List of Abbreviations

AATCC:	Association of Textile Chemist and Colourist
AGOA:	African Growth and Opportunity Act
ASTM:	American Society for Testing and Materials
GOK:	Government of Kenya
ISAK:	International Society for Advancement of Kinanthropometry
ISO:	International Organisation for Standardization
KEBS:	Kenya Bureau of Standards
KEPZA:	Kenya Export Processing Zone Authority
KNUT:	Kenya National Union of Teachers
RATES:	Regional Agricultural Trade Expansion Support Program
RMSS:	Republic of South African Military Standards
UN:	United Nations

Abstract

An explication of the problems with apparel fit experienced by female Kenyan consumers in terms of their unique body shape characteristics

By

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Problems related to apparel fit stem from a variety of factors, such as an outdated anthropometric database from which sizing systems could be developed, lack of and/or inadequate classified body forms, non-standardised communication of sizing and fit and non-standardised fit quality management, amongst the clothing industries (Chun-Yoon & Jasper, 1996; Holzman, 1996; Winks, 1997; Desmarteau, 2000; Anderson, Brannon, Ulrich, Presley; Woronka; Grasso & Stevenson, 2001; Ashdown, 2003; Simmons & Istook, 2004).

Anthropometric data in Kenya was taken in 1975 and the measurements were obtained from girls and women of Kenya's learning institutions and organisations (KEBS, 2001). The source of the original data from which the size tables were derived is obscure, to authenticate the quality of the techniques and instruments used for the data collection. Apparently, there is no known research that has been carried out on clothing anthropometry, sizing (body measurements) and fit (body shape) for women. In the absence of representative sizing systems, wrong styles and sizes based on estimates and not on the actual sizes and body shapes of women consumers in Kenya, contribute to fit problems. Consumers' lack of knowledge about size (body measurements) and fit (body shape) issues also contributes to the disillusionment, confusion and inappropriate apparel selection. Consumers' fit preferences contribute to fit problems, if the available styles do not consider consumers' body shapes, and even further, if the consumers are uninformed about their shapes and how to dress accordingly.

The aim of this research was therefore to identify and describe distinctive female body shapes of career women in Kenya using body dimensions and photographs, to describe the differences between the emerging distinctive body shapes (measurements and photographs) and the Western distinctive shapes, and to finally describe and analyse implications for the fit of apparel associated with the emerging distinctive body shapes of Kenya's career women. It also intended to assess and describe career women's self-perceived fit issues with the ready-made apparel in Kenya, to determine and describe Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes), and also to determine and describe career women's fit preferences for differently fitted apparel items in Kenya.

This research is descriptive as an attempt is made to describe and understand body shape(s) and tendencies in consumers' behaviour regarding fit issues. It is exploratory as it aims to obtain insight into a relatively new area of study, namely identification of the most prevalent (distinctive) body shape of Kenya's career women, consumers' perceived size and fit issues, their knowledge about size and fit, and their fit preferences. Various theories were consulted and adapted in this study, while practical training in anthropometry and photography was undertaken to ensure that measurements and photographs were taken accurately and reliably. Traditional anthropometric-related theories and standards of obtaining body measurements were consulted and applied. Photography rules were set and observed while photographing the women.

Phase one of the study focused on the variables in the body characteristics thought to be appropriate for identifying and describing distinctive female body shapes. Phase two applied the quantitative research that focused on the variables obtained from fit problems with apparel, the communication of size and fit, and fit preferences. A structured questionnaire was used to get the broader picture of the respondents' perceived fit problems, their knowledge about the communication of size and fit, as well as their fit preferences for differently fitted apparel items. The questionnaire measured specific dimensions of fit problems with apparel, the communication of size and fit, as well as fit preferences. The body dimensions that were recorded, body evaluations, and the responses to the questionnaire were coded, captured and analysed.

It is apparent from this study that the most dominant body shape is a curvy rectangular shape that differs not only from the ideal (hourglass) body shape, but also from the Western (USA) prevalent straight rectangular shape. The fit problems such as tight hips, crotch, bust and stomach experienced by Kenya's career women are therefore inevitable, as confirmed by the dissatisfaction with the unavailability of appropriate styles for their sizes and shapes.

It is clear that most Kenyan female consumers are familiar with the non-informative lettered and numbered size labels, but unfamiliar with size label terms that represent established body types. They understand neither the meanings of various size and fit descriptions, nor their own key body dimensions; this leads to confusion as to where the cause of their problems lies.

Apparently most Kenyan career women consumers prefer fitted and semi-fitted skirts and jackets. In the absence of a distinctive body shape in Kenya, it is possible that the available styles do not cater for their curvy rectangular body shape; hence, they experience fit problems. Consumers' lack of knowledge about body shape may also lead to inappropriate fit preferences that do not take into account their distinctive body shape and its critical fit points.

This study makes certain recommendations to the ready-made apparel industry in Kenya and foreign companies that export their apparel items to Kenya, government agencies such as the Kenya Bureau of Standards, and to consumer-oriented organisations. The results contribute to the body of knowledge regarding the theory of apparel size and fit, Ashdown's sizing systems theory, research methodology theory, and consumer education theory.

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Chapter 1

AN OVERVIEW OF THE STUDY

1.1 INTRODUCTION

Female body shapes and proportions vary and change over time and between populations, as a result of nutritional changes, lifestyles, ethnicity, age, grooming and concepts of ideal beauty such as breast enlargement within different cultures. These differences have an impact on the fit of the constructed apparel, be it ready-made or custom-made (Hillestad, 1980:121; Winks, 1997; Ashdown, 1998; Simmons & Istook, 2003). Given that ready-made apparel depends on an accurate estimate of the distribution of body shapes and sizes within a target population, it becomes necessary for every country, and even regions within countries, to establish their own sizing systems based on the target population (Ashdown, 2000; Simmons, Istook & Devarajan, 2004a; Devarajan & Istook, 2004; Honey & Olds, 2007). The problem of fit with ready-made apparel has gained a lot of attention recently as consumers' demands for well-fitted apparel are increasing. Dissatisfaction with fit is one of the most frequently stated problems with garment purchases. Women have been reported to be the most dissatisfied consumers (DeLong, Ashdown, Butterfield & Turnbladh, 1993; Otieno, Harrow & Lea-Greenwood, 2005; Alexander, Connell & Presley, 2005a). This has been witnessed by the emergence of mass-customisation establishments, which have been facilitated by the use of body scanners in the developed countries. Through body scan technology, body dimensions and shapes can easily and rapidly be extracted from a population and converted immediately into body form categories, size charts and patterns for garment production (Ashdown, 1998; Simmons & Istook, 2003; Ulrich, Anderson-Connell & Wu, 2003; Ashdown, Loker & Adelson, 2004; Fiore, Lee & Kunz, 2004). Due to costs and technical requirements, body scan technology would not be feasible in a less developed country.

African developing countries such as Kenya also face similar apparel fit problems, but sizing issues are often overlooked or regarded as unimportant issues, finally giving rise to non-standardised size ranges that do not conform to the recommendations given by standard bodies (Chun-Yoon & Jasper, 1995; Faust, Carrier & Baptiste, 2006). A lack of basic design technologies such as computer-aided design and pattern design systems, in most apparel industries, are an indication of the ignorance about the importance of size and fit and a reluctance to respond to consumer demands (Mason, 1998). The increase in the number of working women in Kenya, as in most parts of the world, can contribute to a surge in fashion interest. Regrettably, the ready-made apparel items available in Kenya are not satisfactory in terms of fit.

1.2 THEORETICAL BACKGROUND

1.2.1 Overview of the ready-made apparel in Kenya

Kenya's ready-made apparel manufacturers fall into two major categories, namely, those that manufacture on a large scale, usually referred to as the industry manufacturers (formal sector), and those that manufacture in mass, but in smaller quantities, comprising tailors, dressmakers, and home sewers (informal sector) (Ongile & McCormick, 1996:40; Mason, 1998:98). The few remaining large-scale manufacturers can further be split into those producing for the local market, and those that produce purely for export (Ongile & McCormick, 1996:40). Ready-made apparel is defined as apparel items produced in advance using standardised measurements (recorded size charts) as well as established body shapes for a specific market (Stone, 1999:179; Bye, LaBat & DeLong, 2006:66). The size charts are compiled from measurements taken from a large population using various techniques that would influence the quality of the size charts and consequently the fit of ready-made apparel (Winks, 1997).

In Kenya, however, the sources of the size database are, unknown and/or outdated, as the available anthropometric data was collected in 1975 (Kenya Bureau of Standards, KEBS, 2001- Appendix 4A). This information is ambiguous since the original source of the anthropometric data mentioned is unknown. The size standards, do not give any breakdown of body shapes or population representations of different sizes. Body dimension charts need to be revised frequently to keep abreast with continuous biological changes that occur in individuals and generations (Brunn, 1983; Winks, 1997; Le Pechoux & Ghosh, 2002:13; Olds, 2003; Bye, LaBat & DeLong, 2006:66). It is assumed that the size charts used in Kenya's apparel industries, are borrowed or copied from foreign established charts. It has been observed that existing size charts used by most manufacturers were copied or adapted in the hope that they would also work for their target market (Winks, 1997; Zwane & Magagula, 2006). However, since people's shapes and sizes vary, adapted sizing systems would result in ill-fitting apparel items.

Apparel production, trade, and consumption are currently undergoing dramatic upheavals in Kenya. Domestic production of ready-made apparel for local consumption has declined tremendously as the industry operates in an environment characterised by competition from imports of new and second-hand apparel as well as counterfeit textile products (Mason 1998:96; Regional Agricultural Trade Expansion Support (RATES) Program, 2003:4). Significant changes in the global regulatory environment affecting Kenya, including preferential trade agreements with the European Union (the Cotonou Convention of 2000) and the United States (the African Growth and Opportunity Act, passed by the United States Congress in 2000), have resulted in tremendous growth in emerging export apparel production just prior to the upcoming end of the Multi-fibre Agreement in 2005 (Omolo, 2006). The increasing importation of second-hand apparel, banned in Kenya until the 1990s, has likewise profoundly affected production of, trade in, and consumption of apparel (McCormick, Kimuya & Kinyanjui, 2001; KEPZA, 2005). Nevertheless, the textile industry ranks first among Kenya's manufacturing sectors in terms of both size and employment (GOK, 2000; RATES, 2003:11). Existing apparel manufacturers produce various types of apparel items, both for the local market and for export. Local apparel manufacturers supply only 45% of the Kenyan textile market requirements, while imported new and second-hand apparel accounts for about 37% of the market. The demand for textile products in the country is estimated to be growing at 3.8% annually (Ministry of Trade and Industry in KEPZA, 2005:7).

The lack of competitiveness has been highlighted as a major obstacle for the growth in the local apparel manufacturing industry (McCormick *et al*., 2001). Local ready-made apparel is poor in terms of fit, design, materials and workmanship. These problems have been seen as resulting from a lack of skilled personnel, outdated, under-utilised and insufficient machinery to tackle specialised work and furthermore, unreliable body dimensions, and lack of information about the uniquely Kenyan body shape, particularly for females. The latter aspect forms the most important component determining the quality of apparel (Ongile & McCormick, 1996:40-41; Mason, 1998:98). With the worldwide continuous increase in international trade in apparel, Kenya – like many other countries – has also witnessed enormous growth in ready-to-wear women's apparel retailing. Many apparel retail stores operating throughout the major cities and towns of the country, bear witness to this. Although locally produced ready-made apparel in Kenya accounts for 45% of all ready-made apparel supplied to the local market, this figure is likely to decline as consumers become more exposed and critical to the way an apparel item fits. The sound traditional custom-made apparel as well as the imported new and second-hand ready-made apparel are an indication that consumers' consumption pattern would soon lean more towards apparel items that are likely to satisfy their needs (Ongile & McCormick, 1996:40; Mason, 1998).

The tailors/dressmakers and/or home sewers custom-tailor each apparel item to the personal dimensions of the wearer. Within the custom-made sewing process, various measurements of the body are directly taken and transposed to the relevant parts of the pattern, to be used in cutting out apparel items (Tamburrino, 1992b). Within the custom-made tailoring, the mastery of the unique relation of the body's characteristics to the apparel produces apparel items that would fit the three-dimensional body as plausibly as possible. However, some "trying-on" and provisional adjustments are necessary with custom-made apparel, particularly with elaborate styles, high quality and complex garments, which require a much closer fit (Tamburrino, 1992b). According to Bye, LaBat and DeLong (2006), the tailor's interaction with the consumers as they are measured, facilitates a deeper understanding of the body shapes' components that need to be critically transformed into well-fitting apparel. Although custom-made apparel is supposed to provide the best fit as opposed to all other types of apparel items available in the market, regrettably, Mason (1998:137-138) reported that most tailors/dressmakers in Nairobi-Kenya, have very low skills and work with inadequate tools and machinery that may actually contribute to the poor fit. Linking the body's proportions to the fabrics and transposing them to three-dimensional apparel items could be a great challenge to tailors with only the most basic or very scant skills.

Although some of the second-hand clothes have been used in their home country, the apparel items may still be in a good condition and in most cases bear designer labels/names such as Armani, DK, Calvin Klein and/or famous brands such as Levi, Lee, Brooks Brothers, Marks and Spencer, Dorothy Perkins and many others. They are more often unique, made of high quality fabrics and workmanship, and are usually sold at affordable prices (Ongile & McCormick in McCormick & Pedersen, 1996:40; Hurreeram & Little, 2005; Mhango & Niehm, 2005). Some of the second-hand apparel bear self-descriptive labels, which act as a guide during selection and hence contribute to the consumer's satisfaction with the fit. All these characteristics collectively render the second-hand clothes quite popular in Kenya's market. Regrettably however, the fit problems of the ready-made apparel are also experienced with the popular custom-made as well as the second-hand clothing.

Ready-made apparel has over time almost replaced the custom-made apparel in most developed countries, as it offers flexibility in terms of style variety, price competitiveness and efficiency. Adams (1988) and Stone (1999:39) affirm that working class women's apparel consumption patterns differ from those of the non-employed, as the former group place greater value on time-saving, convenience-shopping centres, place greater accent on fashion, and take considerable interest in the flattering qualities of apparel and its suitability for work or other occasions. However, there is an outcry worldwide about the bad fit of ready-made apparel, particularly for women (Knight, 1994:15; Chun-Yoon & Jasper, 1996;

Ashdown, 1998). Finding ready-made apparel items of the correct size that fit well is often a frustrating dilemma for many female consumers worldwide (DeLong, Ashdown, Butterfield & Turnbladh, 1993; Otieno *et al.*, 2005; Klepp & Storm-Mathisen, 2005:329).

The problem of fit with ready-made apparel has gained a lot of attention recently as the consumers' demands for better fitting apparel increases (Knight, 1994:15; Ashdown, 1998; Shin & Istook, 2007). In an attempt to solve the sizing and fit problems associated with the manufacture of apparel, the apparel industries in developed countries have introduced body scanners and automated manufacturing systems. These have facilitated easy and faster mass-customised apparel, with fewer sizing and fit problems. Although the quality of the custom-made apparel surpasses that of the ready-made category, the traditional custom-made tailoring tends to be expensive, time consuming and rigid in terms of quick response to a busy consumer (Ashdown, 1998; Fralix, 2000; Ashdown, Loker & Adelson, 2004).

1.2.2 Female consumers and marketing issues

Due to women's varied body shapes, their fashions not only offer a larger variety of styles than men's, but also change more rapidly. Unfortunately, women find it difficult to satisfy their apparel needs and are more concerned with the social significance of apparel than men (Hogge, Baer & Kang-Park, 1988; Goldsberry, Shim & Reich, 1996b; Delk & Casill, 1999; Keiser & Garner, 2003:28-30). It has also been documented that size labels on women's apparel are not related to body dimensions, which has further contributed to frustration when female consumers select their apparel items (Goldsberry *et al.*, 1996b; Chun-Yoon & Jasper, 1996; Holzman, 1996; Winks, 1997; Faust *et al.*, 2006).

The female labour force in Kenya has increased greatly with more education and affirmative action taken by the government and non-governmental organisations to promote gender equality in all sectors (GOK, 2000:24). Working woman are continuously exposed to fashion and have the incentive, the opportunity and the means to respond to fashion's appeal. Often the better educated a woman becomes, the more willing she is to learn new things and to try out new fashions (fashion leaders), which serves to accelerate fashion change (Stone, 1999:38; Keiser & Garner, 2003:28-30). Educated females are experienced with global culture, more observant, more demanding and more confident in their taste and feel for fashion (Stone, 1999:39; Marshal, Jackson, Stanley, Kefgen & Touchie-Specht, 2004:10).

Female executives in the corporate world wearing a size 14 and above mostly have good fashion sense and want to look trendy, luxurious and unique in their selected apparel (Solomon & Rabolt, 2004:159; Marshal *et al.*, 2004:10; Klepp & Storm-Mathisen, 2005:333).

They are independent and cannot accept uncomfortable and constricting apparel just to follow the dictates of some fashion authority (Klepp & Storm-Mathisen, 2005:333). Today's busy and active females have carefully defined preferences for fashions that suit their own individual needs and comfort (Adams, 1988; Stone, 1999:41). However, a working woman places greater value on fashionable, time-saving, convenient shopping outlets and takes considerable interest in apparel's fit, its flattering qualities, durability and suitability for work (Knight, 1994:15; Klepp & Storm-Mathisen, 2005:333). It is reasoned that career women in Kenya as in many developing countries would spend their discretionary income on fashionable apparel. Kenya's local ready-made apparel is of poor quality in terms of materials used, workmanship and fit (Mason, 1998:98). The imported apparel on the other hand, could be appealing to the consumer in terms of visual appearance, quality, design, variety and fabrics used, but the problem of fit still persists (Mason, 1998:99; De Klerk & Tselepis, 2007). Inevitably, the female consumer is forced to have expensive alterations done or simply wear apparel with unsatisfactory fit. The effects of a stunning design, striking fabric and fine workmanship are destroyed if the finished apparel items do not fit the intended wearer (Winks, 1997; Kwong, 2004).

A review of the literature indicates that problems related to apparel fit stem from a variety of factors, such as an outdated anthropometric database from which sizing systems are developed, a lack of classified body shapes, non-standardised communication of sizing and fit and non-standardised fit quality management amongst the apparel industries (Salusso-Deonier, 1989; Chun-Yoon & Jasper, 1996; Holzman, 1996; Winks, 1997; Desmarteau, 2000; Ashdown, 2000). Ashdown (2000) sees sizing systems as the focus point around which all the other factors concerning sizing and fit revolve. She has identified the main factors affecting sizing systems and consequently the fit of ready-made apparel to be the population measurements (body dimensions), the design features (construction of the apparel), the fit issues (fit quality management), and the communication of sizing and fit (size labelling). These factors have been identified as issues that happen within the manufacturing process and occur throughout the production of apparel, from the conception stage to the dispatch stage. It has also been reasoned that fit problems could be attributed to factors outside the apparel manufacture such as the consumers' knowledge about size and fit and their fit preferences (Mason, De Klerk, Sommervile & Ashdown, 2008).

A starting point for the assessment of apparel's fit is studying the influencing fundamentals underlying fit, and studying the influence that the body shapes have on the fit of apparel (Salusso-Deonier, 1989; Gersak, 2002; Ashdown, Loker & Adelson, 2004; Kwong in Fan *et al.,* 2004). Body shape, being in a sense the apparel's framework (Sallusso-Deonier, 2005), will in one way or another affect all four factors highlighted in Ashdown's (2000) model. For example, firstly, body dimensions require measuring the body in a specific way that will facilitate body shape classifications and accurate reflection of the three-dimensional body's characteristics when the apparel item is made. Secondly, the design features require that the body's framework (three-dimensional characteristics) be correctly interpreted to patterns for the construction of well-/better-fitting apparel. In most developing countries and particularly in Kenya, there is no known research on female body shapes or any related subject to support the quality of apparel styles. Thirdly, the fit issues (fit quality management) require that fit testing techniques, which are applied in the apparel industry, such as the use of fit models and dress forms, should conform with the body shapes of the target market. In Kenya, most of the personnel in the apparel industry are inadequately skilled to tackle fit issues and seldom employ modern technologies or dress forms to test the fit of the prototype apparel before even engaging fit models (McCormick, Kimuyu & Kinyanjui, 2002). In addition, communication of sizing and fit requires that the measurements and body shapes indicated on the size labels reflect the true picture of the target market (population). In Kenya, the source of size systems are unknown while most size labels presented on apparel are uninformative. Therefore this study is undertaken to evaluate apparel sizing and fit problems in Kenya in respect of career women's distinctive body shapes, and to assess career women's perceived fit problems, their knowledge about the communication of size and fit, as well as their fit preferences.

1.3 STATEMENT OF THE PROBLEM

According to KEBS (2001: Preface), anthropometric data in Kenya was taken in 1975 and the measurements were obtained from girls and women of Kenya's learning institutions and organisations. However, the size ranges are not grouped into body shape categories. The source of the original data from which the sizing systems were developed is unknown and obscure, so the quality of the techniques and instruments used for the data collection cannot be authenticated. The 1975 data would also be considered outdated and obsolete to cater for dynamic body changes.

Not all body shapes are alike or perfect. Careful evaluation of different figures reveals that most proportions, frameworks, contours and postures may symmetrically or asymmetrically deviate from the so-called ideal figure. Age also affects the body's proportions and hence the need to understand the body proportions and the fit needs of different age groups of females. Apparel has the potential to create a new and better perception of the body, even if it is not considered ideal. The use of apparel therefore is to alter the perceived proportions of the body, and to provide a sense of satisfaction to the individuals who do not fit the cultural ideals of size and weight (Feather, Herr & Ford, 1996; Fiore & Kimle, 1997:331; Rasband & Liechty, 2006:3, 5 & 19). A question may arise, namely: how would career women's distinctive body shapes contribute to the fit problems of the ready-made apparel in Kenya? This constitutes the problem of this study. A pilot study in this regard was undertaken in Kenya, with the aim to sort out the most distinctive body shape of career women in Kenya, rather than simply categorising body shapes. It should be noted that it is possible to classify/categorise shapes from a large and representative population such as the 12,000 (United States of America) or 11,000 (United Kingdom) body-scanned subjects (Devarajan & Istook, 2004) in other studies. However, it would only be feasible to identify distinctive body shapes from data collected from a small population. This study employed manual anthropometric techniques of attaining body dimensions and was only carried out within two urban regions of Kenya. Investigation was therefore undertaken to sort out only distinctive body shapes emerging from the sample data. Accompanying body characteristics that occurred repeatedly, and are critical to apparel's fit, were described to establish how they may contribute to the fit problems of ready-made apparel in Kenya.

Considering that the majority of female consumers are dissatisfied with the fit of female ready-made apparel (Otieno *et al*., 2005; Klepp & Storm-Mathisen, 2005:329), most studies carried out were done in developed countries (Kurt Salmon Associates, 1996; Otieno *et al*., 2005; Zwane & Magagula, 2006; Shin & Istook, 2007) . However, little has been done in a developing country such as Kenya. The question to ask would therefore be: what are the perceptions of the career women in Kenya concerning the fit problems of ready-made apparel in Kenya? As part of the problem statement, this study therefore assessed Kenya's career women's perceptions of general fit problems that they encounter with ready-made apparel.

Communication of sizing and fit involves informing the consumers how the apparel items should fit in terms of size (key dimensions) and fit (body shape). Ready-made apparel items contain a variety of labels/tags that express information to the consumers for estimating the quality of apparel items in terms of size, fit and care. Although supplying size label/tags takes place voluntarily, clearly and accurately written labels provide a means for the consumer to learn about the apparel items (Mason *et al.,* 2008). Labels aid the consumer in making informed decisions about selecting and even caring for the apparel items. However, it has been documented that size label/tags on women's ready-made apparel are not correlated to body dimensions – unlike in men's apparel – thus contributing to the confusion and frustration as female consumers select their apparel items in retail stores (Chun-Yoon & Jasper, 1996; Holzman, 1996; Desmarteau, 2000). Most female sizes are not expressed as body dimensions, but rather expressed as arbitrarily chosen numbers or letters that correlate with sets of hidden body dimensions (Brown & Rice, 2001:147-148; Faust *et al.,* 2006). When body dimensions are not revealed to an ignorant consumer, the size designations are meaningless, thus leaving the consumers to guess and assume what would fit appropriately. Literature on this phenomenon is scarce, while no study has evaluated the consumer's knowledge about the communication of sizing and fit in Kenya. This therefore raises the question: How does consumers' knowledge about the communication of size and fit contribute to the fit problems of ready-made apparel? As this comprises the problem statement of this study, this study was also undertaken to determine career women's knowledge about the communication of size (key body dimensions) and fit (body shapes), and how this may contribute to fit problems.

In a consumer market-driven society, the challenge to the apparel industries is not about giving customers extra choices, but rather to contain consumers' individual preferences. Career women, in particular, expect to get what they want with minimal time and energy committed to the apparel search (Kaiser & Garner, 2003:28-29). An individual's fit preference could be defined as the way that an individual consumer expects or would want the apparel to fit the body correctly. Consumers become loyal to certain brands and stores that repeatedly deliver satisfactory apparel items in terms of size, style and comfort within the fashion trend of the time (Workman, 1991; Glock & Kunz, 1995:135). Consumers with different orientations have different preferences and needs within specific social contexts. In most developing countries such as Kenya, little research has been done, while no study has assessed career women's fit preferences. Hence, another research question emerging is: how do career women's fit preference for differently fitted apparel, contribute to the fit problems of ready-made apparel in Kenya?

To focus properly on the problem under investigation, the following questions therefore directed the investigation:

- What are the career women's distinctive body shapes in Kenya and how do they differ from Western distinctive body shapes?
- What fit implications are associated with Kenyan career women's distinctive body shapes?
- What are the distinctive body proportion differences among different age groups of Kenya's career women?
- What are the general fit problems that career women encounter with the ready-made apparel in Kenya?

- Do career women lack knowledge about the communication of size and fit, and how does this contribute to the fit problems they experience with ready-made apparel in Kenya?
- What are the career women's fit preferences for differently fitted apparel items and how do these preferences contribute to the fit problems with ready-made apparel in Kenya?

1.4 PRIMARY OBJECTIVES AND SUB-OBJECTIVES

Primary objective 1: **To identify and describe distinctive female body shapes of career women in Kenya from body dimensions and photographs**

Sub-objective 1.1: To identify and describe distinctive female body shapes of career women in Kenya from the body dimensions

Sub-objective 1.2: To identify and describe distinctive female body shapes of career women in Kenya from the photographs

Sub-objective 1.3: To establish and describe associations between distinctive shapes emerging from body dimensions and those emerging from the photographs of the career women

Primary objective 2: **To distinguish and describe differences between the emerging distinctive body shapes (from measurements and photographs) and the Western distinctive body shape**

Primary objective 3: **To scrutinise and describe the fit implications associated with the emerging distinctive body shape of the career women**

Primary objective 4: **To assess and describe career women's self-perceived fit issues with the ready-made apparel in Kenya**

Sub-objective 4.1: To investigate career women's perception of fit with different apparel categories that are sold in various retail stores in Kenya

Sub-objective 4.2: To describe fit problems that career women in Kenya encounter regarding the specific critical fit points of different parts of their bodies

Sub-objective 4.3: To describe career women's degree of satisfaction with the process of finding appropriate ready-made apparel items in Kenya

Sub-objective 4.4: To explore career women's self-perceived sources of fit problems with apparel in Kenya

Primary objective 5: **To determine and describe Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes)**

Sub-objective 5.1: To explore Kenyan career women's knowledge about the communication of size

Sub-objective 5.2: To explore Kenyan career women's knowledge about the communication of fit

Primary objective 6: **To determine and describe how career women's preferences for differently fitted skirts and jackets may contribute to fit problems with apparel**

1.5 EXPECTED SIGNIFICANCE OF THE STUDY

1.5.1 Emerging distinctive female body shapes

In today's competitive business environment, companies must ensure that they focus on building the loyalty of and retaining their consumers by offering products and services that fulfil their needs. It is important that the apparel manufacturers, retailers, researchers/educators and government/public agencies in Kenya are aware of the emerging distinctive female body shapes and the apparel's fit implications associated therewith, so as to develop strategies that would help to solve the problem and to promote the production of well-fitting apparel items for the career women in Kenya. Understanding how the prevalent body shape differs from the Western fit model enhances greater knowledge on style selection, pattern development and fabric required for those specific body shapes.

1.5.2 Career women's perception regarding general fit problems with the ready-made apparel in Kenya

Examining consumers' perception of fit problems regarding ready-made apparel would facilitate a deeper understanding of consumers' satisfaction with the process of finding apparel items in their appropriate sizes and styles, consumers' fit problems encountered at critical fit points of their bodies, as well as consumers' perceived sources of those fit problems. Being a new study in Kenya, this will highlight critical areas such as sizing systems that need to be developed or modified to counteract the fit problems.

1.5.3 Consumers' knowledge about the communication of size and fit

In the context of the United Nation's consumer rights (1985), consumer education is valued worldwide. The discipline of consumer science education in actual sense concerns itself with responsible, informed consumer decision-making. Careers in the field of apparel and textiles attempt to educate consumers and assist them with relevant product information to enable them to make appropriate purchasing decisions. Consumers' ignorance on the communication of sizing and fit (terms used on size labels/tags and the meaning of symbols on the labels) should be regarded as a matter of concern. An improved understanding of consumers' knowledge/ignorance about the communication of sizing and fit would be valuable in terms of consumer education and facilitation, and would enlighten the apparel industries for the supply of satisfactory apparel items affixed with durable, legible and efficiently informative size labels/tags.

1.5.4 Consumers' fit preferences

Understanding the fit preferences of female consumers and relating these preferences to the body characteristics that determine the fit of an apparel item, would help apparel companies to produce suitable and better-fitting apparel within consumers' desired fit parameters. If apparel manufacturers produce apparel without taking into account the link between the fit preferences of the consumers and the body's most common critical fit points in a target population, the available products would be purchased based on availability rather than desire – and hence, fit problems.

1.5.5 Contribution to existing theory

Considering that this research would be new in Kenya, and with the emergence of a distinct female shape that differs from the Western prevalent one, it is hoped that all the information gathered would be used as input units, for the development of a knowledge base that would lead to better designing and better predicting the degree of fit, and ultimately to the production of well-fitting apparel in Kenya and other African developing nations.

1.6 STUDY OUTLINE

This thesis is divided into seven chapters. This introductory **Chapter 1** deals with background information, statement of the problem, the expected significance of the study as well as the study outline.

Chapter 2 entails a literature review on the theoretical framework. It uses Ashdown's (2000) model as a launching point. Four main areas (population measurements, design features, fit issues and the communication of size and fit) highlighted in the Ashdown (2000) model, are addressed to facilitate a deeper understanding of issues revolving around the sizing systems, which are key in the fit of ready-made apparel.

Chapter 3 examines specific supporting sources that are directly related to the phenomenon of the study, which encompass female body shapes, consumers' knowledge about size and fit, and consumers' fit preferences. Body shape characteristics, which are critical to the fit of apparel, are addressed. The consumer's knowledge about the communication of size and fit, key dimensions, and the terms used on size labels/tags are also examined, as well as the importance of consumers' fit preferences. The chapter ends with a schematic conceptual framework for the study. This was formulated to bring the various concepts of the phenomenon concerned, to facilitate straightforward definitions and to direct the entire study. It highlights each component that is vital in women's varied body shapes in relation to the fit of ready-made apparel, consumers' knowledge about size and fit in relation to the selection of better fitting ready-made apparel, and consumers' fit preferences and how they relate to the body shape's critical fit points.

Chapter 4 explains the methodology used for the study as it gives an exposition of research instruments employed for the study, such as the chosen research framework and the research strategies employed, limitations encountered, and the measures that were taken to ensure reliability and validity of the study while collecting data. It describes the choice and application of data-collection methods used, which encompassed obtaining body dimensions and photographs from career women dressed in minimal apparel items (leotards) and administering questionnaires. Empirical body dimensions and photos were taken first (Phase one), while the questionnaires were administered immediately, afterwards (Phase two). The assignment of phases was for practical purposes and ease of presentation of the data. This chapter also discusses the statistical analyses used, the quality of the study and how research ethics were observed.

Chapter 5 presents the results and discussions of the phase one data that was collected empirically through measuring and photographing women dressed in minimal apparel (leotards). This was to address primary objectives 1, 2 and 3 of this study. It involved identification of a distinctive female body shape and sorting out common body characteristics critical to apparel's fit from body dimensions and visually evaluated photographs of the career women in Kenya. It was also concerned with assessing and describing apparel fit implications associated with the Kenyan career women's distinctive body shape.

Chapter 6 presents the results and discussions of the phase two data that was collected using the questionnaires, mainly addressing primary objectives 4, 5 and 6 of this study. These were to assess and describe career women's perceived general fit problems, knowledge about size and fit, as well as their fit preferences for differently fitted apparel items.

Chapter 7 contains a summary of pertinent findings according to the primary objectives, an evaluation and the limitations of the study, and how this research contributes further to existing theory. Recommendations for future research are also discussed in this chapter.

Chapter 2

THEORETICAL FRAMEWORK FOR THE STUDY

2.1 INTRODUCTION

A review of the literature indicates that problems related to apparel fit stem from a variety of factors, such as an outdated anthropometric database from which sizing systems could be developed, lack of classified body shapes, non-standardised communication of sizing and fit, non-standardised fit quality management and lack of agreement amongst the apparel industries (Chun-Yoon & Jasper, 1996; Holzman, 1996; Winks, 1997; Desmarteau, 2000; Loker *et al*., 2005). In an attempt to solve fitting problems, Ashdown developed a model of the factors determining and influencing apparel's fit. Ashdown (2000) sees sizing systems as the focus around which all the factors concerning sizing and fit evolve. She has identified the main factors affecting sizing systems and consequently the fit of ready-made apparel to be: the population measurements (body dimensions), the design features (construction of the apparel), the fit issues (fit quality management), and the communication of sizing and fit (size labelling). These factors are presented in **Figure 2.1** (as a Theoretical Framework).

2.2 SIZING SYSTEMS

A sizing system is the assignment of body dimensions and a group of body shapes representing a market segment. The body dimensions and body shapes are presented in a chart for the purposes of creating a set of ready-made apparel for a variety of people in the target market (Winks, 1991:3; Ashdown, 2000; Keiser & Garner, 2003:30; Salusso-deonier, 2005; Petrova, 2007:57). Ready-made apparel is clothing developed in advance using size tables and offered through retailers for potential customers to make selections (Loker *et al*., 2005). A sizing system that sets out to satisfy its target market must be up to date, precise in measurements and body shape classification (proportions), and must represent the population that it was designed for (Salusso-Deonier, 1989; Schofield, Ashdown, Hethorn, LaBat & Salusso, 2006). Sizing systems are designed to fit a segment of a population, defined by demographic data (Ashdown, 2000; Petrova, 2007:57). Most regular sizing systems in the apparel industry use the foundation size (sloper) derived from a fit model whose shape and measurements do not represent a wide population of consumers within the targeted market (Schofield & LaBat, 2005a; Schofield *et al*., 2006; Schofield, 2007:152). Even though the sloper may have been created in a cut and fit that have proven successful in the past, it could be argued that dynamic fashion changes would call for a different fit philosophy in every foundation pattern at different times.

Fit is affected by grading since grading plays a key role in developing a range of apparel sizes. However, existing grading practices have little basis in measurement information from size charts, as they are not based on anthropometric research (Schofield & LaBat, 2005b). Thus a base size sloper that is finally proportionally graded into many sizes leads to poor fitting apparel, because the actual shapes and contours of individuals do not follow a similar outline (Salusso-Deonier, 1989; Workman, 1991; Glock & Kunz, 1995:108; Keiser & Garner, 2003:251; Schofield *et al*., 2006). Notably fit and styling ease should be varied for different body shapes, proportions and sizes – characteristics that are overlooked during grade rule application to a base size.

According to Kenya's sizing standards, anthropometric data was last collected in 1975. Considering that these sizing systems are based on an outdated anthropometric database, it is possible that sizing systems currently in use could be an alteration of the 1975 data, or different industries might have individually made them. They could also have been borrowed or copied from other countries. It has however been observed that sizing systems that are currently being used in most developing countries are adaptations of the Western types (Zwane & Magagula, 2006). When such adopted, modified or outdated sizing systems are used, apparel's fit problems will persist because the sizing systems used would not reflect the actual measurements and body shapes of the present Kenyan woman. Used as a point of departure and as foundation for this chapter, is Ashdown's (2000) model of sizing systems in the apparel industry presented in **Figure 2.1** below.

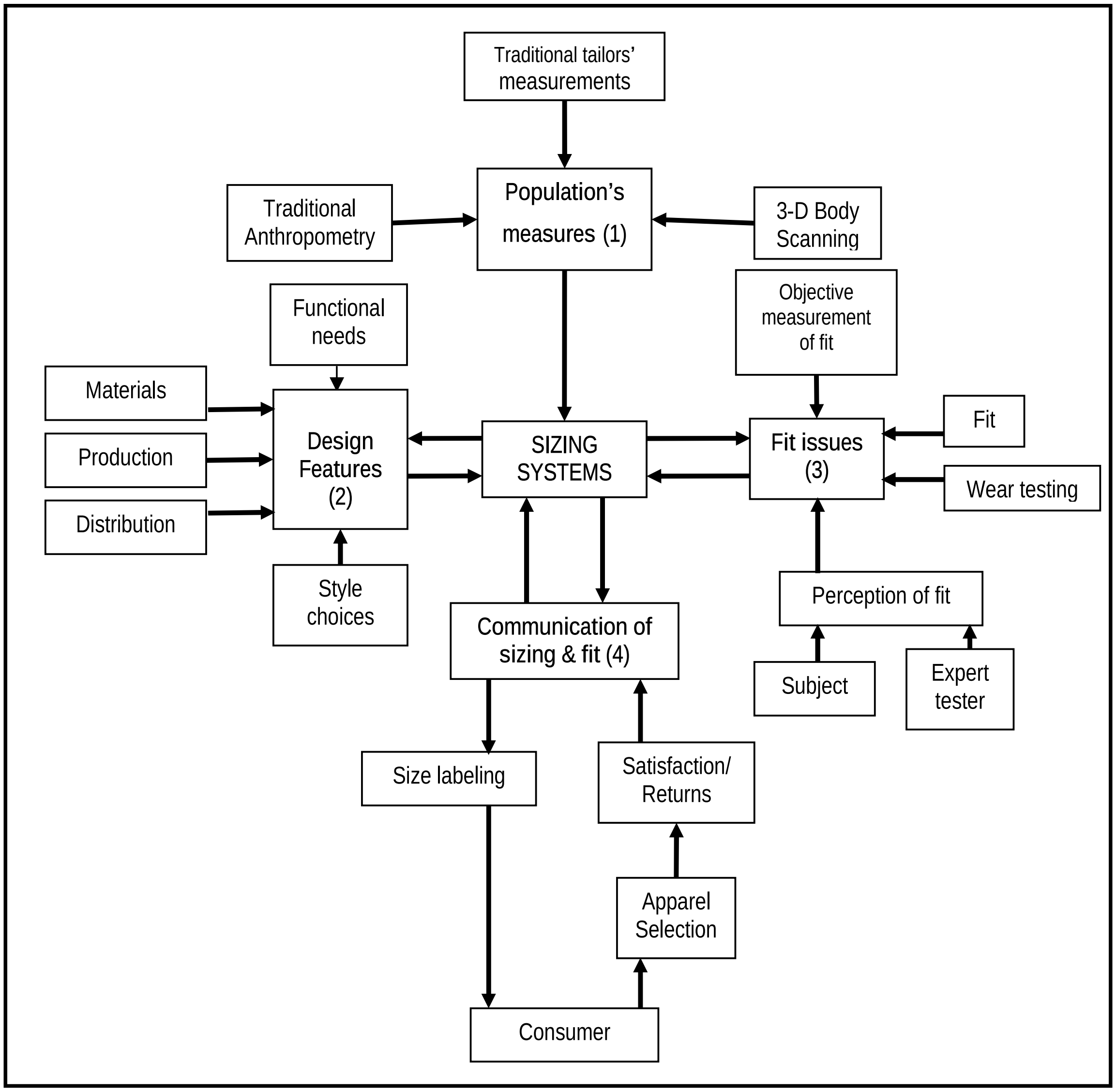


FIGURE 2.1: THEORETICAL FRAMEWORK
(Sources: Ashdown, 2000; Ashdown in Ashdown, 2007:xix)

The framework (**Figure 2.1**) highlights four main factors (population measurements, design features, fit issues and communication of sizing and fit) that are useful for addressing sizing and fit problems. The model is complex and this study focuses mainly on female body shapes, as they act as the apparel's frame and could affect all the major issues highlighted in Ashdown's model regarding fit. This study also focuses on the communication of size and fit from the viewpoint of the consumers' knowledge and how consumers would prefer their apparel items to fit their bodies.

The body shape, being a framework for apparel (Salluso-Deonier, 2005), will affect all four of the major factors in Ashdown's (2000) model, either directly or indirectly. Population measurements demand that the body dimensions should be obtained from the three-dimensional body in an explicit way that will facilitate body shape classifications. Accurate reflection of the three-dimensional body's characteristics would be achieved when the apparel has been made based on the elements of fit (grain, set, line, balance and ease) and dressed on the body (Erwin, Kinchen & Peters, 1979). Design features necessitate that the body's framework (three-dimensional characteristics) are correctly interpreted to patterns for the construction of well-fitting apparel. The fit issues which involve fit quality management strategies call for certain fit testing techniques such as the use of fit models and dress forms. The fit models and/or the dress forms used must correspond with the body shapes and sizes of the target market. Communication of sizing and fit requires that the measurements and body shapes indicated on the size labels reflect the true picture of the target market (population).

2.3 POPULATION MEASUREMENTS (SOURCES OF SIZING SYSTEMS)

The dimensions of the human body underpin an effective sizing system and consequently better-fitting apparel items. Sizing systems originate from people's measurements and body shapes (Bye, LaBat & DeLong, 2006:66; Petrova, 2007:56). Since the body shape is three-dimensional, the measurements obtained from it must be accurately taken and must be representative of the characteristics of body shape that are critical to the fit of apparel. This would facilitate the production of apparel items that harmonise with the body shape. The measurements and the varied body shapes can only be accurate, consistent and representative if they are taken accurately by employing correct methods, instruments and techniques (Ashdown, 2000; Simmons & Istook, 2003; Ashdown & Dunne, 2006). Ashdown's framework illustrates how the population measurements contribute to the effectiveness of any sizing system. The measurements used should be current, accurate, consistent and representative of the population for which the system is being developed (Kunik, 1984:12; Winks, 1997; Ashdown, Loker & Adelson, 2004; Honey & Olds, 2007).

It has been observed that body shapes and proportions vary significantly from one country to another, and to some extent also within one country (Bougourd, 2007:111). Updated and current population measurements are therefore vital in most countries, in order to minimise fitting problems related to ready-made apparel (Kunik, 1984:12; Winks, 1997; Ashdown *et al.*, 2004; Devarajan & Istook, 2004; Shin & Istook, 2007). In the event where anthropometric data shows little relationship with the target markets' existing measurements and proportions, the existing systems should be modified to incorporate the differences in the critical fit points as well as varied body proportions (Ashdown & Dunne, 2006; Zwane & Magagula, 2006; Shin & Istook, 2007).

Body dimensions can be obtained accurately through recommended methods, namely, the traditional (ordinary) tailor or dressmaker's method, traditional anthropometry and the three-dimensional body scanner. Once the measurements are obtained, they are transposed into patterns, which are to be used for cutting out the apparel. If the measurements taken are incorrect, the resulting apparel will contain fitting problems, no matter how accurate the other processes of production may be (Ashdown, Lyman-Clarke, Smith & Loker, 2007:349). Winks (1997) agrees that when apparel does not fit properly, the consumer is dissatisfied – irrespective of the quality of the fabric, the workmanship or even the item's fashionability. The accuracy and the representativeness of a population's body dimensions can be greatly influenced by measuring methods or skills employed (Bye, LaBat & DeLong, 2006: 66). Considering that the source of Kenya's anthropometric database is unknown, the quality of the measuring methods, techniques and instruments used cannot be guaranteed. This means therefore that the skills used to create the data underlying sizing systems currently used in Kenya remain unknown and questionable. However, discussed below are some of the measuring techniques that are commonly applied.

