BODY SHAPE VERSUS BODY FORM: A COMPARISON OF THE BODY SHAPES OF FEMALE SWAZI CONSUMERS WITH THOSE OF BODY FORMS USED IN APPAREL MANUFACTURING

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OPSOMMING

Om goeie pas te verseker is dit belangrik dat klein- en grootskaalse klerevervaardigers klere vervaardig wat die groottes en liggaamsvorme van hul teikenmark sal pas. Vir die pas van klere maak groot- en kleinskaalse klerevervaardigers gebruik van kommersiële pas-modelle, waarvan die groottes en vorme veronderstel is om dieselfde te wees as die groottes en vorme van die teikenmark. Soos in baie ander lande, is geen antropometriese data van die Swazi-populasie beskikbaar nie, en ondervind veral die kleinskaalse klerevervaardigers in Swaziland steeds menige probleme met die pas van hul vervaardigde klere. Die doel van die studie was eerstens om die mees algemene vroulike Swazi-liggaamsvorm wat vir die vervaardiging van kommersiële pas-modelle gebruik kan word, te identifiseer, en tweedens om die mees algemene Swazi-liggaamsvorm met die liggaamsvorme van beskikbare kommersiële pas-modelle te vergelyk.

Die steekproef het bestaan uit 101 jong Swazi-vroue, ouderdom 18-30 jaar, en met ’n grootte 32 en 34 borsmaat. Die studie is in twee fases uitgevoer. In fase 1 is die liggaamsmates van die steekproef en twee verskillende handelsnaam kommersiële pas-modelle geneem en vergelyk. In fase 2 is die pas van ’n basiese rok wat volgens die mates van die geïdentifiseerde mees algemene Swazi-liggaamsvorm (grootte 32 en 34) gemaak is, op die kommersiële pas-modelle geëvalueer.

Die resultate het getoon dat die mees algemene Swazi-liggaamsvorm die driehoekige liggaamsvorm is, gevolg deur die uurglas-liggaamsvorm. In teenstelling met wat verwag is, was die liggaamsvorm van die pas-modelle nie die uurglas of ideale liggaamsvorm nie, maar wel ’n langwerpige en driehoekige liggaamsvorm. Daar was betekenisvolle verskille tussen die liggaamsmates van beide groottes driehoekige Swazi-liggaamsvorms en die mates van die twee verskillende handelsnaam-pas-modelle. Die evaluering van die pas van ’n basiese rok, gemaak volgens die mates van die geïdentifiseerde mees algemene Swazi-liggaamsvorm (grootte 32 en 34 Swazi) op die kommersiële pas-modelle, het dan ook pas-probleme uitgewys. Die resultate het implikasie vir vervaardigers van pas-modelle sowel as van klere wat vir die Swazi-mark bedoel is

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INTRODUCTION AND LITERATURE

In the bid to remain competitive in the current local and international retail market arena, retailers as well as small- and large-scale apparel manufacturers ought to manufacture and sell apparel that offer good fit to the target population. Fit is, however, a complex phenolmenon, has many varied interpretations and is determined by many factors, such as body shape, style and fabric. Fit issues therefore continue to be a growing concern for consumers, retailers and manufacturers. Despite the varied interpretations, fit is highly dependent on human proportions and directly related to the anatomy of the human body. Fit may be defined as the manner in which clothes conform to the body (Ashdown & DeLong, 1995:47-53). Fit and the determination of levels of satisfaction with the features of ready-to-wear garments are not only of importance to enhance sales, but also to cut down on returns due to poor fit. Dissatisfaction with fit is, however, still one of the

most frequently stated problems with garment purchases (Salmon, 2000, cited in Alexander *et al*, 2005). In order to achieve good fit and satisfy the target market, manufacturers therefore ought to consider not only body measurements, but also body shape.

Body forms are fit models used by retailers and small- and large-scale apparel manufacturers to create patterns and fit clothing on, and are based on body conformations extracted from anthropometrical data. However, commercial body form standards are still unsatisfactory due to their limitations in terms of shape and accuracy (Yu, 2004:35). For a body form to ensure fit, it should conform to the target market or population. For instance, if the garments are meant for the Swazi market, then the body forms used to produce those garments should depict the body shape of the Swazi population. The basis for the construction of body forms are body measurements. Although the circumferential measurements of the bust, waist and hips may appear to be similar, the shapes of figures may be quite different, hence will require differently shaped figure forms to give an accurate fit. To address fit problems, a set of current body measurement data for a specific target population is therefore important in the development of measurement charts, which ought to be revised in ten-year cycles due to changes in the characteristics of a population (Brunn, 1983, in Mastamet-Mason, 2008:33). However, most developing countries, including South Africa and Swaziland, still mainly use sizing systems that date back to the 1940s (Magagula & Zwane, 2006; Mlauli, 2004:40).

Body forms are made from materials that give them life-like properties to ensure the best assessment of apparel fit. The three-dimensional shape, size and posture of body forms should be exact conformations of individuals selected in the target market. To ensure this, prototype body forms, made in many developed countries, are milled using approximately 300,000 3-D data points to maintain dimensional and postural accuracy and precision, and to produce body forms that represent real people (Yu, 2004:35).

A silhouette may be developed on the body form by draping the fabric directly over it, or a prototype of the garment may be fitted on the body form for fit evaluation. Pattern makers, fashion designers and manufacturers use body forms to ensure clothing fit. Accuracy and quality of apparel can, however, only be realised through the use of dress forms, fit models and sizing systems that represent the target population's sizes and body shapes. In many cases body forms that are used are built according to the shape and dimensions of fit models that have proportionate bodies instead of the target market's actual dimensions and shapes (Bougourd, 2007:131-132). Using such body forms does therefore not assure better fitting apparel.

Body forms used in the clothing manufacturing industry are non-adjustable and are made for different sizes or according to different body measurements. Some advances in the development of body forms have been seen in recent years, for example, a series of new body forms that resemble the human body more than the conventional body form were developed by the Digital Human Laboratory in collaboration with the Bunka Fashion College in Japan. These include Japanese forms. When compared with the traditional dress forms, it was noted that the Japanese armhole shape is a wonky triangle compared to the rectangular armhole in the conventional body form, and it offers better fit to the front. The wonky triangle is said to give a better orientation of the arm, thus rectifying the problem of the arm hanging straight down from the upright rectangle. The Japanese body forms slightly change in shape and size every two years as all first-year students at the Bunka College are scanned and the moulding of the body forms is fed the averaged data of these new students. This is done to detect trends in body shape and size. Tuka forms were also produced; they feature precise anatomical detail and use a unique material that looks and performs like human skin. These body forms are constructed from 3-D scanned data of real-life fit models. Despite all these advances in the development of body forms, commercial garment standards are in many cases still unsatisfactory in terms of shape and size accuracy (Yu, 2004:35).

