respond, due to the initial response rate by Group 1 (the majority responded in the first 48 hours) and to create urgency to complete.

A total of 404 potential participants were asked to complete the survey by the researcher. Each potential participant from Group 1 was also asked to forward the survey link to females in the age group who may wish to participate. Responses from participants indicate that the link was forwarded to additional potential participants and that there was success from these individuals participating. The number of additional participants is unknown, but the response rate from the 404 sent by the researcher reached 45.7% from the total of 185 responses (initially, responses numbered at 191; however, six were incomplete and therefore discarded). From these numbers, it can be estimated that the total response
rate is < 45.7%. Participants in Group 2 were not asked to forward the link to anyone else. The response rate from this group was easily tabulated and provided a disappointing eight percent response rate. No participant was forced to participate, and no completed survey was dismissed from the study in order to keep sampling random.

In order to collect data and completed surveys, the online questionnaire tool Survey Monkey was used. This method provided ease of access for participants, limited paper use for research, and helped the researcher to reach a wider audience. The software provided by the website was extremely useful in providing the ability to cross reference data and responses, as well as create visual charts. Also, the data could be collected and analyzed at a faster rate than having participants fill out paper surveys which would have to be tabulated manually. Because of the use of online software, participants were also able to remain anonymous because they were not asked to provide name or email in order to use the website. Survey Monkey provided a 10-digit number in order to “identify” each respondent and their given answers. Online data collection also meant that the researcher could easily monitor responses.

Although question banks are available through the online software, each question was designed with a specific purpose and completely created by the researcher. Each participant was greeted by a brief description and background of the survey. While participants were not prohibited from researching 3D body scanning on their own, the researcher did not provide an extensive background on the technology so that perceived thoughts of participants would be given as answers. Participants were required to agree to the “participant informed consent agreement” at the beginning of the survey in order to participate. Each question to the survey required an answer be provided, with the exception of question number 16 which only
required an answer if question 15 was answered as “strongly agree” or “agree.” Fifty questions were asked on a five-point likert scale of “strongly agree,” “agree,” “neither agree or disagree,” “disagree,” and “strongly disagree.” Four of the fifty questions were not answered on a likert scale (gender, age, body shape, and number of different sizes of jeans the participant fit into). These fifty questions were divided into three sections. Section 1 was designed to investigate demographics, consumer purchase behavior, and consumer problems with RTW fit of jeans. Section 2 investigated consumer willingness to adopt the 3D body scanning technology for better fitting jeans. These questions were designed with the TAM in mind, measuring hedonic and utilitarian motives. Section 3 continued the TAM model questions but investigated participants’ point of view on purchasing fashion items.
CHAPTER 4: PRESENTATION AND ANALYSIS OF DATA

Participant’s Issues with Fit of Ready to Wear Jeans

For purposes of the study, it was important to not only measure hedonic and utilitarian attitudes towards technology adoption but also to research consumers’ issues with fit. Exposing further data on consumers’ issues with fit provides a stronger case for the need to adopt this technology for widespread use in the apparel industry.

Figure 7. Age range of participants

Figure 7 represents the age range of the 185 female participants. Target audiences for the survey were females aged 18-35, although no female in the 18-year-old age group completed the survey. Despite a healthy age range, the majority of those who participated...
reported that issues with fit and age had no effect on issues experienced. Various issues with fit were examined and the most important are described in the following figures.

**Figure 8.** Distribution of participants’ attitudes towards the statement “I want better fitting jeans.”

**Figure 9.** Distribution of participants’ attitudes towards the statement "My size is the same amongst all brands of jeans."
In Figure 8, it is shown that 176 out of the 185 (ninety-five percent) participants agreed or strongly agreed that they want better fitting jeans. It is further proof of earlier research that there exists a strong desire for improved sizing of RTW clothing for women. Secondly, in Figure 9 it is shown that women today are facing inconsistency between denim brands available for purchase. Of those surveyed, 146 out of 185 (79%) disagreed or strongly disagreed to the statement that “My size is the same amongst all brands of jeans.” This not only shows that women are frustrated and in need of RTW sizing reform, but also that sizes are not “standardized” as they are proposed to be.