2.3.1 Traditional tailor or dressmaker's measurements

These measurements refer to body dimensions taken manually using a tape measure (measuring tape). Measurements that are directly related to the item to be made often determine the dimensions required (Cornell University, 2004). Although reliable measurements may be obtained with experience, precision cannot be achieved. The tailor or dressmaker (with reference to Kenya) takes body dimensions when the subject is dressed in normal apparel and shoes. Most measurements are taken along the contours of the body and not in straight lines between points, while landmarking is not done before the actual taking of body dimensions. Often there is not much attentiveness by the tailor while taking measurements, particularly to the body's areas that would be critical to the apparel's fit. The subject's movements while being measured would also affect measurements as a result of shifts during the measuring process. Accuracy varies significantly with different professionals in the tailoring and dressmaking fields. It depends entirely on the persons' skills and the experience they have, particularly in their ability to capture characteristics of varied body shapes that are critical to apparel's fit (Kunik, 1984:4; Ashdown, 2003; Yu, 2004:183-184; Aldrich, 2007:3, 5, 22). In Kenya, it could be argued that each segment of the apparel industry, both the formal and informal, uses its own style of obtaining body dimensions for each specific apparel item. Non-standardised and/or inaccurate measuring techniques, combined with the lack of skills and inappropriate tools, could result in unsatisfactory apparel (Ongile & McCormick, 1992; Mason, 1998; McCormick *et al*., 2002)

2.3.2 Anthropometry

Anthropometry is defined as the study of human body dimensions (Pheasant, 1986; Carrol, 2002). The term *anthropometry* is derived from *anthropos*, meaning "human", and *metrikos*, meaning "measuring" (Roebuck, 1995:1). Quelet first used the term in 1870 with the aim of obtaining the measurements of average man (Anthropometry, 2000:1). Anthropometry like any other scientific path depends upon the adherence to particular rules of measurement as determined by national and international bodies controlling standards. Standardised rules of obtaining body measurements facilitate a comprehensive measuring of all the body parts necessary for the fit of apparel items, which eventually must fit a three-dimensional body shape from which the measurements were taken. Formal anthropometry studies specifically for apparel design use apparatuses that have been designed to produce reliable and valid measurements. Anthropometric apparatuses include the Anthropometer (Measuring stand) consisting essentially of a rule, graduated in millimetres, vertically mounted and with a moveable arm. It is used for measuring straight, linear distances. Other instruments are callipers and calibrated measuring tapes, which measure linear depths and widths (Beazley, 1997:58; Bye, LaBat & DeLong, 2006:66).

Measurement errors could be reduced if the techniques of landmarking were well understood and taken seriously. Landmarks are identifiable skeleton points that generally lie close to the surface of the body, and are the points that identify the exact location of the measurement sites (ISAK, 2001:21). Subjects should be landmarked prior to taking measurements. This is to ensure conformity and consistency while taking body dimensions. Standardisation would be achieved once the universal (landmark) points on the body were identified. When correctly identified, landmarks reduce the viewer error, which is common with traditional anthropometric studies (ISAK, 2001:21; Simmons & Istook, 2003). Errors common with landmarks could be reduced and improved if the measurements are obtained by a well-trained/professional anthropometrist, who understands the anatomy of a human body and can link the anatomical terms with apparel design requirements. Understanding the cultural beliefs of the target consumers could help to pinpoint sensitive issues that should be avoided during a measurement exercise (Apeagyei, Otieno & Tyler, 2007; Mastamet-Mason, De Klerk & Ashdown, 2008). Participants could be requested to wear minimal apparel – as minimal as possible – to allow the natural contours of the body without constricting (e.g. body suits). The instruments and tools must be arranged well in advance and in the sequence that the measurements will be taken, in order to minimise the contact time with the participants

(Norton & Olds, 1996:29-30l; Winks, 1997; Beazley, 1997:64; ISAK, 2001:21; Simmons & Istook, 2003:308; Ashdown & Dunne, 2006).

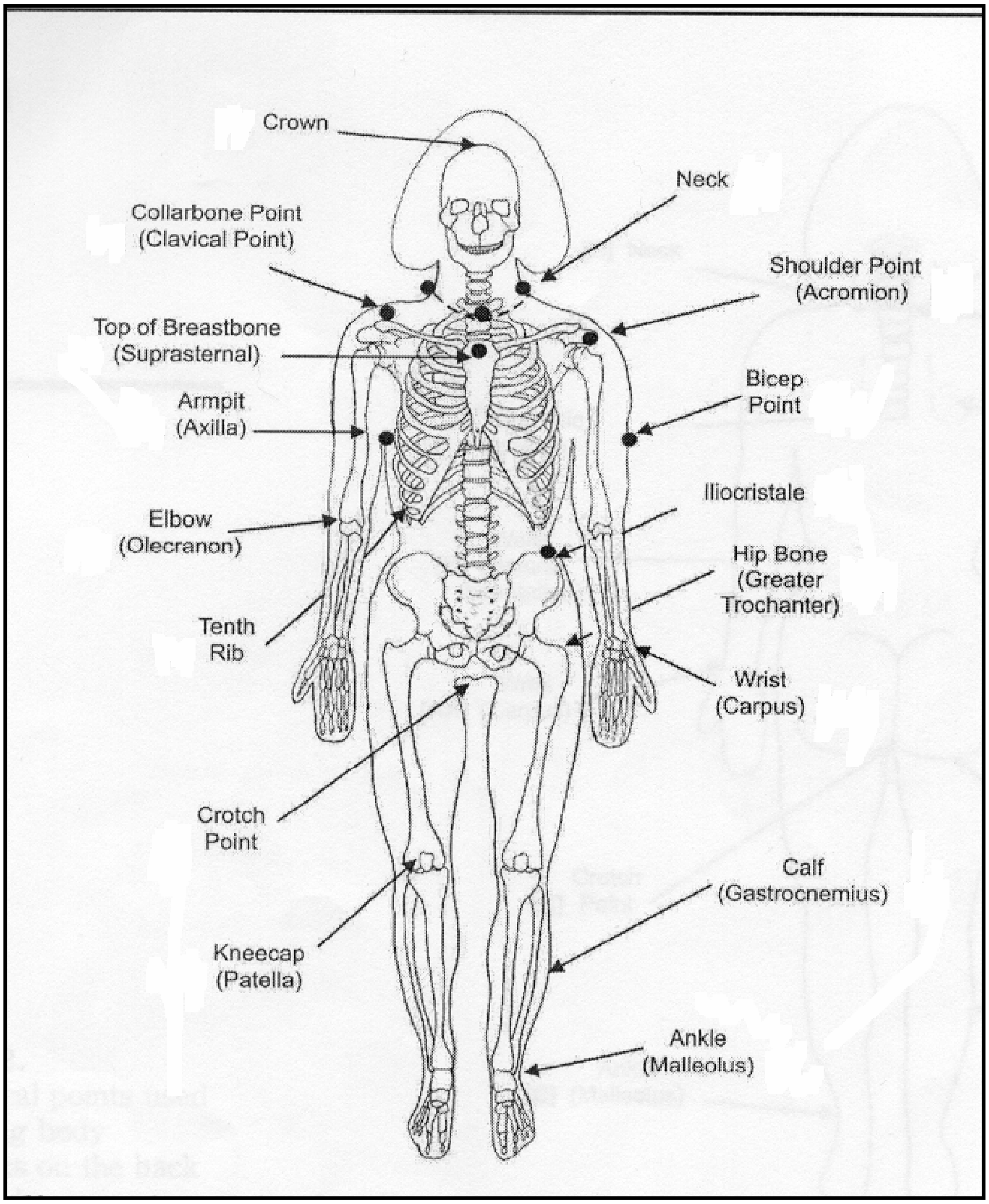


FIGURE 2.2: ANATOMICAL POINTS USED IN LOCATING BODY LANDMARKS ON ANTERIOR POSITION

(Source: Simmons & Istook, 2003: 311)

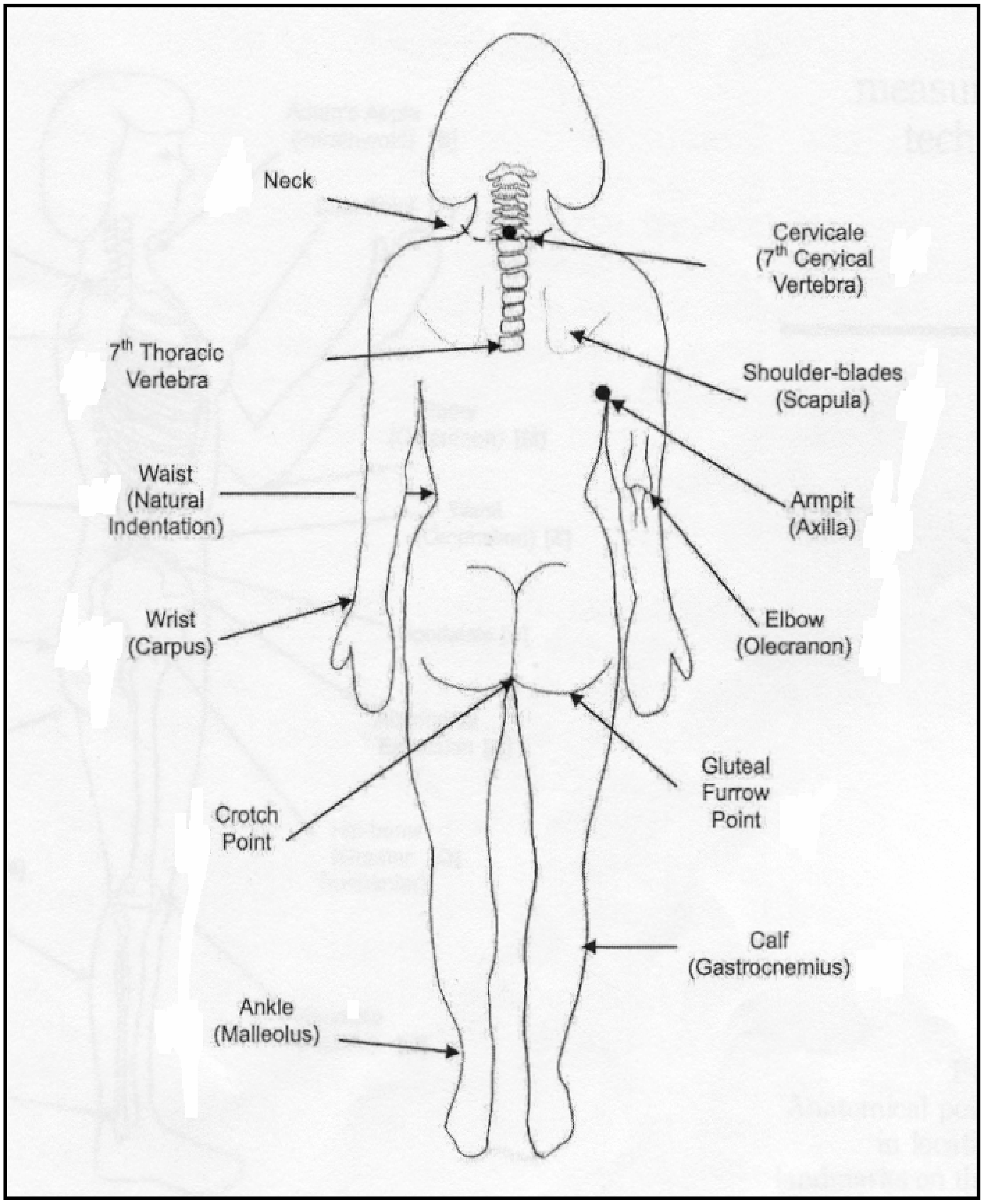


FIGURE 2.3: ANATOMICAL POINTS USED IN LOCATING BODY LANDMARKS ON POSTERIOR POSITION

(Source: Simmons & Istook, 2003: 312)

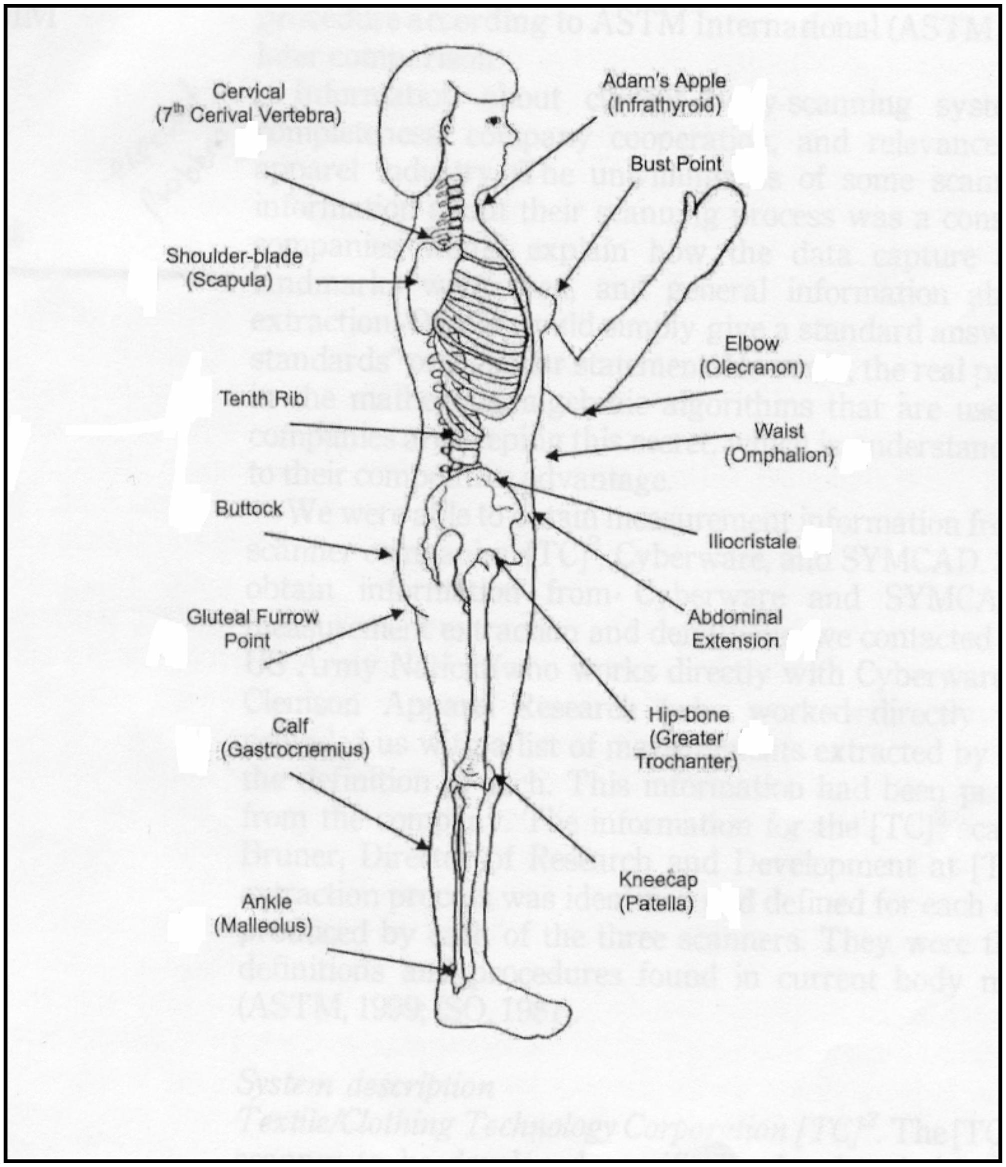


FIGURE 2.4: ANATOMICAL POINTS USED IN LOCATING BODY LANDMARKS (Source: Simmons & Istook, 2003: 313)

Disadvantages with traditional anthropometry are linked to the measuring exercise being tiring as well as the time taken to complete the exercise. Measuring methods require palpitation or touching of the human body or bending of parts while trying to find appropriate landmarks for the required measurements, thus violating the privacy of an individual (Winks, 1997; Simmons & Istook, 2003; Istook, Little, Hong & Plumlee, 2003). Although there are limitations with traditional anthropometric measurements, they have however been used for many studies and have produced reliable results before the emergence of body scan technologies. To ensure the validity and reliability of traditional anthropometry, a thorough preparation, particularly on landmarking (**Figures 2.2**, **2.3** and **2.4**), is required before the commencement of the measuring exercise. In Kenya, it can be argued that, since the sources of the anthropometrical database are obscured, the information on this method of attaining body dimensions is also flawed, thus creating a wide research gap on anthropometric body dimensions. The fact that data collection was last done in 1975 (KEBS, 2001: Preface) could also suggest that instruments and techniques used then could by now be outdated/obsolete and questionable in terms of validity and reliability. This study is therefore designed to fill this gap by providing updated anthropometric data for the purposes of identifying the prevalent body shapes of career females as a market segment in Kenya.

2.3.2.1 Developing sizing systems from anthropometric database

A sizing system is a set of pre-determined body sizes and body shapes represented in size charts, which should be accurate and up to date. Although the development of sizing systems is beyond the scope of this study, it is recommended that sizing systems should be revised at least every ten years to keep abreast with continuous biological changes that occur from one generation to the next (Brunn, 1983; Olds, 2003). This could facilitate the production of better-fitting apparel that would continuously satisfy the consumers. Chun-Yoon and Jasper (1996) identified problems with fit as stemming from the use of obsolete anthropometric data, faulty selection of key dimensions for the body shape classifications and the subsequent developing of sizing systems.

According to Winks (1997), all body dimensions surveys conducted in countries such as the UK, USA, and Germany, agree on the basic rule that a sizing system must be three-dimensional in structure. The bust girth, hip girth and stature as the main control measurements, as these are critical dimensions for the manufacture of body-fitting apparel. The key dimensions should be convenient to measure, be an integral part of the apparel and should have a high degree of correlation with other dimensions that are as important in design and sizing (Robinette, 1986; Winks, 1997). According to Petrova (2007:66), construction of any sizing system involves the assortment of control dimensions and secondary dimensions with respect to garment type and corresponding body shapes in a market, the choice of interval value between sizes, creating the minimum possible number of sizes that could accommodate a large percentage of the population's sizes and shapes, and calculations of secondary dimensions. However, it is almost impossible to address the consumer's problems of fit, unless a set of accurate body dimensions as well as body shapes are recognised and understood (Istook & Hwang, 2001; Loker *et al.,* 2005).

The size standards available for Kenya's females contain vague information, as the source of the anthropometric database from which they were developed is obscure. The following statement is quoted from the Kenya size standards:

"The body dimensions tabulated in this standard were obtained from girls and women in Kenyan learning institutions and organizations" (KEBS, 2001: Preface).

The size standard however does not give any breakdown of body shapes or population representations of different sizes. This may have contributed to the poor fit of Kenya's locally made apparel and hence the closing down of many apparel firms (McCormick *et al*., 2002; RATES, 2003:58)

2.3.3 Three-dimensional body scanning

The development of the three-dimensional body scanning technology came as a result of the desire in the apparel industry to provide apparel with a better fit to the customer at the shortest time possible. It was also due to the fact that traditional anthropometric methods are slow, time consuming and often not accurate. For the spatial analysis of clothing appearance and fit, a three dimensional digitisation of the body shape and clothing surface is essential. Variation in body size and shape can be accessed quantitatively and expressed by contour maps or polygons (Yu, 2004:135). Body scanners facilitate the extraction of body dimensions and body shapes within seconds and allow consistent body measurements and shapes analysis that would encourage the production of mass-produced apparel that is customised for fit (Istook, 2000; Simmons & Istook, 2003; Ashdown, 2003; Loker, 2007:246). There are four main clothing applications of body scanning, which include: non-contact body measurements for size survey, pattern generation for customisation, tailor made mannequin for a target market and clothing fit evaluation of appearance such as drape, wrinkling and bagging. Other than clothing it can also be used in the medical, fitness and dietetic fields. However, main applicable result of three-dimensional body scanning technologies is the point data cloud to be used for the generation for virtual or physical dress model, critical landmarks and anthropometric data to guide the design and sizing of garments (Yu, 2004:135).

According to Yu (2004:135), non-contact body measurements and garment analysis systems are available in four categories: one, two-dimensional systems, which include a "silhouetter" developed to capture a two-dimensional photograph of a body contour with a background of calibrated standard grid, the LASS system which requires that a person must stand as still as possible when the strips of light are projected onto the body and measured by television cameras, and the SYMCAD system, which requires that a person stands in the middle of the boot dressed only in underwear while a digital camera captures the front and the profile images of the silhouette (Gazzuolo, DeLong, Lohr, LaBat & Bye, 1992; Yu, 2004). The second non-contact body measurements and garment analysis system is the structure light, such as moiré topography and phase shift. Moiré topography is a contour mapping technique, which involves positioning a grating close to an object and observing its shadow on the object through the grating. Shadow and projection moiré techniques are applied to obtain object's measurements and form. In the shadow moiré technique, a linear grating is placed close to the surface of the object to be evaluated. When a light source is illuminated against the grating, grating's shadow is emitted onto the object and a distorted shadowed silhouette is formed as a result of the three-dimensional shape of the object (Yu, 2004:148). Although its main purpose was for screening of spinal deformities of school children, Shadow moiré topography has been used for research on the three-Dimensional analysis of relationship between human body and apparel patterns. Some of the examples of the moiré topography are: CubiCam, Nuoro Ailun and RSI – DigiScan. Phase shift involves shifting the grating preset distances in the direction of varying phase, and capturing images at each position. It uses a white light source to project a contour pattern on the surface of the object. As irregularities in the shape of the target object distort the projected grating, the resulting fringe patterns describe the surface contour. Examples of phase shift technologies are: Textile and Technology Corporation (TC^2) and Telmat – OptiFit (Hwang, 2001; Xu, *et al*., 2002; Yu, 2004:150-153).

The third non-contact body measurements and garment analysis system is a laser scanner, which project a line of laser light around the body. The laser line is reflected into cameras located in each of the scan heads. Data is obtained using triangulation method in which a strip of light is discharged from the laser diodes onto the surface of the scanned object and then reviewed simultaneously from two locations, using an arrangement of mirrors. Viewed from the angle, the laser stripe appears deformed on the object's shape; sensors record the deformations and create a digitised image of the subject. Examples of laser scan technologies include: Cyberware, TecMath, Humano – Voxelan, Cubic and Polhemus – FastScan (Paquette, 1996; Yu, 2004:154-157). The fourth technology being Infrared scanner with infrared (IR) imaging sensor operates in the IR region of electromagnetic spectrum. A lens attached to a detector converts the IR energy to an electrical signal. With an infrared LED and a semiconductor position-sensing detector (PSD), triangulation is used for the rapid, non-conduct measurements of three-dimensional shapes of target objects. It extracts the three-dimensional shapes of human body by positioning multiple distance sensors around the person being measured. Examples of infrared technologies include: Hamamatsu and Hokuruku-Conusette (Crawford, 1998; Conusette, 1999; Yu, 2004:159).

As people change in shape due to diets and lifestyle, it becomes apparent that frequent data collection is needed to keep abreast with these changes. The body scanner would be an ideal instrument to use because it provides speed and consistent and accurate data to redefine sizing systems so as to reflect the dynamic changes in body shapes and dimensions (Ashdown, 2003). The disadvantages of body scan technology, compared to traditional anthropometric measuring, are the costs involved and the technical skills required, which are thought to be too advanced for a developing nation such as Kenya. Introducing such technology needs a feasibility study regarding its acceptance and extensive training of manpower to operate the machine. According to Ashdown and Dunne (2006), body scan technology is expensive and requires high maintenance – costs that most retail operations may not be ready to absorb.

Although the advantages of body scanners outweigh all other methods of obtaining body dimensions, regrettably, a developing country such as Kenya may be reluctant to adopt the new technology due to the high costs involved in terms of acquisition and maintenance, and the technical and management skills required to operate it. It may also require a feasibility study on consumers' acceptance due to cultural differences. In this respect, therefore, this study aims to come up with alternative functional, reliable and acceptable techniques such as the traditional anthropometry and others, as recommended by Ashdown and Dunne (2006:122).

2.4 DESIGN FEATURES

Design may be defined as the organisation of different elements (line, colour, texture, pattern and silhouette), using principles of design (proportion, balance, emphasis, rhythm and harmony) to create apparel items that are in harmony with body shapes and sizes, and are aesthetically pleasing to the users. Design plays an important role in the aesthetics of apparel. It describes how a textile product (an apparel item) satisfies the needs of the customer in terms of appearance, fashion preferences, fit and styling.

Design features are those components that make up the product, and include: the number of pieces used to make up the apparel, the apparel details used and the finishing applied, resulting in a completed apparel item ready for use. This will require both design and functional ease to create a specific style and to allow for body movements. The design features chosen at this stage must correspond with the different body shapes and sizes available in the market (Parker, Winters & Axelrod, 1988:9; Keiser & Garner, 2003:316).

Design involves the processing of an apparel item from the conception stage, which basically takes into account the varied body shapes available and sizes. The designer begins from the development stage consisting of design ideas presented in the form of designs on sketched body shapes (production drawings/working drawings), which act as guiding tools for the pattern maker and later, the apparel assembly (Burns & Bryant, 1997:169; Rosenau & Wilson, 2001:136; Keiser & Garner, 2003: 238). In the process of producing well-fitting apparel, the design features of the actual apparel play an important role, all the way from the pattern maker to the finished product (Hudson, 1980:110; Desmarteau, 2000; Ashdown *et al.*, 2007:348).

The relationship between the design and the fit of apparel is complex, because each apparel style has its own ease allowance and ideal relationship to the size and body shape. Each apparel style allows a different range of variation in the bodies that it will fit in an acceptable manner (Solinger, 1988:63; Beazley, 1998pt3: 67). It is generally reasoned that the more style ease an apparel item has, the greater the range of body variations and sizes that the apparel will fit. The look/appearance will vary according to the different body shapes beneath the apparel item (Glock & Kunz, 1995:110). It has been observed that two people could possess the same basic body dimensions, but would look totally different when dressed in the same apparel item due to shape variations (Schofield & LaBat, 2005a; Schofield *et al*., 2006).

Ease can be defined as the difference between the actual measured size of the body and the measured size of the apparel as intended by the designer (Beazley, 1997, Part 3:67; Keiser & Garner, 2003:316). The amount of ease required for comfort, movement and attractive appearance depends on the manufacturer's standards of fit, the apparel style, the fabric, the size/body shape and the needs of the perceived consumer. These characteristics must simultaneously be synchronised into overall suitable and accepted styles (Huck, Maganga & Kim, 1996; DeLong *et al*., 1993). Wearing or comfort ease is an allowance given to provide for flexing, reaching and movement of the body (Beazley, 1997:68; Keiser & Garner, 2003:316). Every apparel item must contain enough ease to enable the body to move comfortably. This type of ease is provided, for example, at the chest to allow for moving and breathing, the sleeves to allow for bending over and raising of arms, the hips to allow for sitting and walking. Each apparel item thus has specific critical fit points based on the fit points of the body. The generally accepted amount of wearing ease can be affected by fashion trends, fabric characteristics and consumers' fit preferences. However, apparel should be designed to fit the intended consumer, irrespective of fashion and fabric behaviour, but within the fit preference context of the consumers (DeLong *et al.*, 1993; Brown & Rice, 2001:47).

Design ease, also referred to as styling ease, is the degree of closeness, looseness or fullness of fit necessary for the style or silhouette (Glock & Kunz, 1995:154). It is the amount added to the pattern during its creation to provide the look that the designer desires. In other words, it is the details added to a basic pattern block to come up with a certain style. Some styles are designed to fit the body very closely and others are intended to be slightly fitted or loosely fitted (DeLong *et al*., 1993). Design features may limit or widen the range of dimensions that can be fitted to a style. Structural seams and darts incorporated into the design of apparel influence how the apparel will fit on the consumers' varied body shapes (Glock & Kunz, 1995:110; Ashdown, 2000). Fullness beyond wearing ease is created by adding the flares, gathers, shirring, smocking, tucks or pleats. Use of these fullnesses together with adjustable openings, can result in apparel that will fit a wider range of sizes, although the appearances will vary according to the body shapes wearing it.

On the other hand, styles with narrower structured features such as the princess-lined apparel, the midriff designs and tailored apparel will fit a limited number of people (Glock & Kunz, 1995:111). For the success of an anthropometric survey used for mass-produced apparel, Ashdown (2000) suggests that it would be practicable and economical to have a reduced number of sizes for a population through the use of creative design or style features that are suitable to varied body shapes, and also acceptable to the consumers. The level of fit offered in those styles must be maintained following the fashion that the customers prefer. The initial size charts used for the creation of patterns must at all times be representative of the target consumers' sizes and body shapes. This facilitates correct ease allowances to be integrated into the patterns at the very early stage of development, for the production of well-fitting apparel for the intended consumer. With the lack of classified body shapes and with the unskilled manpower in Kenya's apparel industry, it is possible that the concept of fit in relation to design may not be well understood and interpreted appropriately; hence the production of poorly fitting ready-made apparel.

2.4.1 Functional features

Functional features refer to the way the apparel will serve the customer or perform according to his/her expectations. The fabric's performance determines the standard it meets and how it benefits the customer (Solinger, 1988:61). Functional performance refers to the apparel's utility in terms of correct fit and the comfort it provides to different body shapes as well as sizes. It also refers to the apparel's durability and its service for its intended purpose (Kadolph, 1998:30). Providing good fit for the full range of the population with varied body shapes is usually more vital for a functional apparel item, especially for protective apparel. Lack of good fit could jeopardise the protection and comfort presented by the apparel and thus the safety of the wearer (Huck *et al.,* 1997). Work-related movement analysis is an effective way of determining the design needs for specific functional apparels. The designers must therefore evaluate the fit, performance, comfort and level of protection of a prototype apparel item to various body shapes and sizes. The choices made in the design process of a functional apparel item will significantly affect the fit, comfort and performance of the apparel on the wearer (Ashdown, 2000; Kadolph, 1998:30).

Expectations for durability may differ, depending on whether the item is a high fashion garment or just a basic product. Kadolph (1998:29) suggests that the durability and comfort used in a product play a major role when designing functional apparel items. The functionality of an apparel item is expected to serve the customer satisfactorily, even after repeated washings and handling (Solomon & Rabolt, 2004:196; Ashdown *et al*, 2007:349). Thus it is important that the manufacturer should estimate the degree of the apparel's serviceability for at least several washings after purchase (Solinger, 1988:66). The designer and the manufacturer should take into account the consumers' body shapes' characteristics that are critical to the apparel's fit, the consumer's expectations and the performance of a particular apparel item. For example, special apparel items such as a raincoat meant to be worn over several other apparel items, are expected to have a wider allowance than an ordinary dress, although both garments will bear the same size code (Glock & Kunz, 2000:154). The lack of classified body shapes to act as design guides together with the low levels of skills in Kenya's apparel industry may be contributing factors to the poor fit of female ready-made apparel in Kenya. The lack of quality raw materials among other elements, coupled with poor production methods, could also contribute to fitting problems with apparel in respect of its functional features (McCormick *et al*., 2001; RATES, 2003:58).

2.4.2 Materials

For the purposes of this study, materials will be defined as *piece goods* and *findings*. Piece goods are fabrics that are cut and assembled into apparel (Glock & Kunz, 1995:87). Findings are all materials other than piece goods that are required to make an apparel item. Examples of findings include: interlinings, trim, zippers, buttons, and thread (Glock & Kunz, 1995:87, Keiser & Garner, 2003:274). Different body shapes and sizes would call for different characteristics of specific materials that would be suitable and appropriate for them.

Material/fabric is one of the critical factors that affect apparel's fit, and therefore understanding fabric's properties has a significant place in the addressing of size and fit issues (Branson & Nam, 2007:264). Fabric's properties such as its texture, hand-drape ability, pattern and colour often influence and dictate style choices and the amount of ease needed in the design process for different body shapes and sizes (Solinger, 1988:66; Branson & Nam in Ashdown, 2007:266). The hand-drape ability of a fabric is an important contributor to the satisfaction with the aesthetics and performance of the fabric (Solinger, 1988:66; Kadolph, 1998:29; Brown & Rice, 2001:187-189). Material properties affect the way that an apparel item fits a person, and also impact on how many different people of diverse shapes and sizes could be fitted with one size. Appropriate and consistent selections of quality findings (trims) required to support and complete the apparel items are important for the apparel's quality and performance.

The amount of ease and the type of fabric used both interact to affect how appropriately a garment will fit an individual (Keiser & Garner, 2003:274-276). Rigid fabrics require more comfort ease than stretch fabrics; highly elastic fabrics may require negative comfort allowances and therefore can be used to fit a wider population with varied sizes and shapes (DeLong *et al.*, 1993). The lack of knowledge about fabric characteristics on the part of the pattern makers could contribute to fitting problems. The lack of a system of classified body shapes as a design guide, combined with the poor skills and the poor quality of raw materials available in Kenya, could also contribute to the production of apparel items with poor fit (McCormick *et al.,* 2002).

2.4.3 Production

Apparel firms are organised in different ways, depending on the type of operation or product line. However, there are certain basic steps involved in the production of any apparel item. Collection of apparel items (product line) may be made from the original designs of a staff designer, based on different body shapes and sizes of the target market. This is the case for a company that produces highly priced, high-fashion apparel or designs that are adapted or copied from original creations. In either case, the actual production does not begin until the line is decided upon (Zangrillo, 1990:45; Glock & Kunz, 1995:156). Basic steps involved in the manufacturing are listed and discussed in respect of their effect on the fit of apparel. Some of these steps may overlap or may be performed simultaneously. The different production stages presented here are:

- design creation stage (fashion illustration)
- pattern creation
- cutting room
- apparel assembly
- pressing/finishing stage

2.4.3.1 Design creation stage (fashion illustration)

The design creation stage is a stage where the designer and design team generate ideas and develop sketches for the new lines (styles), based fit model's body type rather than on varied body shapes and sizes prevailing in a target market. Decisions are based on fabrics, recent sales activity of previous designs and knowledge about the consumer market to be served in terms of body shapes, sizes, styles, colours and prices (Glock & Kunz, 1995:165). The sketches must therefore contain clear and detailed information, particularly on the styles, to be understood and interpreted by the pattern maker, and later also by the sample maker, who must come up with an accurate, well-fitting sample (Brown, 1992:25: Keiser & Garner, 2003:173-177; Ashdown *et al*., 2007:350). Use of computer-aided design (CAD) increases accuracy and efficiency. Fabrics are used as a source of design inspiration and as a guide in the selection of suitable sizes, styles and colours (Zangrillo, 1990:45; Burns & Bryant, 1997:177).

2.4.3.2 Pattern creation

Critical to the development of an apparel pattern is the way in which the human body is measured (as discussed in **paragraph 2.3** above) and how those measurements are interpreted. As was pointed out, the human body is three-dimensional while the measurements obtained from it are one-dimensional. The flat pattern creation is two-dimensional and must result in a three-dimensional garment to fit the three-dimensional body shape (Davis, 1980:69). The successful translation of original designs into finished apparel items is realised through the techniques of draping and/or flat pattern making by a skilled pattern maker. Draping is the molding of fabric to the rounded dress-form figure, representing the human figure, to produce a three-dimensional fabric pattern shape (Zangrillo, 1990:68; Keiser & Garner, 2003:250). Although the art of draping would result in better-fitting apparel, the dress form used for the production of the prototype does not represent the varied body proportions of the different body shapes.

Flat pattern making is the drawing of a pattern on a flat surface to individual or standard measurements in a given size, by applying the principles of drafting (MacDonald & Weibel, 1988:2; Keiser & Garner, 2003:250). Sample pattern makers convert designs into sample patterns that, when the pieces are cut and sewn together, create a sample garment which must fit a three-dimensional human figure. The pattern maker develops a pattern piece for each part of the garment, making necessary changes in the company's basic pattern (i.e. the sloper or the basic block) which was created through drafting from body dimensions and body shapes of the typical target customer (Brown, 1992:26; Brown & Rice, 2001:82). The pattern maker must understand the characteristics of the body shapes, the fabrics to be used, particularly their drape and stress characteristics, as these will determine the effectiveness of the pattern. Knowledge about the exact amount of stretch of the fabric, in all directions, is required so as to adjust the sloper for different body shapes and sizes accordingly. Different sized bodies and different body shapes will exert pressure in different areas, depending on how the bodies are shaped – and this must be understood well by the pattern maker. Shrinkage characteristics should also be well understood and patterns should be created to cater for it (Hudson, 1980:110; Solinger, 1988:55; Ashdown, 2000). The pattern maker must also accurately assess, from the sketch, the overall silhouette desired, the amount of ease and the designer's desired proportions for the design detail, as well as the shape of the intended customer (Burns & Bryant, 1997:178).

A sample maker following the specifications set by the company or the customer makes prototype garments that reflect what is suitable to varied body shapes as well as the consumers' demand (Glock & Kunz, 1995:168; Rosenau & Wilson, 2001:184-187). The fit of the company's product is a way to achieve product differentiation. A fit model is used to assess the fit, styling and overall look of the new prototype, but the problem lies in the fact that the body shapes of the consumers differ from that of the fit model (Salusso-Deonier, 1989; Burns & Bryant, 1997:185; Schofield & LaBat, 2005c; Ashdown *et al*., 2007:353).

Grading as a major process of developing apparel in a range of sizes plays a significant role in the way that an apparel item would fit the intended consumers' sizes and body proportions. Grading is defined as increasing and decreasing a base sized pattern into subsequent larger or smaller sizes with similar outlines as the base pattern (Schofield & LaBat, 2005b; Schofield, 2007:157). Production pattern pieces, which have been made in the sample size and perfected on either fit model or dress stand, are then graded to create a set of pattern pieces for each of the sizes listed on the apparel specifications sheet (Schofield, 2007:157). The pattern maker develops patterns for optimum fabric utilisation and ease of assembly, and determines how each apparel item can be economically mass-manufactured, while retaining the look that the designer intended. Existing grading practices have little basis in measurement information from size charts, as the majority of grade rules applied are not based on anthropometric research (Shofield & LaBat, 2005c). This suggests therefore that the resulting apparel's sizes and styles would contain fit problems as individuals' proportions differ. It has been observed that grade rules used by the industries are not standardised, while body shapes do not change in the same way (linear pattern), and therefore consistent incrementing or decreasing of sizes when grading, does not cater for the diverse body shapes available in a market (Salusso-Deonier, 1989; Schofield & LaBat, 2005).

The lack of formal training in pattern making could also lead to fit problems as there would be no coordination between body forms' characteristics and the two-dimensional flat pattern required to produce a well-fitting three-dimensional garment. If a base pattern has a fit problem, whether in grain line, its balance or proportions, these problems are transferred to new styles developed or graded from the same base pattern, and this leads to the production of ill-fitting apparel (Hudson, 1980:111-113; Desmarteau, 2000). Grade rules used are obtained from anthropometric data for that specific market (DeLong *et al.*, 1993).

It may be argued that the lack of skilled personnel in Kenya's apparel industry is a major contributing factor to the fit problems experienced with ready-made apparel (Mason, 1998; McCormick *et al*., 2002).

2.4.3.3 Cutting room

Marker making: A marker is a diagram of a precise arrangement of pattern pieces for the sizes of a specific style that are to be cut for a single spread (Glock & Kunz, 1995:375). Although body shapes and sizes do not directly influence marker making, pattern making, as mentioned above, requires a thorough understanding of the characteristics of various body shapes as well as sizes. Accurately prepared patterns would therefore influence the arrangement of a marker. The marker indicates how all the pattern pieces of the apparel items are to be arranged on the fabric to achieve the most economical and efficient layout. In the process of producing the most efficient layout, the grain line and seam strength may be affected, resulting in apparel items with poor fit (Hudson, 1980; Brown, 1992:28; Brown & Rice, 2001:95; Ashdown *et al*., 2007:356). The use of computer-aided design to create markers helps in achieving accuracy as well as speed and cost savings (Istook, 2000). In Kenya however, the industry has not advanced to computer-aided design, and manual operations could affect the fit of the final apparel item (Sasia, 1991; Ongile & McCormick, 1996:40; McCormick *et al*., 2001).

Spreading: Fabric spreading is the process of superimposing lengths of fabric on a spreading table, cutting table or specially designed surface. Spreading may be done manually or by computer-controlled machines (Glock & Kunz, 1995:381; Ashdown *et al*., in Ashdown, 2007:358). Although varied body shapes do not directly influence this technique, the way that the fabrics are spread would affect the fit of the final apparel worn by varied body shapes and sizes. A spread should be as tension free as possible. Tension or tightness of a spread is usually a major factor that affects apparel fit and quality because of the reaction of the fabric (Hudson, 1980:120; Solinger, 1988:121; Brown & Rice, 2001:98). If under too much tension during spreading, the fabric may stretch or elongate and later

contract in length, even before the apparel parts are assembled – leading to smaller sizes than intended (Hudson, 1980; Solinger, 1988:121; Ashdown *et al*., 2007:360).
According to Hudson (1980:119), the spreading machine operator could affect fit by failing to smooth out wrinkled cloth or to check cloth width or edge accurately. The use of modern spreading equipment improves the overall quality of the product because it has a reliable automatic edger, tension control and electronic width monitors. However, manual spreaders without automatic devices are still largely used in the apparel industry (Brown, 1992:29). In Kenya, most industries operate manually (Sasia, 1991; Ongile & McCormick, 1996:40), and therefore accuracy may not be achieved – resulting in apparel items with poor fit.

Cutting**:** According to Glock and Kunz (1995:390), cutting is the reproduction process of separating a spread into apparel parts that are the precise sizes and shapes of the pattern pieces on a marker. Accurate, clean-cut, ravel-free pieces facilitate sewing and improve the quality of garments. Accurately cut pieces are easy to align and position during sewing operations. Inaccurate cutting will cause the operators to compensate by stretching or easing to make the apparel parts the same length or size, resulting in puckered seams and hence, apparel with poor fit (Solinger, 1988:128; Brown, 1992:29; Ashdown *et al.*, 2007:360). Although varied body shapes do not directly influence this part of the process, the way that the patterns pieces are cut out, would affect the fit of the final apparel worn by the varied body shapes and sizes.

Since all patterns are cut out simultaneously, if apparel pieces were cut inaccurately, they would plague the entire assembly process. Mistakes made once would affect the entire line's sizes and styles. The type of cutting equipment and any lack of precision while cutting, may also affect the size of the apparel items (Hudson, 1980:120; Ashdown *et al.*, 2007:360). After the apparel items are cut, the cut pieces are marked to enable operators to align seams, details, and other pieces properly, to facilitate ease of constructing the pieces accurately. If any information is missing, then some apparel items would not meet the size specifications required and again, a problem with the fit would ensue. Computerised cutting systems provide accuracy and efficiency. However, most apparel industries have not introduced modern automatic cutters in their firms (Glock & Kunz, 1995:390).

In Kenya, most industries have the basic operator-controlled cutting blades that are controlled manually. It is assumed that factors that may cause cutting inaccuracies include: wide or vague lines on the marker, imprecise following of lines on the marker, variation in the cutting pitch, allowing the fabric to bunch up or push ahead of the knife, using improper equipment and incorrect cutting sequence, while apparel parts are being cut (Hudson, 1980:199-120; Glock & Kunz, 1995:391).