Most of the apparel sold in chain stores in Swaziland and other nearby African countries is imported from South Africa or Asia (especially China). Most South African apparel manufacturers are using sizing systems adapted from the British sizing system, while China has its own sizing system suited to the Asian population (Mlauli, 2004:40). Furthermore, the hourglass body shape is still considered the ideal figure, and apparel is therefore sized, shaped and fit-tested to fit this ideal figure (Alexander *et al*, 2005; Overstreet *et al*, 2010). Consequently, women within the different body figure type size

categories cannot find the right fit of garments within the current sizing system.

In recent years, the government of Swaziland (as is the case in many African countries) has encouraged the nation to engage in entrepreneurial activities to fight unemployment and boost the economy of the country (Southern African Development Community (SADC) Trade, Industry and Investment Review Report, 2007/2008:231). In a bid to realise this initiative, the government, through the Ministry of Economic Planning and Employment, consequently embarked on vigorous skills and entrepreneurship training sessions nationwide. This has seen a rise in the number of small-scale apparel manufacturers. Although armed with entrepreneurial and technical skills, small-scale apparel manufacturers encounter many problems with fit models (body forms) that are not manufactured according to the shape of the target market, and therefore produce apparel that does not offer perfect fit. Body forms used by small-scale apparel manufacturers for fit-testing in Swaziland are also generally sourced in South Africa, made in Taiwan for Singer and Siera, or by a South African company. Clearly, body forms should be manufactured using the body dimensions of the apparel manufacturer's target market in order to yield satisfactory levels of fit. However, this is not the case for the Swazi market, as very little current anthropometric data exists on Swazi women. This exploratory study therefore firstly seeks to establish body profiles of Swazi women that can be used in the production of body forms used for the small- and large-scale manufacturing of apparel sold to the Swazi population, and secondly to compare the most prevalent female Swazi body shape with those of the body forms that are used by small- and large-scale apparel manufacturers.

METHODOLOGY

This study was executed in two phases. In phase 1, body measurements of a sample of 51 size 32 (bust 85 cm) and 50 size 34 (bust 89 cm) young women, as well as the measurements of two different figure form brands (sizes 32 and 34) were taken. Phase 2 consisted of a fit test of a basic dress designed and made according to the measurements of the most prevalent Swazi body shape and fit-tested on the figure forms.

Sampling

The units of analysis were young Swazi female students from the University of Swaziland (Faculty of Agriculture), aged between the ages of 18 and 30 years, and female students from St Christopher's High School aged 18 years and above.

A list of all the Swazi female students in the Faculty of Agriculture was obtained from the Faculty tutor's office. All the students on the list were approached and asked to indicate their bust sizes as it was one of the prerequisites for inclusion in the study. Of the total population of female Swazi students, only those that indicated a bust size of 32 or 34 were included in the study. All the students who had a bust size of 32 or 34 were included in the study to ensure that there were enough participants to provide statistically meaningful data. The initial plan for inclusion into the study was a mere indication by the participants that they wore a size 32 or 34. However, after data collection at the University, it was noted that about 50% of the participants who had indicated that they were a size 32 or 34 were actually a size 36 or above when their individual under-bust measurement was compared with the retail standard under-bust measurements. The issue of body image and body cathexis had been overlooked. To avoid any further surprises, the researcher measured the under-bust and bust dimensions for all the high school girls that were aged 18 years and above. Only those that fell within the size 32 and 34 under-bust retail standard measurement bracket were included in the study. A total of 101 participants were included in the final sample.

Data collection

Phase 1 Before the measuring exercise commenced, the participants were given a consent form which they read and signed before participating in the study. Prior to the measuring exercise, it was explained to the participants that participation was on a voluntary basis. To ensure that the participants did not feel coerced into participating and for ethical reasons, it was further explained that if, at any point of the measuring exercise, any of them felt uncomfortable and wanted to discontinue with the exercise, they could freely do so at any given time.

Pre-preparation To ensure privacy, the measuring sessions took place in a quiet room, without the presence of an unnecessary audience. To ensure consistency and uniformity, the participants were provided with a two-piece, light grey body suit in either a size 32 or size 34

that clung snugly to the body without restriction. The top resembled a sports bra, while the shorts had legs that ended above the knees and reached up to the natural waistline. The light grey colour was chosen as it would create no optical illusion on the size and shape of the participants. The participants chose a suitable size that was not too restricting or too loose; it was worn over their undergarments. Participants were requested to wear an unpadded bra that fitted well, was made of thin material and without metal or other support. If necessary, participants were given a bra that fitted this requirement (ISO 8559, 1989). As participation was on a voluntary basis, the participants were given a small token of appreciation in the form of a lunch voucher to be used at the University refectory after the measuring session. For ethical reasons, the body suit was worn only once by a participant, then laundered and repackaged, before it was used by another participant. Each participant was given an identification number to ensure confidentiality and to ensure that the results could not be traced back to the actual participants.

In 1996, Alison Beazley carried out a study in which measuring methods for an anthropometric survey of young women were well outlined (Beazley, 1996), with the aim among others of explaining to those in industry, retail or education how to undertake a small-scale body measuring survey. In addition to Beazley's study, direction was sought from other sources including anthropometry books and international anthropometric standards (Bougourd, 2007:131; ISO 8559,1989; Johnston, 2004; Lohman *et al*, 1988:39; Rasband & Liechty, 2006:45). This body of literature served as a guideline for undertaking the survey.

To ensure that the body measurements were taken consistently and at the appropriate areas of the body, and that all horizontal markings clearly intersected all vertical markings, it was important to landmark the body before the measuring exercise was executed. The landmarks were identified through reliable standard techniques and were positioned on the participants as stipulated in Beazley (1996) and Bougourd (2007:132) (Figure 1).

Literature sourced from Beazley (1996), ISO 8559 (1989), Lohman *et al,* (1988:39-54) and Shin and Istook (2007), served as a point of departure in the decision-making process of which measuring tools to use for this study. The measuring equipment used for the study is presented in Figure 2, and included an anthropometer made according to the specifications as listed in ISO 8559 (1989), a segmometer, metal tape measure, chain, landmarkers, elastic tape and digital weighing scales.

Measuring equipment and techniques Traditional anthropometric techniques were employed, as there are no digital scanners in Swaziland. Measurement of the human body has been used throughout history to estimate body shapes and proportions, and has produced reliable results (Beazley, 1996; Bougourd, 2007:132; Lohman *et al,* 1988:97; Yu, 2004:37).