![Bar graph showing distribution of participants' attitudes towards the statement](image)

*Figure 10. Distribution of participants' attitudes towards the statement "It is difficult to know what size I am when shopping for a brand of jeans I have never worn before."*
When surveyed, consumers also revealed that when shopping with a new brand of denim it is difficult to know what size to wear. Out of the 185 participants, 163 (eighty-eight percent) agreed or strongly agreed that shopping with a new brand poses difficulty in deciding what size would be best (Figure 10). This is a testament to brands utilizing the “voluntary” part of the PS 42-70 set by the U.S. Department of Commerce. RTW clothing cannot be seen as standardized or of adequate fit for the majority of consumers.

While this information serves as further evidence of past literature, one question included in the survey gave surprising results. It had been explained earlier that when standards were first set for clothing sizing in the 1940s, measurements and sizes were based on an hourglass body shape. Today’s women are said to be more pear-shaped and this served as an explanation for why RTW clothing provided ill fit. This study found the following results for body shape:
Figure 11. Distribution of participants' body shapes

As seen in Figure 11, 84 (forty-five percent) women surveyed described themselves as hourglass shaped, while only 46 (twenty-five percent) claimed the pear shape as their own. While most women described themselves this way, it could have been more accurate had participants been provided with a pictogram of body shapes rather than a written description. The study did show, however, that even those who described themselves as hourglass in shape still found frustrations with the fit of RTW clothing. Figure 12 shows the number of hourglass women who struggle with finding good fit.
Figure 12. Distribution of hourglass participants' attitudes towards the statement "I have an easy time finding good fitting jeans."

Of the 84 women who claim to be hourglass in body shape, 54 (sixty-four percent) revealed that they do not have an easy time finding good fitting jeans. Either these women are not actually hourglass in shape, or RTW sizing is ill-fitting even for those who fit the shape that size charts are made for. If the women are correct in their body analysis, Figure 12 provides further evidence of the problems in our RTW sizing system. If hourglass women cannot fit into sizes easily, then who can?

Questions pertaining to matters of vanity sizing gave no clear evidence that women are buying into the “vanity” of this sizing scheme. This could be due to consumers’ awareness that they may look vain by answering “agree” to questions such as “I would prefer
the brand that fits me into the smallest size.” It could also be that women do not care for the vanity issue and brands have been unwise to pursue this marketing tactic. As shown in Figure 13, the majority of women “disagreed” to the statement designed to measure vanity; thus vanity sizing can be cancelled out as having a significant effect on the sample population.

![Bar chart showing attitudes towards vanity sizing](image)

*Figure 13. Distribution of participants' attitudes towards questions measuring attitude towards vanity sizing.*

**Testing of Hypothesis I: Hedonic Motives**

After exploring participants’ issues with fit of RTW sizing, it is necessary to study their motives towards technology adoption of 3D body scanning technology in order to alleviate fit issues and concerns. For this the principles of the TAM were used. Hypothesis 1 stated that consumers are more hedonically motivated towards fashion technology products, and this was affecting their willingness to adopt 3D body scanning technology for better fitting jeans due to low levels of perceived usefulness.
Table 1. Reliability of scale for measuring hedonic motives

Reliability Statistics

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.773</td>
<td>9</td>
</tr>
</tbody>
</table>

In order to measure Hypothesis 1 accurately, the scales were tested for variables that measured hedonic attitudes and willingness to adopt 3D body scanning technology. Table 1 shows that Cronbach’s Alpha measures .773 for the nine items tested for reliability of scale. This score proves the scale is acceptable as reliable; most research supports scales that are .70 and above as acceptable.

Each question asked of participants was coded in the following manner in order to measure their responses in SPSS software:

Strongly Disagree -1, Disagree - 3, Neither Agree or Disagree - 5, Agree -7, Strongly Agree -9.

Table 2. Measure of means for hedonic motives
Survey statements that measured hedonic attitudes are shown in Table 2 displaying mean responses for each of the nine hedonic statements. Of those that were surveyed, 185 responses were valid and none were excluded or “missing.” On a scale of 1-9 (1 strongly disagree, 9 strongly agree) the majority of means fell into the 6 range, with the exception of “I do not see the value of 3D body scanning for improved fit of jeans,” which measured in the 3 range due to the negative wording used to pose the statement. Because of this it is expected that the mean would be closer to 1. Since it is expected that consumers are hedonically motivated towards adopting technology for fashion products, these means support that the majority of consumers averaged tendencies towards hedonic motivations because of the fact that the scores err on the side of the scale closer to 9. In order to decipher the statement “I do not see the value of 3D body scanning technology for improved fit of jeans” as hedonic, the scale would have to err on the side of 1, being that hedonic motivation would encourage the respondent to answer “disagree” or “strongly disagree.”