2.4.3.4 Assembly

Most factories produce apparel items on assembly lines (Brown, 1992:30). The cut pieces are tied together into bundles with identification tickets attached. Each cut piece passes through many hands in the assembly line, one step at a time. Due to varied skill levels and moods of the operators, the resulting product could end up with substandard quality. Subsequently, different specialised machines, if not controlled properly during the sewing process, will also affect the size of the apparel. An over-locking machine, for example, if not controlled, will trim the apparel excessively – thus affecting its size in the end. Hudson (1980:120) argues that sewing operators could cause fit problems by overloading folders, taking excessive trim and not matching guide points. Apparel sizes could also be affected during the sewing process, due to the unique characteristics of the fabric, which may give, stretch or undergo other changes. Puckering of seams also affects the fit of a garment, and this may happen when the machine operators pull fabrics unevenly while sewing. It is also difficult to inspect every apparel item against specifications at every stage of production. This limitation allows fit problems to accumulate, having skipped previous inspections (Hudson, 1980:122). Although body shapes do not directly influence these techniques, the way that an apparel item is assembled could affect the fit of the final product.

A wide variety of technologically advanced sewing machines, some of which are computerised, help the operators to speedily and accurately perform the various steps in assembling apparel. However, smaller industries may not be able to purchase such automatic machines (Brown, 1992:30; Brown & Rice, 2001:101). The outdated machinery, together with the unskilled personnel in Kenya's apparel industries, could also be a cause of poor fit (Sasia, 1991; Mason, 1998).

2.4.3.5 Pressing and finishing

At the pressing stage, shrinkage could occur due to numerous factors, some of which are in-built in the structure, finishing or handling of the fabric. The problem may not be obvious until the fabric is cut or apparel items are assembled. Shrinkage of any type is seldom consistent, which makes it difficult to compensate for the changes into adapted pattern measurements (Hudson, 1980; Brown & Rice, 2001:102). Snap-back type of shrinkage is one that occurs in cutting and is common with knitted fabrics. This is due to fabric being subjected to too much tension when being placed on the roll or the spread for cutting; in the end, undersized garments are produced. When incompatible interlinings are used, different degrees of shrinkages occur where apparel parts of different materials shrink at unequal amounts during the wet ironing or pressing process, resulting in apparel items with varied dimensions. These garments would be labelled with sizes that do not correspond to their physical dimensions. Shrinkage control is critical to the satisfactory performance of apparel (Glock & Kunz, 1995:409). Although the varied body shapes and sizes of consumers do not directly influence this part of the process, the way that the apparel reacts to pressing would affect the fit and size of the final apparel worn by those varied body shapes and sizes.

It is assumed that quality control is done at almost all levels in Kenya's apparel industry. With inadequate equipment and low-level skilled personnel in Kenya's apparel industries, it is also possible that most of the inspections are done manually and some processes such as wet processing may be skipped, due to ignorance and/or costs involved.

2.4.4 Distribution

Distribution implies logistics, which encompasses the proper distribution and replacement of raw materials and apparel, in servicing customers from the time that orders are received to the delivery of the product to the retailer. Based on available body shapes and sizes in a target market, it is possible to accurately distribute appropriate sizes and suitable styles. Distribution basically involves the selection of the appropriate styles and the numbers of each size to be sold at each store location, based on the consumers' body shapes, sizes and the size of the entire population (Glock & Kunz, 2000:108; Ashdown *et al*., 2007:368).

The classification of commodities and of the target markets' body shapes and sizes would determine the size range for a line, though determining the number of sizes to offer usually entails complex work. If a firm targets women, for instance, it would probably offer apparel in misses, juniors, women's and half-sizes (Glock & Kunz, 1995:108). The apparel industry has also developed a model stock plan which identifies the number of sizes, styles, and colours that will be included in each product line, and establishes a percentage allocation for each. This is designed to reflect the consumer order for each size, colour and style, and to present a basis for a balanced stock in developing a line. With the use of quick response (QR) deliveries and Electronic Data Interchange (EDI), the retailers and the apparel manufacturers can offer their consumers a better selection of styles and sizes, as the inventories are efficiently restocked with desired sizes and styles (Ashdown, 2000). The overall aim is to offer correct and adequate – but not an unnecessary excess – in variety of sizes, styles and colours to the intended consumers (Glock & Kunz, 1995:77; Keizer & Garner, 2003:412; Ashdown *et al*., 2007:368).

The advantage of the optimised sizes is that the number of individuals who fit in each size are more uniformly distributed across a range of sizes, and if each retailer has a precise anthropometric database of their customers, it would be possible to work out the number of different sizes essential to accommodate the population in that area. As the sizes are directly based on data from an anthropometric database, such a forecast should be plausible (Robinette, 1986; Ashdown, 1998; Ashdown *et al*., 2007:368). In cases where the categories of body shapes are unknown, the apparel distributed would be based on estimates and these would ultimately end up with fit problems. In Kenya, it may be argued that the lack of an anthropometric database, and of classified body shapes, may be major contributing factors to wrong distribution methods.

2.4.5 Style choices

The apparel silhouette is the outer shape of a garment; the shape and size of a silhouette is the first thing seen when the garment is worn (Keiser & Garner, 2003:180). Lewis, 2007:319) states that the body shape and the apparel silhouette worn become attached and united so that the body shape beneath the apparel enhances the aesthetic appeal of that particular apparel, while the apparel silhouette enhances the aesthetic appeal of the entire person. Style details incorporated into design such as structural lines, control of fullness and the creation of different silhouettes or shapes influence how the apparel will fit on the wearer. The style features and the general structure of the apparel also influence the consumer's perceptions about the fit of that apparel (Ashdown, 2000). The structure of apparel (silhouette) is an indicator of how closely an apparel item would conform to the body. Generally, the closer the apparel silhouette conforms to body shape, the more limited the apparel is in accommodating the proportions of varying body shapes (Glock & Kunz, 1995:110; Rasband & Liechty, 2006:3-5). Apparel components with limited fit points include rigid apparel parts that do not readily expand or contract to accommodate different body shapes and dimensions. These limited fit points would include: collar length, shoulder width, waist length and hip circumference, depending on the style or design of the apparel. However, these components can be modified to allow more variance in fit. Waistbands of skirts, for example, could be in-built with sections of elastic and side tabs (Glock & Kunz, 1995:112).

Careful evaluation of different body shapes reveals that most proportions, frameworks, contours and postures may symmetrically or asymmetrically deviate from the so-called ideal figure (a comprehensive discussion on body shapes is given in **Chapter 3** (**paragraph 3.2**). Apparel styles have the potential to create a new and better perception of the body – even if it is not considered to be ideal, to alter the perceived proportions of the body, and to provide a sense of satisfaction to the individuals who do not fit the cultural ideals of size and weight (Fiore & Kimle, 1997:331; Rasband & Liechty, 2006:3, 5 & 19). Ready-to-wear apparel depends on an accurate estimate of the distribution of body shapes and sizes within a target population. Therefore, it becomes necessary for every country, and even regions within countries, to establish their own sizing systems, which can only be complete, if body shape classifications are representative of the population that they were designed for (Simmons & Istook, 2003; Shin & Istook, 2007; Honey & Olds, 2007). The styles to be produced would then be based on an understanding of the different shapes available in a market place, rather than being produced at random (Ashdown & Dunne, 2006; Shin & Istook, 2007).

Fashion being so dynamic, the type of fit that is fashionable could change from body-hugging silhouette to loose, flowing styles within a short period of time. However, different groups in a population will want different levels of fashion, style and fit. The challenge to the manufacturer is to offer apparel that is suitable to the varied body shapes and sizes, and yet in harmony with the customers' desires (Hudson, 1980:109-110; Ashdown & Dunne, 2006). Due to the lack of established body shapes as well as the lack of skilled manpower in Kenya's apparel industry, it is possible that the concept of fit in relation to style features may not be well understood – and hence the production of poor-fitting ready-made apparel.

2.5 FIT ISSUES

Fit is defined as the relationship between the apparel's dimensions and the three-dimensional human size and form/shape (Kadolph, 1998:550; Keiser & Garner, 2003:315; Solomon & Rabolt, 2004:196). In other words, it is the apparel item's silhouette and size being right for the human's body shape and dimensions. Fit issues would therefore be seen as those measures carried out by the apparel industry to achieve well-fitting apparel for the target market's body shapes and sizes.

Solinger (1988:562) affirms that fit has two parameters, namely aesthetics and utility. The fit measurements must consider the utility specifications for the styles (aesthetic), and both must be suitable for different body shapes and sizes, and also acceptable to the consumers. Although comfort is subjective to individual consumers' expectations for each apparel item, fit affects comfort as well as the durability of apparel in the sense that if an apparel item was smaller than it should be either in parts or in the entire garment, the wearer's movement is restricted in the area of the problem (Rasband & Liechty, 2006:3-5). This therefore necessitates that the crucial characteristics of different body shapes, such as the bust, derriere, thighs, hips, shoulders and biceps, be well understood by the apparel producers. Once the person is restricted, there is a feeling of discomfort resulting from the restrictions. A tight-fitting apparel item would also tend to wrinkle and finally tear as a result of tension and strain around the affected area. The debate on how well an apparel item fits would depend on one's judgement, perception of fit/comfort and the fashion at that point in time, and these would vary according to the consumer, the designer and the pattern maker (Ashdown & DeLong, 1995; Alexander *et al*., 2005a; Loker *et al*., 2005). It can be argued that, since each industry uses self-made sizing systems and delivers differently fitting apparels, judgements on the concept of fit would also differ. Brown and Rice (2001:154) argue that fit is evaluated subjectively in terms of current fashions, cultural influences, body shapes, age, sex and lifestyle (personal taste). Better-fitting apparel could be a close fit to one person and a loose fit to another or on different occasions and depending on what is fashionable at that point in time.

The concept of a good fit is subjective and dynamic, hence the need to address it at different times and from different viewpoints, to come up with at least an acceptable and plausible fit at that particular given time (Loker *et al*., 2006). It could be suggested that continuous pursuit of quality management for each line production be carried out to ensure the production of better fitting apparel that is suitable for varied body shapes and sizes within the fit preferences of the consumers.

The fact that quality assurance is integrated within all the departments in most apparel industries is an indication of commitment to quality. Random inspection on apparel defects and sizes according to specifications does not, however, simply eliminate fit problems but would detect a problem during the production process or at the final stage rather than prevent it. Accurate sizing systems with categorised sizes and body shapes, and based on correctly taken anthropometric data, are likely to prevent problems with the fit of apparel.

In Kenya, it is assumed that the concept of fit may be a new phenomenon, or it is taken as something frivolous. With the lack of a classification of body shapes, together with the inadequate equipment and low-level skilled personnel, specific strategies such as fit and wear tests may be only rarely or minimally administered – resulting in poorly fitting ready-made apparel. Although set standards of quality assurances may be observed in apparel industries, the lack of sizing systems would still lead to the production of ill-fitting apparel – even if all the quality measures were observed.

2.5.1 Perception of fit

Living in a consumer-driven era (Capraro, Broniarcczyk & Srivastava, 2003:164), companies should aim at managing consumer satisfaction/dissatisfaction by producing products that are tailored to the consumers' fit preferences. According to Yu (2004:31), the definition of fit depends on factors such as fashion culture, industrial norm and individual perceptions of fit. These subjective definitions have however been reflected in the non-standardised philosophy governing good fit. Although there is lack of agreement amongst the stakeholders on fit (industry, retailers and consumers), consumers' perceptions of fit should be taken as an important element in addressing matters pertaining to fit for the purposes of supplying better-fitting apparel to a population with varied body shapes and sizes (Keiser & Garner, 2003:29). Istook (2002) argues that the personal preferences of each customer would govern their perception of fit. The consumers' previous encounter with the apparel shapes her perception of fit (Ashdown, 2000). This could, of course, change with the fashion trend at that point in time. Therefore, frequent checks on fit preferences could be tapped and translated into desired and suitable apparel items to keep abreast with the dynamics of fashion. The satisfaction offered by the apparel in terms of expected performance, may also contribute to a consumer's perception of fit.

In Kenya, no known research has been carried out on consumers' perception of fit. The conclusion drawn is that perception of fit may differ from person to person. It could also be assumed that fit issues could be seen by the apparel industry as conformance to the specifications that are used as quality assurance measures. The set standards are static specifications that are applied repeatedly and therefore cannot address the consumers' fit preferences with the changing dynamics of fashion trends.

2.5.2 Objective measure of fit

To judge the quality of the fit provided by a sizing system, one should rely for the assessment of the fit of the apparel on the individuals for whom the system was designed. Unfortunately, there is no reliability or validity in the responses given by the wearer, the designer or the pattern maker, due to their varied judgements (Ashdown, 2003). The designer's, pattern maker's and consumer's concept of fit could vary a great deal, and therefore there could be confusion concerning everyone's perception of fit, which makes it difficult to be analysed (Loker *et al.,* 2006). The designer's interest is to create a specific artistic look in relation to the body of an ideal figure – a body shape and size that differ from those of the entire population. The pattern maker/grader tries to maintain that look over a range of bodies, while the consumers on the other hand, have their own judgements or preferences regarding fit (Ashdown, 2000). Keiser and Garner (2003:29) are of the opinion that product developers must find ways to gather information regarding consumers' preferences in order to produce apparel items that are satisfactory to consumers.

It is impossible to approach the consumer's perception of good fit without a set of accurate and comprehensive measurements and classified body shapes (Istook & Hwang, 2001:120; Ashdown & Dunne, 2006). Consistent fit within a brand, based on accurate measurements and body shapes, builds customers' loyalty as they can rely on finding a good fit where they have found it before (Glock & Kunz, 1995:107; Yu, 2004:31). Major obstacles in addressing fit issues have been reported to be inadequate agreement among apparel professionals on the parameters defining good fit, varied perceptions of good fit and lack of information about which concepts of fit are important to the consumers (Ashdown, 1998; Ashdown, Loker & Adelson, 2004; Yu, 2004:31).

Ashdown, Loker and Adelson (2004) report that objective measurements used for defining fit have been developed. This includes comparing apparel measurements to the body dimensions, particularly at standard, critical fit locations for different apparel items. Pressure gauges could also be used to measure the actual amount of pressure generated on the body by the apparel item (Ashdown, 1998). The critical fit points for different body shapes differ and this calls for attention so as to assess the objective measuring of fit in different consumers with varied body shapes and sizes. Interactions that occur in the complex system of the dressed body could only be solved by the use of a body scanner (Ashdown, Loker & Adelson, 2004). Unfortunately, not all the apparel industries, particularly in developing countries such as Kenya, could employ such expensive technology, which makes fit issues complex to deal with; hence, the continuous production of poor-fitting apparel items.

2.5.3 Fit testing

Manufacturers should aim to consistently satisfy their consumers by producing apparel items that are suitable to varied body shapes and sizes (Brown & Rice, 2001:154). As discussed earlier, consistent quality of fit is pursued at every step of the apparel production process. Prototypes are checked on models with measurements and body shapes that are conforming to the desired body dimensions and form, but are not necessarily a representation of the shape/dimensions of the entire population. The fit of the sample apparel is also checked on the three-dimensional form (dress form), which is a replica of the so-called ideal body shape (Glock & Kunz, 1995:165-166). Fit testing is crucial because it prevents unwanted returns by the consumer, while it much improves apparel's quality as it becomes the company's norm. Testing the apparel's fit reveals key problems underlying the fit or the functionality of a garment, which serves as an improvement tool for the consistent and continuous production of better-fitting apparel. There are methods established to subjectively measure fit through analysis by experts in the apparel profession who visually analyse the apparel's fit on the wearer. Using trained, professional panel members would avoid bias and perception error during such a study, as the training helps them to develop a high degree of sensitivity to the complexities of good fit. Data gathered from expert assessments are used to qualitatively analyse the fit of the apparel and evaluate the accuracy of sizing systems and pattern prototypes (Ashdown, 2000, Keiser & Garner, 2003:318-319).

Disadvantages observed in the use of live models are that they may gain or lose weight, change proportions or become unavailable, making it difficult for a company to maintain consistent fit – even when the company pro-actively maintains a current group of fit models (Brown & Rice, 2001:155). In Kenya, it may be argued that apparel industries might be ignorant of fitting tests. The lack of appropriate basic tools, such as dress forms for pattern draping, could be an indication of ignorance or negligence. However, the apparel industries countercheck apparel's fit with the specifications written for a certain product, which is not sufficient to capture the unique relationship between the body and apparel.

2.5.4 Wear testing

Wear testing is also necessary in order to address issues of durability and consistent fit of the apparel item, even long after purchase. Although Solomon and Rabolt (2004:148) argue that apparel must imperceptibly reconcile body changes that occur over time and encourage comfort without looking age-specific, the performance and fit of apparel still change over time. This poses a challenge for manufacturers to provide apparel that continues to fit after wear and care. Brown and Rice (2001:52-54) state that consumers cannot accurately evaluate apparel's functional performance at the point of sale, but may estimate some features of functional performance, such as comfort or freedom of movement, by trying on the apparel. Care labels represent an implied warranty by the manufacturer that the apparel will retain its shape and appearance if laundering care instructions were carried out appropriately. Based on design, material, workmanship and information given on the labels, consumers should be able to predict the functional performance of apparel, especially if they had prior experience with similar apparel items (Brown & Rice, 2001:147-148; Keiser & Garner, 2003:333).

It could be argued that customers' satisfaction extends beyond the fit observed in a retail environment, to also include the performance of the apparel long after purchase and even after repeated washings. Wearing and caring for the apparel under normal circumstances without change, helps determine how the interaction between the body shape and the apparel (design, material and construction) affects its performance overall (Brown, 1992:18). Wear tests also occur uncontrollably under different circumstances, and although the reports could be subjective, the wearer's results regarding the behaviour of a garment under actual wearing conditions could be useful for addressing fit problems resulting from wearing and handling of the apparel long after purchase. Unfortunately, reports from the subjects are hardly ever received (Ashdown, 2000). Ashdown (2000) is of the opinion that wear tests should be done on subjects that are identified by the company, to wear an apparel item over a period of time, while it is subjected to recommended cleaning methods, normal handling, and wearing. The processes can be monitored and studied, and any changes that might occur over time would be used to address the problem and could eventually lead to the production of enduringly better fitting apparel (Ashdown, 2000; Cornell University, 2003).

Some manufacturers and few retailers perform extensive lab tests or a day's tests on apparel that they produce to ensure that quality is maintained. Lab testing or a day's testing could be simple or complicated, with equipment ranging from home washing machines and dryers to more sophisticated computer-integrated instrumentation. However, many manufacturers do not carry out any tests on the apparel they sell, and if they ever perform the tests, they seldom inform the consumers about the results (Brown, 1992:18). In Kenya, no known wearing tests are carried out. It is assumed that the industry is ignorant or generally negligent in this regard.

2.6 COMMUNICATION OF SIZING AND FIT

Istook (2002:65) explains the importance of communicating how each apparel item was designed to fit, by the manufacturer to their consumers. This communication is an indispensable step to meet the fit expectations of consumers. Ready-to-wear apparel contains a variety of labels and tags that express information to the consumers for estimating the quality of an apparel item in terms of size, fit and care. According to Brown (1992:45), apparel labels must be permanent and must remain legible throughout the useful life of the garment, as this would act as a future reference for a similar size and fit. It would also continuously guide the consumers in caring processes that would facilitate consistent fit even after long use. According to Chun-Yoon and Jasper (1996:89), a size label is a tool for communicating sizes and body types to the consumers and to assist them in choosing apparel that fits their body shapes and sizes appropriately. Glock and Kunz (1995:108) state that size labels are supposed to indicate dimensions and to describe the body shapes that the apparel was designed to fit. They should indicate whether the person is tall with large/small bust and large/small hips, short with large/small bust and large/small hips, or regular (medium height) with large/small bust and large/small hips. These indicators of fit would provide a foundation for judging the suitability of apparel in selecting for a particular body type and size. Unfortunately, female consumers often get frustrated and confused as they flip through several assortments of styles and sizes trying to get an apparel item that fits correctly (Chun-Yoon & Jasper, 1996; Ashdown, 1998).

Reasons for the variations that exist between apparel that has been sized with the same codes within one company or between different companies could be traced to the use of obsolete and/or wrong measurements. Most databases were taken many years ago and do not reflect the dimensions of the present female body shapes (Brunn, 1983; Olds, 2003). The methods of obtaining body dimensions are inappropriate and most apparel industries do not adhere to the suggested (voluntary) standard sizes (Faust *et al*., 2006). Most sizing systems available do not include classification of body shapes, which is the core component of a successful sizing system (Chun-Yoon & Jasper, 1996; Istook & Hwang, 2001). The pattern development, grading, fabric spreading, cutting and assembling procedures employed by different manufactures are inconsistent (Hudson, 1980:112; Solinger, 1988:128; Brown, 1992:29; Glock & Kunz, 1995:390). Failure of quality control measures right from the size charts/tables through various apparel production processes could easily permit errors to slip through from one section of apparel processing to the other.

The factors determining apparel's fit are also not clearly defined, thereby enabling manufacturers and retailers to use size labels as competitive advantage and as a marketing gimmick (Ashdown & DeLong, 1995; Glock & Kunz, 1995:111). For example, apparel of different brands and styles, as well as apparel items of the same brands, may be labelled with the same size but could fit differently (LaBat & DeLong, 1990; Workman & Lentz, 2000; Brown & Rice, 2001). Size labels keep from larger to smaller sizes as a result of "vanity sizing". These psychological sizing systems are best described as lying labels as they portray a smaller size on the face of the label and yet the measurements of the garment, fit a large sized person. Thus, a woman whose measurements are normally within a size 14 range, could wear an apparel item sized 12 or even size 10 (Tamburrino, 1992a & 1992b; Ashdown & DeLong, 1995; Glock & Kunz, 1995:111; Keiser & Garner, 2003:304; Faust *et al*., 2006).

2.6.1 Size labels' quality and consumers' apparel selection

Size labels for women's apparel lack the correlation that men's size labels have to their actual body dimensions, leaving manufacturers to develop their own sizing systems, which are confusing and frustrating to the women consumers as they look for apparel that fits (Workman, 1991; Holzman, 1996). Although size labels are not obligatory (Keiser & Garner, 2003:336; Faust *et al*., 2006), the way they are presented to the consumers plays a major role in their apparel selection exercise. Ironically, an apparel item bearing a mandatory care label also bears a size label with flawed information. Care labels represent an implied guarantee by the manufacturer that the apparel will perform exactly as stated, and yet the information on the non-instructive size labels is vague and obscure.

Informative (self-explanatory) size-labelling that relates directly to body dimensions contributes to consumer satisfaction (Chun-Yoon & Jasper, 1995; Holzman, 1996). Most women sizes are not expressed as body dimensions, but rather expressed as arbitrarily chosen numbers or letters that correlate with sets of unrevealed body dimensions (Brown & Rice, 2001:147-148; Faust *et al*., 2006). Unfortunately, when body dimensions are not revealed to uninformed consumers, the size designations are almost meaningless, thus leaving the consumers to guess and assume what would fit appropriately. These uninformative labels would contribute consumer frustration in their humiliating experience of apparel selection.

2.6.1.1 Uninformative size labels

The uninformative size labels have been described as tacit, implicit or inferred (Mason *et al.,* 2008), because only individual manufactures and retailers know the meaning. The meaning of the numbers indicated and exactly how large, medium or small a person should be, is kept a secret by individual manufacturers/retailers. As in the case of numerical labels (**Table 2.1**), different manufacturers whose aim is to maximise profits, would actually keep the key measurements concealed. To an uninformed consumer, these would actually be seen as meaningless labels, as they cannot link the letters or the numbers indicated on a size label to the body shapes and dimensions used for the construction of that particular apparel item (Brown, 1992:55; Mason *et al*., 2008).

Numbered size labels, for example, size 16 or size 34, is the most common method of sizing for the majority of mass-produced apparel, particularly on moderately priced and even on expensive apparel (Workman & Lentz, 2000). However, consumers often find it difficult to link the number to their own measurements, as they do not understand what constitutes those numbers (Chun- Yoon & Jasper, 1995; Workman & Lentz, 2000). The information on the size labels is not adequate enough and not sized according to body dimensions to assist the consumer in finding the correct size and style (Chun-Yoon & Jasper, 1995; Faust *et al*., 2006). Uninformed consumers may not be able to interpret odd numbers such as sizes 9 and 11 or even numbers such as sizes 10 and 12, or even the larger numbers such as 38 and 40. The efforts of retailers and apparel manufacturers to reduce stock units have been reflected in the move to double sizing or collapsing sizes. For example, combining sizes in juniors and misses, such as sizes 9 and 10, could be confusing and frustrating during apparel selection.

Research shows that differences in body contours exist between people of the same measurements and more so between different categories of people (Zwane & Magagula, 2006; Shin & Istook, 2007). Therefore, if sizes are combined it could end up confusing the customers even more, because neither misses nor junior female consumers would then be fitted well (Kunik, 1984:16; Winks, 1997; Ashdown, 1998).

TABLE 2.1: NUMERICAL SIZE LABELS

Sizes indicated as numbers and presented on the apparel's label sometimes singly or accompanied by key dimensions			
Numbered sizes -examples	Numbered sizes - examples	Numbered sizes (odd numbers)	Half sizes
8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28 ----------	36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56 ----------	13, 15, 17, 19, 21, 23, 25, 27 ----------	8½, 10½ , 12½ , 14½, 16½, 18½, 20½ ----------

Lettered size labels are particularly uninformative systems and are also known as average sizing. Examples are: S = Small, M = Medium, L = Large and XL = Extra Large, and sometimes XXL = XX-Large and XXXL = XXX-Large for yet larger sizes and XS = Extra Small. These size indications reduce the possibilities for excellent fit, because they result in collapsing size categories to a small number of size divisions. In the lettered sizing, as in other sizing systems, there is little standardisation from brand to brand and no consistent correlation to the body dimensions – making it more confusing and exasperating to the consumer (Hudson, 1980:116). Although lettered sizing is popular in loose-fitted apparel, some retailers use them on woven apparel with a closer fit. Nonetheless, consumers cannot find an accurate fit within S, M, L and XL as easily as they can within the numbered sizes developed from anthropometric data of the targeted population. People's sizes vary between regions, different ethnicities and even within a region or ethnic group. A small size in one region would be a larger size in another region – thus the need to have accurate data of each region or ethnic group (Shin & Istook, 2007). In a case like Kenya, where information on sizing systems is inconsistent and confusing and no known anthropometric database exists, the question arises of which labels are to be used. As was mentioned earlier, the size standards records (KEBS, 2001:7) indicate that the anthropometric data available was collected in 1975. The sources of the original data are not available to verify the reliability of the records.

The one-size-fits-all label type of sizing is also an attempt by manufacturers and retailers to further collapse sizing by providing apparel that has the ability to stretch and to fit many body shapes and sizes (Abend, 1993; Brown & Rice, 2001:148). It can be argued that one-size-fits-all apparel cannot accurately fit body shapes of extreme sizes. The stretch characteristic of a fabric has a certain percentage of elasticity (stretchability), which may either be too little for the largest size or too much for the smallest size. Design ease provided for this kind of sizing has its limitations within each body build/size and cannot be suitable for the entire range of varied body builds and sizes.

2.6.1.2 Informative size labels (Figure 2.5)

A size label that shows or tells the consumer how the apparel should fit is referred to as an informative/self-descriptive/instructive label. Informative (self-descriptive) size labelling that relates directly to body dimensions contributes to consumer satisfaction, while apparel manufacturers enjoy profits (Chun-Yoon & Jasper, 1995; Holzman, 1996). Since sizing and size labelling are often used by the manufacturers/retailers as a marketing tool, it is important to have accurate information. Brown and Rice (2001:147) argue that instructive or self-explanatory size labelling (**Figure 2.5**) that directly indicates the body type and relates to the body measurement, is beneficial not only to the consumer, but also to the companies aiming at satisfying and retaining their customers. Chun-Yoon and Jasper (1995) confirm that consumers prefer the wordless pictogram label, which is self-explanatory as it indicates measurements essential to the fit of a particular apparel item on a little sketch or diagram of the human body. Pictograms are particularly useful for international trade because they overcome language barriers and are easy to understand at a glance by the consumers (Brown & Rice, 2001:147/148). The efficient apparel selection that an informative size label allows will not only ensure customers' emotional well-being as well as manageable wardrobes, but also growth in manufacturers' and retailers' business.

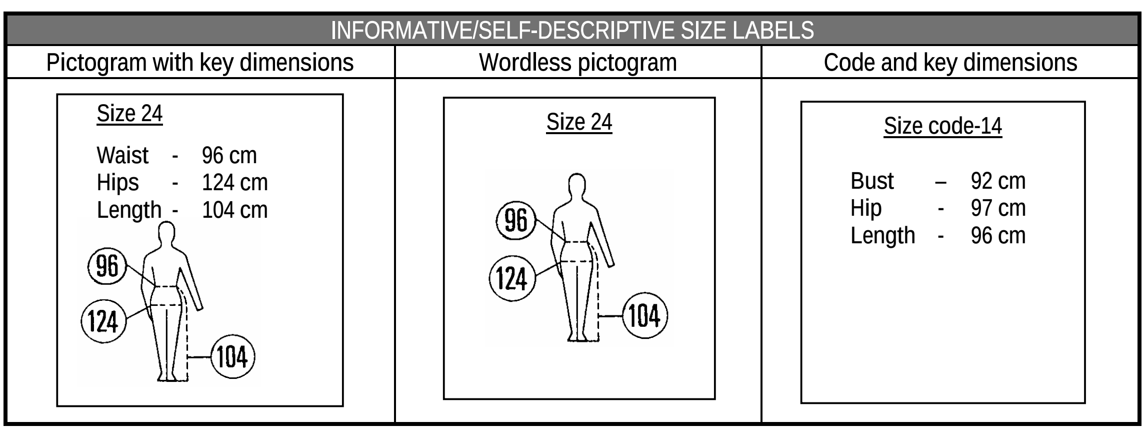


FIGURE 2.5: INFORMATIVE SIZE LABELS

Wordless pictogram (without supportive written key dimensions): With an increase in international trade in apparel, difficulty of communicating sizes of imported/exported apparel becomes an issue (Brown & Rice, 2001:147-148). Methods of sizing differ between different manufacturers within countries and between different parts of the world. This means that different countries could have different sizing techniques and codes to communicate sizes. Pictograms therefore have proven to overcome the language barriers (Chun-Yoon & Jasper, 1995). The body dimension critical to the fit of a particular apparel item is indicated on an illustration of a human figure. The illustrated human figure enables a consumer at a glance to estimate the fit of the apparel, thus providing meaningful information about sizes and easing apparel selection (Mason *et al.,* 2008). Unfortunately, the imported and the local ready-made apparel in the Kenyan market, continues to use tacit size labels with very little, insufficient and hidden meaning; thus their entire purpose of size communication fails.

***Pictogram supported with written key* dimensions**: This size label is considered to be effective and its strength is enhanced by the use of a wordless pictogram, indicating specific parts/regions of the body that are accompanied by body dimensions. It may be argued that this system would be strongly effective within a country where there is an updated anthropometric database. In countries where the data is obsolete, it would be more valuable to provide all the necessary information on the apparel labels to facilitate some close estimation of key body dimensions by the consumers, in order to ease the apparel selection exercise (Mason *et al*., 2008).

Size code and the key body dimensions: This system could be very effective in a country where there is an updated anthropometric database. The size code given is accompanied by measurements of the key dimensions, making it easier for the consumers to predict how the apparel would fit, and thus easing the process of apparel selection. This therefore demands that all the necessary information be given on the apparel label, with the presence or absence of updated anthropometric data.

Although providing size labels is voluntary, Istook (2002:65) explains the importance of communicating how each apparel item was designed to fit, by the manufacturer to their consumers. This communication is an indispensable step to meet the fit expectations of the consumers. In Kenya, size labels presented on either imported or local apparel are flawed and in most cases the uninformative types. Uninformed consumers may not comprehend what the codes mean and therefore may not find it useful enough during apparel selection.

2.7 CONCLUSION AND IMPLICATIONS FOR THE STUDY

After going through each concept presented in Ashdown's model and other supportive literature, the following conclusions based on the main concepts highlighted throughout this chapter, are hereby given.

2.7.1 Population measures

The foundation of any successful sizing system should reflect accurate dimensions and body shapes of a studied population. The body dimensions of a population must be accurately taken, using recommended techniques and instruments. This means that outdated, borrowed/copied size data cannot be used or improved without an accurate, up-to-date and representative anthropometric database for a target market. Kenya's sizing standards are outdated, while the anthropometric database from which they were developed is obscure. There is no classification of body shapes to act as design guide for the purposes of producing better-fitting apparel.

2.7.2 Design features

The lack of classified body shapes could mean a lack of design guides for the production of better-fitting apparel. The low-level skills of personnel in the apparel industry are likely to lead to the production of poor-fitting ready-made apparel. Personnel with low-level skills are also likely to face many challenges in translating the different body shapes into suitable styles and sizes. Kenya's lack of classified body shapes together with the lack of skills in the apparel industry's personnel could be viewed as contributing factors to the poor fit of ready-made apparel in Kenya.

2.7.3 Fit issues

The lack of standardised agreement on the concept of fit amongst different stakeholders (designer, pattern maker and the consumer) could contribute to fitting problems because fit quality standards based on representative body shapes would vary from one manufacturer to another. In Kenya, research on the perception of fit by the apparel industry and by the consumers, is not readily available. The industry, however, lacks adequate and modern technology necessary for improving the fit of apparel.

2.7.4 Communication of sizing and fit

The lack of adequate information on the size labels leads to consumers' confusion and frustration as they select ready-made apparel items. Informative size labels based on accurately taken anthropometric data should inform the consumer about the dimensions used, and which body shape the apparel will fit best. The sizes and body shapes indicated on a size label must reflect the dimensions and body shapes of the target market. Obsolete sizing systems and the lack of a body shape classification systems in Kenya could be major contributing factors to the poor fit of the ready-made apparel. The uninformative size labels presented on women's ready-made apparel are most probably not well understood by the consumers, and hence they select inappropriate apparel items.

Based on the above conclusions and for the purposes of this study, sizing systems are therefore defined as the classified dimensions and body shapes, based on a target population (market) for the construction of ready-made apparel for that specific market. It is further reasoned that a sizing system would not be complete and successful, if the dimensions and body shapes represented are not communicated effectively and appropriately to the consumers. The consumers as the receivers should also be acquainted with size and fit issues, to understand their own body shapes as well as their key dimensions necessary for a specific apparel item. This enables a link between the information given on the labels to the consumers' body shapes, dimensions and proportions. All these aspects could collectively result in easy and successful apparel selection as well as satisfactory apparel items for the consumers, while the retailers/manufacturers enjoy profits.

The situation in Kenya regarding sizing and fit seems to be worse than in most developed countries where studies have been carried out. According to Kenya Bureau of Standards' records (KEBS, 2001: Preface), anthropometric data was collected in 1975; the original database from which the size charts were established is unknown and obscure. This suggests, therefore, that the data available is flawed and obsolete as there is no known evidence to guarantee the quality of the sizing systems currently in use. The size charts available do not include body shapes, which should form the core component of a successful sizing system. The consumers do not understand the tacit size labels used on Kenya's ready-made apparel and this has an influence on their choice of appropriate apparel styles and sizes. Ignorant consumers could make wrong apparel choices and at the same time get frustrated as they flip through several apparel assortments, guessing and estimating what would fit their bodies and sizes appropriately. The lack of research carried out on sizing and fit issues or on any related subject in Kenya, highlights the deficiency that needs to be addressed. Considering the novelty of the concept of sizing based on consumers' varied body shapes, consumers' knowledge about size and fit, their perceptions regarding general fit problems and their fit preferences, this study may provide reference data on apparel sizing and fit issues in Kenya. As the focus of this study, these issues are addressed in Chapter 3.

Chapter 3

SPECIFIC SUPPORTING LITERATURE REVIEW AND CONCEPTUALISATION

Considering that this study is new in Kenya, this chapter provides a review of specific literature addressing the female's body shape identification and body characteristics that are critical to the fit of apparel, and how they (shape and body characteristics) may contribute to fit problems. It also focuses on the female consumers' knowledge/ignorance about the communication of sizing and fit, as this would determine the success or failure of her selection of appropriate apparel in a retail environment. Although every consumer's fit preference is a subjective matter and varies from one person to the next, understanding consumers' fit preferences could allow the tapping and translation of the consumers' required degree of fit, into apparel styles and sizes that should be suitable for the different body shapes and sizes within specific markets (Keiser & Garner, 2003:29; Ashdown & Dunne, 2006).

3.1 INTRODUCTION

3.1.1 The concept of fit

Beautiful and well-fitted apparel is not only attractive, but also enhances the appearance of the wearer, because apparel is an extension of the self. Apparel that is too large gets in one's way, creating a comical appearance, whereas too small apparel restricts movement, and appears immodest and odious (Rasband, 1994:8; Rasband & Liechty, 2006:5-6). In either case, poorly-fitted apparel distracts attention, emphasises body shape problems and undermines the confidence of the wearer (Zangrillo, 1990:4; Fiore & Kimle, 1997:176). A well-fitting garment hides a body shape problem and directs the attention away from the problem area – thereby contributing to the psychological and social well-being of the wearer (Farmer & Gotwals, 1982:3). Pleasing apparel leads to the customer's loyalty to the store that continues to satisfy her needs, and hence profit to the manufacturer/retailer (Hudson, 1980:112; Rasband, 1994:19; Bougourd, 2007:108). In Kenya, with regards to sizing and fit, it is likely that, if the customer identifies a retailer that stocks satisfactory apparel in terms of fashion and better fit, it is possible that she will develop a loyalty to the store and perhaps tell others about it.

Fit refers to how well the apparel conforms to the three-dimensional body in a comfortable and flattering manner. It is determined by proportional relationships between the dimensions and the body shape used in a firm's sizing system (Ashdown & DeLong, 1995; Glock & Kunz, 1995:110; Fiore & Kimle, 1997:175; Brown & Rice, 2001:153). Fit is an important part of both the aesthetic and the performance features of apparel (Yu in Fan *et al*., 2004:31; Bougourd, 2007:108). It is crucial to consumer satisfaction, as it influences the attractiveness as well as the comfort of an apparel item; thus it is one of the attributes that an individual evaluates when trying on apparel items (Kadolph, 1998:27-28). However, Brown and Rice (2001:153) argue that it is often easier for consumers to find colours, prices and styles they like, than to get better-fitting apparel. This implies that attaining the correct fit is a very exigent task in the apparel industry. This also confirms that apparel sizing and fit are difficult concepts to research and analyse as the relationship between the body and apparel is complex and often ambiguous (Loker, Ashdown & Schoenfelder, 2005). Examining the body shape and its components requires knowledge of the elements of fit and how they interact with the body's physical features to produce aesthetically pleasing and better-fitting apparel.

Apparel is the product of a design process and the fabric's properties, and its quality is measured by its drape-ability, appearance and comfort on the body shape. The body shape functions as a framework for the apparel (Salluso-Deonier, 2005), and the fabric's properties and the apparel's style must be in harmony to produce aesthetically pleasing, comfortable and well-fitting apparel. However, the effects of a stunning design, gorgeous fabric and exquisite workmanship are destroyed if the finished apparel does not fit the intended wearer (Winks, 1997; Brown & Rice 2001:153). The elements of fit, which encompass grain, set, line, balance and ease (Erwin *et al.,* 1979), contribute to both the appearance and the comfort of the apparel. They are used as appraisal gauges for the quality of the apparel's fit.

The correct grain of the fabric contributes to the correct hang of the garment in harmony with the size and body shape, while the set is the apparel's smoothness without undesirable wrinkles or folds. It results from correct body dimensions and body shape proportions that are translated into the three-dimensional apparel style. The style must harmonise with the size and the body shape that the apparel is designed for. Correct body dimensions and the alignment of the apparel's structural lines in accordance with the natural lines of the body shape, characterise the line as an element of design. The balance is achieved through correct body dimensions and correctly translated body proportions used to create the apparel silhouette's equilibrium on the right and left halves of back, front and profile characteristics of the body shape. The ease involves the use of correct body dimensions and the amount of ease allowed into a pattern for the purposes of wearing and styling/design. The functional ease allowed must be in a harmonious relation to the body shape, size and proportions to provide comfortable apparel items without wrinkles or creases. The design ease allowed should result in suitable styles that must also be suitable for the various body shapes and sizes (Erwin *et al*., 1979; Brown & Rice, 2001:153). The comfort of an apparel item is attributed to its wearing/functional ease and styling/design ease. The wearing ease allows for flexing and movement without restriction or straining in any way. It is judged on both tactile and visual responses (Kadolph, 1998:30; Ashdown & DeLong, 1995; Glock & Kunz, 1995:111). The comfort provided by the amount of ease allowed, differs with differently fitted apparel (such as the three basic types of fit: close fit, relaxed or semi-fitted, and looser to very loose fit), the body shape and the end-use of the apparel.

All the aforementioned elements of fit work simultaneously to produce aesthetically appealing apparel that is comfortable and well-fitted to various body shapes. The lack of any of these attributes contributes to apparel fitting problems, which could be seen as too tight, or too loose a fit. It could also contribute to a lack of symmetry in the apparel item, sagginess in parts such as pockets, bulginess in linings, seams that pucker, wrinkles and/or any other undesirable fabric behaviour in the finished apparel (Hudson, 1980:110; Brown & Rice, 2001:157; Rasband & Liechty, 2006:29, 194, 324). With low-level skilled personnel in Kenya's apparel industry, it is possible that the factors contributing to apparel's fit quality (the elements of fit) are not well understood, and hence the production of poor-fitting ready-made apparel. Since body shape plays a major role in apparel's fit quality, an overview of body shape is hereby given to provide a deeper understanding of the body's physical properties, such as proportions, postures, shapes and sizes, and how they could influence the fit of apparel.

3.2 BODY SHAPE

For the purposes of this study, the body is described as a three-dimensional human structure, which Salusso-Deonier (2005) describes as a framework for proportioning apparel. It is usually discussed in terms of shape, contours and postures (Davis, 1980:73; Liechty *et al*., 1992:33-35; Rasband, 1994:15; Marshal *et al*., 2004:137). People's shapes and proportions change over time as a result of changes in nutrition, lifestyle, ethnicity, age, grooming and concepts of ideal beauty (Winks, 1997; Ashdown, 1998; Shin & Istook, 2007; Bougourd, 2007:108). It has been observed that body shapes vary not only from country to country but also from region to region within countries (Winks, 1997; Yu in Fan *et al.*, 2004:185; Zwane & Magagula, 2006). Chun-Yoon and Jasper (1996) identify one of the fitting problems as a lack of appropriate sizes to accommodate the full range of variation in body shape that exists in the current population. Ready-to-wear apparel depends on an accurate estimate of the distribution of body shape and sizes within a target population (Salusso-Deonier, Delong, Martin & Krohn, 1985; Yu in Fan *et al.*, 2004:185). The adequacy of a standard sizing system depends on both database and body shape classification methods (Ashdown, Loker & Adelson, 2004). An anthropometric database must be classified such that the majority of the sample is accommodated by a minimum number of size categories, yet it should integrate the variation in body shapes within the population that the sizing system is expected to serve (Workman, 1991; Ashdown, 1998; Loker *et al.*, 2005).

Differences in body shape arise from variations in body type, posture and body size (Salusso-Deonier, 2005). According to DeLong (1987:38, 42), the weight distribution on the body frame constitutes the shape of the body. The body can be considered to be a vertical graduation of size, with the upper section containing more details than the lower section. As a visual structure, the body is made up of visual units that can only be clearly distinguished when viewed from the front, back (silhouette) and side (profile) (DeLong, 1987:38-42; Salusso-Deonier, 1989). Apparel sizing relies therefore upon an understanding of body shape variation in terms of dimensions and shape that should be translated into three-dimensional apparel, which should fit a shape appropriately. However, many apparel designers tend to build their products around conventional (fit model/ideal shape) consumers with well-proportioned body features. In doing so, they neglect many important body shapes that exist in the market place (Bougourd, 2007:108).