The measuring area was set up in such a way that it allowed a smooth progression of the measuring session as arranged in the measuring form. One of the issues that were addressed after the dry test of the measuring session was ensuring that there was a smooth flow from one measurement to the next by arranging the equipment as per the need. The body was landmarked with adhesive circles with

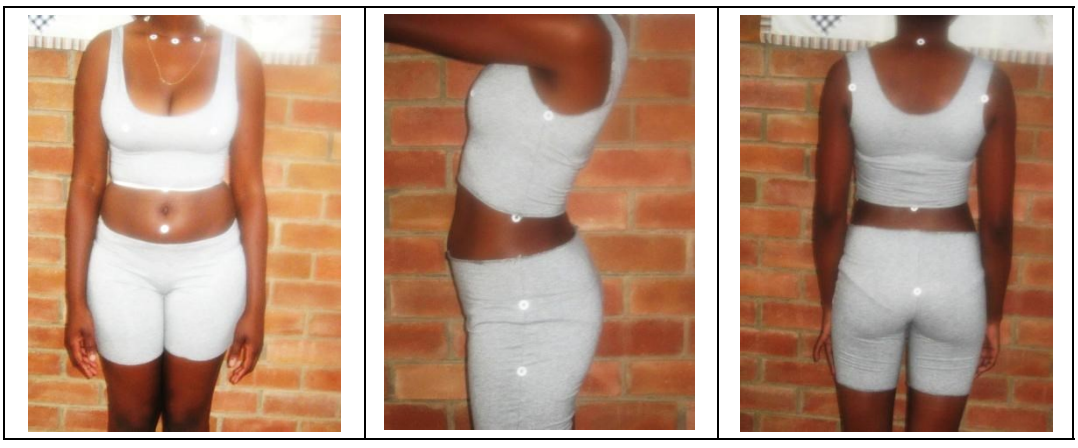

FIGURE 1: BODY LANDMARKS USED FOR THE STUDY

		
Anthropometer	**Digital weighing scales**	**Chain, elastic tape, adhesive stickers, segmometer and stature meter**

FIGURE 2: BODY MEASURING EQUIPMENT USED FOR THE STUDY

a hollow centre as they were easy to remove after the measuring process (Beazley, 1996). For circumference measurements, the plane of the tape around the body was held perpendicular to the long axis of that part of the body. In addition, for measurements taken while the subject was in a Frankfort plane position, such as the bust, waist, hip, and abdomen measurements, the plane of the tape was parallel to the floor (Lohman *et al,* 1988:40). The measuring tape was held snugly around the body part, but not too tight so as to compress the adipose tissue, thus indenting the skin. The tension applied to the tape by the measurer and the positioning of the tape measure affects the validity and reliability of the measurements, so the researcher and recorder were as consistent as possible throughout (Beazley, 1996; Johnston, 2004 ; Lohman *et al,* 1988:40). The researcher was a trained clothing specialist with more than 10 years of experience in clothing manufacturing and the taking of measurements.

The researcher took each measurement three times, and called them out to her assistant, who also loudly called out the measurement to confirm that it was correct, so as to ensure and maintain consistency and reduce error before recording (Beazley, 1996; Lohman *et al,* 1988:91). The research assistant was a Consumer Science student who had a background in taking body dimensions – a skill she gained in her apparel design and construction course and community nutrition course. The research assistant was further trained by the researcher on how all the measurements in the data collection form would be taken, and her role in the whole exercise was explained as she assisted with recording the measurements and aligning the tape measure at the back when girth measurements were taken.

Handedness has been found to influence some anthropometric dimensions, as in some studies the right-hand side of the human body has been found to be larger than the left side, though this has not been found to have significant influence with regard to the purpose of the anthropometric studies. However, for that reason the body measurements were taken from one side of the body; the choice of which side is more suitable depends on the researcher as it is not significant (Lohman *et al,* 1988:91). For purposes of this study the right side of the body was used. The data was collected and recorded in data collection forms that were categorised into three sections to enhance the efficiency of the measuring exercise, i.e. vertical measurements, horizontal measurements, and girth or circumferential measurements.

A body form is used to create patterns and test the fit of different garments; the key dimensions chosen should therefore cover the scope of apparel that employs the benefits of body forms (Yu, 2004:31). For purposes of this study, the key body dimensions were selected in view of the fact that the study seeks to analyse the shape and proportions of young Swazi women and of the currently used body forms in a bid to improve the shape and proportions and ultimately the fit of body forms. This study was limited to linear measurements, i.e. lengths and heights and circumferences, as it employed anthropometry which is limited in capturing body angles. Only the measurements that are rele-

vant to the body forms and critical to the fit of apparel were selected. The selected measurements provided useful information in relation to body shapes and proportions, which is congruent with the purpose of the study. To understand human variation in shape, size and proportions, specific segment lengths and circumferences are of critical importance (Beazley, 1996; Bougourd, 2007:131; Lohman *et al,* 1988:9; Rasband & Liechty 2006:86). Measurements were taken according to the measuring techniques described in ISO 8559 (1989).

Phase 2 A body form is used to create patterns and test the fit of different items of apparel (Yu, 2004:35). Basic pattern blocks of a bodice and skirt were therefore developed by the researcher for purposes of constructing a test garment that was then used for testing fit on the two brands of body forms.

Preparation of the basic blocks A bodice basic block and a skirt basic block for sizes 32 and 34 were drafted, using the key dimensions (bust, waist and hip, Table 2) of the most prevalent triangular shape of young Swazi women that was determined in phase 1 of the study. The patterns were drafted using the pattern development procedure as outlined in Rosen (2004:34-44). Seam allowance of 1,5 cm was used for all the basic seams and no seam allowance was added to the armhole and neckline.

Ease is added to the body measurements to enable a garment to fit and hang well on the body. Ease refers to the measurable difference between the body measurements and the measurements of the garment (Myers-McDevitt, 2004:331; Rasband & Liechty, 2006:31). To emulate a human being, wearing ease was added to the body measurements to facilitate movement, breathing and comfort. Design ease was not considered for purposes of this study as the test garment was a basic toile that had no design features. The appropriate amount of ease is dependent on the design, the fabric, size and shape of the figure being designed for (Rasband & Liechty, 2006:36). The pattern designer's and manufacturers' common practice often determines the amount of ease to add, or it is calculated as a percentage of the circumferences in a relaxed state, which removes the size dependence aspect. For purposes of this study, 1,25 cm was added to the bust, waist, hip and across the back measurements. The amount of ease added was guided by the table on ease allowance by Myers-McDevitt (2004: 332) and common practice. The least amount of ease suggested was used to avoid excess fabric that would tamper with the measurement comparisons and the fit of the test garment. The basic blocks (bodice and skirt) were used to cut and construct a calico (muslin) sleeveless, close -fitting, two-piece dress. The two-piece dress was chosen because such a garment facilitates an easier assessment of the positioning of the waistline in addition to the other key body dimensions. The body forms were prepared for the fit testing session by attaching a tape at the bust-line, waist-line and hip-line. White adhesive stickers were used to landmark the body forms at key body positions to aid the fit evaluation process.