In order to gauge consumers’ willingness to adopt 3D body scanning technology, a straightforward approach was taken and the 185 participants were asked if they would use the technology. Figure 14 shows a frequency chart of responses, with 69.7% (129) answering “strongly agree” or “agree” to adopting 3D body scanning technology for better fitting jeans.
Figure 14. Frequency chart for participants' attitudes towards adopting 3db for better fitting jeans

Of the 129 participants who would adopt the technology, measures of hedonic motives (perceived usefulness) were high. In Figure 15, it is shown that the majority of consumers who would adopt the technology measured high in hedonic motivations: 3DBSs is useful; 3DBS would benefit me; I would benefit from 3DBS; I would get better fitting jeans from 3DBS; and I would use 3db for other garments. The statement “I do not see value in 3DBS” is phrased opposite of the rest, and therefore measures higher levels of disagree and strongly disagree, meaning participants do indeed see value in 3D body scanning for jeans.
Figure 15. Distribution of participants’ attitudes towards hedonic motivations

Seeing value in using technology is a hedonic measurement of benefitting from use. These facts are supported by statistical correlation using SPSS software. Adoption of 3D body scanning and statements measuring hedonic motivation had significant positive correlations on the Pearson Correlation scale (Tables 3-8). All of the tables demonstrate a significant relationship between willingness to adopt 3D body scanning technology and statements that measure hedonic motivation. As stated in each table, the Pearson Correlation is significant at the .01 level, and each table’s Pearson correlation fits that criterion as significant. Each significance level (2 tailed) measures .000, which also proves statistical significance.
Table 3. Correlation for 3dbs adoption and perceived benefit from use

<table>
<thead>
<tr>
<th>Correlations</th>
<th>I would use 3D body scanning for better fitting jeans.</th>
<th>I would benefit from using 3D body scanning technology for jeans.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson Correlation</td>
<td>.585**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>N</td>
<td>185</td>
</tr>
<tr>
<td>I would benefit from using 3D body scanning technology for jeans.</td>
<td>N</td>
<td>185</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4. Correlation for 3dbs adoption and willingness to use for garments other than jeans

<table>
<thead>
<tr>
<th>Correlations</th>
<th>I would use 3D body scanning for better fitting jeans.</th>
<th>I would use 3D body scanning for other garments.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pearson Correlation</td>
<td>.539**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>N</td>
<td>185</td>
</tr>
<tr>
<td>I would use 3D body scanning for other garments.</td>
<td>N</td>
<td>185</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Table 5. Correlation for 3dbs adoption and perceived usefulness for better fitting jeans

<table>
<thead>
<tr>
<th></th>
<th>I would use 3D body scanning for better fitting jeans</th>
<th>3D body scanning is useful for better fitting jeans</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>Pearson Correlation</td>
<td>.562**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
<tr>
<td>3D body scanning is useful for better fitting jeans.</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6. Correlation for 3dbs adoption and perceived benefit from using for better fitting jeans

<table>
<thead>
<tr>
<th></th>
<th>I would use 3D body scanning for better fitting jeans</th>
<th>I would get better fitting jeans from using 3D body scanning</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>Pearson Correlation</td>
<td>.531**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
<tr>
<td>I would get better fitting jeans from using 3D body scanning.</td>
<td>Pearson Correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Table 7. Correlation for 3dbs adoption and perceived solution to fit issues of jeans

<table>
<thead>
<tr>
<th></th>
<th>I would use 3D body scanning for better fitting jeans.</th>
<th>I believe 3D body scanning is a solution to my fit issues with jeans.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>Pearson Correlation 1</td>
<td>.470**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
<tr>
<td>I believe 3D body scanning is a solution to my fit issues with jeans.</td>
<td>Pearson Correlation .470**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Table 8. Correlation for 3dbs adoption and perceived benefit for user

<table>
<thead>
<tr>
<th></th>
<th>I would use 3D body scanning for better fitting jeans.</th>
<th>Using 3D body scanning for better fitting jeans would benefit me.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>Pearson Correlation 1</td>
<td>.584**</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
<tr>
<td>Using 3D body scanning for better fitting jeans would benefit me.</td>
<td>Pearson Correlation .584**</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>185</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Figure 16. Participants who chose non adoption of 3dbs, measure of attitudes for hedonic motivation.