3.2.1 Ideal body shape

Although the ideal shape varies, and is bound to change due to the whims of fashion and within different cultures (Rasband & Liechty, 2006:23-30), most studies define the ideal figure (**Figure 3.1**) as a perfect human structure, and a well-balanced shape, which is usually used as a standard figure and/or a fit model (Armstrong, 1995:33). The perfect body is assumed to provide a silhouette that will fulfil everyone's desired image of perfection, but in reality it denies the consumers the opportunity to see themselves sensibly (Lewis, 2007:319). To facilitate an in-depth understanding of aesthetically appealing apparel, insight into and knowledge about the ideal figure's proportional relationships of body components become important. This will provide some form of standard in examining the proportions of any other body shape that may differ from it, and hence in the making of apparel that is suitable and pleasing to different body shapes – even if they are not ideal. Proportion, or the relationship of one segment of the body to another, is used to describe the ideal body shape (LaBat & DeLong, 1990; Rasband & Liechty, 2006:23-30).

The bust, waist and hip positions are in relation to the total height of the figure. The height of an average (ideal) shape is divided into four equal parts (Lyle & Brinkley, 1983:63; Armstrong, 1995:33). Hips serve as the mid-point of the total body height, where the waistline is the mid-point between the hipline and the underarm. Knees serve as the mid-point between the hips and the floor line. If any of the figure's four length points are not equally distributed as in the ideal figure, then the body shape could be described as high-waisted, high-hip, short-waisted or low-hip, depending on where these points fall within the height of the figure (**Figure 3.2**) (Lyle & Brinkley, 1983: 63). The height proportions could also influence the design values applied to an apparel pattern at specific height fit points such as the hips, waist and the bust. The height proportions can be obtained more accurately through body dimensions and to some extent, through visual analysis.

Typically, the ideal figure shows the following characteristics:

- It has just enough weight covering the bone and hollows of the body softly and smoothly.
- Its body mass is distributed evenly from the centre core of the body or the spine, as the body is viewed from back, front and side.
- The bust balances the buttocks as the body is viewed in profile.
- It is similar in width in the shoulders and hips, with medium bust, small waist, flat to slightly curved abdomen, moderately curved buttocks and slim thighs.
- It is a well-balanced figure with no exaggeration on any part of the body (bust/shoulders and hips/buttocks measures the same or are closely similar, with a waist of about 26 centimetres (cm) or 10 inches smaller than the hips.

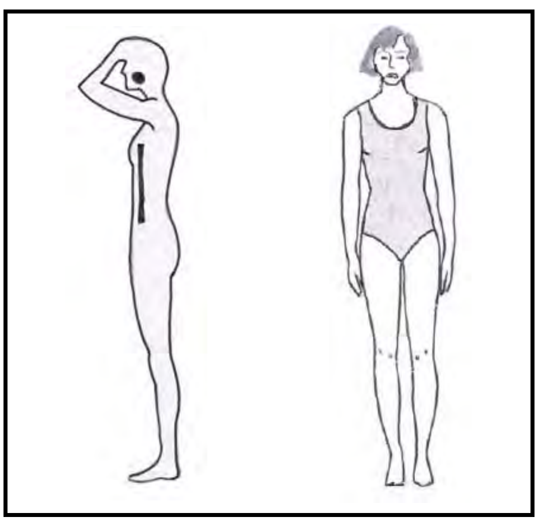


FIGURE 3.1: IDEAL BODY SHAPE

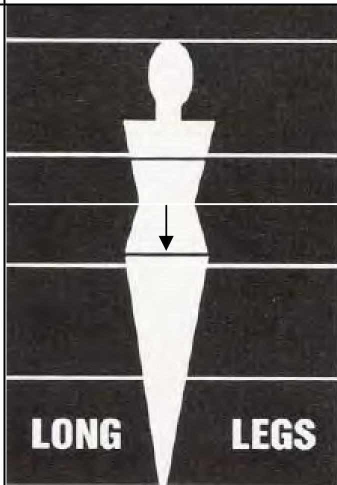
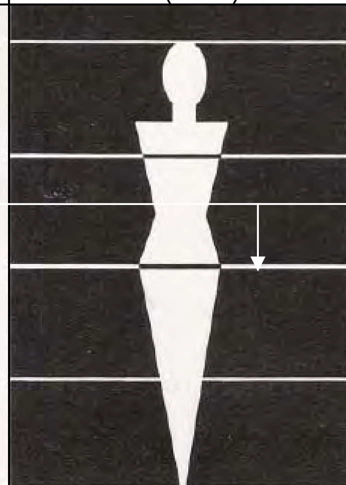
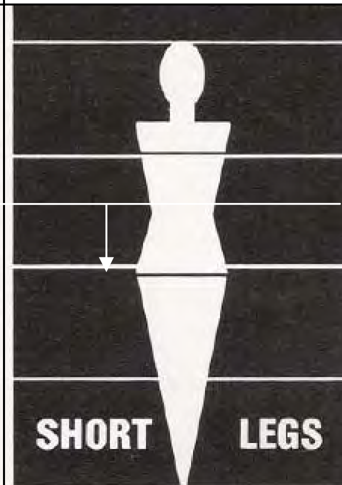
	SHORT-WAISTED	AVERAGE (IDEAL) SHAPE	LONG-WAISTED
			
BUST	Bustline is above the bustline of the ideal figure.	Bustline is midway between shoulders and waistline.	Bustline is below the bustline of the ideal figure.
WAIST	Waistline is above the waistline of the ideal figure.	Waistline is midway between the bustline and the hipline.	Waistline is below the waistline of the ideal figure.
HIPS	Hipline is above the hipline of the ideal figure or above the mid-point of the figure's height.	Hipline is the mid-point of the total figure's height.	Hipline is below the hipline of the ideal figure or below the mid-point of the figure's height.

FIGURE 3.2: HEIGHT PROPORTIONS

(Adapted from: Lyle & Brinkley, 1983:63)

With non-standardised height proportions among body shapes, ready-made apparel is bound to contain fit problems around the waistline. The fit problems arising as a result of non-proportional height distributions could be high or low waist, and problems of too tight fit. Currently, media and apparel companies worldwide use a well proportioned but relatively slim body shape for their fashion shows and catwalks. This is viewed in Western society as ideal (Yu, 2004:33; Zwane & Magagula, 2006). Most apparel industries and apparel designers use the slim figure described as perfect, for wear-testing sample apparel items (Brown & Rice, 2001:154; Yu, 2004:33; Loker *et al.*, 2005). The heavier or the plus-figures are left out without representation (Glock & Kunz, 1995:166; Bougourd, 2007:108). It may be argued that the criteria used for selecting the ideal figure by the industry are unknown and biased. It should be noted that live models are trained professionals whose bodies, in most cases, have been moulded, groomed and guided by accepted concepts of ideal beauty – characteristics which most consumers lack, but crave to possess. This implies that the fit of the apparel available in the marketplace are only suitable for the fit model and not for the entire target market. Salusso-Deonier (1989) states that accuracy, and consequently quality, of apparel can only be attained through dress forms, fit models and sizing systems that represent the target population's sizes and body shapes.

In contrast to the Western viewpoint, the ideal body shape in Africa (black race) varies with different cultures. Roach & Eicher (1973:101-102) describes the Ghanaian female ideal body shape as consisting of egg-shaped ovals right from the head through to the legs. The head-top to the chin forms an egg shape, while the neck consists of wrinkles. The torso must also contain two oval shapes above and below the waist. The thighs to the knees form another oval, while the knees to the ankle form another. A figure with a prominent hipline, narrow waistline with medium breasts (pear shape) is considered beautiful and desirable in Kenya, as expressed in most love songs. However, due to culture transfers, online marketing/website cat walks, movie stars and imports of different styles and designs to the country, mostly through second-hand apparel (Mason, 1998:100; McCormick *et al*., 2001 & 2002), the Western slim hourglass ideal figure is becoming part of what the acceptable body shape should look like. This is even further enhanced by sporting, the wellness and fitness industry in which most working-class women participate (Rudd & Lennon, 2000). Most women, on realising that certain styles are not available in their sizes, tend to indulge in dieting and weight loss activities in the hope of attaining their perceived ideal body (LaBat & DeLong, 1990:43). Not all the women in weight loss exercises attain the ideal bodies they crave. DeLong (1987:38, 42) states that body shape is determined by the body framework, and not by exercises or dieting. The apparel industry must therefore produce apparel items that have a better fit for all kinds of body shapes and sizes within their target market.

The ideal body shape is a base from which most apparel patterns and ready-made apparel are designed (Bougourd in Ashdown, 2007:108). This ensures that ready-made apparel items fit only body shapes and sizes that are similar to those of the ideal figure. However, because there are many body shapes whose proportions and dimensions deviate from those of the ideal, ready-made apparel will not fit many bodies as properly as the ideal body shape (Schofield & LaBat, 2005b). With the lack of classified body shapes in Kenya, it is impractical to discuss the ideal body shape. However, since most sizing systems used in developing countries are adaptations of the Western systems (Zwane & Magagula, 2006), it is also possible that the ready-made apparel items are designed on the basis of the Western ideal body shape's characteristics.

According to Bougourd (2007:131-132), a fashion model form is built according to the style dimensions that women should possess, rather than to their true dimensions and shapes. In most cases, the dimensions used are based on fit models that possess rare body proportions. Using these dress forms therefore cannot produce better-fitting apparel to a population of varied body shapes. The lack of classified body shapes in Kenya's apparel industry could be viewed as a factor affecting the production of well-fitted apparel (Mason, 1998; McCormick *et al*., 2002). Apparel samples produced need to be tested, not only on dress forms made from a current, accurate and representative sizing system, but also on live fit models whose dimensions and body proportions represent the range of sizes and proportions of the population (market). This would guarantee that the fit is correct on both stationary and moving body shapes before mass production and dispatch of the apparel items. The use of inadequate and outdated equipment/machinery in Kenya is still a major challenge to the apparel industry (Sasia, 1991; Mason, 1998; McCormick *et al.,* 2002).

3.2.2 Established body types in some selected countries

Body shapes differ from one country to the next and even from region to region within countries (Winks 1997; Shin & Istook, 2007). Differences in body shape arise from variation in body type, proportions, posture and body size (Fiore & Kimle, 1997:331; Bourgourd, 2007:120). To facilitate an in-depth understanding of the characteristics of established body types, an ideal body shape becomes a basis from which to address the other shapes. The symmetrical deviations from those of the ideal body shape, which occur identically on both sides of the body, are noticeable from the front or back and side views of the body. Examples include broad or narrow shoulders, broad or narrow upper back, small or wide waist, large or small hips, full or small bust, high hips or low hips, large or flat buttocks and protruding or flat abdomen (Rasband & Liechty, 2006:29-30). Finding that symmetrical and uniform deviations occur repeatedly on different body shapes, facilitates the development of preliminary subgroups/patterns of weight distribution (categories) referred to as body shape, which are useful in the construction of well-fitting apparel (design guidelines), as well as in the selection of appropriate and suitable sizes and styles by informed consumers.

Rudd and Lennon (1994:163) refer to body shape as the size, shape or weight distribution of the various body parts. A well-proportioned body has a “pleasing” relationship between its various parts as well as in the entire body conformation (Armstrong 1995:33; Yu, 2004:33). However, few individuals have perfect body proportions in terms of the Western ideal body shape. A person’s body size and shape could be proportional, if the individual parts were balanced with the application of elements and principles of apparel design (Zangrillo, 1990:5; Rasband, 1994:12). The emphasis in categorising/classifying body shape is to produce apparel items that can alter the perceived proportions of the body, and to provide a sense of aesthetic appeal as well as satisfaction to the individuals who do not necessarily fit the cultural ideals of size, weight and shape (Fiore & Kimle, 1997:331). The success of ready-to-wear apparel depends on an accurate estimate of the distribution of body shapes and sizes within the target population (Ashdown, 1998). Body classification based on a target market ensures that consumers within that market would be able to purchase apparel with a better fit (Chun-Yoon & Jasper, 1993; Loker *et al.,* 2005). Most developed countries have classified women's shapes to ease the apparel selection crisis experienced within retail environments and to provide better-fitting apparel. Unfortunately, developing countries such as Kenya have no classification of body shapes. It is assumed that the apparel designs in Kenya are based on Western established body shapes, and hence all the fit problems with the ready-made apparel available.

3.2.2.1 Classification of body types in the United States of America

In the USA, for example, apparel is made for various body types. The following examples have been compiled from: *Readers' Digest* (1988:46-47), Winks (1991:63), Glock and Kunz (1995:108), Burns and Bryant (1997:110), Kaiser and Garner (2006:304-307).

Women's sizes: These are made for the adult shape of average to above-average height (5'5" – five foot five inches – to above 5'6"), with fuller and more mature in girth and weight distribution than the misses' category. Women's sizes are denoted with size codes such as 14W (W = Women) as the beginning size up to 24W or above, depending on retailers'/manufacturers' target market.

Women's petites: This category is designed to reflect a shorter figure of larger girth, with a fuller torso, shorter sleeves and larger waist in proportion to the bust than in the women's category. They are denoted with size codes such as 14WP up to 20WP or more, as the starting and end sizes for this category. They are also denoted with size codes such as 38 up to size 50 or above, depending on the target consumers.

Misses: This category is made for the mature youthful figure of average build. Size codes such as 2 are used as a starting size, while size 20 is used as the last size code in this category and only even numbers are used.

Misses-petites: This category is made for the mature youthful figure of average build, but of shorter height under 5'4". Size codes such as 2P (P = Petites) to 20P are used to reflect dimensions similar to those of the misses, except that they are shorter, which is denoted by the letter P.

Juniors: This category is made for women with average height of about 5'6". This type of figure has a shorter torso and less mature development than the misses' categories. It is usually labelled with odd-numbered size codes starting from size 3 or 5 up to 17. The numbering of the sizes varies from one manufacturer/retailer to another, depending on the target market.

Half- sizes: These are made for the full-bodied shape of shorter height (less than 5'4") but with a larger waist and shorter back-waist length than for the misses' sizes.

3.2.2.2 Classification of body types in the United Kingdom

In England, the apparel council measured 4,349 women between the ages of 18 and 70. The council defined three body shapes by height and bust development. ***Short:*** Body shape with height less than 155cm, ***Average:*** Body shape with a height of between 155 cm and 162.5 cm, and ***Tall:*** Body shape with a height of 165 cm and over.

The bust types were divided into six categories, namely (Kemsley, 1957:14):

Extra large bust: Body shape with bust measuring 4" more than the hips
Large bust: Body shape with bust measuring 2" more than the hips
Full bust: Body shape with bust measuring the same as the hips
Medium bust: Body shape with bust measuring 2" less than hips
Small bust: Body shape with bust measuring 4" less than hips
Very small bust: Body shape with bust measuring 6" less than hips

3.2.2.3 Classification of body types in the Republic of Germany

Germany conducted surveys in 1983 and 1994 respectively. Body size tables for women's outerwear provided nine body size groups in three (3) height groups and narrow (slim), normal, and heavy/strong (broad) hips for each of the height groups (160, 168 and 176 cm). The values of the primary control dimension, bust girth, were set down using "standard" preferred numbers with fixed inter-size intervals, and the hip values were obtained incrementally reducing drop values (Winks, 1991:51; DOB-Verband, 1994:6-7).

Sheldon (1940) in Salusso-Deonier *et al*. (1991) is accredited with originating somatotyping. Somatotyping is defined as a system of classifying human physical types and body shapes by their natural, genetically predetermined body build, appearance and temperament. Sheldon and colleagues classified over 10,000 nude male students into 76 commonly occurring body types. However, Salusso-Deonier (1989) argue that most studies have focused only on the stereotypical versions of the three body types characterised by extreme development of either long, slender bones (commonly known as ectomorphs), muscle/bone bulk (commonly known as mesomorphs), or fat accumulation (usually referred to as endomorphs).
Although the established body shapes from the selected countries do not exhaustively

describe the various characteristics of the body that are critical to the fit of ready-made apparel, they do provide some guidelines that are useful for designing and distributing apparel to the marketplace. If informative size labels were presented in a country with established body shapes, the informed consumers (in size and fit issues) would be able to select appropriate apparel items that are suitable for their body shapes as well as their sizes. Kenya lacks representative size tables as well as classified body shapes to guarantee the production and distribution of appropriate apparel styles. Body shapes classifications based on a target market, ensure that consumers within that market would purchase apparel with a better fit (Chun-Yoon & Jasper, 1993; Loker *et al.,* 2005).

3.2.3 Commonly used established body types

It has been observed that there are more than five typical patterns of weight distributions. However, presented in **Figures 3.3**, **3.7**, **3.12**, **3.14** and **3.16** are the five prevalent categorised body shapes common within the regular-sized and the plus-sized body shapes. The descriptions provided are based on different authors' views as well as the researcher's observations of photographs taken in the field, particularly on the characteristics of profile views. They have been summarised and were compiled from: Harper and Lewis (1983:29, 31); Salusso-Deonier (1989:373); Zangrillo (1990); Rasband (1994:12-13); Armstrong (1995:33); Spillane (1995:33); Fiore and Kimle (1997); Kuma (1999:65-68); Connell *et al*. (2003); Simmons, Istook and Devarajan (2004a); Devarajan and Istook (2004), Rasband and Liechty (2006:23-29); Zwane and Magagula (2006); Connell *et al*. (2006) and the researcher's observations in the field.

3.2.3.1 Triangle body shape

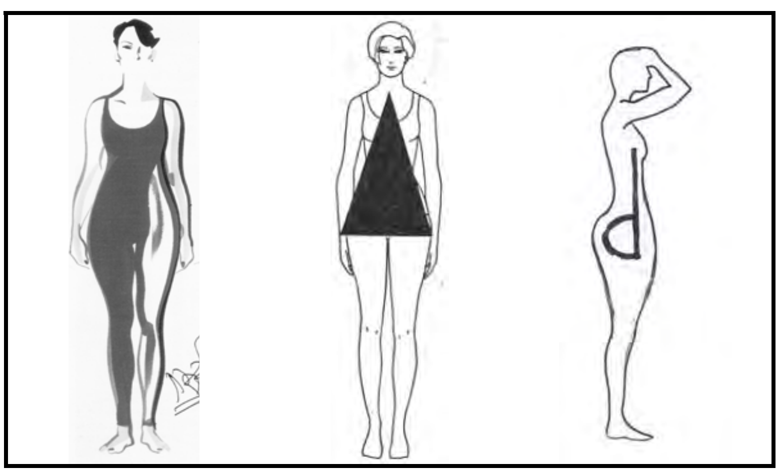


FIGURE 3.3: TRIANGLE BODY SHAPE

The triangular body shape (**Figure 3.3**) is also known as the pear shape, the A-line, the bell shape, the Christmas tree or bottom-heavy, and is sometimes represented by the following symbols

Typically, it shows the following characteristics:

- The bottom section is heavier than the upper section. From the front and back views, this appears like a triangle due to the wider parts falling around the thigh and hip area, giving an illusion of a narrower waist.
- The lower part of the body could be described as large, by the combined heavy buttocks (full pelvic tilt) and thigh prominence or by the prominence of either buttocks (full pelvic tilt) or thighs separately.
- The shoulders and/or bust are relatively small as compared to the large hip/buttock area.
- When viewed from the side, the buttocks may appear as the letter "d" when the person is facing the right side.

The weight in the lower part of the triangular body shape could be attributed to buttock/derriere protrusions and heavy hips and/or bulging thighs which may contribute to problems of tight fit. Shown in **Figure 3.4** are apparel items such as skirts and pants with fit problems due to more weight concentrated around the lower part of the body. Since the upper part of the body is much smaller, it may experience problems of loose fit, particularly around the bust and shoulder regions (**Figure 3.4**).

Over-sized buttocks curve outward more than the average, and this causes creases (wrinkles) or strain on apparel across the buttocks (**Figures 3.4** and **3.5**). The side seam appears bowing backward as the strained fabric cups under the abdomen and/or buttocks (Rasband, 1994:134-135).

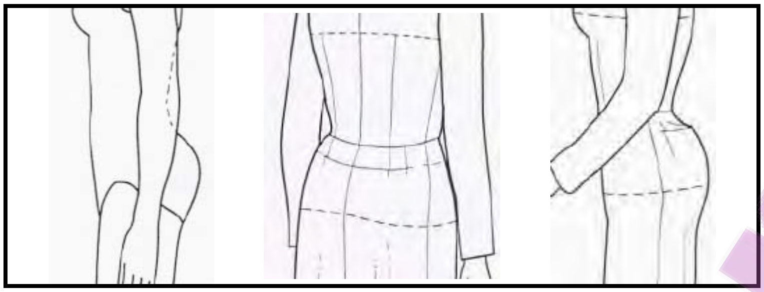


FIGURE 3.4: STRAINED FABRIC CUPS ABOVE BROADEST BUTTOCK REGION
(Sources: Rasband, 1994:134; Rasband & Liechty, 2006:324)

Heavy/bulging thighs may be positioned and/or shaped differently, thus affecting the fit of the apparel, either vertically or horizontally. They affect the way that pants and skirts fit. If thighs are fuller or heavier than for the average body shape, pants or skirts with a close fit are likely to form wrinkles at the affected region (**Figure 3.5**).

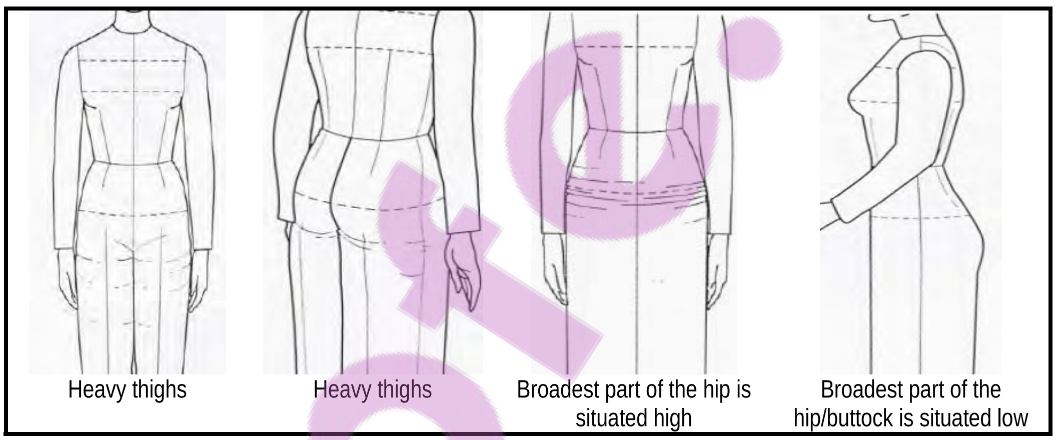


FIGURE 3.5: WRINKLES AROUND THE FULLEST PART OF THE THIGH/HIP
(Sources: Rasband, 1994:130,138; Rasband & Liechty, 2006:324)

The position of the fullest part of the thigh is critical in designing patterns and particularly when curving skirt or pants patterns around the hip/bulge area. The shaping of fitted skirts/trousers, will call for more attention to each critical fit point of the hipline and the fullest part of the hip separately. In cases where the latter has been ignored, the resulting apparel forms wrinkles around that part, or uncalled-for "pockets" may form above the hipline (Rasband, 1994:138-140; Rasband & Liechty, 2006:340).

Fit problems may result from the narrow upper part of the body, that is from narrow/small shoulders and/or bust. The apparel item worn by such a body shape would indicate folds forming on the garment as a result of excess fabric in the area where the body is narrow/small (**Figure 3.6**).

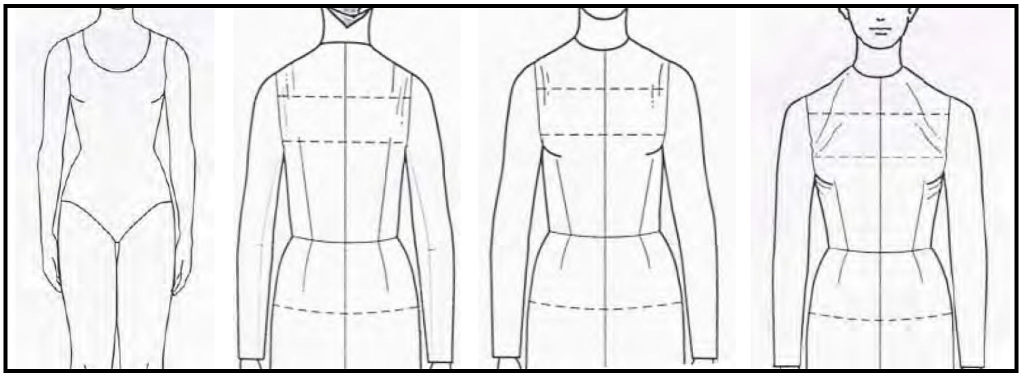


FIGURE 3.6: NARROW SHOULDERS AND/ OR BUST
(Source: Rasband, 1994:66, 68)

3.2.3.2 Inverted triangle body shape

The inverted triangular figure (**Figure 3.7**) is also referred to as the barrel, wedge, V-shape or top-heavy, and is represented by the following symbol:

▽

Typically, it shows the following characteristics:

- Heavy upper torso translating into a short, wide waist and wide-shouldered form, with relatively narrow hips.
- When viewed from the side, the shape may appear as the letter "P" at the bustline if the width prominence is attributed to the size of the breasts.
- Width prominence may be attributed largely to prominence of bust and shoulders combined or to the prominence of either bust or shoulders separately. In either case, the width prominence concentrates on the upper part of the body.

It may be assumed that this kind of shape, when viewed from the side, may also bear a moderate to full pelvic tilt, a characteristic of protruding buttocks – and therefore may appear like the letter "**P**" (bust) at the upper part and the letter "**d**" (buttocks) on the lower part.

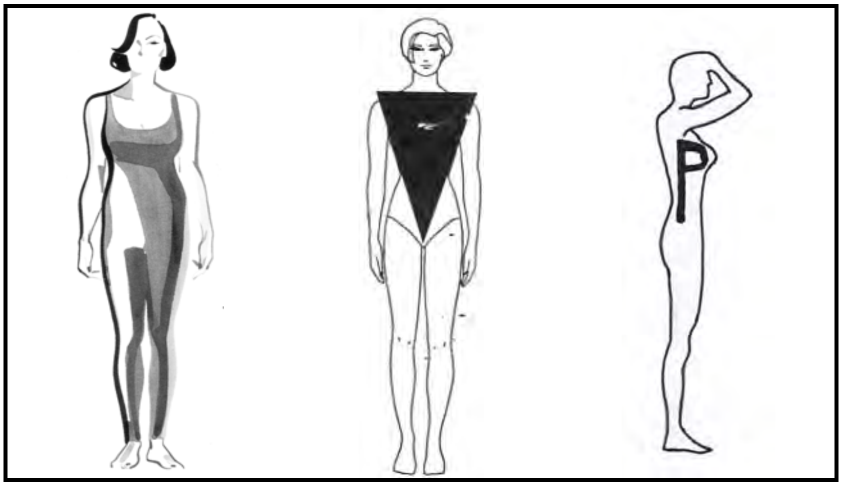


FIGURE 3.7: INVERTED TRIANGLE BODY SHAPE

The weight in the upper part of the inverted triangular body shape could be due to bust protrusion, broad shoulders and/or shoulder blades region, which may contribute to problems of tight fit. Shown in **Figure 3.9** are apparel items such as blouses and jackets with fit problems resulting from more weight concentrated on the upper part of the body and particularly in the bust region. The lower part of the body may experience loose fit problems, particularly around the hips and thigh regions (**Figure 3.11**).

A	Small bust (almost flat)	
B	Average bust, with little protrusion	
C	Full bust, but slightly out of proportion	
D	Full bust, extremely out of proportion	

FIGURE 3.8: BUST CUP (Adapted from: Solinger (1988:77); Spillane (1995:84))

Figure 3.8 shows that busts vary anatomically with respect to the horizontal protrusion which they are comprised of, and the vertical droop, nipple position and bust shape denoted by AA, A, B, C, D, DD cup sizes (Solinger, 1988:76; Spillane, 1995:84)**.** Bust cup size is determined by the difference between over-bust girth (chest girth) and the under-bust girth (Beazley, 1997:282). The under-bust is not necessarily parallel to the horizontal because it depends on the torso's back and side curvatures (Solinger, 1988:77; Spillane, 1995:84). The different protrusions/droops (**Figure 3.8**) can only be noticed in a profile view and could be clarified with the use of dimensions. The trick lies in the fact that bust dimensions obtained from two people may be similar, and yet their shapes and proportions may be totally different, resulting in dissimilar looks in the same apparel item (Schofield & LaBat, 2005a; Schoefield, *et al*., 2006).

A person's back width (over the shoulder blades) and/or under-arm area, for example, could be broader with small breasts, while another person's body shape may be characterised by large breasts and a narrower back width (over the shoulder blades) and/or under-arm area. In such circumstances, the two people would have the same circumferential dimensions, yet different shapes. Bust has been identified as the key dimension representing the upper part of the body; its size and shape plays an important role in determining the correct bra size, and subsequently, well-fitted apparel without wrinkles (**Figure 3.9**) or folds resulting from too large or too small bust size and shape.

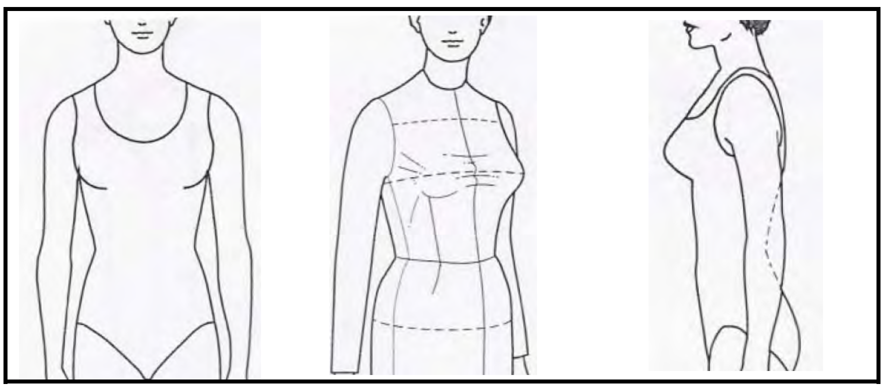


FIGURE 3.9: WRINKLES AT BUST REGION DUE TO LARGE BUST
(Source: Rasband, 1994:86; Rasband & Liechty, 2006:194)

Shoulders act as the hanger for the apparel, and as a pivot point which facilitates an aesthetic appearance, as the apparel drapes gracefully on the body. The size of the shoulders in relation to other parts of the body and how they are shaped will affect the fit of the apparel. If the size and the shape of the shoulders on apparel items are wrong for the size of the body's shoulders, as in the case of barrel- or pear-shaped bodies, then the apparel item would fold, sag (collapse) or wrinkle as a result of narrow, sloping or squared and broad shoulders respectively, as shown in **Figure 3.10** (Bray, 1978:28-30; Rasband, 1994:68-72).

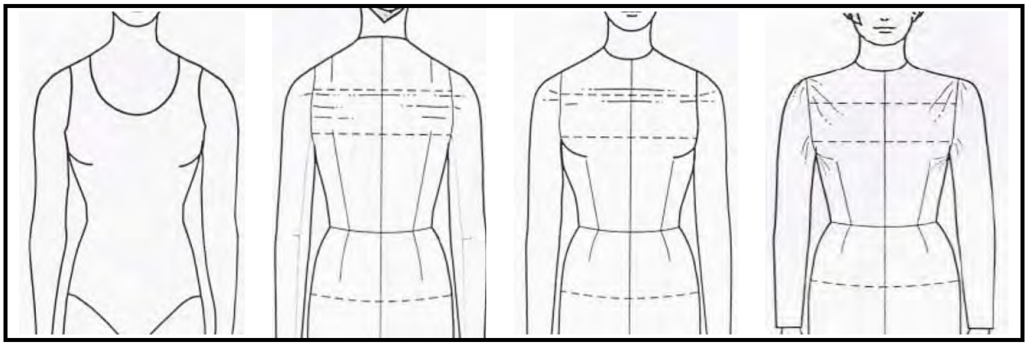


FIGURE 3.10: APPAREL FORMS WRINKLES AT SHOULDER REGION
(Source: Rasband, 1994:66, 68)

Fit problems resulting from the narrow lower part of the inverted triangular body shape may be due to narrow hips or flat buttock and/or thighs. The apparel item worn by such a body shape would indicate folds forming on the garment as a result of excess fabric around the area where the body is narrow (**Figure 3.11**).

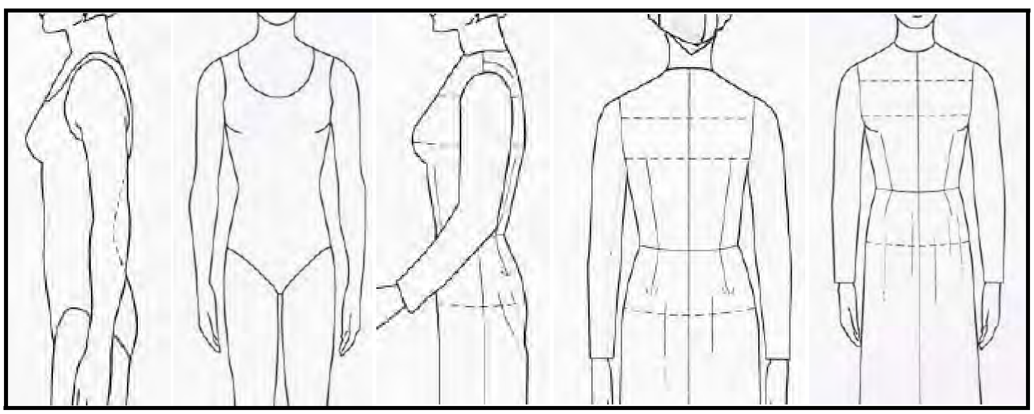
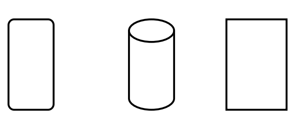


FIGURE 3.11: APPAREL FORMS FOLDS AT HIP/THIGH REGION
(Source: Rasband, 1994:66 & 68)

3.2.3.3 Rectangle body shape

The rectangular shape (**Figure 3.12**) is sometimes also called the box shape, square, straight, block, tubular, oblong, angular, figure 11, figure H and figure 1. It is sometimes represented by the following symbols:



Typically, it shows the following characteristics:

- Full and firm, evenly packed figure.
- Broad all round and straight up and down.
- The shoulder-/bust line width equals that of the hips/buttocks, with no visible waistline.

This kind of figure may have a flat bust or buttocks, or a full bust appearing like the letter "**P**", or protruding buttocks and/or abdomen, depending on the pelvic tilt of the individual; this is only observable through the profile view which might show a shape with the stomach appearing like the letter "**b**" or the letter "**D**" at the front, and the buttocks appearing like the letter "**d**" at the lower back.

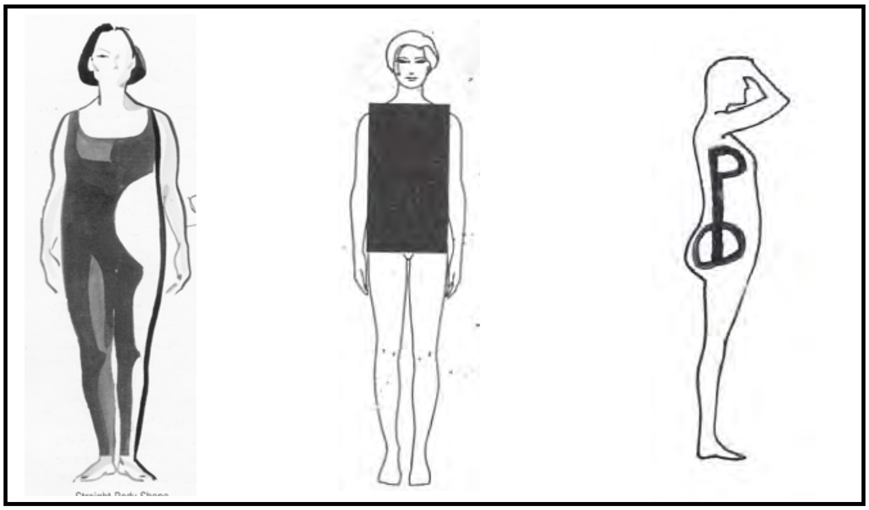


FIGURE 3.12: RECTANGLE BODY SHAPE

The weight in the upper and lower parts of the rectangular body shape is distributed evenly without a waist indentation. This could be attributed to a large stomach/waist (**Figure 3.13**). Apparel items such as skirts, pants, blouses, jackets and dresses would have a tight fit around the stomach region.

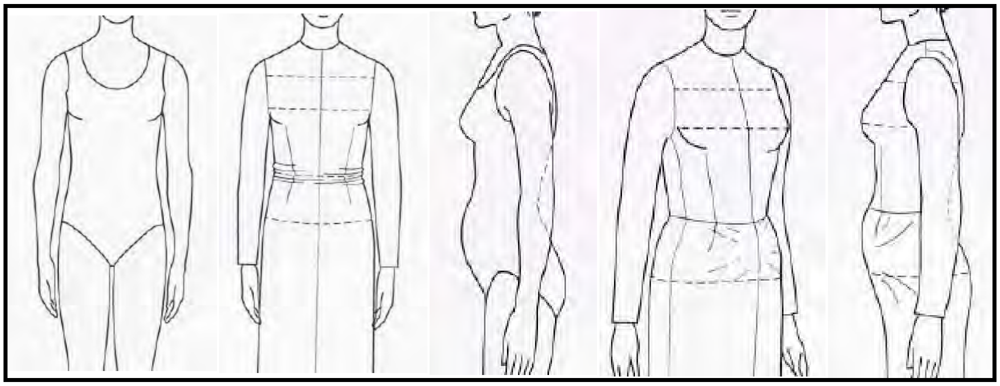
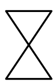


FIGURE 3.13: APPAREL FORMS WRINKLES AT WAIST/MIDRIFF REGION
(Source: Rasband, 1994:66, 68)

3.2.3.4 Hourglass body shape

This shape (**Figure 3.14**) is also called the rectangular "8", figure X or "curvy" and is presented by the following symbol:



Typically, this shape shows the following characteristics:

- The shoulders and the hips are aligned, with a visibly indented waistline.
- Most evenly proportioned within the plus sizes.
- Has more weight and flesh covering the bone and hollows than the ideal body shape.

Viewed from the side, this shape may appear with bust prominence like the letter "**p**" at the top and large buttocks appearing like the letter "**d**" at the bottom or just moderate buttocks but with heavy thighs.

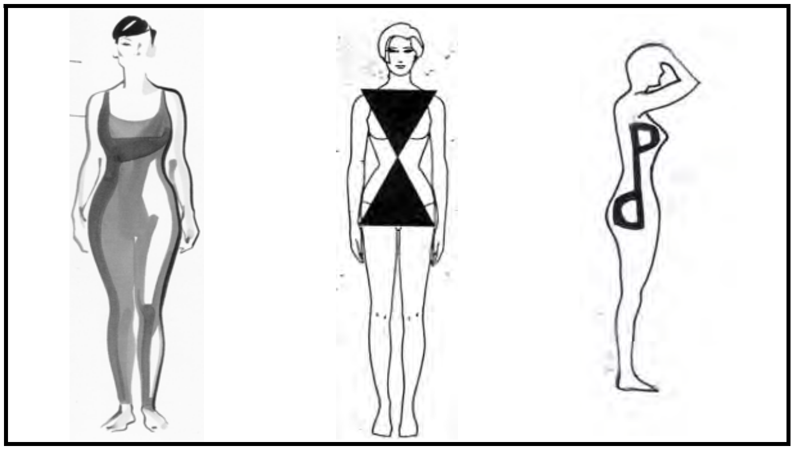


FIGURE 3.14: HOURGLASS BODY SHAPE

The weights in the upper and lower parts of the rectangular body shape are distributed evenly with a noticeable waist indentation. The lower part of the body's weight could be attributed to large hips/derriere and/or thighs. Large bust and shoulders could characterise the upper part of the body's weight. Fit problems encountered by such a body shape could be attributed mostly to the narrow waistline. However, the heavy parts on the upper and lower body sections may also contribute to the tight fit of apparel items around the heavy parts as already seen in **Figures 3.5**, **3.9** and **3.10**. Apparel items such as skirts, pants, blouses, jackets and dresses would have a loose fit around the stomach region (**Figure 3.15**).

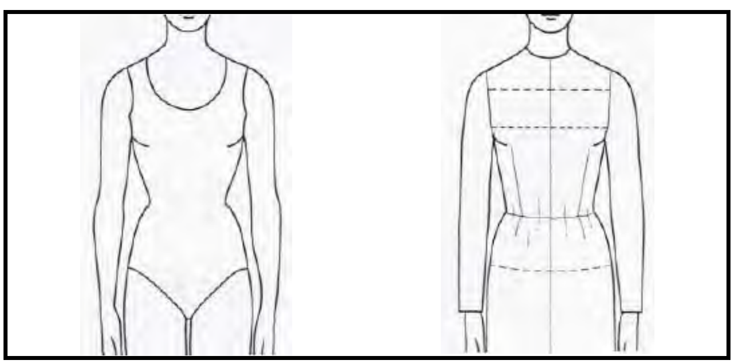
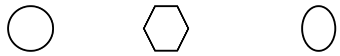


FIGURE 3.15: APPAREL FORMS FOLDS AT WAIST/MIDRIFF REGION
(Source: Rasband, 1994:66, 68)

3.2.3.5 Apple body shape

This figure (**Figure 3.16**) is sometimes referred to as circular, oval, egg, ball or round, and is represented by the following symbols:



Typically, this shape shows the following characteristics:

- Has curves, and carries weight from shoulders to hips.
- The front, back and side views of this type of figure present a rounded torso with round shoulders, waistline, bust and buttocks.
- No waist indentation as the upper torso connects to the lower torso with an almost continuous same circumference.
- The waist may be bigger than the bust and the hips. When this is the case, this sort of shape is referred to as a diamond shape because of the bulging waistline.

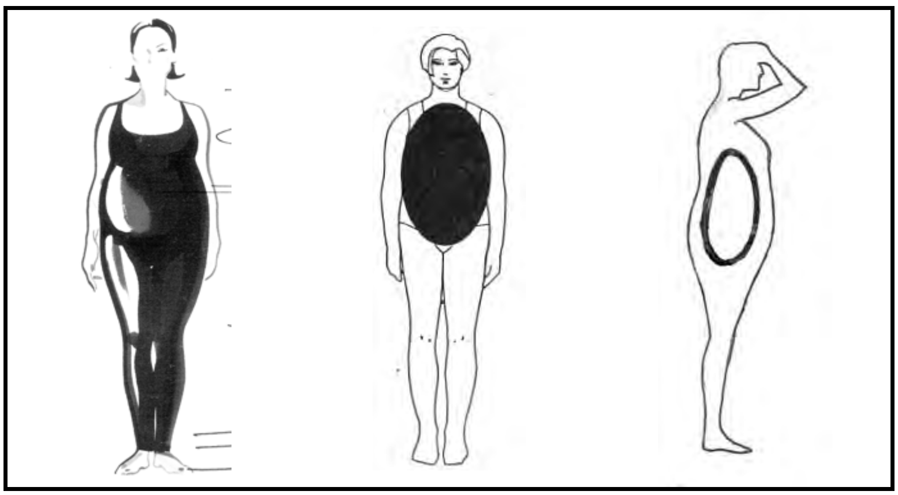


FIGURE 3.16: APPLE BODY SHAPE

The weights on the upper and lower parts of the rectangular body shape are distributed evenly, with large stomach protrusion. The whole framework of the body is filled up with muscle and fat and thus may cause problems of tight fit throughout the body. However, most weight concentration is usually around the stomach region, causing the fit problem (**Figure 3.17**). This kind of body shape may also experience tight fit problems throughout the entire body due to roundness of the entire body shape. The size of the body could be more critical for this body shape than its contours.