Visual analysis Visual analysis was used to evaluate and determine the fit of the test garments on the body forms. The fit assessment was subjective by nature, as a number of factors could have been at play, e.g. the evaluator's skills, state of mind and personality. The researcher therefore sought to ensure the reliability and validity of the whole fit assessment exercise by taking into consideration the skills of the evaluators, the assessment scaling, the assessment procedure and the analysis of the data collected. Thus three evaluators who are experts in apparel design and construction were used for the evaluation of fit, to enhance the reliability of the assessments. Each evaluator independently completed a fit assessment form regarding the fit of the test garment on the body forms. Each body form was assessed twice to control measurement error and the average was used. A set of fit standards, adapted from Rasband and Liechty (2006:61), was used as guiding principles for the evaluation of the fit of the test garment. A fit assessment form was used to collect data and the scale for questions about fit had increments from 1 to 9. A score of 1 indicated a loose/long fit, while a score of 5 indicated a perfect fit, and 9 indicated a tight/ short fit. The fit assessment form included only the standard dimensions that are needed when drafting and those that have design implications, i.e. nape to natural waist, natural centre back waist to hip, nape to bust point, bust point to waist, bust girth, waist girth, lower hip girth, across shoulders, back width, across chest, width of bust prominence, bust extension and buttock extension.

The three evaluators had differences in some of the evaluation scores, which necessitated that they reach an agreement on the final score to award. A difference of more than 1 between the

scores for the three evaluators was deemed wide and hence called for re-evaluation by all the evaluators and their having to reach an agreement on the score.

Data analysis

Univariate analysis of the drop values was done to determine the body shapes. Univariate analysis is the simplest form of quantitative (statistical) analysis. The analysis is carried out with the description of a single variable in terms of the applicable unit of analysis. It explores each variable in a data set separately. It looks at the range of values, as well as the central tendency of the values.

Parameters within the maximum and minimum range values of drop values (bust minus waist and hip minus waist) were calculated and used to identify distinctive body shapes in this study (Makhanya *et al,* 2014; Mastamet-Mason *et al*, 2012*)*. The difference in hip and bust circumferences (drop value) was used to first classify triangle and inverted triangle shapes. Step 1 was therefore to identify the inverted triangular and the triangular body shape, using the hip minus bust drop value. The triangular body shape has a bust that is smaller than the hips, thus it has positive drop values, while the inverted triangular shape has a bust that is wider than the hips, thus has negative drop values (Lee *et al,* 2007; Rasband & Liechty, 2006:24). After identifying these two body shapes, they were removed from the data to allow the identification of the remaining body shapes that are not identified with this drop value. Step 2 was to identify the hourglass, the apple and the rectangular body shapes, using the bust minus waist drop value. The rectangular, apple and hourglass body shapes have a bust that is similar to the hips but a smaller waist, with the exception of the apple shape, which has a wider waist than bust and hips. The hourglass has a higher drop value compared to the rectangular shape, while the apple is fuller around the waist compared to the bust and hips.

The conventional body forms based on Western standards are currently used by Swazi small-scale apparel manufacturers. To identify the shapes of the body forms therefore, the recommended Western standards within the minimum and maximum range values were employed. The relationship between the key dimensions or inflection points of the body are major indicators used to identify and interpret body shapes. The three key dimensions, i.e. hips, waist and bust, where the body contours change in movement, aided in interpreting the shape differences.

Statistical analysis

The SAS V9.2 software was used to analyse the data for the body shape classifications and summary statistics. The study sought to identify and describe the most prevalent body shapes of young Swazi women and to compare them with those of body forms currently used. Drop values were used to identify the body shape groupings. The hip minus bust drop values were used to identify the triangle and the inverted triangle, while the bust minus waist drop values were used to identify the rectangle, the apple and the hourglass shape.

The BMDP software was used to determine whether significant differences existed between the body proportions of Swazi women and those of two brands of body forms. The underlying parameter of the t-test, i.e. the assumption that the sample was drawn randomly from a normal population with equal variance, did not hold true for this study. For that reason, the Wilcoxon non-parametric t-test was appropriately used, as the scale of measurement was also nominal, i.e. numbers with no implied order were used as labels. The t-test is used to compare two means, i.e. it gives one mean difference. When the p value is equal to or below the scientifically established threshold of ($p \leq 0,05$), the difference is said to be significant. As the mean difference increases, the p level decreases, thus making it significant. The t-test assumes that the sample was drawn randomly from a population that was normal, with equal variances. However, if the underlying parameter has been violated then non-parametric tests are used. Non-parametric tests are also appropriate when the scale of measurement is nominal or ordinal. One of the non-parametric tests used is the Wilcoxon matched pairs signed ranks. It was appropriately used for this study because the parametric assumptions appeared in doubt and the type of data was clearly not interval scaled.

For purposes of interpretation of the findings, probability values that were 0,05 or below ($p \leq 0,05$) were considered as implying the existence of a significant difference, while those above 0,05 ($p > 0,05$) were considered to imply no significant difference.

RESULTS AND DISCUSSION

Identification of the most prevalent Swazi shape

It became evident from the findings that the most prevalent body shapes identified in the sample were the triangular body shape (54,5%), followed by the hourglass body shape (34,7%) (refer to Table 1). The rectangular body shape and the inverted triangle were less prevalent, as the rectangular shape accounted for 7% while only 4% represented the inverted triangle body shape. These findings concur with the view that there is body type variation among and within ethnic groups, as shown by the fact that four different body shapes were identified within the sample of Swazi women. Furthermore, the findings underscore the notion that Swazi women are generally found to fall within four figure types, the most prevalent being the triangular/pear/bottom-heavy shape (Magagula & Zwane, 2006).

The hourglass body shape is pre-dominantly used in pattern development and clothing design as a base body shape for ready-to-wear apparel by the clothing manufacturing industry (Connell *et al*, 2003). It is apparent from the above results that only 34,7% of the women in the sample fell within this body type, though most apparel is manufactured based on this body type. It is therefore highly probable that the Swazi women would experience fit problems with ready-to-wear clothing due to variations in their figure types, as the Swazi women are predominantly triangular in shape.

Identification of the body shapes of the body forms

The measurements for the key body dimensions for size 32 and size 34 of the body forms are presented in Table 2. A constant linear increment pattern is recognised from one size to the next, i.e. from size 32 to size 34 in all three measurements for both body form brands. In other words, the body forms increase from one size to the next at a uniform pace for all three measurements. According to Apeagyei (2010), Gupta and Gangadhar (2004) and Shin and Istook (2007), a key dimension is generally distributed evenly across the system in an attempt to cover the broadest range of measurements, e.g. the waist measurements for sizes 2-10 are 2,5 cm apart, for sizes 12-16 they are 3,8 cm apart, and for size 18 and above, they are 5 cm apart.