Of the 20 participants who would not adopt 3D body scanning for better fitting jeans, Figure 16 shows their measures of hedonic motives. This group had a tendency to choose “neither agree or disagree” in their responses; however, some measured hedonic motivational tendencies as well.

**Testing of Hypothesis II: Utilitarian Motives as Moderator**

Hypothesis 2 used utilitarian motives as a moderator variable, stating that consumers were more utilitarian in motivation towards adopting technology for fashion products. The lack of adoption would therefore come from low levels of perceived ease of use and perceived usefulness. It has already been proven that of those surveyed, levels of perceived usefulness are high. Now it is necessary to examine levels of perceived ease of use for utilitarian motivations.
Survey questions regarding utilitarian motivations (perceived ease of use) are shown in Figure 17. For hedonic motivations, the charts show a clear majority favoring hedonic motivation for adoption of 3D body scanning technology. In the case of utilitarian motivations it is not so clear. Of 185 participants, 110 (fifty-nine percent) disagree or strongly disagree to “I would not use 3DBS for jeans because it would take too long.” This is the only clear majority that disagrees to a utilitarian motive. The other three motivations that were measured show no clear majority (“I do not know enough about 3DBS to want to use”), or were undecided about their feelings towards the statement (“3DBS involves too much work,” and “3DBS is easy to use”). While no clear majority existed, shown in Figures 18-20 are those who had low perceived ease of use and their feelings about adoption of 3DBS for better fitting jeans. It is shown that despite unsure feelings on scales of perceived ease of use, these consumers are still willing to adopt the technology.
Figure 18. Distribution of participants’ attitudes towards adoption with low perceived ease of use for 3dbs

Figure 19. Distribution of participants’ attitudes towards adoption with low perceived ease of use for 3dbs II
Figure 20. Distribution of participants' attitudes towards adoption with low perceived ease of use for 3dbs III

Using SPSS software to run correlations (Tables 9-11) between utilitarian motives and adoption, it was concluded that the two variables had a negative correlation. Thus as willingness to adopt 3D body scanning technology for better fitting jeans increases, the “agree” and “strongly agree” answers to the following utilitarian statements decrease. Consumers did not exhibit that their level of perceived ease of use affected their willingness to adopt, again proving that hedonic motivation is primary for adoption of 3D body scanning for better fitting jeans. Each measured a significance level (2 tailed) as .000, showing statistical significance.
Table 9. Correlation for 3dbs adoption and perceived ease of use (time)

<table>
<thead>
<tr>
<th>Correlations</th>
<th>I would not use 3D body scanning for better fitting jeans because it would take too long.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>Pearson Correlation: 1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).

Table 10. Correlation for 3dbs adoption and perceived ease of use (knowledge)

<table>
<thead>
<tr>
<th>Correlations</th>
<th>I do not know enough about 3D body scanning to want to use it.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I would use 3D body scanning for better fitting jeans.</td>
<td>Pearson Correlation: 1</td>
</tr>
</tbody>
</table>

**. Correlation is significant at the 0.01 level (2-tailed).
Table 11. Correlation for 3dbs adoption and perceived ease of use (work)

Correlation for the statement “3DBS is easy to use” was not used due to the large number of consumers who were undecided on the statement. Also, it was depicted previously that even those who were unsure about ease of use would still elect to adopt the technology for better fitting jeans.
CHAPTER 5: CONCLUSIONS

As discussed in previous literature, this study did prove that there are definite issues with the fit of RTW sizing for women, specifically in the denim pants market. Of the 185 women participants in the survey, ninety-five percent stated that they wanted better fitting jeans. This is an alarming number of consumers to be frustrated with the goods that are supplied for their purchase. Authors and scholars in the field have given warning that a re-evaluation of sizing standards should be conducted because of variation in body shapes from the time of PS 42-70 and today. While there may be more pear-shaped women today than in the past, this study found a ratio of forty-five percent to twenty-five percent of hourglass to pear-shaped women, respectively, and the hourglass body shape was not immune to frustrations with fit of jeans. The number of hourglass body shape women was surprising, and it can be deduced that possibly women are identifying their body shape wrong. If a change to the survey were to be made, it may be more suitable to provide a pictogram of body shapes rather than a written description in order to get a more accurate idea of the distribution of body shapes. However, despite body shape and age, it is determined from those participants in the study that something need be done to alleviate fit issues.