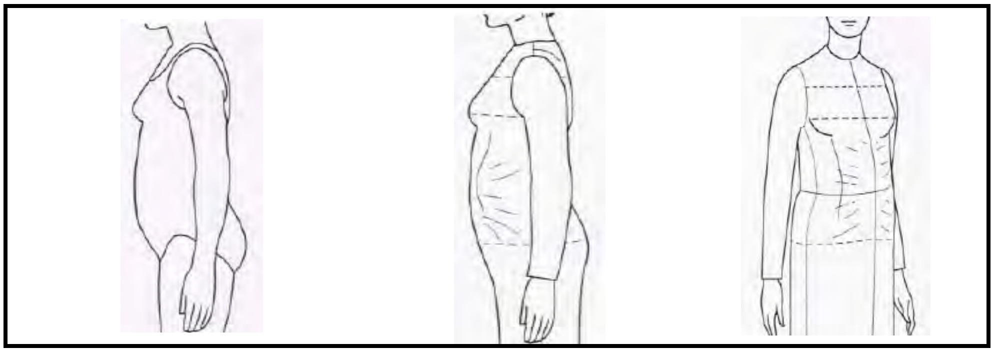
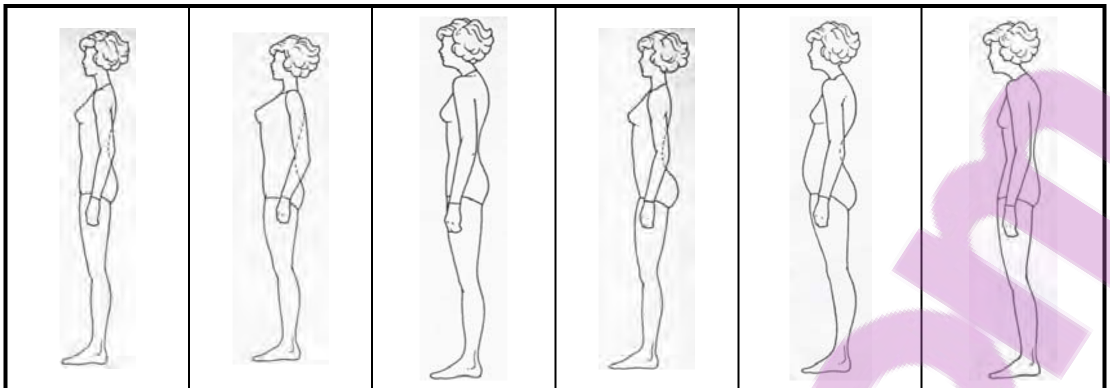


FIGURE 3.17: WRINKLES AT WAIST/MIDRIFF REGION DUE TO FULL STOMACH
(Source: Rasband, 1994:66, 68)

3.2.4 General factors critical to apparel's fit (applicable to all body shapes)

3.2.4.1 Posture

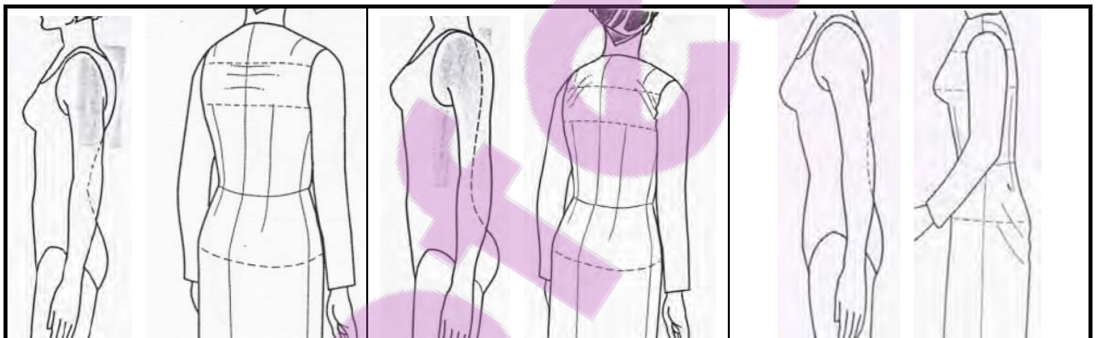
Although fit implications of each body shape have been discussed under each body shape, there are some fit problems caused by the body's posture in general and by the upper arm of the body, which cannot be confined to any specific body shape. Posture refers to the alignment of body parts and the manner in which the frame is carried (Liechty *et al.*, 1992:37). A correct posture assumes a balanced alignment of all the body parts over each other and could influence the physical attractiveness of apparel items (Rasband, 1994:13). Rasband and Liechty (2006:29) state that excessively incorrect posture could be termed as a figure variation as it would cause fit problems with any apparel (**Figure 3.18**). It has also been reported that posture has a direct bearing on physical health and on how one visualises oneself. An overly erect posture, for example, may indirectly feel over-confident and arrogant, while a slumped posture tends to express fatigue and unpleasantness (Rasband, 1994:13; Rasband & Liechty, 2006:29).



Correct posture, with balanced pelvis	Overly erect back, with balanced pelvis	Rounded upper back and shoulders with a forward head and a balanced pelvis	Swayed back with forward pelvic tilt	Slumped posture, with forward pelvic tilt and a pronounced stomach	Rounded shoulders, forward head and backward pelvic tilt

FIGURE 3.18: POSTURES

(Sources: *Reader's Digest*, 1988:82-83; Liechty, Pottberg & Rasband, 1992:37-38; Rasband, 1994:78, 79, 122, 124, 134)



Stretched/wrinkled apparel as a result of rounded upper back	Folds/excess fabric on the apparel as a result of erect upper posture/shallow back	Folds/excess fabric around the derriere as a result of a swayed front and a backward pelvic tilt

FIGURE 3.19: FIT PROBLEMS RELATED TO POSTURE

(Source: Rasband, 1994:78-79)

3.2.4.2 Upper arm

Arm contours or the upper arm shape is important to all the apparel items with sleeves. The size of the arms (**Figure 3.20**) varies from thin (bony with little flesh), average (softly curved without excess flesh or muscle development), to full (heavy/fatty or masculine curves). An apparel item showing wrinkles or folds around the upper arm region is an indication that the contours of the wearer are either full/fatty/heavy masculine, or excessively thin (Rasband, 1994:106-108).

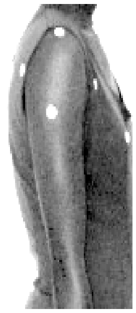
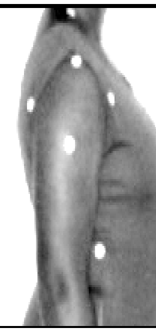
			
Slender biceps	Medium biceps	Large biceps	Wrinkles forming on the sleeve around the top arm as a result of large biceps

FIGURE 3.20: UPPER ARM SIZES AND FIT PROBLEMS

In Kenya, no research is available on body shapes. According to the KEBS (2001), the size tables meant for female apparel are presented with size codes and accompanying dimensions, but without any indication of body shapes. Since body shape acts as a design guideline for apparel manufacture, established body shapes would therefore facilitate ease of manufacturing as well as distributing suitable styles to a marketplace from which the body shape categories were developed.

It may also be argued that the lack of classified body shapes in Kenya is an indication of consumers' ignorance on size and fit issues with apparel, such as important parts of the body that are critical to the fit of the apparel. Since a classified body shape structure is the foundation from which fit-related problems are addressed, the lack of classified body shapes would therefore contribute to fit problems with apparel. Low-level skilled labour together with obsolete and inaccurate sizing systems (particularly on body shapes) – or a complete lack thereof – in Kenya, would be viewed as major contributing factors to the fit problems with apparel in Kenya.

3.3 TECHNIQUES USED FOR THE CLASSIFICATION OF BODY SHAPES

It is important for any country and/or apparel industry aspiring to satisfy their consumers with better-fitting apparel, to consider different techniques of classifying body shapes. Being a guideline for the designing and production of suitable and well-fitting apparel styles, body shape identification becomes critical in a country where there is such a lack of classified body shapes as in Kenya. Examining different techniques used for the development of classified body shapes could facilitate a deeper knowledge of the critical issues required to identify and isolate only the significant body characteristics that are critical to the fit of apparel.

3.3.1 Key dimensions necessary for the development of body shape

Body measuring techniques have been in use for many studies and have proved to produce reliable results when the recommended instruments and standards are applied. Different body measurements techniques were described in **Chapter 2 (paragraph 2.3)**. Successful body shape classification depends on the correct selection of the key dimensions (Chun-Yoon & Jasper, 1996). Key dimensions, also referred to as control dimensions, are the combination of those dimensions most closely related to other body dimensions (DOB, 1994:6; Robinette, 1986:573; Winks, 1997:24). O'Brien and Shelton (in Winks, 1997:14) stated that the success of body shape classification relies on special selection of the key body dimensions. In classifying variations in body builds, O'Brien and Shelton selected a pair of key dimensions, which they found to have low correlation between vertical and horizontal body dimensions. Stature was selected as the index of vertical dimensions because it was closely related to most vertical dimensions measured. Weight was selected as the index for horizontal, because it was highly correlated with most trunk circumference dimensions (O'Brien & Shelton, 1941 in Salusso-Deonier *et al*., 1985).

Kemsley (1957:56) also stated that a key dimension must be a good predictor of other related body dimensions, which are a collection of all the dimensions of all the body units covered by an apparel item. Kemsley (1957:70) selected the key dimensions by a correlation analysis within an anthropometric data set. He discovered that height and weight had the highest multiple correlation coefficients. However, bust and hip were selected because these two dimensions offered flexibility for varying relationships between upper and lower parts of the body. Key dimensions must be convenient to measure, must have a high degree of correlation with other dimensions important in design and sizing, but they should not be highly correlated with each other, and they should form an integral part of the apparel (McConville, Tebbetts & Churchill, 1979 cited by Chun-Yoon & Jasper, 1996:90).

Ashdown (1998) developed an optimised sizing system, which uses as many body dimensions as needed to account for the variability in the population. These sizing systems, according to Ashdown (1998:324), would potentially fit the population better than sizing systems that are currently based on one or two dimensions only. However, this complex method is not possible in countries without advanced technologies to facilitate easy grading. Ashdown (1998:336) confirmed this by saying, "If it were still the case that most grading was done by hand, this complexity of grading would be extremely labour intensive and therefore not worth any gains in the fit of sizes generated."

Devarajan and Istook (2004:7) in their study, selected bust, waist, hips, high hip, abdomen and stomach based on the literature review and their professional expertise of more than thirty years in the field of apparel. This was used for the purposes of developing the software Female Identification Technique (FFIT©) for classifications of body shapes from body scanned and body dimensions data.

Most sizing systems developed in most countries vary in the body dimensions chosen to divide the population, but the basic structure of most sizing systems remains the same. Most have classified body shapes by height and drop value (the difference between the hip circumference and the bust circumference), so as to ease the problem of fit (Chun-Yoon & Jasper, 1993; Winks, 1997; Yu, 2004:185; Petrova, 2007:64).

Describing body shape with the use of body dimensions alone, cannot give a true representation of the proportions of the body. Body characteristics such as buttock prominence and breast protrusion cannot be exhaustively explained in terms of the dimensions taken around the most prominent protrusion of the breast or around the fullest part of the hip (McConville *et al*. in Simmons & Istook, 2003:309). The circumference dimensions obtained are one-dimensional and do not isolate contours and protrusions along the circumferential measurement. The depth/size of the protruding body characteristics such as the buttocks, the breasts and stomach, can only be understood through visual analysis of silhouette and profile images/photographs. Thus the body dimensions necessary for the development of body shape could be enhanced by critically evaluating body shape images.

3.3.2 Key physical characteristics of the body necessary for the development of body shape

Although body scan technology has demonstrated a high reliability in capturing three-dimensional body shape, its use in developing countries, as mentioned earlier, may not be practical in terms of the cost and technical skills involved. Detailed information on body scanning has been given in **Chapter 2** (**paragraph 2.3.3**). Salusso-Deonier (1989:373) stresses the importance of different body shape views from all angles as opposed to the usual front-view line drawings. She noted that this format precludes viewing the three-dimensional form, which allows artistic interpretation of variation in real humans' body shapes. For the purposes of this study, this demanded that images of female shapes be captured using the recommended techniques and modern technology. Since body scanning is impossible in a developing country such as Kenya, photography would be an alternative method as suggested by Ashdown and Dunne (2006). Though photography has been scantily used for the purpose of classifying body types, it has however produced reliable results (Douty, 1968 in Simmons, Istook & Devarajan, 2004a; Salusso-Deonier, Markee &

Pedersen, 1991; Kuma, 1999:39; Anderson *et al*., 2001:7).

Photography is the art of capturing images using either an ordinary camera filled with a film, or a digital camera. Other than describing body shape with the use of dimensions alone, in-depth descriptions can be enriched by the use of visual sensory evaluation of stimulus materials. This implies that human figures are photographed (stimulus material) for this purpose. Sensory evaluation as a method allows for the systematic, subjective evaluation of a product. It uses perception psychology to measure, understand and define the visual relationships of varied human body shape characteristics/variables that impact on a person's shape, such as the body's size, contours and proportions (Gazzuolo, DeLong, Lohr, LaBat & Bye, 1992; Bye & DeLong, 1994:1-3; DeLong, 1998:26-27; Istook *et al*., 2003). This calls for consistency and reliability when photographing. An explanation of measures that were taken to ensure reliability and validity of photography are explained in **Chapter 4** (**paragraph 4.6.1.1**).

Although the body shapes already discussed in **paragraph 3.2.3** above are prevalent, it may be argued that the African female's body shape may differ from those already mentioned above, due to differences/changes in nutrition, lifestyle, ethnicity, age, grooming and concepts of ideal beauty within different cultural contexts. Most of the established figures appear to have been classified on the basis of front/back silhouette characteristics only, omitting the profile characteristics, which are critically essential to the fit of apparel. From the descriptions given under each shape, it appears that judgements have been based on dimensions and/or two-dimensional points of view**,** which are also clearly demonstrated by the two-dimensional symbols attached to each body shape. Another example is the assumption of evenly distributed weight on the back and front parts of the body, derived from circumferential dimensions rather than the visual, physical configurations of the various body components as they appear. However, it may be reasoned that the weight/size distribution of body components are not balanced or standardised, even amongst shapes of women assumed or thought to fall within the same category (Kwong, 2004; Zwane & Magagula, 2006). Most established body shape classifications have not incorporated striking side view characteristics (**Figures 3.21** and **3.22**).

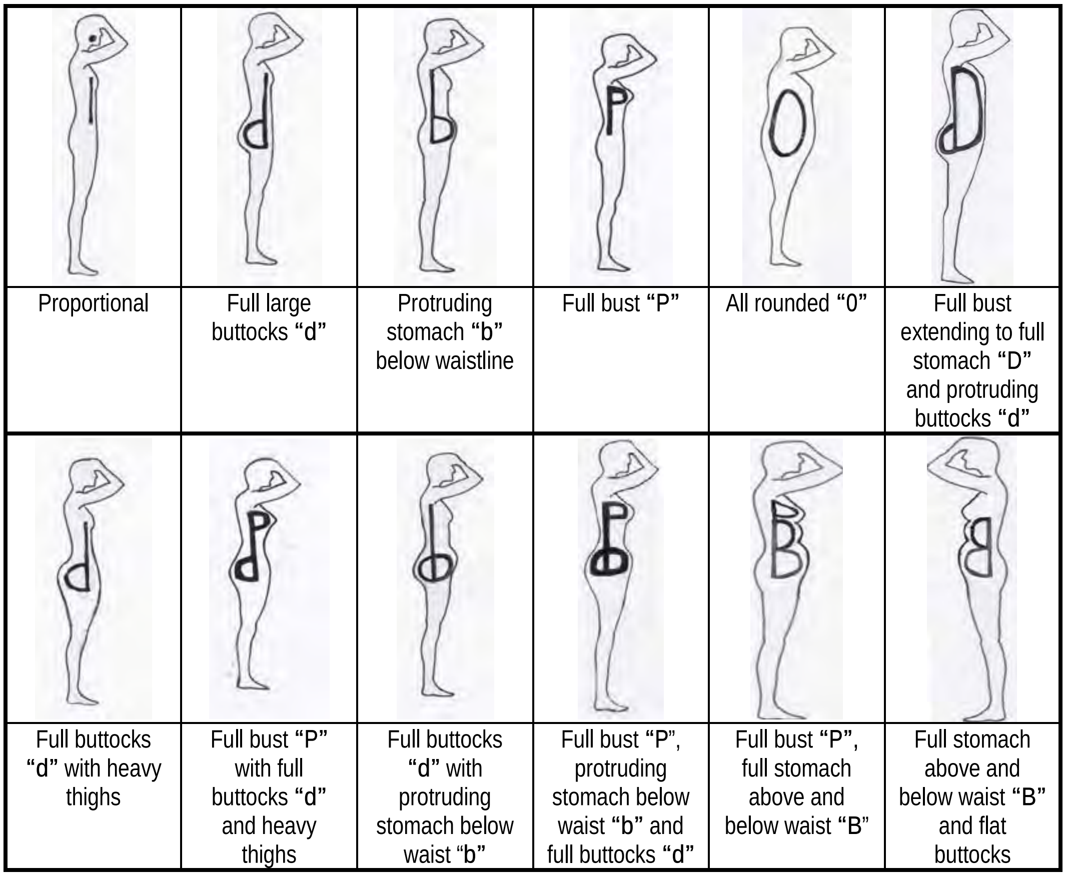


FIGURE 3.21: SIDE VIEW BODY SHAPE’S STRIKING CHARACTERISTICS

Salusso-Deonier (1989) is of the opinion that it is important to view the body from all angles as opposed to the usual front-view line drawings. She noted that this format precludes viewing the three-dimensional form, which allows artistic interpretation of real human variations. She identified a key component of posture as pelvic tilt, which is only observable through profile analysis. The pelvis serves as a balancing point for posture and it results from the angle of the juncture between the spine and the pelvis. It is both inherited and influenced by posture and muscle development. **Figure 3.22** presents three different pelvic tilts identified and analysed by Salusso-Deonier (1989). However, the direction of the pelvis was not indicated, whether forward or backward; this could have facilitated a deeper understanding of the relationship between the pelvic position, the buttocks size/prominence, the back curvature and the posture generally (**Figure 3.18**). Backward pelvis is likely to result in a forward-headed body shape and flat buttocks, while a forward pelvic tilt results in a slumped posture, large buttocks and hollow back (Rasband, 1994:78-79).

		
1. Slight pelvic tilt Yields little curvature in lower back as well as flat buttocks	2. Moderate pelvic tilt Yields medium lower back curvature and slightly rounded buttocks	3. Full pelvic tilt Yields deep curvature and very rounded buttocks

FIGURE 3.22: DEGREE OF PELVIC TILT

(Source: Salusso-Deonier, 1989:373)

From the discussions of the different body shapes, it is clear that a critical evaluation of the body's characteristics that influence the fit of apparel items should be understood and categorised from all the views so as to facilitate the production of well-fitting or better-fitting apparel. However, consumers' ignorance about issues that relate to the fit of ready-made apparel items could also lead to inappropriate selection of ready-made apparel, even if the available merchandise were well made for different body shapes in a market. Consumers need to know their own body shapes as well as their key dimensions to be able to identify well-fitting or better-fitting apparel. They need to understand how their body shapes deviate from those of the ideal, so that they may appreciate their own body shapes and dress appropriately. As discussed in **Chapter 2**, Ashdown (2000) has given a breakdown of all the possible factors that may contribute to the fit of ready-made apparel. All these factors are related to the manufacture of the apparel and they happen throughout the production processes, from the design stage through to dispatch (Hudson, 1980; Salusso-Deonier, 1989).

3.4 FACTORS EXTERNAL TO APPAREL MANUFACTURE THAT MAY CONTRIBUTE TO POOR FIT OF READY-MADE APPAREL (FIGURE 3.23)

The magnitude of the problem of consumers' dissatisfaction with fit is an extreme challenge to both the retailers and the manufacturers of women's ready-made apparel. From the consumer's point of view, finding an apparel item that fits correctly can be time consuming and frustrating (Chun-Yoon & Jasper, 1996; Ashdown, 1998). Factors that are not linked to apparel production processes, but may contribute directly or indirectly to the fit of ready-made apparel, are treated as factors external to apparel manufacture. They are the consumers' behaviours as they interact with the apparel in and outside a retail environment. Consumers' perceived satisfaction with the fit of a garment depends on physical comfort, psychological comfort as well as appearance (aesthetics).

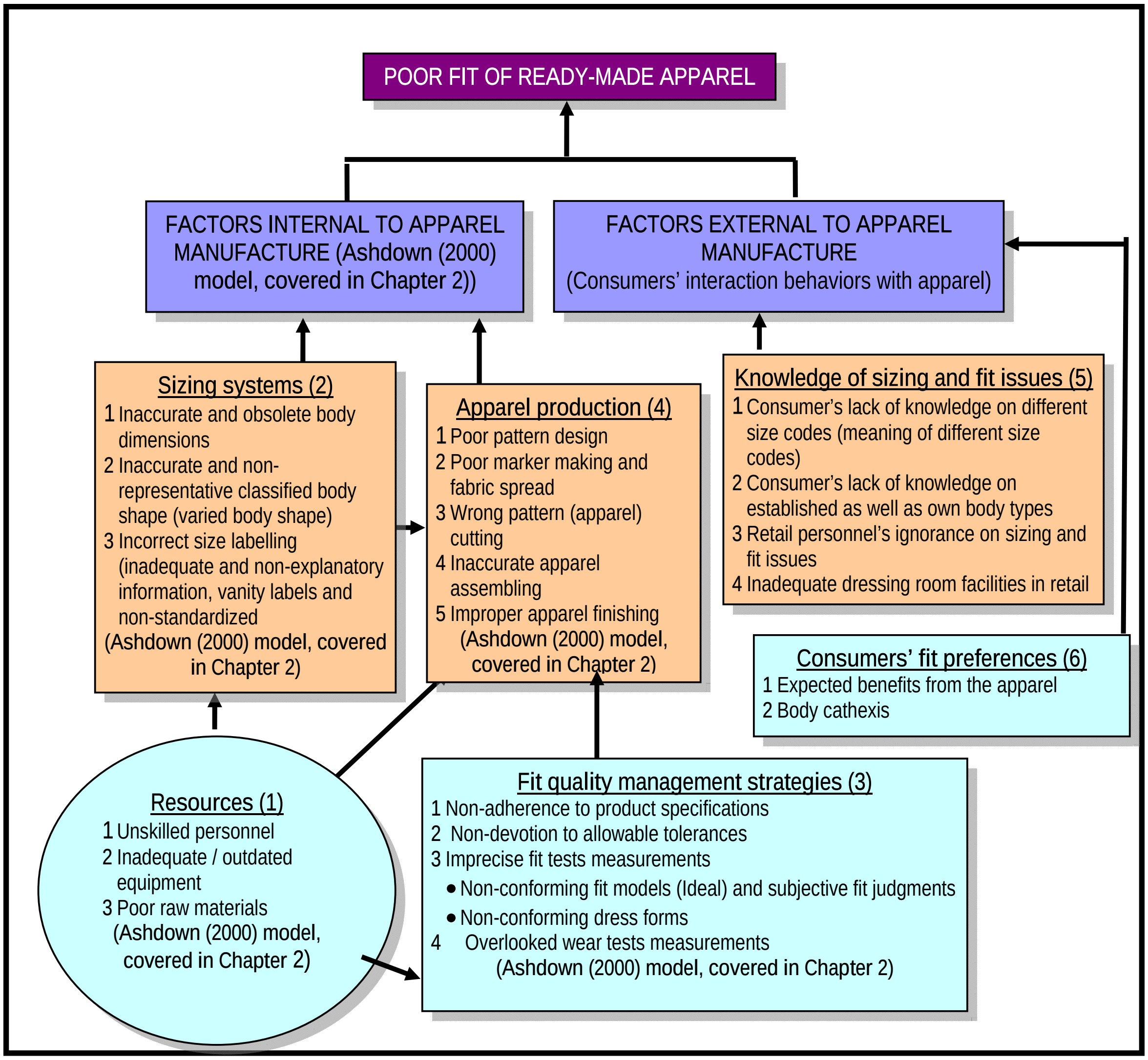


FIGURE 3.23: APPAREL MANUFACTURE'S INTERNAL AND EXTERNAL FACTORS THAT MAY CONTRIBUTE TO FIT PROBLEMS WITH APPAREL

(Based on: Hudson, 1980: 111-114; Solinger, 1988:37, 66, Salusso-Deonier, 1989; Glock & Kunz, 1995:98-111; Chun-Yoon & Jasper, 1996; Winks, 1997; Ashdown, 2000; Anderson *et al.*, 2001; Brown & Rice, 2001:154-156; Alexander, 2005a).

In a country such as Kenya, where little is known concerning apparel sizing and fit, the ignorance of both retailers and consumers about sizing and fit issues may also be a major contributing factor for consumers' inappropriate selection of apparel items, and hence the fit problems they experience. **Figure 3.23** depicts possible internal and external factors in the manufacture of apparel that may contribute to fit problems. Since the factors internal to apparel manufacture were already discussed in **Chapter 2**, only factors external to apparel manufacture will be examined.

3.4.1 Consumers' fit preferences

For the purposes of this study, fit preference will be defined as the consumers' desired apparel fit. In a consumer market-driven society, the challenge to the apparel industries is not about giving consumers extra choices, but rather to contain consumers' preferences (Chun, 2007:221). Professional women, in particular, expect to get what they want with minimal time and energy spent on the apparel search (Kaiser & Garner, 2003:28-29). Consumers become loyal to certain brands and stores that repeatedly deliver satisfactory apparel in terms of size and style within the fashion trend of the time (Workman, 1991; Glock & Kunz, 1995:135). Consumers with different orientations have different preferences and needs within a specific social context. Apparel manufacturers must therefore gather information regarding the fit preferences of specific groups of people so as to be able to cater for their needs (Ashdown & Dunne, 2006). There are various reasons for a preference for certain fitted apparel. Closely fitted or body-hugging apparel may be preferred to emphasise certain body shape characteristics such as broad hips, large breasts or narrow waistline, while loosely fitted apparel may be worn to camouflage certain unpleasing body features. There are apparel benefits that consumers may achieve from differently fitted apparel.

Apparel benefits (expectations), according to Anderson *et al.* (2001), are the outcomes that a certain product may provide for the consumers. Differences exist within cultures as well as between cultures. Socio-cultural differences affecting aesthetic preference include geographic locations, ethnicity, religion, and sexual orientation (Fiore & Kimle, 1997:86). These differences often lead to divergence in aesthetic preference and consumer behaviour (Morris, 1993; Feather *et al.*, 1996; Marshal *et al.*, 2004:94).

Apparel manufacturers should tap into consumers' thoughts, beliefs and feelings pertaining to their fit preferences, so as to translate these into preferred apparel, which are also suitable for the different body shapes available within a market at a particular point in time (Keiser & Garner, 2003:29; Ashdown & Dunne, 2006; Lewis, 2007:310-311). Fiore and Kimle (1997:80) state that consumers' selection of a product strengthens, or gives credibility to, the situation, as selection shows acceptance or approval of the ideas that must be in harmony with different body shapes and sizes of the consumers. If consumers' fit preferences were incorporated into different styles suitable for the established body shapes, there would be satisfying, better-fitting apparel within the fit preference context. According to Shim and Bickle (1994), the most common apparel benefits sought by females are said to be the following:

- Self-improvement: Human beings have the desire to beautify their bodies, either by enhancing existing attractive characteristics or camouflaging unsatisfactory ones. Beauty enrichment could be attained from make-up and apparel's qualities of the structural composition, such as the colour, texture, pattern, fabric and the silhouette (shape) or style (Spillane, 1995:91; Romano, 2000:11-14, 23-24).
- Sex appeal: Physical attractiveness affects a person's well-being, as people are judged based on their appearance. Apparel designed to almost expose some sensual parts of a woman's body, for example, could be seen as or may be used for sex appeal (Stone, 1999:51; Romano, 2000:59). In cases where the characteristics of the natural physical body are not attractive enough, they are transformed to achieve standards of ideal beauty through the invented grooming techniques such as make-up, fitness and varied apparel styles, even if they could not meet the standards before.
- Social status/prestige: This may be achieved by wearing apparel for self-expression and to create individual effect. Combining various fashion components, dressing expensively and/or imitating the famous people in a way, could be seen as prestigious. Branded apparel may also be seen as a form of status (Stone, 1999:51, 60-61). However, a consumer whose body shape's characteristics does not meet those of the standard ideal body shape, would only attain prestigious status if the apparel styles selected are suitable and flattering for their kind of body shape (Fiore & Kimle, 1997:331).
- Body shape flaw compensation: Consumers with unattractive physical features (body cathexis), may also have special aesthetic preferences and functional needs for apparel products. Although the body shape may not be perceived as ideal, consumers with this kind of body are usually interested in an aesthetic appeal that would camouflage and enhance their appearance (Zangrillo, 1990:4; Rasband, 1994:12; Spillane, 1995:22-44; Romano, 2000:24-56).
- Fashion leader: This would entail taking the lead in purchasing new fashion on the market. According to Stone (1999:60), a fashion leader is a person constantly seeking individuality, an individual constantly daring to be different. Since appearance is culturally constructed, an individual's expectations of what is beautiful are most likely to be influenced by her culture's ideal figure (Roach & Eicher, 1973:95).

In Kenya, however, there is no available research on consumers' fit preferences or expectations. It is assumed that people's body shape characteristics, culture and the fashion trend are likely to influence the consumers' fit preferences. Considering that there are no classified body shapes in Kenya, it may be assumed that consumers' choices are made on the basis of the Western ideal body shape characteristics. Although body cathexis is not the focus of this study, it is imperative to bring forth the underlying factors for a satisfactory image, which could then be translated into appropriate apparel that can provide all the benefits expected by the consumers.

3.4.2 Consumers' preference for an ideal body shape

Consumers may have troublesome physical features, which may affect their aesthetic preferences and functional needs for apparel products (Schofield *et al*., 2006). A consumer whose body shape does not conform to the ideal figure's size and proportions would choose apparel close to her size from the available apparel, even if it is not suitable to her body proportions. Sizing systems used in the apparel industry are based on an ideal body shape, which ready-made apparel manufacturers usually interpret as the characteristics of that ideal figure (Morris, Cooper & Cooper, 1989; Salusso-Deonier, 1989; Zwane & Magagula, 2006). Consumers judge the reinforcement effect of apparel on their own bodies and make assumptions about the effect, based upon the images in promotional media. When the apparel does not fit as it did on the model, the consumer may perceive the cause as being related to her body rather than to the apparel. She forgets that the interaction of the apparel on her shape differs from that on the model or the ideal figure. All this, results in negative feelings (body cathexis) towards her own body shape rather than to the apparel (LaBat & DeLong 1990; Fiore & Kimle, 1997:30; Yu. 2004:33).

Body cathexis is an evaluative dimension of body image. It is defined as positive and/or negative feelings towards one's body (LaBat & DeLong, 1990:43). Body image is a mental perception of one's body and may influence one's general desire for apparel and even one's self-confidence (Fiore & Kimle, 1997:92). How people experience their bodies affects their pursuit of beauty and, consequently, their desire for products and services to enhance their bodies (Domzal & Kerman, 1993). Rudd and Lennon (1994:167) observe that it might be impossible for many women, particularly those with large bones, to attain the ideal body shape. In this case, the apparel industry should ensure that apparel is available that is suitable for these people.

The negative feeling towards the self could be aggravated even further, if each time a woman goes shopping, she does not get suitable and better-fitting apparel. It becomes worse if the apparel industry does not respond to her needs, by providing fashionable or attractive apparel to fit her body. In a study correlating body cathexis and satisfaction with the fit of ready-made apparel, Shim and Kotsiopulos (1990) observed that petite women were less satisfied with their bodies, and most dissatisfied with the fit of apparel, compared to average-/medium-sized women. Large-sized women have also been reported to be less satisfied with the sizing and fit of apparel (Salusso-Deonier *et al*., 1985). Understanding how cultural standards impart body image and body esteem would also influence apparel-sizing and fit decisions for a specific market (Salusso-Deonier, 2005). Research on consumers' satisfaction with their self-images is not readily available in Kenya. Body cathexis is an important factor, but it is beyond the scope of this study.

3.4.3 Knowledge about the communication of apparel sizing and fit

According to Shani, Sena and Olin (2003), knowledge is viewed as a socially constructed phenomenon within the context of collective learning cycles in any environment. It may be seen as the cognitive comprehension capacities of people, the accumulation of facts and the ability to see functional relationships between them. Knowledge requires assumptions, interpretations and rules. True knowledge is being able to take the interpreted information and understand the relationships in a social context (Shani *et al*., 2003). Since there is no literature on consumers' knowledge pertaining to apparel sizing and fit, literature that would provide supportive theory for this specific topic, would be on consumer socialisation and product-related consumer socialisation.

Consumer socialisation and product-related consumer socialisation are important for the professional women consumers to enable them to make informed and responsible purchasing decisions regarding the selection of well-fitting apparel. Their selections will depend on their previous experiences with the apparel items, the support they get from the retail environment, their education level and personal fit preferences and expectations. These factors will influence the apparel evaluation in terms of size, style, functional, performance, and care attributes. All these facts are supposed to be communicated effectively through an apparel label/tag (Mason *et al.,* 2008). It would enhance consumer satisfaction if they could receive quality products repeatedly that meet their needs (Reid & Brown, 1996). Consumer socialisation is defined as the process by which people acquire skills and knowledge relevant to their functioning as consumers in a market place (Hawkins *et al*., 2001:212). Consumer socialisation is both directly and indirectly related to consumption. The first is concerned with the acquisition of skills and knowledge relevant to budgeting, pricing and brand attitudes. The latter is concerned with underlying motivations that stimulate an individual to seek further detailed information and to purchase the products, even though he/she has not been exposed to them before (Sciffman & Kanuk, 2000:346-351). The latter is significant for this study, because when the consumer encounters physically attractive apparel, purchases could only be made once the apparel's label/tag has been consulted, and the apparel item tried on to check the size, style and perhaps fibre content and care instructions. When the consumers can establish and understand their sizes and body shapes, their decision-making behaviour will be simplified because they would already understand how apparel that is labelled in a specific way would fit. A lack of knowledge will therefore lead to inappropriate apparel selection, and hence fit problems.

Aspects of size presented on a size label are those factors pertaining to the body dimensions that are necessary for the production of a specific apparel item. Those key dimensions that are critical to the fit of a specific apparel item, and were used for its construction, should be presented on a size label/tag. The waistline, the hipline and the length of a skirt, for example, are the key dimensions required on skirts' size labels, while the bust measurement is an important key dimension for an apparel item covering the top part of the body. Critical aspects of fit are mainly the characteristics of the body, the apparel silhouette and how they relate to each other harmoniously, resulting in what DeLong (1998:27) refers to as apparel-body-construct. The styles produced in an apparel industry should be based on the common body shapes found in a target market. The label/tag attached to an apparel item should therefore indicate the body shape, which it should fit.

The body as a pre-existing physical structure may be used as a basis for the visual presentation of apparel. The interrelationship between body and an apparel item creates the integrated body-apparel silhouette, which either accentuates or de-emphasises characteristics of the body, as may be desired (Davis, 1980:73; Salusso-Deonier, 1989; Keiser & Garner, 2003:315). A consumer who is well informed on issues pertaining to the apparel's sizing and fit and the body shape's characteristics would be able to successfully select a pleasing apparel item. Retailers who are devoted to satisfying their consumers should provide information on how each size is classified (in other words, the key dimensions). They should also provide instructions on how to take specific body dimensions for specific apparel items, and how to evaluate and identify different body shapes. Ashdown and Dunne (2006) observed that consumers' self-dimensions were more accurate when instructions and illustrations showing how to take those dimensions, were given.

Literature on size and fit issues tailored specifically for the consumers' use, are available in the form of textbooks, magazines, brochures and as electronic versions online. Most of these books and magazines have been written in the developed countries and are tailored for the Western body shapes and sizes as well as for a light skin. The consumers in the developing countries could hardly access them. It may be argued that even if those books were available in the marketplaces of developing nations, the principles laid down would not be fully applicable for dark-skinned persons who have very different body shapes, sizes and builds. In such cases, therefore, the retailers and perhaps the researchers/scientists are responsible for the lack of the necessary information reaching to the consumers. On the basis of the United Nations' consumer rights (1985), consumer education is valued worldwide, and not confined to developed nations only. The discipline of consumer science actually concerns itself with responsible, informed consumer decision-making; thus professionals in the field of apparel and textiles attempt to educate consumers and assist them with relevant product information to enable them to make appropriate purchasing decisions. Consumer education on size and fit issues in Kenya is not happening.

Consumers' ignorance about the communication of sizing and fit, and the terms used on size labels, means that some education in this regard is necessary. Consumers' knowledge on how to link size label information to their own shapes and dimensions could be regarded as a matter of concern. It would be pointless to sell apparel that the consumers cannot relate to their own body dimensions and proportions. Women's apparel lacks the kind of correlation that men's sizes have; most women sizes are not expressed as body dimensions, but rather as arbitrarily chosen numbers or letters that correlate with sets of unrevealed body dimensions (Holzman, 1996; Workman & Lentz, 2000; Brown & Rice, 2001:147-148; Faust *et al*., 2006). There is flawed communication amongst the stakeholders, on problems related to the communication of size and fit of apparel, right from the dressing rooms of the retail environment through to the manufacturers (Ashdown, 2000). Although size labels are not obligatory (Keiser, 2003:336; Faust *et al*., 2006), the way they are presented to the consumers plays a major role in the apparel selection exercise. As mentioned earlier, informative (self-descriptive) size labelling that relates directly to body dimensions would contribute to consumer satisfaction (Chun-Yoon & Jasper, 1995; Holzman, 1996).

Professional women in particular expect to get what they want with minimal time and energy spent in the apparel search (Kaiser & Garner, 2003:28-29). Uninformative labels would make their frustration and humiliating experience during apparel selection worse. On the other hand, presenting informative size labels to the informed consumers would make their apparel search easier and provide satisfactory, better-fitting apparel. According to KEBS (2001:7-9), the size designation of each apparel item should be indicated clearly, in plain and legible form on a label or a swing ticket. In contrast to this, the sizes presented on the ready-made apparel in Kenya are uninformative. It seems that retailers/manufacturers generally do not disseminate the correct information pertaining to body shapes and/or sizes to their clients (Faust *et al*., 2006). An improved understanding of the consumer's knowledge/ignorance on the communication of sizing and fit would be valuable in terms of consumer education and facilitation, and will enlighten the apparel industries to supply satisfactory apparel items affixed with durable, legible and informative size labels/tags. Size communication systems have been discussed in detail in **Chapter 2** (**paragraph 2.6**).

Any sales transaction is a dyadic interaction between a consumer and a salesperson and is an important determinant of the consumer's overall satisfaction with a service (Solomon, Surprenant, Czepiel & Gutman, 1985). Sales people in a retail store often influence sales (Reynolds & Arnolds, 2000; Regan & Llamas, 2002). Knowledge has been cited as one of the key dimensions of service quality (Kim & Lennon, 2005). It is assumed that the retail personnel, particularly in developing countries, lack knowledge on sizing and fit issues. They might not know the correct key body dimensions necessary for specific apparel items, nor the varied body shapes available in the market. Unskilled personnel would not sufficiently guide the consumers to search for better-fitting and more flattering apparel items. In actual sense, sales persons should have knowledge on which styles, and from which company, an apparel item would accommodate variations in size and shape.

Consumers' satisfaction with apparel depends on its aesthetic appeal, which is attributed to the interaction between the body and the apparel. Consumers judge the apparel's appeal, as it interacts with their bodies. It is therefore important to have fitting room facilities that are well equipped with full-length mirrors, adequate ventilation and lighting, to facilitate a thorough evaluation of the apparel before the consumers make a purchase. A lack of fitting room facilities in a retail store could also be viewed as a contributing factor to problems with apparel fit. A customer who does not properly evaluate an apparel item before purchasing it, could discover fit problems later at home. The solution to this problem could be to educate the consumers and the retail personnel on sizing and fit issues, thus enabling them to recognise varied shapes and to identify the key dimensions necessary for every apparel item and size. They should also be able to practically and accurately take those key body measurements for different apparel items, and be competent in the use of the principles and elements of design, so as to guide consumers while selecting styles and sizes for the varied body shapes. The importance of fitting room facilities and after-sales service could also be emphasised, along with accurate sizing systems (Zangrillo, 1990:21; Rasband, 1994:58).

In Kenya, one can assume that most consumers and apparel sales assistants are uninformed on apparel sizing issues, particularly on the key dimensions necessary for identifying a size, taking body measurements and correlating them to the sizes of apparel. One may also assume that they are uninformed about the various body shapes, principles and elements of design that are used to flatter the different body shapes. Most retailers have very small and congested dressing rooms, not conducive for trying on and evaluating an apparel item's fit before making any purchasing decisions. It is important that consumers' knowledge about sizing and fit issues should be addressed alongside body shapes classification to facilitate a base from where to address the fit problems.

Size chart (measurement table) can only be effective if it is applicable to the people for whom it is designed (Winks, 1991; Shin & Istook, 2007). Fitted apparel, irrespective of fabric and style, usually ends up in the closet unworn, being altered or even given away. This causes loss and disappointment to the consumers. The success of well-made apparel could only be achieved, if the consumers are able to efficiently and effectively select apparel items without undergoing the exasperating exercise of trial and error in the retail environment. This implies that those dimensions and body shapes used during the construction of apparel must be true representations of the dimensions and the body shapes of the target consumers. Those dimensions and body shapes must also be communicated effectively to the consumers who in turn should be able to interpret and link them to their own sizes and body proportions.

In Kenya, however, there are no classified body shapes to act as design guidelines. The sources of the size standards are also flawed and thus cannot guarantee the quality of ready-made apparel. Communication of sizing and fit through size labels is also flawed and is uninformative, making it difficult for the consumers to use effectively. Ignorant consumers in the market place would not find them useful, as they would continue to guess and estimate how an apparel item would fit their sizes and body proportions. Size labelling is a tool for communicating sizes and body types to the consumers and to assist them in choosing apparel that would fit their body shape and size appropriately. Such labels are supposed to indicate dimensions and to describe the body shape that the apparel was designed to fit (Glock & Kunz, 1995:108; Chun-Yoon & Jasper, 1996:89). Furthermore, labels should indicate whether the person is tall with large/small bust and large/small hips, short with large/small bust and large/small hips, or regular (medium height) with large/small bust and large/small hips. These fit indicators provide a foundation of judging the suitability of an apparel selection for a particular body type and size. Non-instructive size labels become almost meaningless to uninformed consumers on size and fit issues.

3.5 CONCLUSIONS

From the literature review, it is clear that consumers in various parts of the world, particularly women, encounter problems with the fit of ready-made apparel. The implications these problems have on the clothing industry are also costly and burdensome. Based on the literature review covered in **Chapters 2** and **3**, the following conclusions in relation to the focus of this study are hereby given:

3.5.1 Female body shape classifications

Based on the literature about the female body shape, it is evident that:

- The lack of varied body shape representation in a sizing system is one of the contributing factors to the fit problems experienced with apparel.
- Female body shape identification forms the basis of developing a successful sizing system. The success of any body shape categorisation depends on the correct classification techniques being applied, the selection of the key dimensions, which must be taken accurately, and/or evaluating photographs/images.
- An understanding of different body shape characteristics or components that are critical for the production of apparel patterns, could lead to an understanding of the theoretical issues concerning female body shapes, and hence to the manufacturing of better-fitting apparel for the various body shapes.