It is evident from the results that the identified shape of the currently used body forms was the triangular body shape for brand 1, and an ideal body shape for the brand 2 (Table 3).

The brand 1 body forms (sizes 32 and 34) were found to conform to the Western standards of a triangular body shape (the figure appears unbalanced, seen top to bottom, as it has a dominant low hip or side thigh curve, with a hip circumference that measures 5 cm or more larger than the bust circumference. The bust is small to medium and the waist is also small to medium. The buttocks and hips are rounded, with a low hip curve, and the upper thighs are usually heavier). Though both the Swazi and the brand 1 body forms' shapes were found to be triangular, the standards within the minimum and maximum range of drop values differed. There was a disparity between the range from minimum to maximum for the body forms and that of the Swazi women. The range from minimum to maximum for the body forms was 5 cm to 7 cm, while the range from minimum to maximum for the Swazi women was 8,9 cm to 23 cm. This observation implies that, although both shapes (the most prevalent Swazi body shape and the brand 1 body shape) were found to be triangular, there are notable differences with regard to the degree of the body contours. The Swazi women are conspicuously heavier and more rounded at the hip area (as the measurement differences that are evident from the findings show). The expectation that this body form would offer a better fit for Swazi women as they have similar body shapes, may in principle not be realised due to the vast differences in the drop values.

Comparison of the Swazi triangular body shape with the two body form brands

The findings on the comparisons of the body proportions for the triangular Swazi body shape and the body proportions for the two brands of body forms for sizes 32 and 34, and the determination whether the differences are significant or not, are presented in Table 4.

It is clear from Table 4 that there were measurement differences between the average body measurements of the identified most prevalent Swazi triangular body shape and those of both brand body forms. With regard to the length dimensions, young Swazi women were much shorter at the bust point to waist measurement, compared to brand 1. Young Swazi women were much smaller at the bust girth, under-bust girth, lower waist girth and especially at the

TABLE 1: PERCENTAGE DISTRIBUTION OF SWAZI WOMEN BY BODY SHAPE

Body shape categories				
Step 1				
Univariate analysis of drop values	**Mean**	**SD**	**Minimum**	**Maximum**
Hip minus bust	8,9 cm	5,2 cm	–2 cm	23 cm
Shape categories	**Cut-off points**		**Count (%)**	
Triangle	Mean to max 8,9 cm to 23 cm		55 (54,5%)	
Inverted triangle	Negative drop values		4 (4%)	
Step 2				
Univariate analysis of drop values	**Mean**	**SD**	**Minimum**	**Maximum**
Bust minus waist	17,8 cm	3,8 cm	10 cm	28 cm
Shape categories	**Cut-off points**		**Count (%)**	
Hourglass	Mean to max 17,8 cm to 28 cm		35 (34,7%)	
Rectangle	< mean < 17,8 cm		7 (7%)	

N=101

TABLE 2: BODY MEASUREMENTS (cm) FOR THE BUST, WAIST AND HIPS OF THE BODY FORMS

Inflection points	Size	Body form (B1)	Body form (B2)
Bust	**32**	**81**	**84**
	34	**95**	**89**
Waist	**32**	**60**	**64**
	34	**72**	**69**
Hip	**32**	**88**	**86**
	34	**100**	**92**

upper hip girth in size 34, and will thus experience looseness at these measurements. There was much cause for concern at the vast measurement differences at the hip and lower hip girth in combination with well-extended buttocks in size 32, where the young Swazi women were much wider by up to 13 cm at the lower hip girth. This implies that Swazi women will experience tightness around these areas.

With regard to the young Swazi women and the brand 2 body forms, the bust to waist dimension was much shorter for Swazi women. This will affect the placement of the waistline and the front waist darts. The Swazi women appeared to be much wider by comparison at the girth dimensions, specifically at the lower waist, upper hip (34), hip and lower hip girths. It is therefore predictable that Swazi women will experience severe tightness around these areas.

Comparison of the average triangular-shaped size 32 and 34 Swazi women with both body forms therefore clearly shows that Swazi women are shorter and smaller in the bodice and bigger with regard to the lower hip and buttock extension.

Fit-testing of the triangular test garment on the triangular body form

This paper reports on the fit-testing of the fit garment that was designed for the 32 and 34 triangular Swazi shape (using the measurements of the 32 and 34 size Swazi triangular body shape) on the body form, identified as a triangular shape. The average evaluation scores for the fit test of 13 body measurements positions are presented in Table 5.

The size 32 test garment was short at the nape to natural waist, natural centre back waist to hip,

TABLE 3: DISTRIBUTION OF BODY FORMS BY BODY SHAPE

Body shape categories *(Phase 1)*				
Body form brands	**Taille B1**		**Sierra B2**	
Size	**32**	**34**	**32**	**34**
Hip minus bust	7	5	2	3
Shape categories	**Recommended standards within the minimum and maximum range of drop values**		**Count**	
			Taile B1	**Sierra B2**
Triangle	≥ 5 cm to maximum *i,e, if the hip is 5 cm or more wider than the bust, then the shape is a triangle*		2 *(Size 32 & 34)*	0
Inverted triangle	≥ 2,5 cm to maximum *i,e, if the bust is 2,5 cm or more larger than the hip, then the shape is an inverted triangle*			0
Body form brands	**Taille B1**		**Sierra B2**	
Size	**32**	**34**	**32**	**34**
Bust minus waist	21 cm	23 cm	20 cm	20 cm
Shape categories	**Recommended standards within the minimum and maximum range of drop values**		**Count**	
			TailleB1	**Sierra B2**
Ideal	> 17,5 cm to ≤ 25 cm i,e, *if bust = hip and the waist is 25 cm smaller, then the shape is ideal*			2 *(Size 32 & 34)*
Hourglass	> 25 cm to maximum *i,e, if bust = hip and the waist is 27,5 cm smaller, then the shape is hourglass*			
Rectangle	Minimum to ≤ 17,5 cm *i,e, if bust = hip and the waist is 17,5 cm or less than the bust and hip, then the shape is rectangular*			

and bust point to waist, and slightly tight across the chest, at the back width and across the back shoulder. The opposite was found to be true for the buttock extension and lower hip girth, as the test garment was found to be too loose while it was slightly loose at the natural waist girth. There was a satisfactory fit at the bust extension and bust girth, and a perfect fit was only at the nape to bust point and the width of bust prominence dimensions (Figure 3).

The test garment was too short at the natural centre back waist to hip, and short at the bust point to waist dimensions, while it was slightly short at the nape to natural waist and nape to bust point. It was found to be very tight at the bust girth and back width, and tight at the natural waist girth, across the back shoulders and at the width of bust prominence, while it was slightly tight across the chest. The tightness at the bust, under-bust and waist girths resulted in the wide gaping of the test garment that is evident at the back due to the fact that the edges of the opening could not meet. There was a satisfactory fit at the bust extension and a slightly loose fit at the buttock extension and the lower hip girth (Figure 4).