Answers provided by the 185 women surveyed also show that inconsistencies do exist in the RTW industry for jeans. No adherence is made to standardized sizes, and companies are utilizing the “voluntary” part of PS 42-70 liberally, resulting in only more frustration on the consumer end of the spectrum. In the literature review, the topic of vanity sizing as a marketing tool was discussed as a product of voluntary product sizing. The participants in this study gave no clear indication that vanity sizing had an effect on their choice of brand. It can be reasoned that participants may have been hesitant to admit to vanity and therefore did
not response honestly, skewing the results. In the case of this study and the answers given, it should be recommended to manufacturers that vanity sizing be eliminated in favor of body scanning and mass customization in order to alleviate consumer frustration with variation between brands, since consumers do not pay brand loyalty to vanity sized items. Also in the case of this study, since consumers are willing to adopt 3D body scanning for better fitting jeans, it may be wise to further investigate manufacturer’s willingness to adopt the technology. The fault of the technology not being used in the industry may rely on the manufacturers of clothing not wanting to lose any perceived competitive edge from vanity sizing.

The research conducted for this study aimed to prove Hypothesis I, which is stated as follows: most consumers are more hedonically motivated towards fashion technology products, and the 3D body scanner does not possess high enough levels in perceived usefulness preventing adoption. Hypothesis I can see be dissected into two parts: consumers are hedonically motivated towards fashion products, and hedonic motivations are preventing adoption of 3D body scanning technology. Part one of Hypothesis I was proven; consumers are hedonically motivated towards fashion products. In Table 2 it was shown that the majority of hedonic motives were supported by the 185 participants, followed by support of consumers’ willingness to adopt the 3D body scanning technology in Figure 14. Of the 185 women, 69.7% would adopt the technology for better fitting jeans, and their adoption was motivated by high levels of perceived usefulness (participants saw perceived benefits from use and perceived value of the technology). Significant statistics also supported the positive relationship between hedonic motivations and willingness to adopt. From this, it can be concluded that part one of Hypothesis I was proven (consumers are mostly hedonic in
motivation towards fashion technology products) but part two was not, seeing as consumers were very willing to adopt the technology. Even though the 20 participants who would not adopt still displayed some hedonic tendencies, this group was not large enough to support Hypothesis I on its own. Thus, it is necessary to reject Hypothesis I of the study. While Hypothesis I is rejected, it still carries implications. Manufacturers and apparel brands should take note that consumers have issues with fit and are ready for adoption of 3D body scanning technology for improved fit due to possession of high levels of perceived usefulness in hedonic consumers.

The second part of the study was stated in Hypothesis II: Most consumers are utilitarian in motivation towards fashion technology products, and the 3D body scanner does not possess high enough levels of perceived ease of use and perceived usefulness, preventing adoption. It was already proven that participants had high levels of perceived usefulness, so the study needed to examine whether the levels of perceived ease of use has any moderator effect on adoption of the technology. Questions in the survey pertaining to utilitarian motives provided no clear majority of attitudes, mostly falling into the “neither agree nor disagree” option. Despite that fact that those women in the survey were unsure about their feelings on utilitarian motives, this had no effect on adoption (shown in Figures 18-20; those who were unsure still favored adoption). It was also shown through correlation analysis that hedonic motivation is a key aspect for adoption not utilitarian motivation. Utilitarian motivations showed a negative correlation to adoption; as willingness increases, utilitarian motive decreases. It can be concluded that the utilitarian motives are not in the majority towards adopting fashion technology products. We can reject Hypothesis II as having an
effect on adoption, due to the fact that consumers were proven to be more hedonic in motivation.

Although the hypotheses were not supported in the study, important facts can be taken from it for future research and reference. In the apparel industry today, consumers are facing frustration with the fit provided and are ready for a change. If the apparel industry feels that 3D body scanning is the proper avenue to proceed with, consumers are willing to adopt due to their hedonic nature and high levels of perceived usefulness of 3D body scanning technology. From this research it can proposed that the technology be used for mass customization of garments or that manufacturers cease use of fit models and utilize the technology to study the population and adjust size charts accordingly for better fit of ready to wear clothing. If the first option were to be pursued, every consumer could be measured and given an identification number in a database of consumer measurements to be used by companies to create custom fit of the individual consumer’s desired garment. In order to make this system optimal and useable, measurements may have to be updated on a regular basis and body scanning systems would have to be readily accessible in places like shopping malls or doctor’s offices. At this early phase, the system is not without negative aspects. Consumers may oppose the lack of privacy such a database would offer, and children’s measurements would be constantly changing due to growth. Again, this leaves room for further research projects as to how to best pursue this option. If the second option were to be pursued, projects like Size USA would need to be re-implemented to gain a picture of the current size and proportion of the consumers in our country. Manufacturers could use this information in order to re-create sizing for RTW as we know it and relieve consumers’ issues
with the current fit of their clothing. This option could take years to implement, again a topic for further research.