3.5.2 Consumers' knowledge about size and fit communication systems

Regarding consumers' knowledge about size and fit communication systems, it is evident that:

- Consumers' lack of knowledge about the codes and contents of different size labels, can lead to inappropriate apparel selection and hence fit problems.
- Uninformative size codes are not instructive enough to guide the consumers while selecting appropriate sizes and styles.
- Informative size labels can only be effective if the consumers are able to link their own key dimensions and shapes accurately to the information provided on the size labels.
- Recognising consumers' lack of knowledge on sizing and fit issues from the consumers' point of view, will allow researchers and apparel manufacturers to understand fit problems in the light of a lack of knowledge. Based on this understanding, measures can be devised to educate the consumers. Consumers potentially have much to gain from well-orchestrated consumer education efforts that are jointly endorsed by concerned parties at both the micro- (apparel manufacturers/retailers) and the macro-levels (governmental agencies and private consumer-oriented organisations).

3.5.3 Fit preferences

Concerning consumers' fit preferences, it is clear that:

- Consumers' fit preferences that do not harmonise with their critical fit points can contribute to fit problems, hence the need to educate the consumers on the elements and principles of design to provide them with knowledge regarding the selection of suitable apparel for specific body shapes and sizes.

- Understanding the fit preferences of female consumers can help apparel companies to realistically produce suitable and better-fitting apparel within the consumers' desired fit.
- If apparel manufacturers produce apparel without taking into account the fit preferences of the consumers, the available products could be purchased based on availability rather than on what the consumers desire.

All the information gathered based on the above conclusions, can in the end be used as input units for the development of a knowledge base that can lead to practical designing, predicting the degree of fit, and ultimately the production of better-fitting apparel in Kenya. This will enhance customer satisfaction and increase financial gains for the apparel industry (LaBat 1989; Gersak, 2002).

Based on these conclusions, schematic framework (**Figure 3.24**) was developed.

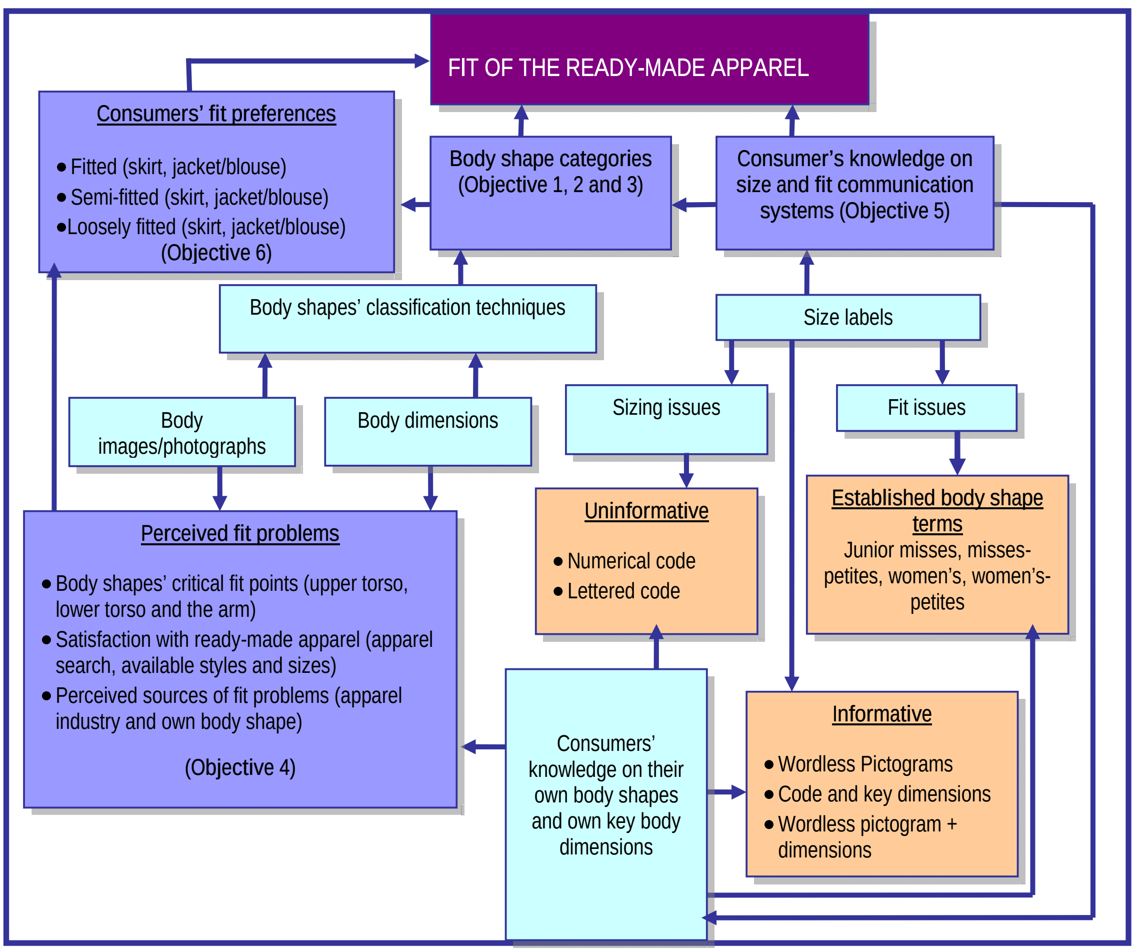


FIGURE 3.24: SCHEMATIC FRAMEWORK

The framework (**Figure 3.24**) includes the objectives of this study and have been conceptualised from the theoretical definitions within the literature covered in **Chapters 2** and **3** of this study. The dimensions and concepts presented play important roles in the fit of ready-made apparel.

Strategies to address the above-mentioned problems of this study are discussed in **Chapter 4**.

Chapter 4

RESEARCH METHODOLOGY

4.1 INTRODUCTION

The purpose of any research undertaking is to explore and describe phenomena leading to the generation of applicable results (Neumann, 2000:21). The research question in this study addresses an everyday problem in World 1 (W1), where people's knowledge has been acquired through experience and learned through tradition. World 2 (W2), being the world of science, tries to use the phenomena of W1 as objects of research and attempts to investigate these in a systematic and methodological way. Research methodology refers to the methods, techniques and procedures used to implement the research design. This process enables the scientist to examine the phenomena in the most accurate manner and make truthful (epistemological) judgements about them (Babbie & Mouton, 2001:10-11). World 3 (W3) is the world of meta-science where the development of academic disciplines stems from. This discipline takes W2 (the world of science) as the object of investigation and reflects thereupon (Mouton, 1996:8-9). Thus empirical, scientific inquiry begins with a movement from W1 to W2 (Mouton, 1996:64).

For the purposes of reliability and validity of the study, the methods, techniques and procedures must be carefully chosen. However, the choice of the research instruments and techniques would depend on the nature of the research problem statement, the research objective, the expectations of the researcher, and to a certain extent the resources available (Morse in Schurink, 1998:253; Babbie & Mouton, 2001:XXV). From the review of the literature, the conclusions given in **Chapter 3** and the schematic framework (**Figure 3.24**) of the main concepts of this study, it is clear that all the aspects mentioned have implications for the choice of the research strategy, data collection methods and statistical analyses used in this study. In order to obtain results that are reliable and valid, this chapter gives an exposition of the aspects employed for this study. They are:

- The chosen research framework and the research questions, which are stated as the primary objectives and sub-objectives for this study.
- The research strategies that are employed under two phases in the study, are
  - the samples chosen for the study,
  - the choice, description and application of data-collection methods for phases one

and two of the study,

- analysis of data for phases one and two of the study,
- the quality of the study, and
- how the research ethics were observed.

Figure 4.1 on the next page, outlines the research framework, phases and objectives of this study.

<table>
<tr><td rowspan="4">PHASE ONE</td><td colspan="3">QUANTITATIVE DATA (BODY SHAPE CLASSIFICATION) THROUGH BODY DIMENSIONS AND PHOTOGRAPHS
(Objectives 1, 2 and 3)</td><td rowspan="8">THE FIT OF FEMALE'S READY-MADE APPAREL</td></tr>
<tr><td colspan="2">Career women's body dimensions</td><td>Career women's body images/Photographs</td></tr>
<tr><td colspan="2">1. Top part of the body (the shoulder slope, the bust, the waist, the sleeve length and upper arm (biceps), bust extension and the arc measurements of both front and back body at bust, and both front and back waist arc measurements).
2. Lower part of the body (the hip, the broadest hip region, the thigh, the arc measurements at the waist, hip, and the buttock extension)</td><td>1. Front view's areas for scrutiny: whole body, shoulder, bust, top arm, waist, hip sizes and the thighs
2. Side view's areas for scrutiny: bust prominence, back curvature, stomach prominence, pelvic tilts/buttocks and thigh bulge and height proportions
3. Back view's areas for scrutiny: whole body, shoulder, waist, hip sizes, top arm and thighs</td></tr>
<tr></tr>
<tr><td rowspan="4">PHASE TWO</td><td colspan="3">QUANTITATIVE DATA, THROUGH QUESTIONNAIRE
(Objectives 4, 5 and 6)</td></tr>
<tr><td>Career women's general fit problems with ready-made apparel (Objective 4)</td><td>Career women's knowledge about size and fit issues (Objective 5)</td><td>Career women's fit preferences (Objective 6)</td></tr>
<tr><td>1. Fit perception of different apparel categories
2. Fit problems at specific critical fit points (neck, bust, shoulders/shoulder blades, nape to waist, waist, armcye, upper arms, abdomen, hips/buttocks, thighs and crotch line)
3. Satisfaction with the fit of ready-made apparel
4. Perceived source of fit problems</td><td>1. Communication of fit issues (Junior Females, Females petites, Misses, Misses-petites and linking to their own body shape)
2. Communication of sizing issues (meaning of size codes and linking to their own dimensions)</td><td>Fit preference for differently fitted apparel items
1. Fitted jackets and skirts
2. Semi-fitted jackets and skirts
3. Loosely fitted jackets and skirts</td></tr>
<tr></tr>
</table>

FIGURE 4.1: RESEARCH FRAMEWORK AND PHASES FOR THE STUDY

From the research framework and research phases (**Figure 4.1**, previous page), the following research questions directed the investigation:

- What are the distinctive body shapes of career women in Kenya and how do they differ from the Western distinctive body shapes?
- What implications for the fit of apparel are associated with Kenyan career women's distinctive body shapes?
- What are the distinctive differences in body proportions among the different age groups of Kenya's career women?
- What are the general fit problems that career women encounter with the ready-made apparel in Kenya?
- Do career women lack knowledge about the communication of size and fit, and how does this contribute to their fit problems with ready-made apparel in Kenya?
- What are the career women's fit preferences for differently fitted apparel items and how do these contribute to the fit problems of ready-made apparel in Kenya?

4.2 PRIMARY OBJECTIVES AND SUB-OBJECTIVES OF THE STUDY

Primary objective 1: **To identify and describe distinctive female body shapes of career women in Kenya from body dimensions and photographs**

Sub-objective 1.1: To identify and describe distinctive female body shapes of career women in Kenya from the body dimensions

Sub-objective 1.2: To identify and describe distinctive female body shapes of career women in Kenya from the photographs

Sub-objective 1.3: To establish and describe associations between distinctive shapes emerging from body dimensions and those emerging from the photographs of the career women

Primary objective 2: **To distinguish and describe differences between the emerging distinctive body shapes (from measurements and photographs) and the Western distinctive body shape**

Primary objective 3: **To scrutinise and describe the fit implications associated with the emerging distinctive body shape of the career women**

Primary objective 4: **To assess and describe career women's self-perceived fit**

issues with the ready-made apparel in Kenya

Sub-objective 4.1: To investigate career women's perception of fit with different apparel categories that are sold in various retail stores in Kenya

Sub-objective 4.2: To describe fit problems that career women in Kenya encounter regarding the specific critical fit points of different parts of their bodies

Sub-objective 4.3: To describe career women's degree of satisfaction with the process of finding appropriate ready-made apparel items in Kenya

Sub-objective 4.4: To explore career women's self-perceived sources of fit problems with apparel in Kenya

Primary objective 5: **To determine and describe Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes)**

Sub-objective 5.1: To explore Kenyan career women's knowledge about the communication of size

Sub-objective 5.2: To explore Kenyan career women's knowledge about the communication of fit

Primary objective 6: **To determine and describe how career women's preferences for differently fitted skirts and jackets may contribute to fit problems with apparel**

4.3 RESEARCH STRATEGY CHOSEN FOR THIS STUDY

This study is exploratory and descriptive in nature. Fit problems with ready-made apparel associated with career women' distinctive body shapes, career women's knowledge about the communication of size and fit as well as career women's fit preferences have not been addressed in Kenya. Considering that these issues are new in Kenya, an exploratory study was carried out in order to obtain an insight into a relatively new area of study (Babbie & Mouton 2001:80). According to Miles and Huberman (1994:23), no research study can claim inductive purity, because all research begins to a certain extent with existing knowledge and builds on previous research. This study initially followed a deductive route, starting with an abstract idea, obtained from a thorough review of the literature covered in **Chapters 1, 2** and **3**. From this, some guiding principles could be extracted for the quantitative research approach used (Neumann, 2000:132).

Although data collection occurred simultaneously from the participants, this research is divided into two phases for practical purposes and ease of presentation (**Figure 4.1**). In the first phase of the study, the career women were measured and photographed for the purposes of sorting out and identifying their distinct body shapes. The second phase was to determine by means of a structured questionnaire, general problems that career women experienced with the fit of ready-made apparel, their knowledge about size and fit, and their fit preferences.

Based on the research problem statement, and the primary objectives and sub-objectives formulated for this study, a quantitative research style was selected as the most suitable paradigm. In quantitative research, the process of measurement begins after the research question has been formulated, the variables identified and the units of analysis determined. This is done to develop clear definitions and create measures that will yield precise and accurate findings (Neumann 2000:132). In order to gain a broad understanding of the stated phenomenological issues of this study, an extensive literature search was done, as clearly indicated in **Chapters 2** and **3**. This study primarily followed a deductive route by starting with an abstract idea as stated in **Chapter 1**, followed by measurement procedures with concrete indicators, and ending with empirical data (precise numerical information) that represents the abstract ideas, as presented in **Chapters 5** and **6** of this study. The measurement techniques that were used, were precise, linking the relevant concepts with the data and predicting what the data would be (Neumann, 2000:158). This study was cross-sectional, implying that it was undertaken at a specific point in time and not over a long period.

4.4 CHOICE OF THE RESEARCH SAMPLE FOR THE STUDY

4.4.1 Units of analysis for the study

The units of analysis for this study (in both phases) were female urban high-school teachers between the ages of 25 and 55 from three major cities (Nairobi, Kisumu and Eldoret) situated in the central and western regions of Kenya (**Figure 4.2**). They were used to represent urban career women in Kenya. The decision to use urban high-school teachers was taken because the teaching profession in Kenya has the highest percentage of female employees (KNUT, 2001:1). Considering the time constraints, these groups of women had the advantage of time and financial savings, as they would be exposed simultaneously to the same stimulus material and measured at the same time, at their respective schools (Delport in De Vos, 2002:175).

For the purposes of this study, a career female is described as a woman whose growth in height is completed (International Standards Organization (ISO)/TR 10652, 1990:32), and who is pursuing a certain profession as a means of earning an income (Callahan, 1988:31). Career women are exposed to fashion, and have got the means and the incentive to respond to fashionable apparel, but are also critical regarding the way that apparel items fit (Stone, 1999:39; Klepp & Storm-Mathisen, 2005:329). Women in the teaching profession also fall within a wider age bracket suitable for the study. It is assumed that females attain their profession by the age of 25, while retirement age in Kenya is 55. There are enough urban high schools in the two regions, to obtain the sample from. Given that this study was undertaken in two regions of Kenya (**Figure 4.2**), the findings of this study shall not be generalised to the entire population of career women in Kenya, but rather to the career women of the two regions only. The following criteria (**Table 4.1**) were used to select the respondents for participation in this study.

TABLE 4.1: CRITERIA USED FOR SELECTING THE CAREER WOMEN

CRITERION	JUSTIFICATION
Respondents had to be females.	Females' ready-made apparel offers a variety of styles and changes fast (Hogge *et al*., 1988), whilst their body shapes are also varied and dynamic.
They had to be between the ages of 25 and 55.	It is assumed that females attain their profession by the age of 25. In Kenya, retirement age is 55.
They had to be employed in a full-time or part-time profession of teaching.	Involvement in activities that save time (wasted in shopping and apparel selection and trials) is greater for a woman in a profession than unemployed females (Stone, 1999:38). Female professionals would have the income to spend on apparel.
They had to have a post-school education with a diploma or a degree certificate.	The more educated a woman, the more she is exposed to and willing to try out new fashion, and the more critical she would be about the fit of her apparel (Stone 1999:36-37).

4.4.2 Sample selection for the study

Kenya as a country covers a large geographical area. It was not possible to study the whole area within the time constraints at the time of research. The study was therefore limited to two geographical regions situated at the western region (comprising Kisumu and Eldoret), and the central region (comprising Nairobi city) of Kenya (**Figure 4.2**). The sample size was predetermined before the fieldwork commenced; however, while in the field, unanticipated problems arose which demanded that the initial plan be revised.

FIGURE 4.2: GEOGRAPHICAL AREAS COVERED FOR THE RESEARCH

4.4.3 Initial plan of sample selection for both phases of the study

Two samples were to be drawn from the two regions of study (one sample from each region). There are 41 urban high schools in the western region (Kisumu has 20 and Eldoret has 21 schools), with a total population of 1083 female teachers. There are 35 urban schools in the central region (Nairobi), both private and government schools, with a population of 1052 female teachers. Both regions together yielded 2132 (1083+1052) female teachers. The entire population sample was selected using the probability sampling technique (**Appendix 2A**) for the purposes of addressing all the objectives of the study, involving empirical body measuring (phase one), photographing (phase one), and the use of questionnaires (phase two). This method was chosen because in the probability sampling technique, all the elements in the population would have an equal (or unequal and subsequently weighted) chance of selection, as it avoids any conscious or unconscious bias on the part of the researcher in the selection of elements. There is also an excellent chance that the sample selected will closely represent the population of all elements. Although they may not be perfectly representative in all respects, controlled methods permit the researcher to estimate the degree of expected error (Kerlinger, 1986:110-111; Bailey, 1994:90; Babbie & Mouton, 2001:201-202; Strydom & Venter in De Vos, 2002:205). Prior to the fieldwork, a list of schools had been obtained from municipal education offices in both regions of study. Systematic sampling methods were applied for each region.

In the Kisumu region with 20 schools, the ninth number was randomly picked as a starting number. Thereafter, every third school was picked from the list, making a total of 6 schools to be studied. The list of names of the teachers from the selected schools was to be obtained from the respective schools, to facilitate further selection of participants, using the same procedure of every third person on the list, after the first number had been determined by flipping a coin (heads – odd number, and tails – even number). A total of 76 female teachers were thus randomly selected from this region to participate in the study.

In the Eldoret region with 21 schools, the fifth number was randomly picked as a starting number. Thereafter, every third school was picked from the list, making a total of 6 schools to be studied. The list of names of the teachers from the selected schools was to be obtained from the respective schools, to facilitate further selection of participants using the same procedure of every third person on the list. The first number was determined by flipping a coin (heads – odd number, and tails – even number). A total of 74 female teachers were thus randomly selected from this region to participate in the study.

In the Nairobi region with 35 schools, the 15th number was randomly picked as a starting number (point). Thereafter, every third school was picked from the list, making a total of 12 schools to be studied. The list of names of the teachers from the selected schools was to be obtained from the respective schools, to facilitate the further selection of participants, using the same procedure of every third person on the list after the first number had been determined by flipping a coin (heads – odd number, and tails – even number). A total of 151 female teachers from this region were thus randomly selected from this region to participate in the study. The two cities of Kisumu and Eldoret had a total population of 150 teachers to be studied; this figure added to 151 from the Nairobi region brought the total to 301 female teachers for the whole study.

4.4.4 Limitations of the predetermined sample while at grass-roots level

When planning to carry out the study in both government and private schools, certain problems were overlooked. In the field, some of the head teachers (gatekeepers) of the private schools refused us access to their schools and demanded a research permit from the Ministry of Education (**Appendix 1C**, **1D** and **1E**). Strydom (in De Vos, 2002:283), cautions that in some cases, gatekeepers and other sensitive obstacles might prevent one from gaining access to the field. Neumann (2000:352) also warns that bargains and promises of entry may not remain stable over time and may require that the researcher return later for re-negotiations. It was decided to eliminate all the private schools in both the regions, because time and limited finances could not facilitate any further trial and error. The number of private schools is lower than the number of public schools, but the wages of the female staff members in both private and public schools are the same, thereby ensuring that the results of the study would not be significantly affected. This decision demanded that a research permit and new lists of only government schools be sought from the Ministry of Education's Headquarters, as well as offices within the two regions that had been identified for the study. The research permits (**Appendix 1C**, **1D** and **1E**) were granted and the new lists of female teachers were obtained for re-sampling purposes. Babbie and Mouton (2001:299, 310) state that most field research offers no fixed rule in methodology or ethics to follow, because sometimes, sampling criteria emerge from the fieldwork. Although the new lists represented fewer schools, the original predetermined sample sizes of 151 and 150 participants from different regions respectively, were maintained. Systematic sampling techniques as planned earlier remained in force, and the procedure followed was sustained (**Appendix 2C**).

4.4.5 Emergence of qualitative (snowball) technique within quantitative (systematic sampling) technique

Socio-cultural differences that often lead to divergence in perceptions, beliefs and behaviour, include geographic location, ethnicity, religion, and sexual orientation (Fiore & Kimle, 1997:86; Marshal *et al.*, 2004:94). Considering the nature of the study – taking body dimensions and photographing female career women while dressed in minimal apparel – is a delicate matter, as also observed by Apeagyei, Otieno and Tyler (2007). It required caution, patience and a deep understanding of the participants' cultural and religious beliefs, even before negotiating with them.

The researcher, after seeking permission from the head teachers (gatekeepers), comprehensively explained the objectives and the importance of the study to the staff members (the potential participants of the study). The researcher then requested them to volunteer at their own discretion. As soon as agreements were made, those who were willing to participate in both phases of the study, were requested to decide on a suitable date and time for the measurements, photographs and completing the questionnaires. Initially, all the sampled participants were positive and agreed unanimously to participate in both phases of the study. Later on, the majority agreed to complete the questionnaire, but declined to be measured and photographed.

According to Hammersley and Atkinson (1995:55), it is imprudent to allow one's strategy to be led entirely by one's own prepositions concerning what is, and is not accessible. Although participants had refused to participate in both phases of the study (measurements and photographing exercises, and completing the questionnaire), a re-negotiation process was still achievable, as recommended by Neumann (2000:352). A new approach was devised and reached with caution and patience. Having interacted with the teachers, the researcher identified skilled and influential (vocal) members with apparel and textiles skills, to be used as pioneers, negotiators/recruiters and persuaders of other participants. The vocal members convinced a few other members, who then in turn identified others for the exercise. This recruiting exercise went on until there were no further participants willing to participate from each school. This ended up with an emergence of snowball sampling techniques within the initial (already) systematically sampled groups in different schools. Out of the 301 participants identified for the original study sample as initially pre-determined by the researcher and the statistician, only 123 participants' body dimensions and only 89 participants' photographs were taken (**Appendix 2C**) from the snowball-sampled group (phase one). This agrees with what Babbie and Mouton (2001:310) reported that in an interpretive research design, two types of sampling are commonly found: one where the researcher sets up sampling before commencing with the fieldwork, and the other where sampling criteria emerge from the fieldwork.

Neumann (2000:349) asserts that the steps of the field project are not completely programmed but rather serve as an estimated guide or road map. As a re-entry strategy, the researcher and the research assistant were forced to develop stronger trust and rapport with the participants by providing their own photographs that were taken while dressed in body suits and without any masks on their faces. The purpose and importance of the study were once again comprehensively explained to all the willing participants (snowballed sampled group). Some apparel items with fit problems were used to demonstrate how the body shape influences the fit of apparel, to drive the point home. Neumann (2000:352) reports that the researcher has to continuously negotiate and explain the research objectives of the study time and again in the field.

4.5 CHOICE, DESCRIPTION AND APPLICATION OF THE DATA COLLECTION TECHNIQUES

As reported earlier, data collection occurred simultaneously from all the participants. The presentations of two phases are given here for practical purposes and ease of data reporting and management. Data collection was done from two groups sampled through the systematic technique and the emerged snowball technique. Not all of the snowball-sampled participants were measured and photographed. There were some participants who were only measured, and others were measured and photographed (**Appendix 2C**). The measuring and photographing exercises were however performed before the structured questionnaires were administered.

4.5.1 Body dimensions and photographs for body shape classification (First phase of the study – Objective 1)

To address objective 1 of this study, which is to identify and describe distinctive female body shapes of career women in Kenya, it involved taking the body dimensions as well as photographs of career women from the snowball-sampled groups only. Out of the 301 participants identified for the original study sample as initially pre-determined by the researcher and the statistician, only 123 participants' body dimensions and only 89 participants' photographs were taken from the snowball-sampled group. It was observed that the majority of the women who appeared older were adamant to be measured and photographed, although their shape differences were not conspicuous.

Body shape identification is the backbone behind the development of apparel sizing and ultimately, well-fitting apparel. As discussed earlier, most female sizing systems currently in use are based on the ideal Western figure that has well-proportioned body components, and in any case on an outdated database (Simmons & Istook, 2003; Newcomb & Istook, 2004; Devarajan & Istook, 2004). Although shapes have been classified in most developed countries to solve the problem of fit, African shapes with reference to Kenya, however, have not been considered. The dimensions of body components can only be extracted from the human shape through measurements and images, which are only obtainable through body-scan technologies and/or photographs with the use of recommended instruments and techniques.

For the purposes of identifying the distinct body shapes of the career women in Kenya, traditional anthropometrical techniques of obtaining body dimensions were employed in this study. Anthropometry has been applied in many studies, while photography (somatography) has been used scantily, but has produced reliable results (Gazzuolo *et al*., 1992; Douty, 1968; Salusso-Deonier, Markee & Pedersen, 1991; Kuma, 1999:39; Anderson *et al.*, 2001:7). It may be argued that in describing body shapes, measurements alone would not be exhaustive enough to give true representations of the proportions of the body. Profile characteristics such as pelvic tilt (buttock prominence), stomach protrusion, back curvature and breast protrusion can only be understood through visual analysis of the body's silhouette and profile. Based on this understanding, and on a thorough study of the literature on traditional anthropometry, somatography and body shape classifications, a comprehensive body measurement form, a body shape assessment training manual and a body shape assessment scale were compiled.

Important key body dimensions necessary for the identifying of body shape, and that are critical to apparel's fit, were included in the body measurement form (**Appendix 3A**), while the characteristics of body shape that are critical to fit were included in the body shape assessment training manual as well as the body shape assessment scale (**Appendix 3D**). To obtain the body dimensions as well as the images, the empirical/practical study was carried out as follows.

4.5.1.1 Preparations for measuring and photographing exercises

Prior to taking the measurements and the photographs, the subjects were informed about the apparel items to be used, the measurements to be taken and the different views required for the images. To be efficient and effective in the exercise, the subjects were provided with and requested to wear body suits (leotards) with minimal thickness and that follow the natural contours of the body without constriction – as recommended by ISAK (2001:5). This was to ensure uniformity amongst all the participants. The researcher provided all the body suits that were the same in colour and thickness. Due to a shortage in ready-made leotards in the recommended colour and style, and within the available finances and time constraints, the researcher made only 20 body suits for all the participants. They were dry-cleaned after each use or before the next participant's use. The size description system used for assigning sizes to the body suits was the lettered type of Small (S), Medium (M), Large (L) and Extra Large

(XL). The measurements used for the production of the body suits were based on the Kenyan size standards (**Appendix 4A**). The Small (S) size category comprised size 8 and 10 measurements; the Medium (M) size category comprised size 12 and 14 body dimensions; the Large (L) category comprised size 16 and 18 body dimensions; while the Extra Large (XL) category comprised sizes 20 and 22 measurements.

Taking body dimensions: Dimensions from the human body form the foundation for well-fitting apparel. The body dimensions taken accurately, by employing the correct methods, instruments and techniques, can yield accurate and representative results (Ashdown, 2000; Simmons & Istook, 2003; Bye, LaBat & DeLong, 2006:66). It is not practical to use body scanners in developing countries due to its costs and the technical skills required, even though it promises better results (see **Chapter 2, paragraph 2.3.3**). The use of traditional anthropometry in conjunction with specific successful tailoring techniques of taking body dimensions (stipulated in most sizing standards) was deemed appropriate for this study as they offered alternative methods. Since these techniques are standardised and have been used in many studies, reliability and validity were ensured (Winks, 1997; Beazley, 1998; Simmons & Istook, 2003; Bye, LaBat & DeLong, 2006:66).

Body shape scrutiny is the foundation from which the development of apparel sizing stems. Distinctive characteristics of the body, which are critical to the fit of apparel, are considered in body shape identification. In this regard, more dimensions were required than just the basic key body dimensions (i.e. height, bust, waist and hips), which alone cannot exhaustively describe body shapes in terms of specific characteristics (such as pelvic tilt/buttock protrusion, back curvature, shoulder slope, and the protrusion of stomach and breasts).

After having reviewed the literature on apparel anthropometry and having considered all the characteristics of the body's front, back and side views, the body measurement form was developed (**Appendix 3A**) to guide and ease the measuring exercise. The body measurement form contained the dimensions of the upper and lower parts of the body that were carefully selected to improve the quality of the sorting and identification of the different body shapes. The body measurement form was designed in such a way that it would promote quick measuring. Height and vertical measurements were grouped and arranged in the order of their occurrence, from the top to the lower part of the body. All the horizontal (girth) measurements and all the width and length measurements were also grouped and arranged in the order of their occurrence, from the right to the left part of the body.

The landmarks and measurements for both the upper and the lower parts of the body (**Figure 4.3**) were obtained through standardised techniques, as stipulated in ISO-8559-89;

Beazley (1996); ASTM-D 5219-99; ISAK (2001); and Simmons and Istook (2003) (**Appendix 3B**). The landmarks identified were:

- **The neck/nape (7th cervical vertebra):** The subject assumed a relaxed position with hands hanging by the sides and the head in the Frankfort plane position. The landmark was obtained by bending the neck forward (lowering the chin) to locate it, as it pops out when the head is lowered. This position was marked with the circular hole on the sticker, being placed on the centre (RMSS, 1994; Beazley, 1996). This landmark guided the calculation of the shoulder slope, which was obtained by subtracting the shoulder to ground measurement from the nape to ground measurement.
- **The shoulder point (Acromion):** The subject assumed a relaxed position with hands hanging by the sides and the head in the Frankfort plane position. Acromio-clavicular joint positions on both right and left sides were determined by palpating along the spine of the scapula to the corner of the acromion. Marking was applied with the stickers' central holes placed at the mid-points of the acromions (ISAK, 2001:29; McConville, in Simmons & Istook, 2003). The shoulder landmark guided the calculation of the shoulder slope. It was also one of the points used to obtain the side seam line (profile trunk line).
- **The armpit (axilla) level:** The subject's hands were raised and the head in the Frankfort plane position. Landmarks were placed with the stickers' central holes at the mid-points of the hollow armpit regions. This landmark guided the bust extension measurement and the bust measurement. It was also one of the points used to obtain the side seam line (profile trunk line).
- **The upper arm/bicep point:** The subject assumed a relaxed position with arms hanging by the sides. The site is located at the mid-point of the straight line joining the Acromiale and Radiale, perpendicular to the long axis of the arm, also appearing as the fullest part of the bicep region. This landmark guided the upper arm circumferential measurements.
- **The breast tips/bust level:** The subject assumed a relaxed position with hands hanging by the sides and the head in the Frankfort plane position. Marking was then applied with the stickers' central holes placed at the breast tips. This landmark guided the bust extension measurement and the bust circumference measurement.
- **The waist (natural indentation):** The subject assumed a relaxed standing position with the arms folded across the thorax and the head in the Frankfort plane position. The landmarks were placed with the stickers' central holes at the mid-points of the natural waist indentation at the sides. Subjects with waistlines difficult to identify in a relaxed standing position, were requested to bend sideways in order to facilitate the locating of the waistline. This landmark served as a guide for measuring waist

circumferences, waist height and was one of the points used to obtain the side seam line (profile trunk line) (ISAK, 2006:87).

- **The hip (trochanterion):** The subject assumed a relaxed standing position, with the arms folded across the thorax and the head in the Frankfort plane position. The site was identified by palpating the lateral aspect of the gluteal muscle, with the heal of the hand up, until the superior surface of the hip bone (trochanter) could be felt when strong downward pressure was applied. For subjects with thick adipose tissue over the hipbone it was difficult to locate it. However, it helped to request, while supporting the left side of the subject's pelvis that the subject lift up her right leg as the palpation continued. This landmark served as a guide for measuring hip/buttock circumferences at the level of their greatest posterior protuberance, and was one of the points used to obtain the side seam line (profile trunk line) (ISAK, 2006:87).
- **The thigh bulge point (almost at gluteal furrow point):** With the subject assuming a relaxed standing position, the arms folded across the thorax and the head in the Frankfort plane position, the landmark was located at the broadest (bulging) part of the thigh. This landmark served as a guide for measuring the lower hip circumference (appearing broadest), and as one of the points used to obtain the side seam line (profile trunk line) (ISAK, 2001:87). It also guided the calculation of the thigh bulge, which was obtained by subtracting the hip circumference from the lower hip circumference (hip appearing broadest).
- **Knee level (tibiale laterale):** With the subject assuming a relaxed standing position and with the arms hanging by the sides or folded across the trunk and the head in the Frankfort plane position, the site was identified by palpating to locate the lateral condyle of the femur and the antero-lateral portion of the lateral border of the head of the tibia. Although it is a difficult site to locate, the subject was requested to flex and extend the knee several times to ensure that the correct point has been located; alternatively, the subject could bend the knee slightly to define the crease line; the mid-part on the side was then identified and landmarked (RMSS, 1994; ISAK, 2001:46). This landmark served as one of the points used to obtain the side seam line (profile trunk line).
- **The ankle (malleolus):** The subject assumed a relaxed standing position, arms hanging by the sides or folded across the trunk, and the head in the Frankfort plane position. The lower edge of the tibial bone was located and landmarked. This landmark served as one of the points used to obtain the side seam line (profile trunk line).
- **Trunk line (side seam):** With the subject assuming a relaxed standing position, the ear's hole served as the head's landmark, while the shoulder, armpit, natural waist indentation, hip (trochanterion), knee (tibiale laterale) and the ankle (malleous) served as landmarks for the lower part of the body.

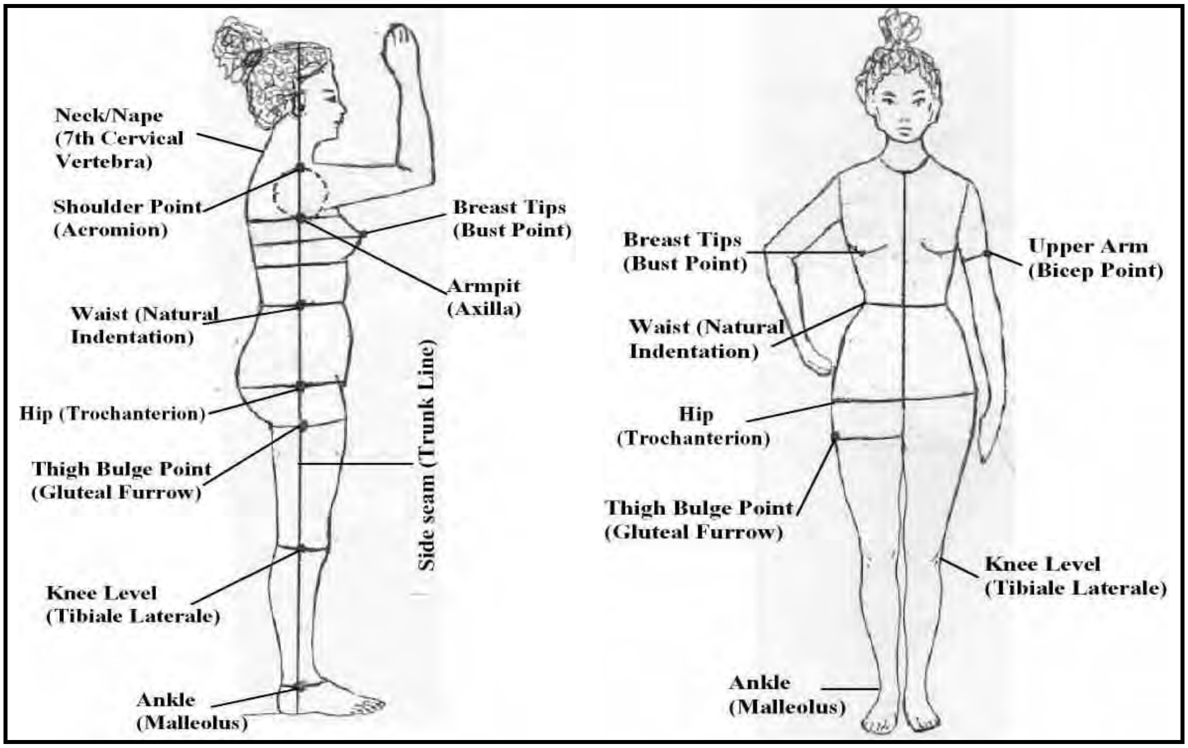


FIGURE 4.3: LANDMARKS AND BODY DIMENSIONS OBTAINED FOR BODY SHAPE IDENTIFICATION

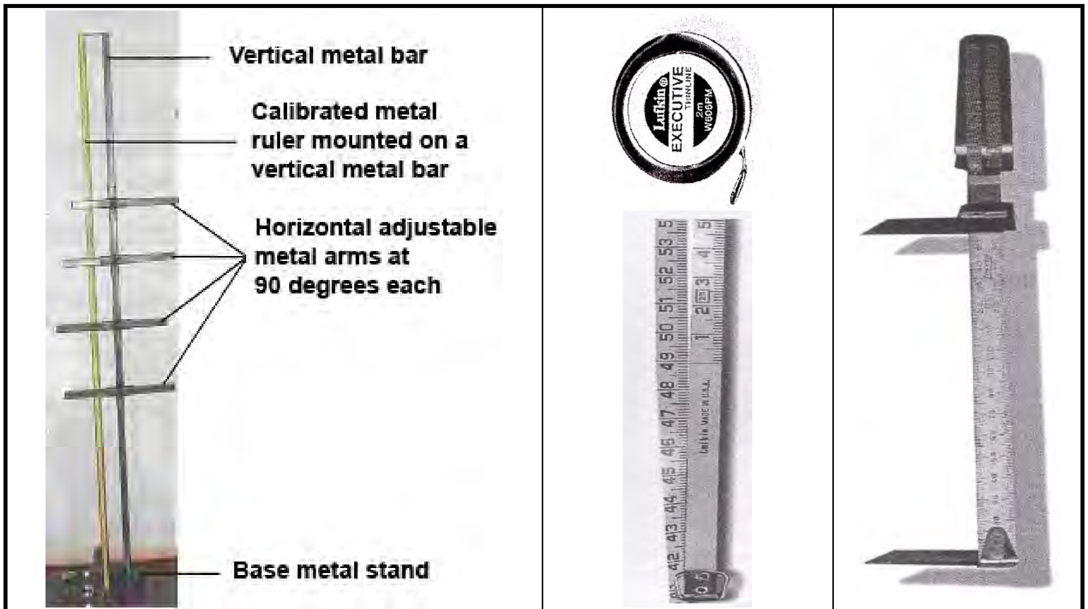
Instruments used for measuring: Apparel anthropometry studies specifically use apparatus that have been developed to produce reliable and valid measurements. An anthropometer (measuring stand), consisting basically of a graduated rule in millimetres, that is vertically mounted and has a moveable arm, is used for measuring straight linear distances, while callipers are used to measure linear depths and widths. Calibrated measuring tapes are used to measure depths and widths (Beazley, 1997:58; Ashdown, 2000).

According to Morse (in Schurink, 1998:253), the nature of the research problem statement and the resources available determine to a certain extent the data-collection methods to be used in a study. For the purposes of this study and due to the available resources, the researcher consulted professional anthropometrists from the company Ergotech in South Africa for training on how to take body dimensions professionally, and on suitable instruments to be used. The Ergotech Company is well known for their anthropometric surveys. In this regard, Ergotech's measuring techniques and the instruments that they use were considered reliable and valid. To further enhance reliability when taking body dimensions, the researcher underwent a one-week training on anthropometry as a level 1 Kinathropometrist, offered by the International Society for Advancement of Kinanthropometry, ISAK (**Appendix 3C**). Based on the expertise and experience of Ergotech

South Africa, the researcher's training with ISAK and a thorough review of the literature, the decision was made to use specific instruments for this study (**Figure 4.4**). The techniques of taking body dimensions of ISO (1989), ASTM (1999), Beazley (1996) and Simmons and Istook (2003) were also consulted before that decision was taken.

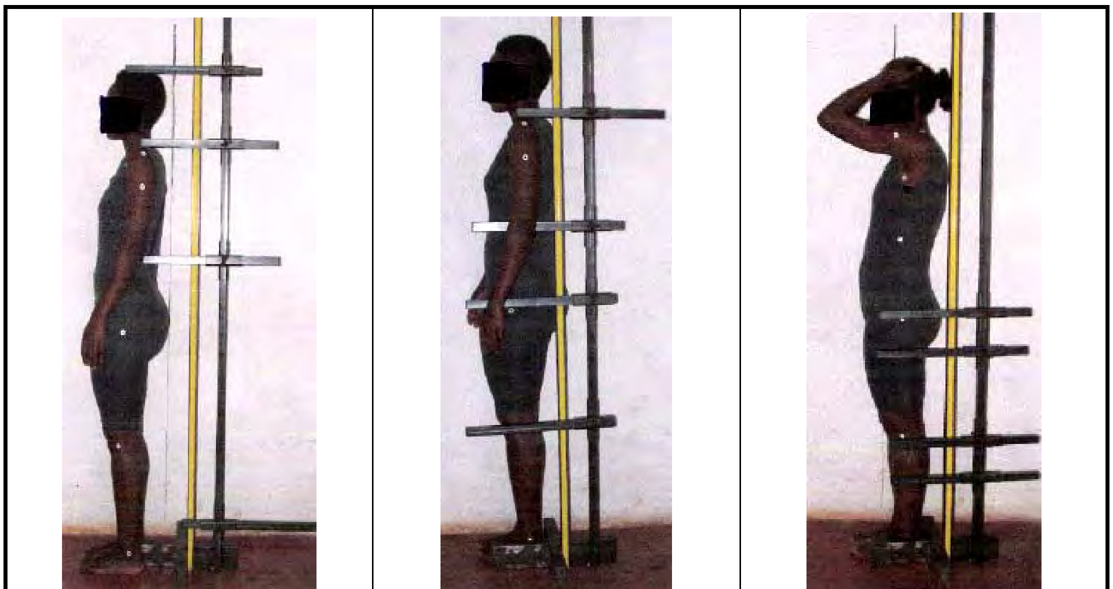
Due to limited funds available and the unavailability of an anthropometer, the researcher opted to use an improvised standing anthropometer, with approximate resemblance to a real anthropometer. It basically consists of a measuring stand of a graduated rule in centimetres and millimetres. It contains two parallel metal bars held at right angles from the base and has rods mounted at right angles on the fittings that slide/move along one of the vertical primary rods, as shown in **Figure 4.4**. It was designed according to the specified measurements of an ordinary anthropometer. After it was assembled, it was subjected to critical testing for accuracy and reliability. The improvised standing anthropometer was used for measuring all the straight vertical linear distances as shown in **Figure 4.5**. A stature meter was used interchangeably with the anthropometer for the height measurements. All the contour measurements were measured using a 200 cm long dressmaker's metal tape to avoid stretching and tear during the exercise. A set square was used for locating the trunk line on the side, while a segmometer was also used interchangeably with the metal or fibre glass tape to measure widths (**Figure 4.4**). All these instruments were used after consultation with an anthropometrist and anthropometry books and standards such as the Republic of South African Military Standards (RMSS) (1994), Norton and Olds (1996) and ISAK (2001).