Comparison of the fit test results and the t-test results

The means of all the measured dimensions of the young Swazi women were compared to those of each of the body form brands and a t-test was employed to determine whether there were significant differences (Table 4). The levels of significance in conjunction with the mean differences were then used to predict pertinent fit problems. The fit of the test garment constructed using the measurements of the most prevalent body shape of young Swazi women, was evaluated on the triangular body forms and

TABLE 4: A COMPARISON OF THE SWAZI WOMEN TRIANGULAR BODY SHAPE TO THE TWO BODY FORM BRANDS FOR SIZES 32 & 34

#	Body dimensions	Size	Brand 1 (Body form)			Brand 2 (Body form)		
			Mean	SD	*P*	Mean	SD	*P*
1	Nape to natural waist (back)	32	-3,37	1,77	0,0000	-2,37	1,77	0,0000
		34	1,08	1,85	0,0101	-1,92	1,85	0,0003
2	Natural centre back waist to hip	32	-1,33	1,42	0,0002	0,67	1,42	0,0133
		34	-0,28	1,4	**0,2986**	0,72	1,4	0,0174
3	Nape to bust point	32	-2,07	1,93	0,0000	-1,07	1,93	0,0066
		34	-0,88	2,59	**0,0690**	-0,88	2,59	**0,0696**
4	Bust point to waist	32	-5,43	1,92	0,0000	-3,43	1,92	0,0000
		34	-3,44	2,08	0,0000	-4,44	2,08	0,0000
5	Neck base girth	32	-1,33	1,54	0,0003	-,3,33	1,54	0,0000
		34	-1,48	1,36	0,0002	-3,48	1,36	0,0000
6	Bust girth	32	0,97	2,53	**0,0584**	-2,03	2,53	0,0006
		34	-8,8	3,49	0,0000	-2,8	3,49	0,0012
7	Under-bust girth	32	-1,27	1,39	0,0002	-3,27	1,39	0,0000
		34	-4,04	1,72	0,0000	-3,04	1,72	0,0000
8	Natural waist girth	32	5,93	3,15	0,0000	1,93	3,15	0,0030
		34	-1,76	3,5	0,0274	1,24	3,5	**0,1461**
9	Lower waist girth	32	-3,3	3,74	0,0002	5,7	3,74	0,0000
		34	-5,92	3,66	0,0000	4,08	3,66	0,0001
10	Upper hip girth	32	-5,1	4,95	0,0000	2,9	4,95	0,0032
		34	-8,44	6,87	0,0001	8,56	6,87	0,0001
11	Hip girth	32	6,63	3,55	0,0000	8,63	3,55	0,0000
		34	-1,12	4,21	**0,1992**	6,88	4,21	0,0000
12	Lower hip girth	32	13	3,52	0,0000	15,0	3,52	0,0000
		34	3,84	4,08	0,0002	11,84	4,08	0,0000
13	Across back shoulders	32	2,13	2,06	0,0001	-1,87	2,06	0,0002
		34	-3,32	1,91	0,0000	-1,32	1,91	0,0032
14	Back width	32	-1,27	1,51	0,0004	1,73	1,51	0,0000
		34	-4,4	1,5	0,0000	0,6	1,5	**0,0777**
15	Across chest	32	-2,47	1,22	0,0000	0,53	1,22	0,0250
		34	-4,92	1,12	0,0000	-0,92	1,12	0,0012
16	Width of bust prominence	32	-0,4	1,43	**0,1169**	-0,4	1,43	**0,1169**
		34	-4,12	2,03	0,0000	-1,12	2,03	0,0098
17	Bust extension	32	1,2	1,16	0,0001	-1,8	1,16	0,0000
		34	0,32	1,22	**0,1953**	-0,68	1,22	0,0120
18	Buttock extension	32	3,23	1,41	0,0000	3,23	1,41	0,0000
		34	2	0,96	0,0000	3	0,96	0,0000

N=101

Significant at p ≤ 0,05, The mean values in the table show the mean measurement differences between the measurements of the Swazi women and those of the body forms,
Negative (-)values = Swazi measurements are smaller,
Positive (+)values = Swazi measurements are greater,

the resultant levels of fit were observed (Table 5). It is essential to examine whether the fit problems predicted or assumed by the t-test are consistent with the observations made during the evaluation and assessment of the fit test (Tables 6 and 7).

The t-test indicated a significant difference with a negative mean difference for the nape to natural waist, natural centre back waist to hip, and the bust point to waist, implying that the Swazi women were short at these dimensions. The fit test on the other hand found these lengths to be short to too short. The t-test and the fit test are therefore in agreement as the test garment was expected to be short at these areas due to the fact that Swazi women were found to be shorter, and indeed that was the case.

TABLE 5: FIT EVALUATION SCORES FOR THE TRIANGULAR TEST GARMENT ON THE TRIANGULAR BODY FORM

#	Body measurements	Brand 1 (size 32)	Brand 1 (size 34)
1	Nape to natural waist	8	7
2	Natural centre back waist to hip	9	9
3	Nape to bust point	5	7
4	Bust point to waist	9	8
5	Bust girth	6	9
6	Natural waist girth	3	9
7	Lower hip girth	1	3
8	Across back shoulders	7	9
9	Back width	7	9
10	Across chest	7	7
11	Width of bust prominence	5	8
12	Bust extension	6	6
13	Buttock extension	1	3

Fit evaluation scale:

1 = Too long/loose *2 = Long/loose* *3 = Slightly long/loose* *4 = Satisfactory fit* *5 = Perfect*
6 = Satisfactory fit *7 = Slightly short/tight* *8 = Tight/short* *9 = Too short/tight*

Visual presentation of fit for brand 1 (size 32)

B 1 (32) Front view

B 1 (32) Side view

B 1 (32) Back view

FIGURE 3: VISUAL PRESENTATION OF FIT FOR BRAND 1 (SIZE 32)

With regard to the bust girth, the t-test found no significant differences between the measurements for the Swazi women and the body forms, as the measurement difference was only 0,97 cm. Though the Swazi women were slightly bigger at this dimension, the fit test indicated a satisfactory fit with a score of 6 at this dimension, as the measurement difference did not impact on the fit of the test garment; therefore, the t-test and the fit test are in agreement.

The t-test indicated significant differences at the natural waist girth, lower hip girth and buttock extension, with positive mean difference values, which implies that the Swazi women were larger at these body dimensions, while the fit test found these dimensions to have a loose fit. The two tests are therefore in agreement as the significant differences impacted on the fit of the test garment, resulting in looseness, as the Swazi women were shown to be bigger than the body forms at these body dimensions.