Issues with fit have been blamed primarily on the manufacturers’ end, but the question could also be asked, what are consumers doing to alleviate their own issues? The survey of 185 women exposed that a variety of fit issues existed, yet only 17.9% used a tailor when jeans were ill-fitting. About half believed a tailor was too expensive, and the same amount believed using a tailor would take too much time. Further studies could investigate more into what consumers do to fix ill-fitting RTW, or if they choose to suffer in silence. The question of price of garment could also be further investigated. Do high end garments yield better fit, and would consumers be willing to spend more money for a better fitting garment? Spending more money on a better fitting garment could bear the same weight as purchasing a less expensive garment and having it altered by a tailor or seamstress.

While many questions are left for further research, this study gets the topic of 3D body scanning as a solution to widespread fit issues on the table for those in the apparel industry and on the minds of consumers. Companies like Canada-based Unique Solutions Design Ltd. have already begun to roll out solutions using the 3D body scanning technology for consumer use. Shoppers in malls can be measured in the scanner, with clothing on, and be matched up with optimal sizing for each apparel brand, free of charge (Textile World, 2011). Unique Solutions has recently received a $30 million investment to expand this service across the United States due to its success since 2010. Now that groups of consumers have been exposed to the existence of the technology, plans should be set in motion to help make this technology widely accessible and useable for the everyday consumer. It would be an advantage to the consumer to purchase products perfectly tailored
to their needs and hopefully increase sales of those manufacturers willing to invest in the adoption of the technology. The hope of this research is that this “new-age” technology will one day be the norm in apparel manufacturing.
References


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*Psychology & Marketing*, 1059-1084.


*Journal of Industrial Technology*, 1-8.


Appendix A: Participant Informed Consent Agreement and Sample Survey

Women’s Ready to Wear Denim and 3D Body Scanning Technology

Greetings!

Are you frustrated with the search for a perfect fitting pair of jeans? You are not alone! We are all different body shapes, so how can we expect to fit into the same pair of jeans? Professionals in the garment industry are tackling this widespread issue by using 3D body scanning technology to create custom fitted garments for consumers. The technology requires the user to wear a “second skin” type of body suit which enables the scanner to take measurements of multiple spots and angles that are impossible to get using traditional measuring tape. After a matter of seconds, the scan is complete and the user has a 3D avatar of themselves and a list of complete body measurements that can be used to draft custom patterns for clothing. In a matter of weeks, the user can have their very own custom fitted garment! Since many women face issues with finding perfect fitting jeans from ready to wear clothing stores, why not adopt this new technology?

The following survey will ask questions regarding your own shopping experiences for jeans, your feelings about 3D body scanning technology, and your thoughts about shopping for clothing overall. Participation is strictly voluntary and you may exit the survey at any time with no consequence. All answers are confidential (I won’t even ask your name) and will be used for academic purposes with the hope of spreading awareness of 3D body scanning technology and its implications for clothing fit.

Please answer all questions to the best of your ability. By doing so, you are giving your permission for your answers to be used for research purposes. Thank you so much for your participation!

Now...let’s get started!

1. By selecting “YES, I give my informed consent” I am giving my INFORMED CONSENT to voluntarily participate in the survey via electronic signature. I do so knowing that my answers will be used for academic research, my identity will be kept confidential, and my responses will provide possible implications for further development of 3D body scanning technology. I am also aware that I may exit the survey at any time with no consequence.

“This research protocol and informed consent document has been reviewed and approved by the Eastern Michigan University Human Subjects Review Committee for use from _______ to _______ (date). If you have questions about the approval process, please contact Dr. Dob de Laski-Smith (734.487.0042, Interim Dean of the Graduate School and Administrative Co-chair of UHSRC, human.subjects@emich.edu).”

- YES, I give my informed consent.