Other tools necessary for the body dimensions exercise included landmarkers; these were white stickers with a circular hole in the middle. They were placed on the relevant positions of the body and body suits (leotards) to signify the landmarks (Beazley, 1996). Elastic tapes were used for locating the natural waist indentation. Hair clips were required to hold hair away during measuring of the subjects. Body suits were provided in standardised sizes and brassières were provided whenever necessary. The measuring area was prepared well in advance for convenience and speed of handling equipment, and to reduce the fatigue of both the subject and the measurer. A table on the right-hand side of the measurer had all the equipment and tools arranged according to the sequence of the measurements given on the body measurement form.



Improvised standing anthropometer	Metal measuring tape	Segmometer

FIGURE 4.4: MEASURING INSTRUMENTS



Stature, nape and waist heights from the ground	Shoulder, waist, hip and knee heights from the ground	Hip, thigh, Knee and calf heights from the ground

FIGURE 4.5: HEIGHT MEASUREMENTS USING STANDING ANTHROPOMETER

Actual body measuring: It has been observed that a person's measurements (dimensions) can only be accurate and representative if they are taken accurately by employing the correct methods, instruments and techniques (Ashdown, 2000; Simmons & Istook, 2003; Bye, LaBat & DeLong, 2006:66). However, accuracy could be improved if the subjects were landmarked prior to taking the measurements. This ensures conformity and consistency (Simmons & Istook, 2003). Since a landmarking exercise requires palpitation, touching and sometimes bending of limbs to determine the appropriate positions for taking the measurements, participants' privacy is violated in the process (Simmons & Istook, 2003; Istook *et al*., 2003). Having observed the resistance of the career women to participate in the exercise, it was necessary to continue with negotiations throughout the practice, as recommended by Neumann (2000:352). Most of the participants preferred as little contact as possible and this demanded that the landmarking positions planned earlier be adjusted to include only the most important points. The procedure used for landmarking followed the standardised methods stipulated in Beazley (1996), ISAK (2001) and Simmons and Istook (2003).

The researcher took all measurements and called them out loudly to her research assistant for recording. To confirm that the measurements were correctly recorded, the research assistant also loudly repeated what she had heard. The research assistant was also skilled in apparel design, and had been trained prior to the fieldwork. She also assisted with the aligning of the metal tape measure at the back of the subjects when circumferential measurements were taken, and thus acted as a mirror for the measurer where she could not see or reach.

Photographing: Based on the study of somatography (Salusso-Deonier *et al*., 1991; Gazzuolo *et al*., 1992; Kuma, 1999) and the concept of imagery with the body-scan technologies, it was decided to use photography for this study as an alternative method to body scans technologies. Female participants were photographed using standardised methods while dressed in minimal apparel (body suits/leotards) and assuming different positions/views (front, back and side/profile). The different views would facilitate accurate judgements on body units/components that are critical to the fit of apparel. Those components within the body would then be visually analysed and categorised to facilitate the production of ready-made apparel with a better fit.

In order to achieve consistency and reliability when photographing, all sets of photographs were taken from the same distance, with subjects and the photographer taking the same postures and positions. Six-meter guiding grid paper was mounted on the wall and extended to the forefront on the floor. The extended section on the floor had two sets of footprints marked on it. The first set was close to the wall and indicated the subject's position, while the second set was further away from the wall and indicated the photographer's position. The grid paper was divided up into 15 cm squares with a bold line down the centre, which served as a balancing point when photographing. The background (grid paper) was to standardise all the photos taken and to allow ease of judgement concerning each shape later in the analysis. All the sets of photographs were taken from the same position and distance, while the subjects took specific standardised poses and were dressed in similar styled and neutral (gray) colored body suits/leotards, in order to ensure uniformity and clarity during the evaluation later (**Figure 4.6**) (Gazzuolo *et al.*, 1992; Kuma, 1999:39; Anderson *et al.*, 2001).

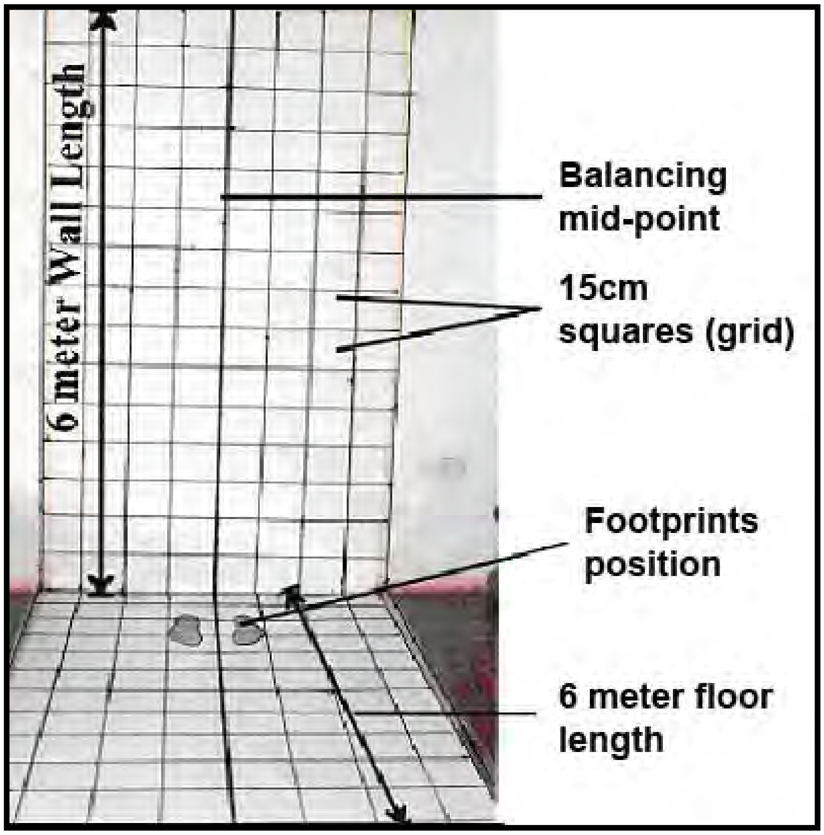


FIGURE 4.6: PHOTOGRAPHING STUDIO SET UP

To facilitate the easy identifying of the sets of photographs later during the analysis, numbers (two digits) were assigned to the subjects (photos) as they were photographed, while their privacy was ensured by having their heads masked (Kuma, 1999:39). Photographs were taken from the front, side and back, as shown in **Figure 4.7**. Subjects were requested and assisted regularly to stand erect and directly on the footprints, with the head in the Frankfort plane position and, with the grid central line passing through their mid-points. A good quality digital camera was used and standardised distance positions as well as focus points were observed consistently during the entire exercise. With the training experience of the researcher, the reliability of the study was ensured. All the photographs were later subjected to evaluations by trained sensory evaluators for the purposes of sorting out and identifying the most distinct body shapes.

Front view	Side view	Back view

FIGURE 4.7: DIFFERENT VIEWS OF BODY SHAPES

4.5.2 Structured questionnaire (Second phase of the study – Objectives 2, 3 and 4)

For the second phase of the study, a structured questionnaire (**Appendix 1A**) was used to address Objectives 4, 5 and 6. Other researchers have successfully used structured questionnaires to measure fit problems, fit preferences as well as preferences for instructive size labels (Objectives 4, 5 and 6) (LaBat, 1989; Chun-Yoon & Jasper, 1995; Anderson *et al*., 2001; Otieno *et al*., 2005). Alexander, Connell and Ulrich (2005) also tested consumers' knowledge about their key body dimensions, which are necessary for identifying the correct apparel sizes. Since testing of career women's knowledge about the meaning of the communication of size and fit (Objective 5) is a new venture, the use of structured questions was also deemed appropriate to address the problem.

The questionnaire was compiled after studying literature on fit problems with apparel regarding sizing systems (size tables and the female body shapes), the communication of size and fit (size labels), and career women's fit preferences. Dimensions that would influence such fit problems were identified from all the areas studied, as presented in a schematic framework in **Chapter 3 (Figure 3.24)** of this study.

The questionnaire's top page had the University of Pretoria's logo (letterhead) and an introductory letter stating the purpose of the research, giving an assurance of anonymity, an appeal for participation in the study and acknowledgement for participation (Delport in De

Vos, 2002:170). The questionnaire was scrutinised by the researcher's study leader, the co-study leader, the statistician and the subject specialist lecturers at the Department of Consumer Science, University of Pretoria (peer evaluation). This was done to determine the clarity of the questions used and whether the intended meanings were clear. Suggestions that arose were used to adapt and revise the questionnaire. The corrected questionnaire was then pilot-tested (First pilot test) on twenty third-year students enrolled for Apparel Management at the University of Pretoria, for further refinements (e.g. the time it takes to complete) and to improve the reliability of the questionnaire.

The questionnaire was developed to get information from career women about a variety of aspects related to the stated objectives of the study. These included asking the career women about their satisfaction/dissatisfaction with the ready-made apparel available in the market place, testing their knowledge about the meanings of the size codes presented on the size labels/tags attached to the ready-made apparel, and about their own key dimensions as well as their own body shapes (communication of size and fit). It also questioned the career women on their fit preferences for differently fitted skirts and jackets. The questionnaire contained questions that were randomly arranged, but were originally derived from different sections, using different indicators as shown in **Table 4.2**.

TABLE 4.2: THE STRUCTURE OF THE QUESTIONNAIRE (SECOND PHASE)

SECTION		ASPECTS MEASURED	QUESTION NUMBERING	TYPE OF SCALES
1. Demographics		Age	Question 1	Nominal (Reporting)
		Background profession of the participants	Question 2	Nominal (Yes or No)
2. Career women's perceived fit problems		Rating fit quality of different categories of ready-made apparel sold in Kenya	Question 3	Five point Likert-type scale
		Rating fit quality of ready-made apparel sold in different retail stores in Kenya	Question 4	Five point Likert-type scale
		Career women's fit problems at critical fit points	Question 22	Nominal (Yes or No)
		Career women's satisfaction with ready-made apparel	Question 21	Five point Likert-type scale
		Perceived sources of fit problems	Question 20	Five point Likert-type scale
3. Career women's knowledge about communication of sizing & fit	Sizing issues (Key body dimensions)	Knowledge about reported own key dimensions	Question 6	Nominal (Reporting)
		Knowledge about reported own sizes	Questions 13 & 14	Nominal (Yes or No)
		Familiarity with size labels	Question 15	Nominal (Yes or No)
		Knowledge about the meaning of size labels	Questions 16 & 17	Nominal (Yes or No)
		Effectiveness of size labels	Question 18	Nominal (Yes or No)
	Fit issues (body shape)	Familiarity with body shape terms presented on the label/tag	Question 5	Nominal (Yes or No)
		Knowledge about the meaning of body shape terms presented on the label/tag	Question 5	Nominal (Reporting)
		Knowledge about sketched body shapes	Questions 7 & 8	Nominal (Reporting)
		Knowledge about reported own body shape	Question 7	Nominal (Yes or No)
		Techniques applied to establish own body shape	Question 9	Nominal (Yes or No)
		Knowledge about style selection for the reported own body shape	Question 12	Nominal (Yes or No)
		Preferred ideal body shape	Question 10	Nominal (Yes or No)
		Knowledge about own body proportions compared to those of the ideal	Question 11	Nominal (Yes or No)
4. Fit preferences		Fit preferences for differently fitted Jackets & skirts (fitted, semi-fitted & loosely fitted)	Question 19	Five point Likert-type scale

The questionnaire contained 22 questions, which were randomised to avoid biased responses as a result of closely related questions, and the explanatory sketches. Clear instructions were given for each question. Most questions were closed-ended, except where the respondents were required to self-report their year of birth (question 1), their key dimensions (question 6) and where they were required to give a brief description of the terms that represent different body shapes on size labels/tags (question 5), and to give a brief explanation of the sketched body shapes (questions 7 and 8). The closed-ended questions were specifically used because they are easier and quicker for the respondents to answer, as the response choices provided could clarify the meaning of the questions for them, while data-analysis is also easier. It is easy to code and analyse statistically and it permits easy comparison of different responses (Neumann, 2000:260-261). Varied scales were used to provide more flexibility in the design of items while making the questionnaire generally interesting. The reported answers permitted respondents to express themselves without any restriction. This enhanced the exploration of career women's knowledge about size and fit issues. Closed-ended questions were applied where a number of possible responses were reasonably obvious, with the predetermined response options in place.

For the purposes of data management and presentation of the results, all the questions had been pre-coded in advance. Although the questions were randomised in the questionnaire, the questions were derived from the four sections given below:

- Demographic information was to address factors such as the consumer's age, background and profession, as these might influence the purchasing decisions of the career women.
- Career women were asked to determine the fit quality of different apparel categories and apparel items that are sold in different retail stores. This was also to try and identify approximately where fit problems lie in Kenya's ready-made apparel, to evaluate career women's awareness of the critical fit points of their upper and lower torsos, to assess career women's satisfaction with the fit of the ready-made apparel and to explore career women's perceived sources of fit problems.
- Career women's knowledge about the communication of sizing and fit was tested to establish whether they were knowledgeable about the meaning of the size codes, the body shape terms presented on size labels/tags and about their key dimensions – all necessary for identifying their own sizes and body shapes.
- Career women's fit preferences were used to determine how the career women would prefer their skirts and jackets to fit their bodies. Questions were asked to determine how they would prefer differently fitted skirts and jackets (from fitted, semi-fitted to loosely fitted). This was to determine whether the career women's fit preferences were within the available styles and sizes in relation to their critical fit points (as their needs would affect the fit of the apparel if not in harmony with the critical fit points), and whether these needs are being catered for.

While in the field (in Kenya), the questionnaire was further pilot-tested (Second pilot test) on 10 career women between 28 and 40 years . This was purposely done to determine whether items were worded properly and specifically for the target people. A research assistant, who had knowledge about apparel and experience in textiles, was chosen and trained how to handle participants and administer the questionnaire. Both the researcher and the research assistant administered the questionnaires to a group of career women in one sitting, ensuring that no discussion took place between respondents. Any problems/questions that arose, as the respondents completed the questionnaire, were clarified and answered (Bless & Higson-Smith, 2000: 108-110). This method of data collection had the advantage of time- and cost-effectiveness, because the groups of respondents were handled at the same time, and exposed simultaneously to the same stimulus material (Delport in De Vos, 2002:175). Three hundred and one (301) questionnaires were administered, but only 201 (67%) were returned and could be used. Although all the questionnaires were administered, about 50% of the questions in 100 questionnaires were left blank, thereby forcing the researcher to consider them spoilt and not include them in the data analysis.

Mouton (1996:107) refers to the recording of data as a form of quality assurance prior to the fieldwork. Therefore, the questionnaire (**Appendix 1A**) was divided into two sections for the purposes of edge coding. The larger section was to be used by the respondents, while the smaller sections contained numerical coding in the margins for official use (Babbie & Mouton, 2001:415-416).

4.6 DATA ANALYSIS

4.6.1 Data obtained from phase one

4.6.1.1 Data obtained from career female's body dimensions

The researcher ensured that the body dimension forms were all available and complete without any missing data (Neumann, 2000:419). Mouton (1996:107) refers to the recording of data as a form of quality assurance; thus prior to the fieldwork, the body dimension form was divided into two sections for the purposes of edge coding. Larger sections contained the list of body dimensions to be obtained, while the smaller sections contained numerical coding in the margins for official use (**Appendix 3A**). On the official sections of the body measurement form, blank spaces were left to facilitate the eventual data entry and computing (Babbie & Mouton, 2001:415-416).

The captured data was compared with every completed body measurement form to ensure that the information of each measurement form was correctly captured. Mistakes and errors that emerged were managed and cleaned up (Babbie & Mouton, 2001:41). After the data cleaning and management were done, the useful data was statistically analysed using appropriate statistical methods. Statistics used were descriptive methods that integrated simple percentiles to combinations of uni-variate and bi-variate. Un-ivariate analysis refers to the analysis of one variable at a time. Example is a frequency/percentage table (Bryman & Bell, 2007:357). Bi-variate analysis is concerned with the analysis of two variables at a time in order to uncover whether or not the two variables are related (Bryman & Bell, 2007:360). These analyses were employed for the purposes of dividing the study population into subgroups. The data was normalised, giving ranges of two standard deviations either side of the mean value, which covered 95% of the population where applicable. This removed the extreme dimensions in a range, which could cause distortion. The mean values ± the standard deviations (SD) facilitated the classification of height groups (short, medium and tall), and the body shape categories of distinct characteristics (small, medium and large). The medium categories were classified by “Mean ± SD”. Values above the “Mean ± SD”, were classified as large, whereas values below the “Mean ± SD" were classified as small. Beazley (1998:269) and Gupta and Gangadhar (2004) applied descriptive statistical techniques in their studies. Chi-square tests and Pearson’s correlation coefficient were also used for hypothesis testing and for the correlation of measurements.

A literature search was done to identify descriptive parameters to define the five prevalent shapes (hourglass, triangle, inverted triangle, apple and rectangular), for the purposes of setting up standards within the maximum and minimum dimensions of the drop values. The drop values used were the difference between the bust and the hip dimensions and the difference between the bust and waist dimensions. Since the five main body shapes only served as guide for the purposes of identifying the body shapes in this study, it was not possible to classify body shapes using the concept of “Mean ± SD”, because the rule allows classification into only three categories (small, medium and large). However, Shin and Istook (2007) report that the waist measurement for the rectangular shape is nine inches (23 cm) less than the bust. Rasband and Liechty (2006:25-26) state that the waist of an hourglass body shape measures more than 10 inches (25 cm) less than the hip or the bust. Using the range (maximum and minimum) dimensions of the drop values within the context of the anthropometric data of this study, in combination with the recommendations of Shin and Istook (2007) and Rasband and Liechty (2006), it was possible to identify the different body shapes of this study.

To process the data in a logical and direct meaningful manner, the first printouts were converted from a random order to a grouped height order, as body height has been reported as one of the control dimensions for most apparel (Winks, 1997; Gupta & Gangadhar, 2004). The data was then re-arranged into the different body shapes within the range of drop values. The drop values of the bust and the hips facilitated the identification of triangle and inverted triangle body shapes, while the remaining body shapes (rectangle, hourglass and the apple) were identified by the drop values of bust and waist dimensions (the difference between the bust and the waist dimensions). Hip-bust drop values were used to establish the sizes of the hips and bust in relation to each other for the purposes of sorting out the inverted triangle shapes and the triangle shapes respectively. Drop values or key dimensions are considered to be the best predictors of all the other body dimensions and have been widely used for body shape classifications (Winks, 1991:74; Gupta & Gangadhar, 2004; LePechoux & Ghosh, 2002:20).

The descriptive statistics*:* Descriptive statistics describe basic features of the data, providing simple summaries about the sample and the measurements (Kranzler, 2007:48). They provide a powerful summary that enables comparison across different variables (Trochim, 2005:212:212). It uses the range value to measure the dispersion of variables. The mean value measures the central tendency, and the standard deviation summarises the dispersion by calculating the amount of deviation from the mean value (Bryman & Cramer, 1997:80; Bryman & Bell, 2007:357). The standard deviation used in conjunction with the mean, reflects the degree to which the values in a distribution differ from the mean, and summarises the amount of dispersion in a distribution (Bryman & Cramer, 1997:85). Height, for example, can be summarised/categorised into different groups based on the means, standard deviations and the range values obtained from the height dimensions. The population can be classified into: Short = < (Mean ± SD), Medium = (Mean ± SD), and Tall = > (Mean ± SD) – as done by Winks (1991), Beazley (1998); and Gupta and Gangadhar (2004) in their studies.

4.6.1.2 Data obtained from the career female's photographs

- **Development of female body shape assessment formula**

Body shape analysis is the theoretical underpinning for the development of apparel sizing systems (Connell *et al*., 2006). In order to identify and sort the most distinctive body shapes from the sample data, digital photographs served as stimulus material to allow for analysing and sorting them by a trained panel of evaluators. This was done through visual sensory evaluations done in five different steps. Sensory evaluation is the assessment using human good judgement with the sensitivity of human senses. It implies the evaluation of selected characteristics of a product under controlled conditions by a panel of judges (ASTM, 1981:3; Leibowitz & Post, 1982:4; Lyon, Menneer, McEwan, Metheringaham & Lallemand, 2000:1). The use of panelists as measuring devices is perceived to be similar to the use of any scientific strategy to bring out the dimensions of specific subjects under investigation (ASTM, 1981:3; Leibowitz & Post, 1982:9).

The testing methods of evaluation are based on the concept of *difference threshold*, which is the least amount of stimulus change that is detectable to human assessment (Ashdown & DeLong, 1995). A stimulus is defined as any chemical or physical activator, which causes a response in a receptor (ASTM, 1968:7). An effective stimulus produces a sensation, the dimensions of which are quality, intensity, and extension – among others. For this particular study, the difference threshold implied the differences in size and shape of the body shapes' components that appeared different from the characteristics of the Western established female body shapes. Visual sensory evaluation provided an orderly framework to evaluate perceived physical characteristics within different body shapes. In order to ensure the utmost validity and reliability of this method of study, the quality of the evaluators, the assessment procedure, assessments scaling as well as methods of analysis were carefully considered. The following steps were carried out to ensure that the outcome of this study, which involved categorising preliminary subgroups with similar body shape characteristics, were reliable and valid. In order to ease and make the evaluation process easy and faster, the first three preliminary steps were done entirely by the researcher with assistance from computer technical assistant. This was done to make the images simple and as clear as possible to facilitate ease and quick assessments later by the trained professional evaluators.

First step (preliminary - done by the researcher)**:** There is no known research that has been carried out on Kenya's female body shapes. Therefore, this being a virgin study on female body shapes, the researcher subjected all the photographs to a thorough scrutiny by examining and studying each body shape's components from the front, back and – more critically –the side view. Using the Western established body shapes (**Figure 4.8**) as point of departure and as a launching ground for this study (Rasband & Liechty, 2006:25), the researcher and the study leaders were able to identify a distinct (rectangular) body shape (**Figure 5.5** in **Chapter 5**) appearing to contain a long torso and strong features – and to take note of those characteristics that differ from the Western established body shapes. The body shapes provided were compiled, based on descriptions as well as illustrations found in: Harper and Lewis (1983: 29, 31); Salusso-Deonier (1989:373); Zangrillo (1990); Rasband (1994:12-13); Armstrong (1995:33); Spillane (1995:33); Fiore and Kimle (1997); Kuma (1999:65-68); Connell *et al*. (2003); Simmons, Istook and Devarajan (2004a); Devarajan and Istook (2004), and Rasband and Liechty (2006:23-29).

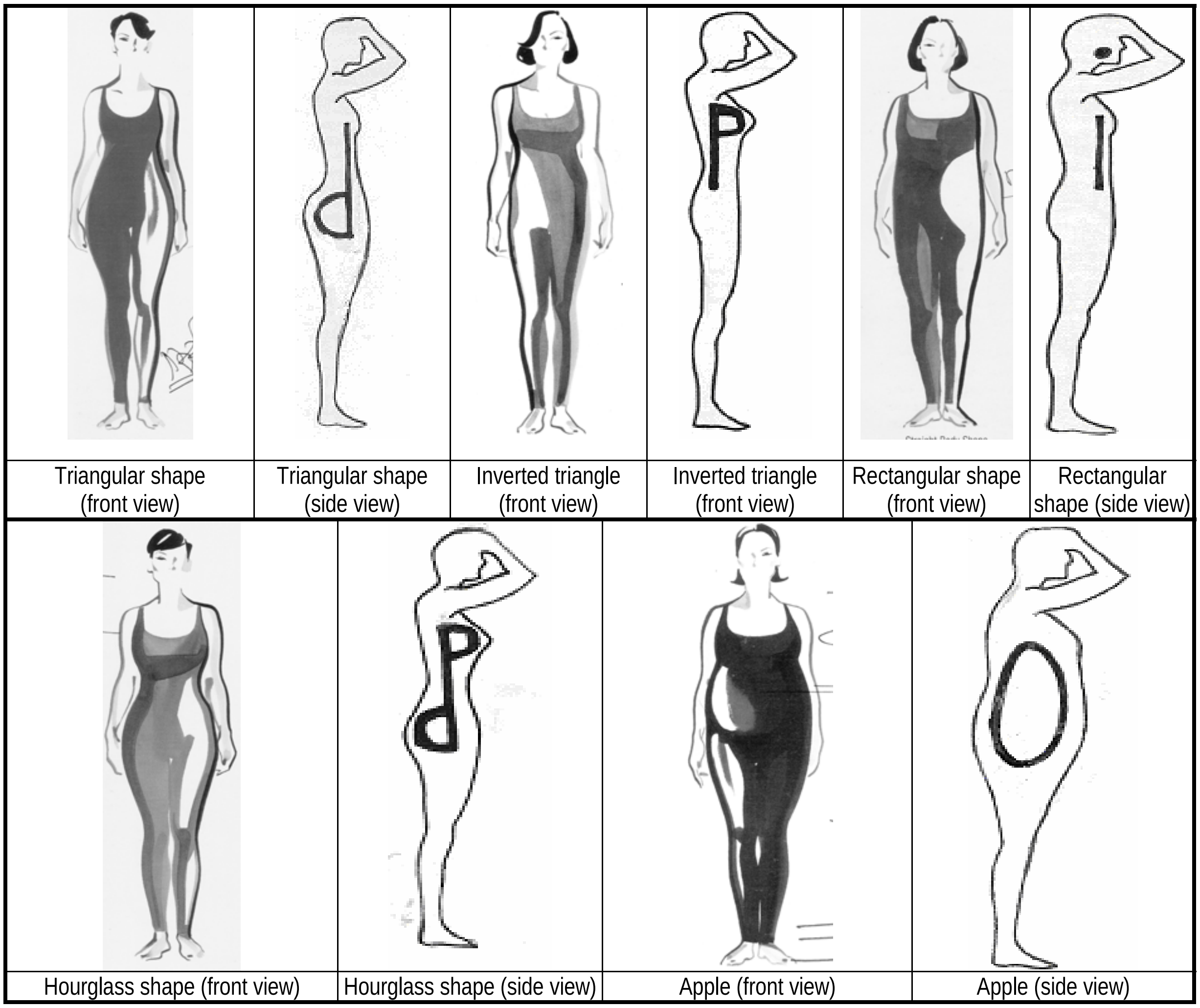
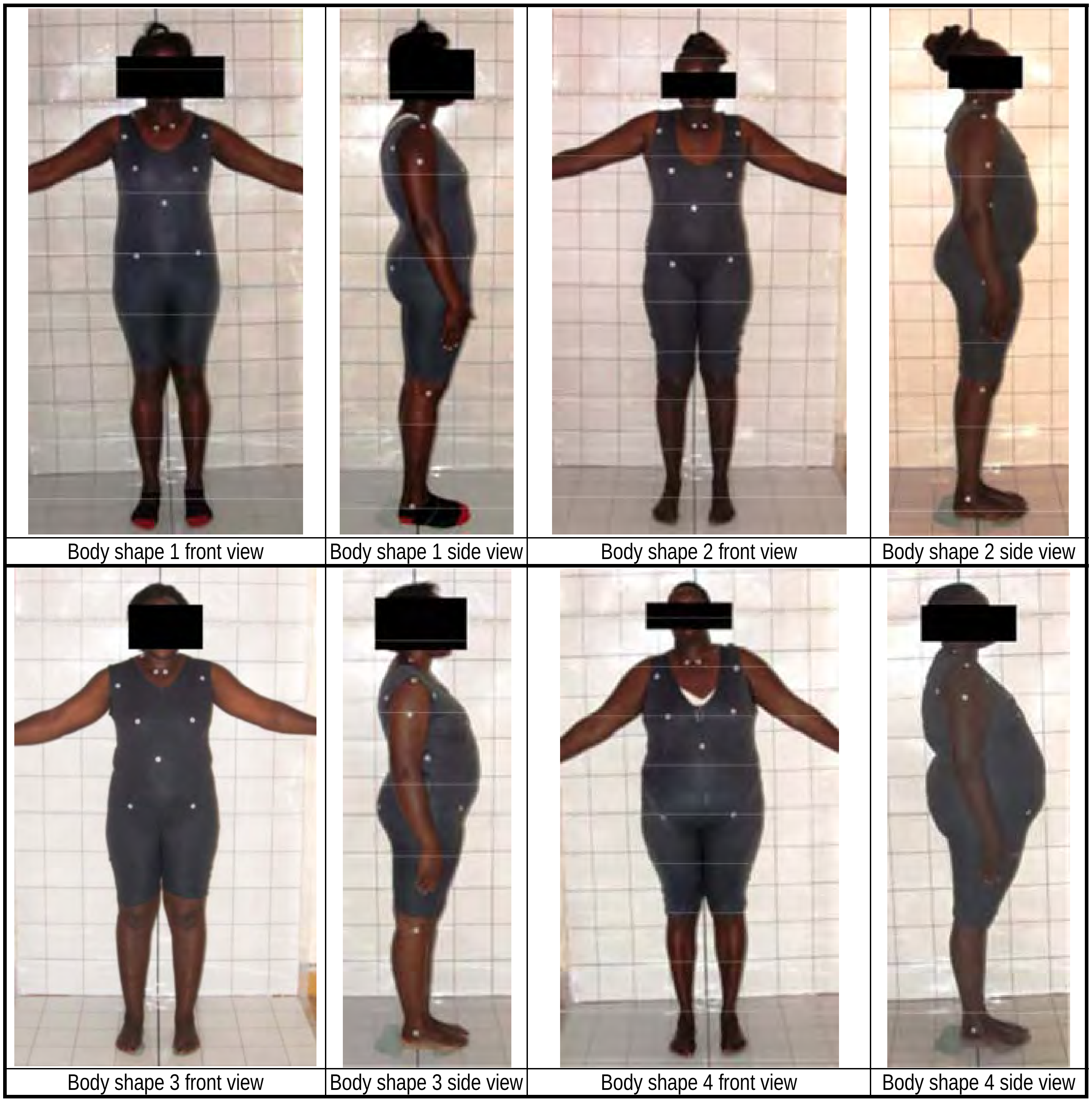


FIGURE 4.8: ESTABLISHED BODY SHAPES IN WESTERN SOCIETY

Body characteristics that were uncommon for the Western established rectangular shapes, were the thigh bulge that seemed to be situated at approximately two inches below the normal hipline (trochanterion position), the strong (rounded) upper shoulder blades and strong buttocks, contributing to a deep hollowed back waist. The stomachs appeared like a strong block extending from just below the bust to below the waistline, down to the crotch line region at the front (**Figure 4.9**).



Body shape 1 front view | Body shape 1 side view | Body shape 2 front view | Body shape 2 side view

Body shape 3 front view | Body shape 3 side view | Body shape 4 front view | Body shape 4 side view

FIGURE 4.9: UNREFINED PHOTOS

Second step (preliminary - done by the researcher): From the raw photographs, it was almost impossible to extract all the details as exhaustively as possible. The researcher, with the help of the computer Microsoft Office photo editor, was able to get the photographs edged, as shown in **Figure 4.9**. This permitted a clear outline of the body for more additional scrutiny. From the negatives and the edged shapes, pronounced details such as a stomach shape from just below the waistline (appearing as the letter “b”), to another shape with more weight concentrated below the waistline (and appearing more like the letter “D”), and to shapes where the weight extended from above and below the waistline to the crotch at the centre front. The back shape became clearly outlined, ranging from a less hollow waist to a sharp deep hollow at the back waist (lordosis), depending on how rounded the upper shoulder blades and the depth of the buttocks were (appearing like the letter "d" when they conspicuously protrude beyond the rest of the body).

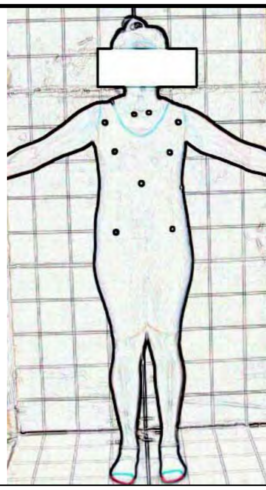
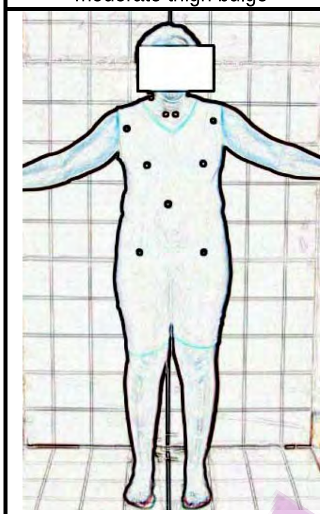
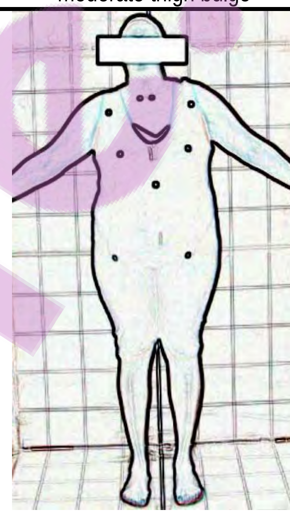
			
Body shape 1, front view. Rectangular shape, no waist indentation and a noticeably moderate thigh bulge	Body shape 1, side view. Rounded upper back, hollow waist, "d" buttocks and "D" stomach	Body shape 2, front view. Rectangular shape, little waist indentation and a noticeably moderate thigh bulge	Body shape 2, side view. Less rounded upper back, hollow waist, "d" buttocks and "D" stomach
			
Body shape 3 front view. Rectangular shape, no waist indentation and a noticeably moderate thigh bulge	Body shape 3 side view. Rounded upper back, less hollow waist, "d" buttocks and extreme "D" stomach	Body shape 4 front view. Rectangular shape, no waist indentation and a noticeably moderate thigh bulge	Body shape 4 side view. More rounded upper back, hollow waist, "d" buttocks and extreme "D" stomach

FIGURE 4.10: EDGED PHOTOGRAPHS

***Third step (preliminary - done by the researcher with assistance from computer technical assistant)*:** The IGRAFX Designer 5 software was used to extract only the important characteristics that were identified in the first and the second steps above. This decision was reached for the purposes of developing preliminary subgroups with similar characteristics. With the help of an expert in computer apparel/pattern design, each individual picture was copied into Adobe Photoshop CS. The resolution was increased to 762 pixels per square inch and the pictures were saved as *.bmp (bitmap) files so as to improve the quality and to make them manageable while being manipulated when drawing and extracting specific characteristics. With the use of IGRAFX Designer 5 software, the software scale was set to 1cm = 5 cm, and 1cm by 1cm grid-lines were drawn over the blank page. This page was saved as a template. The pictures were then imported individually onto the blank template in IGRAFX Designer 5 and saved as *.dsf (designer) files. The picture size was then reduced and the pictures were manipulated by means of rotation so that the grid-lines on the template and the grid-lines on the pictures matched perfectly.

With the use of the dimension tool in IGRAFX Designer 5 software, the measurements between specific points that were predetermined by the researcher were drawn in. White lines were used in drawing and marking specific points because the background was dark, and thus a lighter colour was used for visibility reasons. All the markings and drawings made were scaled as shown in **Figure 4.11**, to assist in the proportional comparisons and assessments to be made later. The picture was then manipulated by means of rotation back to its original position. The picture and all the measurements were selected and then re-exported and saved as a *.jpg (jpeg) file. The compound line tool in IGRAFX Designer 5 software was used to make the silhouette outline. The designer technician used the picture with the measurements and drew the silhouette over it, and then extracted that silhouette to an open space on a blank page template as shown on **Figure 4.11**. This was then exported and saved as a *.jpg (jpeg) file. These steps were done on all the pictures' views of back, front and side. Once all the pictures were completed, the *.jpg (jpeg) files were then re-inserted into Microsoft Word 2003 for accessibility and presentation in a versatile format.

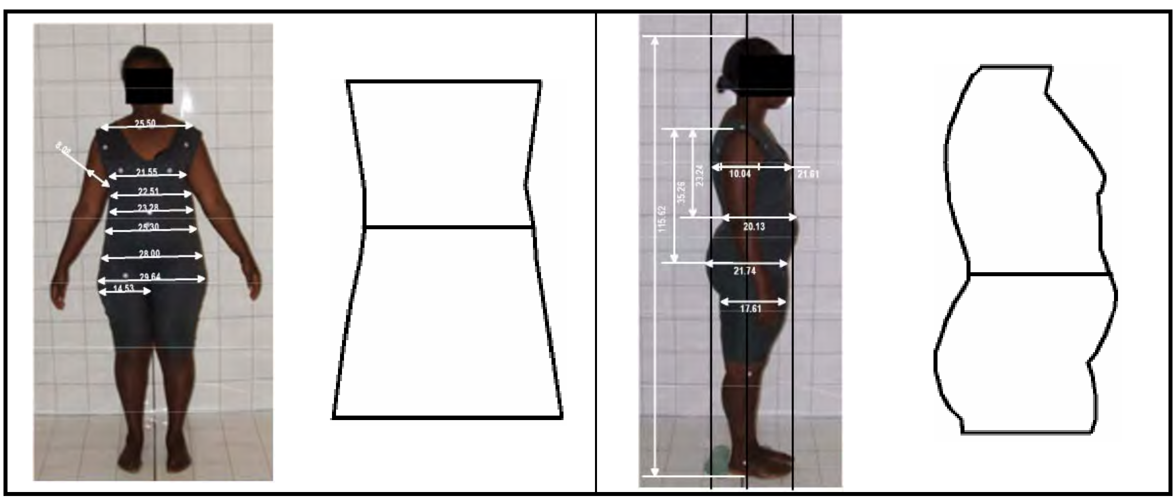


FIGURE 4.11: SILHOUETTES EXTRACTED BY IGRAFX DESIGNER 5 SOFTWARE

From Photoshop, it was easy to evaluate each shape (photo) and assign it to one of the five prevalent body shape categories (rectangle, hourglass, triangle, apple and inverted triangle). The researcher prepared a comprehensive training manual and a body shape assessment scoring sheet/scale to enhance trustworthiness and reliability of this study (evaluations of the photographs). It was reasoned that accuracy in evaluations could be achieved if there were some form of agreement between different evaluators and if they worked according to a uniform method of assessment. Standardisation would be achieved once the universal body shapes' characteristics were identified and well understood. The development of the training manual was therefore necessary to facilitate some form of uniformity and standardisation between different evaluators in their assessments of the body shapes. According to Fan (in Fan *et al*., 2004:28), assessors who do subjective assessments may have different internal assessment scales to rate an observation; therefore, it is vital to train them so as to bring each member of the panel as near to the same, standard scale as possible. Based on a thorough literature search and the outcomes of the preliminary preceding steps of the female body shape assessment formula, it became possible to develop a comprehensive training manual for the purposes of developing an assessment scale (**Appendix 3D**).

- **Evaluating females' body shapes by professional evaluators**

Slater (1997) highlights that in subjective assessment, results could be affected by factors such as the subject's personality, skills, state of mind and health. In order to ensure utmost validity and reliability of this method of study, the quality of the evaluators, the assessment procedure, the assessment scaling and the analysis methods were carefully considered. It has been pointed out that using trained professional assessors ensures that the differences perceived are smaller (Slater, 1997). An expert panel in a testing atmosphere works as a sensitive test instrument, capable of providing valid and reliable responses to the sensations being studied (ASTM, 1981:5). This implies that well-trained professional evaluators would give more reliable judgements.

Three judges are recommended for reliability in any subjective assessments only, if visual parameters are established and clearly defined for the judges (AATCC, 1999; Fan & Liu, 2000: Lyman-Clarke, Ashdown, Loker, Lewis & Schoenfielder, 2005). The training and the subsequently developed assessment scale, in this case, set out clearly defined body characteristics, which served as visual parameters. In this study, two professionals in the field of apparel design and manufacture were believed to be experts and qualified enough for the assessment of the body shapes in this study. Their professional experience ranged from 14 to 25 years of field experience, respectively. However, as both evaluators were experts in apparel design and manufacture, which involves an understanding of the human figure and translating it into apparel, each evaluator independently studied the training manual and practised with similar stimulus material (sample photos). This helped them to understand the clearly defined visual parameters necessary for the assessment of the images. The professional evaluators later met to resolve any misunderstanding arising from the training manual and to develop an assessment scale sheet (scoring sheet). This provided a standardised and sequential way of assessing and recording evaluations of the photos.

Development of an assessment scale/sheet: According to Trochim (2005:49), measurement is a process of observing and recording the observations that are collected as correctly and precisely as possible. However, the measurements must be both reliable and valid. Having consulted the comprehensive training manual and the literature on female body shape scales (Armstrong, 1995; Rasband & Liechty, 2006:19-30; Connell *et al*., 2006:80-94), the two professional raters in collaboration with the researcher, developed the assessment scale (**Appendix 3D**). It has been reported that an assessment scale – like any other measuring instrument – should be devised very carefully, ensuring that all the important elements of the study are well covered to ensure its reliability (Fan in Fan *et al*., 2004:28). The assessment scale/scoring sheet covered all the areas of the female body shapes' characteristics that were deemed critical to the fit of ready-made apparel (all that emerged in the preceding steps).

For the purposes of inter-rater reliability, and due to uncertainty in deriving a valid scale, the researcher and the evaluators decided to use ordinal measurements for all the items where attributes such as small, medium and large were assigned points according to the order of their sizes. A point system was used (1 = small, 2 = medium, 3 = large and 4 = extra large). In cases where assessors were unable to differentiate between two attributes (choices given in the assessment form), they could select an adjacent choice, which is still close to the actual choice. If evaluators were to differ in agreement between attributes (choices given), they would do so because adjacent choices are not far from each other (Connell *et al*., 2006; Fan in Fan *et al*., 2004:28-30).

Evaluation of female body shapes using the assessment scale: With the use of the evaluation guiding principles highlighted in the training manual and the assessment scale, the two trained professional experts evaluated all 89 sets of photos within 7 to 14 days. The data was analysed and inter-rater reliability tests were performed using Kappa statistics, to estimate the degree of consistent agreement between the two raters. After inter-rater reliability tests and data analysis had been done, it was observed that the degree of consistent agreement between the evaluators had Kappa values that ranged from 0.2 to 0.9. Landis and Koch (1977) suggest that Kappa values of 0.00 reflect poor agreement, 0.01-0.20

slight agreement, 0.21-0.40 fair agreement, 0.41-0.60 moderate agreement, 0.61-0.80 substantial agreement, and 0.81-1.00 almost perfect agreement. In this study, it was decided to use a Kappa value of 0.75 as the cut-off point for acceptable agreement. This implied that all the evaluations with Kappa values of > 0.75 were accepted, while evaluated attributes with < 0.75 agreement were rejected on condition that they were to be further subjected to a professional group of experts' evaluations for a final decision. The group of experts comprised three professionals who are experts in apparel design-related careers. Their respective professional experience in the field of apparel design ranged from 10 to 20 years, which ensured the reliability of their judgements.

Before the professional group of experts evaluated the photographs, they underwent one day's training on female body shapes evaluation techniques, using the comprehensive training manual and the assessment scale/scoring sheet. During the training session, they used similar stimulus material (sample photos) for practice. The training was to ensure that they fully understood the sensory tests that they had to perform, and that they were familiar with the specific knowledge required to actually perform the tests correctly. The training was also aimed at improving their ability to recognise and identify the sensory attributes within the body shapes, thus determining a level of consistency in evaluating visual differences which may have escaped the first two expert evaluators (ASTM, 1981:18; Leibowtz & Post, 1982:3, Bye & DeLong, 1994:5; Lyon *et al*., 2000).