For the back width and across chest measurements the test garment was found to have a slightly tight fit, while the t-test indicated significant differences with negative mean differences, thus implying that the Swazi women were smaller at these dimensions. The t-test and the

Visual presentation of fit for brand 1 (size 34)		
		
B 1 (34) Front view	B 1 (34) Side view	B 1 (34) Back view

FIGURE 4: VISUAL PRESENTATION OF FIT FOR BRAND 1 (SIZE 34)

TABLE 6: FIT EVALUATION SCORES FOR THE TRIANGULAR TEST GARMENT ON THE TRIANGULAR BODY FORM

#	Body dimensions	Fit test		T-test	
		B1 (32)		Triangular body shape & B1 (32)	
		Evaluation scores	Interpretation	Mean difference	*(p)*
1	Nape to natural waist	8	Short	-3,37	0,0000
2	Natural centre back waist to hip	9	Too short	-1,33	0,0002
3	Nape to bust point	5	Perfect fit	-2,07	0,0000
4	Bust point to waist	9	Too short	-5,43	0,0000
5	Bust girth	6	Satisfactory fit	0,97	0,0584
6	Natural waist girth	3	Slightly loose	5,93	0,0000
7	Lower hip girth	1	Too loose	13	0,0000
8	Across back shoulders	7	Slightly tight	2,13	0,0001
9	Back width	7	Slightly tight	-1,27	0,0004
10	Across chest	7	Slightly tight	-2,47	0,0000
11	Width of bust prominence	5	Perfect fit	-0,4	0,1169
12	Bust extension	6	Satisfactory fit	1,2	0,0001
13	Buttock extension	1	Too loose	3,23	0,0000

Fit evaluation scale:
1 = Too long/loose 2 = Long/loose 3 = Slightly long/loose 4 = Satisfactory fit 5 = Perfect
6 = Satisfactory fit 7 = Slightly short/tight 8 = Tight/short 9 = Too short/tight
Significant at $p \leq 0,05$.
The mean difference values show the differences between the measurements of the Swazi women and those of the body forms.
Negative (-) values = Swazi measurements are smaller, and positive (+) values = Swazi measurements are larger.

fit test were therefore in agreement, as the significant difference between the measurements for the Swazi women and those of the body forms had an impact on the fit of the test garment.

With regard to the width of bust prominence, the t-test found an insignificant difference between the measurements of the Swazi women and those of the body forms, with a mean difference value of 0,4 cm, while the test garment was found to have a perfect fit on the body form. This was expected as the measurements for the Swazi women and the forms were relatively

equal as the difference was too small to have an impact on fit at this body dimension.

The t-test indicated a significant difference between the measurements for the Swazi women and the body forms with regard to the bust extension dimension. The mean difference was 1,2 cm, implying that the Swazi women were slightly larger. Though the Swazi women were shown to be slightly larger at this dimension, the fit test indicated a satisfactory fit with a score of 6 at this dimension, as the measurement difference was not much, thus did not impact on the fit of the test garment.

There was a discrepancy between the findings of the t-test and the fit test with regard to the nape to bust point and across back shoulders body measurements. The t-test indicated that there was a significant difference for the nape to bust point measurement which had a mean difference of 2,07 cm, meaning that the Swazi women were shorter at this dimension, but the fit test found the test garment to have a perfect fit at this dimension. There was also a significant difference for the across back shoulder measurement with a mean difference of 2,13 cm, meaning that the Swazi women are broader at this dimension, thus the test garment was expected to be slightly loose. On the contrary, the test garment was found to be slightly tight.

It is worth noting that the t-test and the fit test are generally in agreement as the expectations of the impact on fit as predicted by the t-test were evident in the fit test, with the exception of the nape to bust point and across the back shoulder measurements.

The comparison between the fit test and the t-test for the size 34 brand 1 body forms is presented in Table 7. The t-test indicated that there was a significant difference for the bust point to waist, bust girth, natural waist girth, across back shoulders, back width, across chest, nape to bust point and the width of bust prominence measurements. The mean differences for these dimensions were all negative, implying that the Swazi women were smaller at these dimensions and therefore the test garment was expected to be short or tight at these areas. The fit test confirmed this expectation as it was found to be tight at all these dimensions.

With regard to the lower hip girth and the buttock extension, the t-test indicated that there

TABLE 6: COMPARISON OF THE FIT TEST TO THE T-TEST FOR THE TRIANGULAR BODY FORM SIZE 34

#	Body dimensions	Fit test		T-test	
		B1 (34)		Triangular body shape & B1 (34)	
		Evaluation scores	Interpretation	Mean difference	*(p)*
1	Nape to natural waist	7	Slightly short	1,08	0,0101
2	Natural centre back waist to hip	9	Too short	-0,28	0,2986
3	Nape to bust point	7	Slightly short	-0,88	0,0690
4	Bust point to waist	8	Short	-3,44	0,0000
5	Bust girth	9	Too tight	-8,8	0,0000
6	Natural waist girth	9	Too tight	-1,76	0,0274
7	Lower hip girth	3	Slightly loose	3,84	0,0002
8	Across back shoulders	8,5	Too tight	-3,32	0,0000
9	Back width	9	Too tight	-4,4	0,0000
10	Across chest	7	Slightly tight	-4,92	0,0000
11	Width of bust prominence	8	Tight	-4,12	0,0000
12	Bust extension	6	Satisfactory fit	0,32	0,1953
13	Buttock extension	3	Slightly loose	2	0,0000

Fit evaluation scale:

1 = Too long/loose 2 = Long/loose 3 = Slightly long/loose 4 = Satisfactory fit 5 = Perfect
6 = Satisfactory fit 7 = Slightly short/tight 8 = Tight/short 9 = Too short/tight

Significant at p ≤ 0,05.

The mean difference values show the differences between the measurements of the Swazi women and those of the body forms. Negative (-) values = Swazi measurements are smaller, and positive (+) values = Swazi measurements are larger.

was a significant difference between the measurements for Swazi women and those for the body forms. The mean differences were positive at both these dimensions, implying that the Swazi women were found to be larger compared to the body forms; therefore, the test garment was expected to be loose. This was indeed the case as the fit test found the test garment to be loose at these dimensions, thus the two tests yielded similar results.

There was an insignificant difference between the measurements for the Swazi women and those of the body forms at the bust extension as the mean difference was only 0,32 cm, which is too small to have an impact on fit at this dimension. The implication of the t-test is that, although the Swazi women are very slightly larger, the difference is too small to have an effect, therefore the fit test was expected to yield a good fit. The test garment was found to have a satisfactory fit but with a score of 6, implying that the garment was more aligned to tightness. This may be attributed to the fact that the test garment was too tight at the bust girth, thus slightly affecting the fit of the bust extension.