2. Gender
   - 

3. Age
   - 

Page 1
### Women’s Ready to Wear Denim and 3D Body Scanning Technology

4. The body shape that best describes me is
   - **Pear** (broader hips than shoulders)
   - **Rectangle** (Straight up and down, no waist definition)
   - **Hourglass** (Full bust and hips with waist definition)
   - **Inverted Triangle** (Broad shoulders and smaller hips)
   - I do not know

### Consumer Experience with Denim Pants (Jeans)

5. I purchase denim pants (jeans) frequently.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

6. I wear jeans frequently
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

7. I have an easy time finding good fitting jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

8. I have only found 1 brand of jeans that fits me to my liking.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

9. I have not found any brand of jeans that fits me to my liking.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

10. I have found more than 1 brand of jeans that fits to my liking.
    - Strongly Agree
    - Agree
    - Neither Agree or Disagree
    - Disagree
    - Strongly Disagree

11. I am loyal to 1 brand of jeans
    - Strongly Agree
    - Agree
    - Neither Agree or Disagree
    - Disagree
    - Strongly Disagree

12. I choose good fit over style when buying jeans.
    - Strongly Agree
    - Agree
    - Neither Agree or Disagree
    - Disagree
    - Strongly Disagree
Women's Ready to Wear Denim and 3D Body Scanning Technology

13. If it is difficult to know what size I am when shopping for a brand of jeans I have never worn before.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

14. My size is the same amongst all brands of jeans.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

15. I currently fit into more than one size for jeans.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

16. If you agree or strongly agree, how many different sizes of jeans do you currently fall into?
   [ ]

17. I prefer to purchase jeans from the brand that fits me into the smallest size.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

18. I shop loyally with the brand of jeans the fits me into the smallest size.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

19. I would shop loyally with the brand of jeans that fits me into the smallest size.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

20. I can find jeans to fit my hips, but they are too big in the waist.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

21. Regular length jeans are too long on me.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree

22. I get my jeans tailored if they do not fit properly.
   [ ] Strongly Agree  [ ] Agree  [ ] Neither Agree or Disagree  [ ] Disagree  [ ] Strongly Disagree
Women's Ready to Wear Denim and 3D Body Scanning Technology

23. I do not get my jeans tailored because it is too expensive.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

24. I do not get my jeans tailored because it takes too much time.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

3D Body Scanning Technology

25. I do not see the value of 3D body scanning for improved fit of jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

26. I would use 3D body scanning for better fitting jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

27. I would not use 3D body scanning for better fitting jeans because it would take too long.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

28. I do not know enough about 3D body scanning to want to use it.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

29. I would benefit from using 3D body scanning technology for jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

30. I would use 3D body scanning for other garments.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

31. 3D body scanning is useful for better fitting jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree
<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Women's Ready to Wear Denim and 3D Body Scanning Technology</strong></td>
</tr>
<tr>
<td>32. I would get better fitting jeans from using 3D body scanning.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>33. I am not comfortable with the 3D body scanning process.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>34. 3D body scanning involves too much work.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>35. 3D body scanning for improved fit of jeans is innovative.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>36. I enjoy trying new technologies.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>37. I believe 3D body scanning is a solution to my fit issues with jeans.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>38. I want better fitting jeans.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td><strong>Fashion Point of View</strong></td>
</tr>
<tr>
<td>39. Fashion is fun.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>40. Fashion should be more functional than stylish.</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
<tr>
<td>41. I prefer traditional methods of shopping (i.e. trying on clothing in the store).</td>
</tr>
<tr>
<td>□ Strongly Agree □ Agree □ Neither Agree or Disagree □ Disagree □ Strongly Disagree</td>
</tr>
</tbody>
</table>
Women's Ready to Wear Denim and 3D Body Scanning Technology

42. I get pleasure/enjoyment from traditional methods of shopping
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

43. I do not care about finding better fitting jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

44. I do not take fashion serious enough to use 3D body scanning.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

45. I purchase clothing without trying it on.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

46. I enjoy shopping for clothing.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

47. Shopping for clothing is a chore.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

48. 3D body scanning is easy to use.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

49. Ordering clothing from a catalog or online takes too long, I prefer to get my clothing immediately.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

50. I am excited to try 3D body scanning for better fitting jeans.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree

51. Using 3D body scanning for better fitting jeans would benefit me.
   - Strongly Agree
   - Agree
   - Neither Agree or Disagree
   - Disagree
   - Strongly Disagree
Thank you so much for your participation, it is greatly appreciated. The information you have provided will hopefully be a valuable resource in the advancement of apparel sizing systems.
Appendix B: Human Subjects Approval Form

EASTERN MICHIGAN UNIVERSITY

September 1, 2011

To: Aimee M. Raszka
School of Technology Studies

Re: COT-HSRC # 1020
Approval Date: 8/15/11

Title: Fashion: Hedonic vs. Utilitarian. A Study of Women’s Ready to Wear and an Examination of the Technology Acceptance Model for Consumer Adoption of 3D Body Scanning for Improved Fit of Denim Pants

The College of Technology Human Subjects Review Committee (COT-HSRC) has completed their review of your project. I am pleased to advise you that your expedited research has been approved in accordance with federal regulations.