There was again a discrepancy between the findings of the t-test and the fit test with regard to the nape to natural waist measurement. The test garment was found to be slightly short, yet the Swazi women were found to be significantly taller by 1,08 cm, implying that the test garment was expected to be longer than the body forms. The fit test therefore yielded findings that were contrary to the findings of the t-test. The natural centre back waist to hip dimension for the Swazi women was found to be insignificantly short by 0,28 cm, compared to the body forms. The fit test on the other hand found the test garment to be too short at this dimension, yet the difference between the Swazi women and the body forms was a mere 0,28 cm. This slight discrepancy can be attributed to the fact that the nape to natural waist measurement for the test garment was short, the effect on fit rippled to the natural centre back to hip dimension since the test garment was a dress.

CONCLUSIONS

It can be concluded that the body shape of young Swazi women is not homogenous but predominantly triangular, as the most prevalent body shape of the young Swazi women was the triangular body shape, followed by the hourglass body shape. The inverted triangular and rectangular shapes were the least common body shapes, while the apple body shape was not found within the group of young Swazi women. The physical attributes of the triangular shape identified within the group of young Swazi women fit the profile of a triangular shape as described in Rasband and Liechty (2006:24), where the triangular shape is said to be smaller above the waist and wider below the waist, with a low hip curve and a small bust. The triangular shape identified within the group of young Swazi women has a wide hipline in comparison to a small waistline, with the hipline measuring 34,5 cm more than the waistline, and a low hip curve as the low hip measures more than the hips. With regard to the hip type and the width of the shoulders in relation to the hips, the hips gradually and progressively curve outward from the waist and round out over the hip bone, while the hip width exceeds the shoulder width. Though the young Swazi women are predominantly triangular in shape in terms of their physical features and attributes, one notes with interest that the standards within the minimum and maximum range of the drop values for the Swazi women and Western standards are not similar. The distinction for the triangle shape in Western terms is that, if the hip is 5 cm or more wider than the bust, then the shape is said to be triangular; yet based on the sample for the young Swazi women, the distinction for the triangular shape is that if the hip is 9 cm or more wider than the bust, then the shape is triangular. One can therefore conclude that there is a disparity between the cut-off points for the recommended standards within the minimum and maximum range of drop values based on ethnicity. This attests to the notion that there is variation in terms of body shapes between different ethnic groupings (Shin & Istook, 2007).

In contrast to what was expected (an ideal or hourglass body shape), the shapes of the two brands of body forms used in this study were not the same in terms of shape and body dimensions. One brand was more triangular shaped, while the other brand was ideal-shaped, and the measurements for all the key dimensions in size 32 and size 34 for brand 1 differed in brand 2 in both sizes. One can conclude therefore that body form brands are not identical in terms of shape and measurements for the same size category.

It can be concluded that the triangular-shaped young Swazi women and the triangular body form were significantly different. With regard to the body lengths, the young Swazi women were shorter compared to the body forms; therefore they will experience fit problems with the use of these body forms as the accuracy of body length

is critical in enhancing apparel fit. The narrow body widths of the young Swazi women attest to their small skeletal frame. Contrary to the petite trend in the skeletal frame of the Swazi women, their lower hip in size 32 and buttock extension is noticeably wider or well-padded and protruding. Compared to the triangular body forms, triangular shaped Swazi women have short length dimensions, therefore the placement of the bust-line, waistline and hipline will be affected, and one may predict that it will not be aligned with the actual level on the body in both one-piece and two-piece styles. Young Swazi women are narrow above the waistline and slightly below the waistline, i.e. up to the upper hip girth. This is attested to by the narrow body widths and narrow upper girth measurements. Conspicuous looseness of garments made and fitted from the triangular body forms is therefore predictable on young Swazi women. However, Swazi women have wider and well-padded hips and more protruding buttocks; therefore they are expected to experience tightness around the hip area with garments made from the triangular body forms. Fit tests confirmed the predicted fit problems. T-test and the fit test were generally in agreement as the expectations regarding the impact on fit as predicted by the t-test were realised in the fit test, with a few exceptions. One can therefore conclude that fit problems or implications predicted based on measurement differences hold true as the fit test showed fit problems where they were expected.

IMPLICATIONS AND RECOMMENDATIONS

There was a clear indication from the results that the prevalent body shape of young Swazi women is not similar to that of the body form brands currently used in apparel manufacturing. Though one of the body forms was found to bear the same body shape as the prevalent triangular body shape of young Swazi women, upon further investigation a disparity was evident in terms of size. The young Swazi women were found to be much wider and more extended around the hip and buttocks area and narrower above the waistline, thus rendering the body form dissimilar in terms of body measurements and contouring.

The results further indicated significant differences in the measurements of the different body dimensions of the body forms and those of the young Swazi women. The measurement differences are having adverse fit implications for Swazi women that manifest as fit problems encountered with apparel produced using the body forms. When the fit of the test garment produced using the measurements of the body shape prevalent among the young Swazi women was tested on the body forms, the fit was generally found to be too short/tight or too loose, and seldom perfect.

From the review of the relevant literature on sizing and fit, it is clearly evident that an efficient sizing system is only possible when, among other factors, accurate body measurements of the different body shapes of a target population are used (Istook & Hwang, 2001). It is therefore recommended that all stakeholders in the apparel industry, which is comprised of clothing manufacturers, pattern developers, apparel designers, apparel retailers and apparel consumers, work together to address sizing and fit issues and so ensure the standardisation of measurements and size categories. There is a need for transparency in terms of the sizing systems and body form shapes and brands used; all the relevant stakeholders should strive to reduce the ambiguity that exists in the industry, leading to different manufacturers using their own standards and thereby compounding the problem.

To ensure that apparel stakeholders across the board make informed decisions that will ultimately afford the Swazi women better fitting apparel, it is highly recommended that the awareness and comprehension of the impact of sizing, shape of the body forms and target market body shapes on fit, are extensively promoted, for instance through workshops and dissemination of research findings that have a bearing on fit issues. Consequently the comprehension of the impact of sizing and body form shape begs the recommendation that apparel manufacturers use body forms that are shaped like the target market population to improve the levels of apparel fit. There is a dire need for consumers to be schooled on the different body shapes that exist within the consumer populations to help them attempt to identify which body shape they are more aligned to.

LIMITATIONS

Though this study was limited to a relatively small sample of young Swazi women, sizing and fit issues are pertinent to a wider spectrum of the Swazi population in terms of shape, size, age and gender. There is therefore a need to repeat the same study on a larger scale that is focused on more size categories, more age ranges and more body form brands. It is further recommended that, if available, a body scanner

be used for future studies on a larger sample. That could enhance the accuracy of measurements taken. A prototype of a body form, shaped and sized according to the measurements and shape of the most prevalent body shape (Swazi triangular) of young Swazi women, should be developed and used to produce apparel for young Swazi women.

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