Renewals: Expedited protocols need to be renewed annually. If the project is continuing, please submit the Human Subjects Continuation Form prior to the approval expiration. If the project is completed, please submit the Human Subjects Study Completion Form (both forms are found at http://www.ord.emich.edu/research/compliance/human/human.html).

Revisions: Expedited protocols do require revisions. If changes are made to a protocol, please submit a Human Subjects Minor Modification Form or new Human Subjects Approval Request Form (if major changes) for review (see http://www.ord.emich.edu/research/compliance/human/human.html).

Problems: If issues should arise during the conduct of the research, such as unanticipated problems, adverse events, or any problem that may increase the risk to human subjects and change the category of review, notify the COT-HSRC committee within 24 hours (email and phone below). Any complaints from participants regarding the risk and benefits of the project must be reported to the COT-HSRC.

Follow-up: If your expedited research project is not completed and closed after three years, the COT-HSRC will require a new Human Subjects Approval Request Form prior to approving a continuation beyond three years.

Please use the COT-HSRC number listed above on any forms submitted that relate to this project, or on any correspondence with the COT-HSRC.

Good luck in your research. If we can be of further assistance, please contact me at 734-487-1161 or via e-mail at pmajeska@emich.edu. Thank you for your cooperation.

Sincerely,

Paul T. Majeska
Administrative Chair
College of Technology Human Subjects Review Committee

University Human Subjects Review Committee · Eastern Michigan University · 200 Boone Hall
Ypsilanti, Michigan 48197
Phone: 734-487.0040 · Fax: 734-487.0050
E-mail: human.subjects@emich.edu
www.ord.emich.edu (see Federal Compliance)

The EMU UHSRC complies with the Title 45 Code of Federal Regulations part 46 (45 CFR 46) under FWA00000050.
Appendix C: Group 1 Request for Participation

Aimee Rzepka

August 24

Hello Ladies!
I am writing today to ask you to be a vital part of my study in apparel sizing for the completion of my Master’s Degree. This study is concerned with apparel sizing for denim pants (aka “Jeans”). As women, we are all shaped differently and face many frustrations with fit of mass produced clothing. My aim in this study is to research possible solutions to these problems we all face with finding the “perfect” fitting pair of jeans. For those of you that know me best, you know how hard I’ve worked to get to this point, and I would really appreciate all of your support. I hope that one day this study can have an impact on the apparel industry and its practices in sizing for women’s clothing.

Below I have provided a link to my survey. The first page will give a better description of the study and what I am trying to accomplish with this survey. It will take about 5 – 10 minutes of your time to complete and all answers are kept confidential. I would also appreciate if you could forward the survey to any woman aged 18-35 you feel might be interested in / willing to participate.

https://www.surveymonkey.com/s/ARzepkaThesis

Please visit the link as soon as possible, and complete by Friday September 2, 2011.

Thank you for your support,
Aimee M. Rzepka

Women’s Ready to Wear Denim and 3D Body Scanning Technology Survey
www.surveymonkey.com
Greetings fellow students!

I am writing today to request your participation in my thesis study, by means of completing a brief online survey. As students in the Apparel, Textiles, and Merchandising program I am particularly interested in your opinions, and know that as students you understand how important it is to support each other's work, whether it be for thesis research or a class project.

For this project I am looking for women aged 18-35 to give opinions and past experiences on the following topics:

- shopping for denim pants (Jeans)
- apparel sizing/ frustrations with ready-to-wear sizing
- feelings about using 3D body scanning for better fitting jeans

Please visit the following link and complete the survey as soon as possible, preferably by Friday, September 16th, 2011.

https://www.surveymonkey.com/e/ARozpkaThesis

I have worked very hard to get to this point and would really appreciate your participation! If you have any questions please feel free to email me at arzepka@emich.edu or rozpka.aimee@gmail.com

Looking forward to seeing your responses!

-Aimee Rozpka

Eastern Michigan University Graduate Student - Apparel, Textiles, and Merchandising