The attributes that emerged with poor inter-rater reliability and were further subjected to the professional group of experts for re-evaluation, were: the overall body shape's identity, the bust size/shape, the back curvature, both the hollow waist region and the rounded upper section of the body, the shoulder slope and the two stomach shapes ("**D**" and "**b**"). Where there was no agreement at all, all the members resolved the conflicting ratings and final decisions were made. The bust shape/size and the stance of the figures proved difficult to assess for all the members, and therefore it was decided to eliminate them from the study to avoid biased results. The technique of using a professional group of experts for the assessments and identifying of body shape and body characteristics has been applied in similar studies such as the ones by Kuma, (1999); Lyman-Clarke *et al*. (2005) and Connell *et al*. (2006:85-86).

***Data analyses from the assessment scale*:** The scoring sheet had two sections to be used by the evaluators and an official section with blank spaces corresponding to numerical variables in the margins to facilitate the eventual ease of data entry and processing by the computer (Babbie & Mouton, 2001:415-416). Scores obtained from the judges' ratings were entered in the corresponding blank spaces provided in the official section. The captured data was compared with every completed assessment scale form to ensure that the information of each questionnaire was correctly captured. Mistakes and errors that emerged were managed and cleaned up (Babbie & Mouton, 2001:410-412; Trochim, 2005:211).

Quantifying the qualitative data from the scoring sheet, the last question in the assessment scale/scoring sheet was semi-structured with pre-formulated questions that would summarise the whole assessment scale. The panellists defined visual parameters of size and form for the different females' figures, measured their physical properties and assigned each body shape to a category, based on the five prevalent body shapes (hourglass, rectangle, apple, inverted triangle and triangle) obtained from the literature. The assignments were done in a qualitative sense through verbal descriptions, incorporating profile characteristics that were common among the photos. These were used later to facilitate comparison between the distinct body shapes emerging from the sample data and the prevalent Western body shapes. The stimulus materials (photographs in different views), already pre-coded using two-digit numbers, were described in terms of the body's characteristics critical to apparel's fit. Although data analysis is a challenge in the qualitative paradigm, the last question of the assessment scale was a summary of the preceding questions, and therefore categorising the descriptions was made easy based on the previous existing terms within the scale. These descriptions were edited and encoded so as to eliminate any errors before placing them into meaningful categories, to facilitate easy tabulation and interpretation while computing.

The inter-rater reliability tests were performed to establish the degree of consistency of agreement between the two evaluators, and so to measure or assess the reliability and trustworthiness of the study. The value of a reliability estimate should indicate the proportion of variability in the measure attributable to the true score. A reliability score of 0.5 would indicate that about half of the variance of the observed score is attributable to truth and half is attributable to error (Trochim, 2005:62). According to Rust (2001), using percentages between judges is not the best method, as it allows some agreement to occur by chance, and if the numbers of categories were fewer, it would even make reliability appear better than it really was. Therefore the Kappa coefficient of agreement between the two raters was calculated as recommended by Rust (2001), to determine the reliability or consistency of agreement between the raters. The results showed Kappa values that ranged from 0.24795 to 0.9460, indicating very poor to very strong inter-rater reliability between the two raters (Landis & Koch, 1977). Significance tests with Kappa ($p < 0.0001$) suggested that there was no complete disagreement between the two evaluators. As earlier discussed, where the inter-rater reliability was below the Kappa value of 0.75, the researcher decided to subject them to the professional group of experts' evaluations.

The Kappa statistics: Kappa measures the percentage of data values in the main diagonal of the table and then adjusts these values for the amount of agreement that could be expected due to chance alone (Landis & Koch, 1977; Simon, 2005). It provides a measure of inter-rater reliability by focusing on the diagonal variables in a table to see whether it contains more counts than is expected by chance (Dixon, 1992:286). It compares the agreement against that which might be expected by chance. Kappa can be thought of as the chance minus the corrected proportional agreement, and its possible values range from +1.00 (perfect agreement) via 0.00 (no agreement above that expected by chance) to –1.00 (complete disagreement) (Chuang, 2001). Reliability with Kappa statistics is essentially the extent of the agreement between repeated measurements, and validity is the extent to which a method of measurement provides a true assessment of that which it purports to measure. The following formula was used in this study. Statistical significance associations of Kappa is based on a zero (complete disagreement between the two evaluators), thus there is high or significant correlation when the p-value ≤ 0.05.

$$\textbf{Kappa} = \frac{(O - C)}{(1 - C)}$$

O = Observed agreement, C = Chance agreement

- **Operationalisation for phase one**

The central concepts on the identification of body shape were expressed in the research framework, and the theoretical definitions for the concepts concerning females' body shapes and apparel fit implications were given in **Chapters 2** and **3**. The concepts related to the identification of body shape were also indicated clearly on the body measurement form, the photographing guidelines (**Figure 4.6**) and the body shape assessment scale. Theoretical clarity and descriptions of the relevant concepts help to facilitate the development of measures or activities that allow the researcher to observe the construct empirically (Neumann, 2000:160; Babbie & Mouton, 2001:128).

It was also important to assess the pattern of prominent body shapes' characteristics, such as the rounded upper back, hollow back waist and the stomach shape between different age groups (Objective 3). Chi-square tests and Fisher's exact statistical testing of hypotheses were performed; where the null hypothesis (H_o) states that there is no significant association between prominent body characteristics and age group (young adults of 25–32 years, middle-aged 33–40 years, and mature 41 and above). The alternative hypothesis (H_a) states that there is a significant association between prominent body characteristics and age group (young adults, middle-aged and the mature). Acceptance of the alternative hypothesis would indicate that prominent body shapes' characteristics among different age groups differ and hence their apparel fit needs would also differ.

Table 4.3 on the next page indicates how the primary objectives and successive sub-objectives for phase one were operationalised.

TABLE 4.3: OPERATIONALISATION OF PHASE ONE DATA IN TERMS OF PRIMARY OBJECTIVES, SUB-OBJECTIVES AND STATISTICAL METHODS

<table>
<tr><td colspan="4"><u>Primary objective 1</u>
To identify and describe distinctive female body shapes of career women in Kenya from body dimensions and photographs</td></tr>
<tr><td colspan="2">Sub-objectives</td><td>Null Hypothesis</td><td>Statistical analyses</td></tr>
<tr><td>1.1</td><td>To identify and describe distinctive female body shapes of career women in Kenya from the body dimensions</td><td>There will be no significant association between bust size from bust extensions' dimensions and cup sizes.</td><td>Descriptive statistics, uni-variate, bi-variate, means, standard deviations, and range values.

Hypothesis testing was not possible due to sparse cells in some categories; therefore, descriptive methods (frequencies and percentages) were used.</td></tr>
<tr><td>1.2</td><td>To identify and describe distinctive female body shapes of career female in Kenya from photographs</td><td>There will be no significant associations between one evaluator's assessment concerning body shapes and body characteristics, and the other evaluator's assessments of body shapes and body characteristics.

There will be no significant associations between the distinctive body features and the age group of the career women.</td><td>Trained experts' sensory (visual) analyses, inter-rater reliability using Kappa statistics. Professional group of experts' evaluations were used where the Kappa value was < 0.75.

Hypothesis testing was done at a 5% level of significance.</td></tr>
<tr><td>1.3</td><td>To establish and describe associations between the distinctive shapes emerging from body dimensions and those emerging from the photographs of the career women</td><td>There will be no significant associations between the distinct body shapes emerging from body dimensions and those emerging from the photographs.</td><td>Hypothesis testing was not possible due to sparse cells in some categories; therefore, descriptive methods (frequencies and percentages) were used.</td></tr>
<tr><td colspan="4"><u>Primary objective 2</u>
To distinguish and describe differences between the emerging distinctive body shapes (from measurements and photographs) and the Western distinctive body shape.</td></tr>
<tr><td colspan="2">Statistical analyses</td><td colspan="2">Descriptive methods (frequencies and percentages)</td></tr>
<tr><td colspan="4"><u>Primary objective 3</u>
To scrutinise and describe the implications for apparel's fit associated with the emerging distinctive body shape of the career women</td></tr>
<tr><td colspan="2">Statistical analyses</td><td colspan="2">Descriptive methods (frequencies and percentages)</td></tr>
</table>

4.6.2 Data obtained from the second phase of the study (Questionnaire – Objectives 4, 5 and 6)

The researcher ensured that the questionnaire transcripts were all available and usable, as suggested by Neumann (2000:419). The questionnaires were coded manually and the data was then electronically entered and captured at the Department of Statistics, University of Pretoria.

The captured data was compared with every completed questionnaire to ensure that the information of each questionnaire was correctly captured. Mistakes and errors that emerged were managed and cleaned up. Babbie and Mouton (2001:417) state that “no matter how or how carefully the data has been entered, some errors are inevitable”. Although efforts were made to avoid errors arising from the data, it was not possible to eliminate them completely. All the coded data was entered into the computer. This enabled the researcher and the statistician to pinpoint errors and eliminate them. Most of the errors found were as a result of incorrect coding and incorrect reading of written codes on the questionnaires. Babbie and Mouton (2001:417) highlight two possible types of cleaning that may be undertaken, namely possible-code cleaning and contingency cleaning. For this particular study, both cleaning methods were applied.

Possible-code cleaning: Question 5 needed two answers (**Appendix 1A**). Participants were asked to report whether the terms provided (junior, junior-petite, women’s, women’s petites and misses) were familiar to them, and they had to give an answer in one section and to give the meanings of the terms in the adjacent section. The variables for this question were the familiarity of terms, which was coded with 1, and the meaning of the size label terms, which were coded with 1 (for correct answer) and 2 (for incorrect answer). The third option of “none of the above is familiar” was coded with 3. The three different codings got mixed up, with 3, 2 and 1 entered in the wrong places. The distribution of responses to each item in the data was examined, the problem identified and the necessary corrections were made.

Contingency cleaning: Question 1 (**Appendix 1A**). The year of birth was to be coded as it was reported. The study was limited to career women aged between 25 (career starting point) and 55 (age of retirement). Out of 201 questionnaires administered, the following years of birth emerged from the data, 1982 (23 years), 1985 (20 years), 0 years and 1987 (18 years). Considering the age limits set for the study and having conducted the research, there was nobody among the participants who appeared under-age or over-age within the set limits of this study. It was assumed that respondents did not want to disclose their ages. In this case, all the affected ages were excluded from the study because age, as demographic factor in this study was not the main focus of the study, therefore it was reasoned that it would not significantly affect the results. There were other cases where age was left blank completely, so these were treated as blank also. All the necessary changes were made and data that was not applicable for the present study was ignored.

Data management is important because it is done to enable the researcher to organise and bring meaning to large amounts of data (Bailey, 1994:339; Miles & Huberman, 1994: 428-430). It becomes pointless if one cannot understand the data presented, thus the necessity to actually simplify and refine the information by summarising the data into few, but holistically legible/interpretable categories (Babbie & Mouton, 2001:428). Collapsing or combining categories that have a very close denotation when interpreted, could achieve more legible and interpretable presentations. If the information to be reported does not essentially require precise difference between two terms that have very close connotation such as "very good" and "good", it would be wise to combine the two terms for the purposes of simplifying the presentation further (Babbie & Mouton, 2001:430). The terms used in this study with close connotation and where it was felt that their precise differences did not matter in the presentation, were combined. Those terms included: "excellent" and "good" in questions 3 and 4 of the questionnaire, "extremely effective" and "effective" in question 18 of the questionnaire, "more often" and "often" in question 19 of the questionnaire, "strongly agree" and "agree" in question 20 of the questionnaire, and "most frequent" and "frequent " in question 21 of the questionnaire. The initial five-point scales were then collapsed into four-point scales after the related variables were combined.

Babbie and Mouton (2001:429) suggest that it would be advisable to give respondents the option of saying, "don't know" or "no opinion". However, in cases where knowledge was being tested as in questions 5-8, 11-14, 16 and 17 of the questionnaire, the option of "don't know" was provided, but some respondents decided to leave the question unanswered. In such cases, the researcher decided to combine all the "don't know" options together with the blanks and they were all treated as "don't know". The reduction and streamlining of the data were done for the purposes of greater clarity. To facilitate meaningful conclusions, brief and precise, systematic presentations of legible and essential data that represents only the objectives and concepts of this study, were used. All the necessary changes were made while data that was deemed not applicable for the present study was ignored. Nonetheless, detailed raw data and tables of the entire questionnaire are available as hard and soft copies in the researcher's data files, while electronic versions are also available in the database of the Department of Statistics, University of Pretoria.

After data cleaning and management were done, the data was statistically analysed, using appropriate statistical methods. Descriptive statistics (frequency distributions) were used to describe basic patterns and the relationships among variables. They were used to summarise and organise sets of sample observations for easier comprehension. Pearson's correlation coefficient was used to establish meaningful associations between variables such as reported body key dimensions with the actual measurements obtained from the participants. Chi-square and Fisher's exact tests were used interchangeably to investigate significant associations between two categorical variables.

4.6.2.1 Explanations of statistical methods used for the second phase

The choice of statistical measures in a given circumstance depends on the number of variables involved, the measurement scales used and the nature of the relationships between variables (Agburu, 2001:85). The ultimate goal of most statistical tests is to evaluate the observed relationships by comparing them to the maximum imaginable relationship between those specific variables – comparing what is common in those variables to what potentially could have been common if the variables were perfectly related (Mamahlodi, 2006). In this study, the SAS statistical program, which calculates exact probabilities for each statistic, was used for all the statistical analyses carried out. The exact probabilities can be directly compared to the 0.05 cut-off value, with a p-value ≤ 0.05 indicating statistical significance.

The statistical significance of a result is the probability that the observed relationship (e.g., between variables) or a difference (e.g., between means) in a sample occurred by pure chance ("luck of the draw"), and that in the population from which the sample was drawn, no such relationship or difference exists. In other words, stating the statistical significance of a result tells us something about the degree to which the result is "true" (in the sense of being "representative of the population") (Babbie & Mouton, 2001:487). The value of the p-value represents a decreasing index of the reliability of a result; the higher the p-value, the less we can believe that the observed relationship between variables in the sample is a reliable indicator of the relationship between the respective variables in the population. A p-value of 0.05 is customarily treated as a "border-line acceptable" error level (Ryan, 2005). Due to the exact probabilities calculated by the SAS computer program, it was not necessary to determine critical values for the statistics (Chi-square, Pearson's correlation coefficient and Kappa) applied in this study. However, brief explanations on how each of the statistical methods brings about the results, are given below.

Chi-Square statistics: A Chi-square (X^2) test is used to investigate whether distributions of categorical variables differ from one another as it compares the tallies or counts of categorical responses between two (or more) independent groups. It evaluates the significance of the discrepancy between the observed and expected results in research, and it assumes that the participants were randomly selected and that the expected frequencies are not very low. Chi-square tests can only be used on actual numbers and not on percentages, proportions or means. There are several types of Chi-square tests, depending on the way the data was collected and the hypothesis being tested. However, it analyses responses based on nominal (Yes or No responses) or categorical (Likert-type scales) questions, and it was tested at the 5% level of significance in the case of this study (Warrack, 2000; Babbie & Mouton, 2001:481; Ryan, 2005).

Calculation of Chi-square (X^2) used the following formula for this study:

$$X^2 = \Sigma[(O - E - 0.5)^2/E]$$

***O* = Observed responses**
***E* = *E*xpected responses**

The Fisher's exact test: This test is an extension of the Chi-square test, and may be used when the numbers of responses in some categories are low, particularly when the expected number of responses is not more than 5 – as required by the Chi-square test. It is tested at the 5% level of significance (Agburu, 2001:140).

Pearson's correlation coefficient: The correlation coefficient is a numerical measure of the degree or extent of relationship between variables (Agburu, 2001:149, 153). The coefficient of correlation, r (product moment correlation coefficient) ranges from –1.00 (perfect negative correlation) through 0.00 (no correlation) to +1.00 (perfect positive correlation) (Wegner, 1998:311-312). In this study, it implied relationships between the measured key dimensions of the career women and the self-reported key dimensions. These were considered as having good correlation when the correlation value was greater than 0.6, which is above the mid-point between 0.00 (no correlation) and +1.00 (perfect positive correlation). Testing the significance of a correlation is actually testing whether the real correlation is at zero or not. When at zero, it means that there is absolutely no correlation between two variables. The following formula was used for this study:

$$r = \frac{N\Sigma XY - (\Sigma X)(\Sigma Y)}{\sqrt{N\Sigma X^2 - (\Sigma X)^2} \times \sqrt{N\Sigma Y^2 - (\Sigma Y)^2}}$$

N = Number of paired (obtained and reported measurements)
***ΣX* = sum of all the obtained measurements**
***ΣY* = sum of all the reported measurements**

4.6.2.2 Operationalisation for phase two data (Questionnaire)

The central concepts were expressed in the research problem and the research framework. Theoretical definitions for the concepts concerning the fit problems that career women are experiencing with ready-made apparel, their knowledge about the communication of size (body dimensions) and fit (body shape), and their fit preferences for differently fitted jackets and skirts, were given in **Chapters 1, 2** and **3**. As was mentioned, theoretical definitions and descriptions of relevant concepts help to facilitate the development of measures or activities that allow the researcher to observe the construct empirically (Neumann, 2000:160; Babbie & Mouton, 2001:128).

To determine the general fit problems encountered by career women with ready-made apparel (Objectives 1 and 4), it was necessary to investigate their perceptions of fit with different apparel categories and apparel sold in varied retails stores in Kenya. It was also important to examine the body shape characteristics (of the distinctive body shapes that emerged from phase one), and to compare these with the career women's reported frequent fit problems at critical fit points and also with their fit preferences. Statistical testing of hypotheses were performed; where the null hypothesis (H_o) is that there will be no significant associations between the fit of different ready-made apparel categories (imported, second hand and local). The alternative hypothesis (H_a) stated that there would be a significant association between the fit of different ready-made apparel categories (imported, second hand and local). Acceptance of the alternative hypothesis would indicate that the ready-made apparel categories in Kenya have similar fit problems, and therefore that fit problems could be addressed from a collective point of view, rather than addressing specific categories differently. Another null hypothesis (H_o) to be addressed is that there would be no significant association between career women's fit problems at critical fit points and the emerging distinct body shape characteristics that are critical to the fit of apparel. The alternative hypothesis (H_a) states that there would be a significant association between the career women's fit problems at critical fit points and the emerging distinctive body shapes' characteristics that are critical to the fit of apparel. Acceptance of the alternative hypothesis would indicate that the fit problems that the career women frequently encounter could be due to their body shape characteristics deviating from the characteristics of the so-called fit model/ideal shape.

To determine career women's lack of knowledge about the communication of size and fit (Objective 5), it was important to compare the knowledge of those consumers who had professional backgrounds of Home Science or Clothing and Textiles, to those without any such professional background. This required the testing of statistical hypotheses, where the null hypothesis (H_o) was that there would be no significant association between professional backgrounds in Home Science/Clothing and Textiles and knowledge about the communication of size and fit. The alternative hypothesis (H_a) states that there would be a significant association between professional backgrounds in Home Science/Clothing and Textiles and knowledge about the communication of size and fit. Acceptance of the alternative hypothesis would indicate that educating career women on the communication of size and fit would be valuable in their selection of ready-made apparel that would be better fitting and appropriate for their varied body shapes and sizes.

To be able to determine career women's fit preferences for differently fitted apparel (Objective 6), it was necessary to examine consumers' fit preferences among different age groups (young, middle-aged and mature). To establish whether different age groups would require differently fitted apparel items, the null hypothesis (H_o) was that there would be no significant association between the different age groups and their fit preferences for differently fitted apparel items. The alternative hypothesis (H_a) is that there would be a significant association between age group and fit preferences for differently fitted apparel items. Acceptance of the alternative hypothesis would indicate that different age groups require differently fitted apparel items and therefore, the apparel industries as well as the retailers should cater for these different needs.

Table 4.4 on the following page, indicates which objectives were used to test the hypotheses. Specific questions related to different sub-problems are also indicated, as well as the types of statistical measures used for the analysis.

TABLE 4.4: OPERATIONALISATION OF THE PHASE TWO DATA (QUESTIONNAIRE)

Primary objective 4 To assess the general fit problems that career women encounter with the ready-made apparel in Kenya			
	Sub-objectives	Null Hypothesis	Statistical analyses
4.1	To investigate career women's perception of fit with different apparel categories that are sold in varied retails stores in Kenya (Questions 3 and 4)	There will be no significant associations between the career women's perceived fit of ready-made apparel categories that are sold in different retail stores.	Hypothesis testing was not possible due to sparse cells in some categories; therefore, descriptive methods (frequencies and percentages) were applied.
4.2	To describe fit problems that career women in Kenya encounter regarding specific critical fit points of different parts of their bodies (Question 22)	There will be no significant associations between the reported fit problems and the critical fit points of different parts of career women's bodies.	Chi-square and Fisher's exact test. Fisher's exact test was used where the Chi-square statistical test could not be applied, and descriptive methods were also used where statistical analysis was not possible due to sparse cells in some categories. Hypothesis testing was done at a 5% level of significance.

4.3	To describe career women's satisfaction with the process of finding appropriate ready-made apparel items in Kenya (Question 21)	There will be no significant associations between career women's satisfaction with ready-made apparel selection, the way most apparel fit their sizes and the shapes and availability of latest fashion in their sizes.	Hypothesis testing was not possible due to sparse cells in some categories, therefore descriptive methods (frequencies and percentages) were used.
4.4	To explore career women's perceptions concerning the sources of fit problems in Kenya (Question 19)	There will be no significant association between career women's perceptions concerning their body shape as the source of fit problems and their perception concerning the apparel industry as the source of the fit problems.	Chi-square and Fisher's exact test: Fisher's exact test was used where the Chi-square statistical test could not be applied. Hypothesis testing was done at a 5% level of significance.
Primary objective 5 To determine and describe Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes)			
Sub-objectives		Hypothesis	Statistical analyses
5.1	To explore Kenyan career women's knowledge about the communication of size (Questions 6, 13, 14, 15, 16, 17 and 18)	There will be no significant associations between the home science profession and knowledge of size (labels and key body dimensions. There will be no significant associations between age group, knowledge about and familiarity with size labels.	Chi-square and Fisher's exact test: Fisher's exact test was used where the Chi-square statistical test could not be applied, and descriptive methods were also used where statistical analysing was not possible due to sparse cells in some categories. Hypothesis testing was done at a 5% level of significance.
5.2	To explore Kenyan career women's knowledge about the communication of fit concepts (Questions, 5, 7, 8, 9, 10, 11, 12)	There will be no significant associations between the home science profession and knowledge about fit concepts (labels and body). There will be no significant associations between age group, knowledge about familiarity with size labels.	Chi-square and Fisher's exact test and Pearson's correlation coefficient: Fisher's exact test was used where the Chi-square statistical test could not be applied, and descriptive methods were also used where statistical analysing was not possible due to sparse cells in some categories. Hypothesis testing was done at a 5% level of significance.
Primary objective 6 To determine and describe career women's fit preferences for differently fitted apparel items in Kenya			
Sub-objectives		Hypothesis	Statistical analyses
6.1	To assess and describe career women's preferences for differently fitted skirts in Kenya (Question 19)	There will be no significant associations between age group and fit preference for differently fitted skirts. There will be no significant associations between career women's critical fit points and their fit preferences for differently fitted skirts.	Chi-square and Fisher's exact test: Fisher's exact test was used where the Chi-square statistical test could not be applied, and descriptive methods were also used where statistical analysing was not possible due to sparse cells in some categories. Hypothesis testing was done at a 5% level of significance.
6.2	To assess and describe career women's preferences for differently fitted jackets in Kenya (Question 19)	There will be no significant associations between age group and fit preferences for differently fitted jackets. There will be no significant associations between career women's critical fit points and their fit preferences for differently fitted jackets.	Chi-square and Fisher's exact test: Fisher's exact test was used where the Chi-square statistical test could not be applied, and descriptive methods were also used where statistical analysing was not possible due to sparse cells in some categories. Hypothesis testing was done at a 5% level of significance.

4.7 QUALITY OF THE DATA

4.7.1 Validity and reliability of phase one data (body dimensions and photographs – Objective 1)

4.7.1.1 Body dimensions

While preparing for the field study, the researcher consulted professional anthropometrists, from the Company of Ergotech-South Africa, for training in body measuring techniques, particularly in identifying and locating landmarks on the body, and how to take the measurements accurately. The training was based on the standardised anthropometric measuring techniques, using appropriate (recommended) measuring instruments (Beazley, 1996; ISO, 1990; RMSS, 1994).

The researcher underwent further training in the form of an Anthropometry Accreditation Course (AAC) – level one (**Appendix 3C**). The course consisted of both theory and practical sessions on landmarking and measuring the human body. The techniques used were based on the International Standards for Anthropometric Assessment (ISAK, 2001). The measurements that were taken were carefully prepared (after consultation with professionals in the field of apparel – study leaders and Ergotech experts), consulting different literature and different anthropometric standards. Traditional anthropometry together with specific tailoring techniques of taking body dimensions have been used in many studies (stipulated in most sizing standards), and also ensured reliability and validity of this study (Winks, 1997; Beazley, 1998; Simmons & Istook, 2003). The same approach was adopted in this study, which strengthened its reliability and validity.

4.7.1.2 Photography and sensory evaluation methods

Before commencement of the fieldwork, the researcher underwent photography training, which was administered by a professional photographer. The objectivity and trustworthiness of this study were enhanced by purposefully sampling (negotiations) techniques used while selecting the samples for obtaining measurements and photographs. Selecting, training, and screening the judges for evaluating body shapes based on their professional skills and long-term service also ensured trustworthiness of the outcome. Using a comprehensive training manual and an assessment scale, which was subjected to an inter-rater reliability test, further enhanced the reliability of this study as recommended by Trochim (2005:62).

The standardised photographing studio with a predetermined distance and various guiding points, the standardised photographing techniques with the predetermined, standardised focus point, the position, the dress code and postures of the subjects while being photographed and the positioning of the camera, also enhanced the reliability of the photographs.

Inter-subjectivity of phase one data: Objectivity regarding the qualitative approach refers more to the generation of truthful and credible inter-subjectivity than the control over external variables (Babbie & Mouton, 2001:273; Fouché in De Vos, 2002:274). The researcher is central to the research process, and in being responsible for the collection of primary data (through taking body dimensions and photographs), is in a sense the primary research instrument; the researcher therefore developed a strong rapport and relationship of trust with the participants. This was done to gain access to them, and to avoid making biased descriptions and interpretations later on. The challenges encountered in the field, as stated earlier, enabled the researcher to be more vigilant and attentive to the sensitive techniques of approach, and to develop more versatile techniques that were suitable to every group of people approached for the study.

Triangulation of phase one data*:* The researcher and trained assistants used different methods of data collection (taking body dimensions and photographing for the purposes of identifying distinct body shapes from the sample data). Body measurement techniques alongside photography, involved the use of standardised measuring instruments and standardised photographing techniques. Both the techniques were aimed at distinguishing the most prevalent female body shapes more exhaustively as opposed to using only one technique. The use of a digital camera to capture images of different views and the different measuring instruments also facilitated accurate capturing of data in this study.

4.7.2 Validity and reliability of phase two data (Questionnaire – Objectives 2, 3 and 4)

4.7.2.1 Reliability

Pilot-testing was carried out on professional experts and some career women in South Africa and then adjustments were made from the responses. Another pilot study was conducted in Kenya, on a convenient sample of career women, to further determine the clarity of instructions, items, language, and the time taken to complete the exercise. This facilitated further corrections and adjustment of items accordingly, before the actual field events. The group that the questionnaire was pilot-tested on, for example, did not understand the term “custom-made”, thus it was translated to a Kiswahili (Kenya’s national language) term of equivalent meaning (“Fundi”). This was provided in brackets next to the term “custom-made”, as suggested by Neumann (2000:138-141).

4.7.2.2 Validity

In order to ensure that the measurements accurately reflected the concepts they intended to measure (measurement validity), the following different types of validity were observed in the questionnaire instrument for the purposes of Objectives 4, 5 and 6:

***Face validity**:* The instruments were subjected to the scrutiny of members of the scientific community (study leaders, experts in the apparel profession, and the statistician). Questionnaires were also subjected to a group of career women as a pilot test, to ensure that the measurement items, actually measured what they purported to measure. For this study, only those items were used that measured fit problems of females' ready-made apparel (Mouton, 1996:111; Delport in De Vos, 2002:167).

Content validity: Measures used in ensuring content validity represented all the concepts in the conceptual framework presented in **Chapter 3 (Figure 3.24)**. The contents were specified in a construct definition, while sampling was done from all areas of the definitions, and then indicators were developed from all the parts of the definitions, as recommended by Neumann (2000:142-143) and Babbie and Mouton (2001:122-123).

Criterion validity: Due to the lack of standardised criteria to measure the construct validity accurately and to compare with measurements for this study, the researcher selected the experts in the apparel profession with specific skills and knowledge (characteristics related to the phenomenon in question), and predicted how they would score (very high or very low) versus the construct (Neumann, 2000:144).

***Construct validity*:** To determine the degree to which the instruments used for this study successfully measured the theoretical construct that they intended to measure, definitions with clearly specified conceptual boundaries were provided (**Figure 3.24** and **Table 4.1**) to isolate the convergent validity. This implies that multiple measurements of the same construct are related, or operate in similar ways (mutually exclusive and exhaustive attributes (Mouton, 1996:111; Neumann, 2000:144; Delport in De Vos, 2002:167-168).

4.8 ETHICS AND POLITICS

Based on the scientific epistemology, a research project must be as accurate and truthful as possible (Bless & Higson-Smith, 2000:11). However, because scientific research is a source of power, it could easily be abused (Neumann, 2000; 443). The process and results of the research require strict ethical choices and careful thought on the part of a social researcher (Babbie & Mouton, 2001:256; Apeagyei *et al*., 2007). For the purposes of this study, the researcher observed the following measures:

4.8.1 Training

The researcher underwent training on research methodology, for the purposes of preparation of the research proposal, data collection and presenting of the results. Since the researcher was still inexperienced, the preparation of the research proposal, data collection instruments and analyses and presentation of the data were supervised by two senior research professionals as well as experts in the field of apparel design and manufacture (study leader and core study leaders). In preparation for the data collection, the researcher underwent anthropometry and photographic training sessions to equip her with the necessary knowledge and skills to photograph and take body measurements. This ensured that the research project that was undertaken, was professionally conducted – as highlighted by Neumann (2000:444) and Babbie and Mouton (2001:5).

4.8.2 Plagiarism

The researcher did not under any circumstances indulge in scientific misconduct such as plagiarism or fraud regarding other people's work. The procedures laid down for citation and quoting other people's words have been observed carefully, and the authors of referenced literature were acknowledged throughout the research process (Neumann, 2000:445).

4.8.3 Participants' privacy

All the participants involved were consulted and comprehensive explanations of the objectives of the study were given during the negotiation stage. Hygiene and health issues were observed so as not to violate the participants during this study. A strong rapport was also established with the participants before commencing the activity and throughout the measurement and photographing exercises. Participants' faces were masked to ensure that their privacy was not violated. Their rights were fully respected and their permission obtained whenever necessary. Permission to take their photos and measurements were obtained before the research commenced (Bless & Higson-Smith, 2000:12; Babbie & Mouton, 2001:522; Apeagyei *et al*., 2007).

The leotards/body suits that were used by the participants while being measured were laundered after each use and sealed in plastic papers before re-issuing to the next persons. In cases where a participant demanded total hygiene, the researcher provided a new leotard. The researcher washed her hands after every measurement to ensure hygiene for the next participant as well as for herself.

4.8.4 Accountability

The results of the study will be made available to the scrutiny of the scientific community and thereafter will be disseminated for public use. Since the researcher is accountable to both a sponsor and her employer, the researcher will provide copies of the thesis to them too, as recommended by Babbie and Mouton (2001:526-527).

Data analyses and discussions of the findings of this study are presented in **Chapters 5** and **6**.

Chapter 5

DATA ANALYSIS AND DISCUSSION OF THE FINDINGS BASED ON PHASE ONE DATA (BODY DIMENSIONS AND PHOTOGRAPHS)

5.1 INTRODUCTION

This study employed manual anthropometric techniques of obtaining body dimensions as the cheapest method available at the time, and because the aim was to identify only a distinctive body shape from the data collected from a small population. This chapter presents the results, discussions and interpretations according to the primary objectives 1, 2 and 3 of this study.

The body measurements in this study were taken from 123 career women aged between 25 and 55 years. The specific body measurements that were taken for this study have been explained in chapter **4 paragraph 4.5.1.1** and shown in **Figure 4.3,** while rules that were observed during the measuring process is also provided as an attached appendix at the end of this thesis (**Appendix 3B).**

5.2 IDENTIFICATION AND DESCRIPTION OF DISTINCTIVE FEMALE BODY SHAPE(S) OF CAREER WOMEN IN KENYA FROM BODY DIMENSIONS (PRIMARY OBJECTIVE 1 (SUB-OBJECTIVE 1))

Body dimensions have been viewed as the key players in the development of effective sizing systems, and must reflect the height, sizes and body shape proportions of a target population for better-fitting apparel (Beazley, 1998; Gupta & Gangadhar, 2004). Presented in **Table 5.1** are the means, range values (maximum and minimum) and standard deviations calculated for the purposes of identifying height and other body characteristics **(Tables 5.1 and 5.2**) that may affect the fit of apparel. It should be noted that the classifications made in this study were done within the context of the anthropometric data of this study.

5.2.1 Identification of height, bust extension, buttock extension, thigh bulge and the arc dimensions categories

The distributions of measurements for variables used in this study which includes; height, bust extension, buttock extension, bust extension, thigh bulge and arc measures, were summarized by use of the calculated central tendencies (mean values), dispersion (range values) and the degrees of dispersions (standard deviation) (**Tables 5.1 and 5.2**). The variables were placed into different categories as reflected by the degree of deviation (SD) from the mean value. The standard deviation reflected the degree to which the values in a distribution deviated from the arithmetic mean. Standard deviation is usually presented in tandem with the mean **(Mean ± SD)**, because it is difficult to determine it's meaning in the absence of the mean (Bryman & Cramer, 1997:80-85).

TABLE 5.1: PERCENTAGE DISTRIBUTIONS OF HEIGHT, BUST EXTENSION, BUTTOCK EXTENSION AND THIGH BULGE CATEGORIES (n = 123)

HEIGHT				
Univariate analysis of height dimensions	Mean	SD	Maximum	Minimum
	161.6 cm	5.6 cm	176.0 cm	148.0 cm
Height Categories	Mean ± SD		Count (%)	
Short	148.8 cm to < 156.0		12 (10%)	
Medium	≥ 156.0 cm to ≤ 167.6 cm		93 (75%)	
Tall	>167.6 cm to 176.0 cm (Max*)		18 (15%)	
BUST EXTENSION				
Univariate analysis of bust extension	Mean	SD	Maximum	Minimum
	16.0 cm	3.0 cm	23.0 cm	10.0 cm
Bust extension Categories	Mean ± SD		Count (%)	
Small/flat	10.0cm (Min*) to < 13 cm		1 (0.8%)	
Medium	≥ 13.0 cm to ≤ 19.0 cm)		24 (19.6%)	
Large	> 19.0 cm to ≤ 23.0cm (Max*)		98 (79.6%)	
BUTTOCK EXTENSION				
Univariate analysis of buttock extension	Mean	SD	Maximum	Minimum
	16.0 cm	3.0 cm	23.0 cm	9.0 cm
Buttock extension categories	Mean ± SD		Count (%)	
Small/flat	9.0 cm (Min*) to < 13 cm		3 (2%)	
Medium	≥ 13.0 cm to ≤ 19.0 cm		36 (29%)	
Large	> 19.0 cm to ≤ 23.0cm (Max*)		84 (69%)	

* Min = Minimum range value; Max = Maximum range value

Height*:* It has been reported as one of the critical dimensions when designing and distributing apparel items to the correct marketplaces (Winks, 1997; Beazley, 1998; Gupta & Gangadhar, 2004; Chun, 2007). The population in this study was classified into the three different height groups, while body characteristics such as the bust, the buttocks, the thigh bulge, shoulders and the body balance were each also classified into three categories on the basis of how the range values deviated from the standard deviation (**Table 5.1**).

The different height categories were obtained by calculating the degree to which the values in a distribution deviated from the arithmetic mean. Short category was arrived at by sorting out all the values that fell below (**<**) the (Mean ± SD); the medium category was obtained by identifying all the values that were equal (=) to the (Mean ± SD) and the tall category was achieved by sorting out all the values that fell above (>) the (Mean ± SD) (Table 5.1) (Bryman & Cramer, 1997:80-85; Gupta & Gangadhar, 2004). This classification technique was applied in Beazley's (1998) and Gupta and Gangadhar's (2004) studies. Results about Height categories (**Table 5.1**) show that the majority (75%) of the participants were in the medium height category. It is important that the apparel industry take note of this percentage when deciding on relative quantities in the different size/height categories in the design and manufacture of ready-made apparel.

***Bust and buttocks extensions*: ** Circumferential dimensions such as the bust and the hips are one-dimensional in character, and therefore it is difficult to assess the extent of the protrusion of these features (bust/breasts and buttocks/derriere) from the measurements. Therefore, bust and buttock depth dimensions were deemed necessary in this study to determine the extension of the breasts size as well as the buttocks/derriere, respectively. The prominence (degrees of extension) of the bust and the buttocks is known to affect the fit of apparel at the bust and hip regions (Rasband & Liechty, 2006:194, 324).

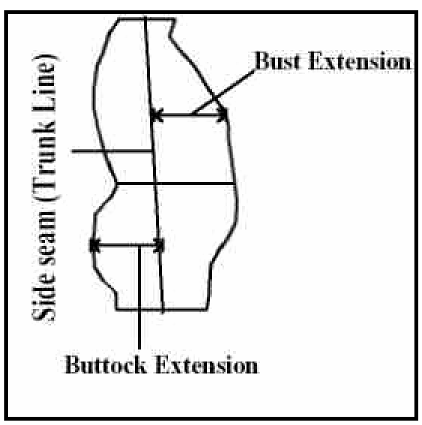


FIGURE 5.1: BUST AND BUTTOCKS EXTENSIONS

The trunk line/side seam line (**Figure 5.1)** must be identified before commencing the measurement exercise (also refer to **Chapter 4, paragraph 4.5.1.1** and **Figure 4.3**). The bust and the buttock extension measurements were taken with a segmometer instrument (**Figure 4.4**) from the trunk line to the breast tips and the edge of the buttocks respectively. Sliding callipers can also be used to obtain the same measurement.

The different bust and buttock extension categories were obtained by calculating the degree to which the values in a distribution differ from the arithmetic mean. Small bust/buttock extension = **<** (Mean ± SD); Medium bust/buttock extension category **=** (Mean ± SD) and the large bust/buttock extension = **>** (Mean ± SD) (Table 5.1) (Bryman & Cramer). The results regarding buttock extension and thigh bulge categories in **Table 5.1** also demonstrate that the majority of the participants had a large bust (81%) and large buttocks (69%). The large buttocks have fit implications around the hip, thigh and crotch line, while the large bust could affect the fit of the garment around the bust region.

Thighs: Heavy or bulging thighs may be positioned and/or shaped differently, thus affecting the fit of the apparel item either vertically or horizontally. If the thighs are fuller or thinner than average, pants/skirts with a close fit will tend to either sag (form folds) as a result of very loose fit, or will form wrinkles as a result of a tight fit (Rasband & Liechty, 2006:340). To determine the thigh bulge dimension, the subjects were measured on two positions of the hip region: one was taken at the normal hip position (trochanterion region) and the second hip dimension was obtained at a position of approximately 10 cm below the normal hipline (**Figure 4.3**).

The thigh bulge **(Table 5.2)** was determined by subtracting the hip circumference dimension at the normal (trochantrion region) position from the measurement over (circumference) the broadest region of the hips (highest thigh position) at approximately 10 cm below the normal hip position. The different categories **(Table 5.2)** were obtained by calculating the degree to which the values in the distribution differed from the arithmetic mean. In this study, small thigh bulge = < (Mean ± SD); Medium thigh bulge = (Mean ± SD) and the large thigh bulge = > (Mean ± SD) (Table 5.2) (Bryman & Cramer).

Shoulders: Shoulders act as the apparel’s “hanger", facilitating an aesthetic appearance as the apparel drapes gracefully over the body. The size of the shoulders in relation to other parts of the body, and their shape, will affect the fit of the apparel (Rasband, 1994:68-72). The shoulder slope dimension was obtained by subtracting the shoulder height (shoulder to ground) dimension from the nape to ground dimension.

The different shoulder categories were obtained by calculating the degree to which the values in the distribution differed from the arithmetic mean. In this study, slopped shoulders = **<** (Mean ± SD); normally shaped shoulders **=** (Mean ± SD) and the squared shoulders = **>** (Mean ± SD). Results about shoulder shape categories **(Table 5.2)** clearly show that the majority (67%) of the participants’ shoulders were normally shaped, which indicates that they may possibly experience minimal shoulder fit problems

TABLE 5.2: PERCENTAGE DISTRIBUTIONS OF THIGH BULGE, SHOULDER CATEGORIES AND ARC AT KEY REGIONS (N = 123)

THIGH BULGE					
Univariate analysis of thigh bulge		Mean	SD	Maximum	Minimum
		2.5 cm	2.0cm	6.0 cm	0.0 cm
Thigh bulge categories		Mean ± SD		Count (%)	
Small thigh bulge		< 1.0 cm		1 (0.8%)	
Medium thigh bulge		≥1.0 cm to ≤ 5.0 cm		102 (83%)	
Large thigh bulge		> 5.0 cm to ≤ 6.0 cm (Max*)		20 (16.2%)	
SHOULDERS					
Univariate analysis of shoulder drop/shape		Mean	SD	Maximum	Minimum
		3.5 cm	1.5 cm	7.0 cm	0.0 cm
Shoulder shape categories		Mean ± SD		Count (%)	
Squared		< 3.5 cm		18 (14%)	
Normal		≥ 3.5 cm to ≤ 5.5 cm		81 (67%)	
Sloped		> 5.5 cm to 7.0 cm (Max*)		24 (19%)	
BALANCE/ARC					
Univariate analysis of arc dimensions		Mean	SD	Maximum	Minimum
Front bust arc subtract back arc		8.0 cm	3.5 cm	22.0 cm	2.0 cm
Front waist arc subtract back waist arc		2.0 cm	3.0 cm	17.0 cm	0.0 cm
Back hip arc subtract front hip arc		9.0 cm	4 cm	28. 0 cm	0.0 cm
Arc dimensions categories		Mean ± SD		Count (%)	
Bust line arcs	Small front bust	2.0 cm to < 4.5 cm		22 (17%)	
	Medium front bust	≥ 4.5 cm to ≤ 11.5 cm		81 (67%)	
	Large front bust	> 11.5 cm to ≤ 22.0 cm (Max*)		20 (16%)	
Waistline arcs	Small front waist	< 0 cm (Min*)		2 (1.6%)	
	Medium front waist	≥ 0 cm to ≤ 5 cm		112 (91.1%)	
	Large front waist	> 5 cm to ≤ 17 cm (Max*)		9 (7.3%)	
Hipline arcs	Small back	0 to < 5.0 cm		11 (9%)	
	Medium back	≥ 5 cm to ≤ 13.0 cm		103 (82%)	
	Large back	> 13.0 cm to ≤ 28.0 cm (Max*)		11 (9%)	

* Min = Minimum range value; Max = Maximum range value

Results regarding thigh bulge in **Table 5.2** indicate that the majority (85%) of the participants had moderately large thighs, which could result with fit problem around the hip, thigh and crotch line.

Balance: A correct posture assumes a balanced alignment of all the parts of the body (back and front) over each other, and could influence the physical attractiveness of apparel (Rasband, 1994:13). The trunk line/side seam, also known as the balancing line, must be identified before commencing the exercise (refer to **Chapter 4, paragraph 4.5.1.1** and **Figure 4.3**). Arc dimensions (measurements taken from the right-side trunk line to the left-side trunk line, either at the front or the back) were taken at the key regions (bust, waist and hip), to establish whether the postures/body shapes were balanced at these regions. Ashdown, Choi, Milke and Raymond (2004) warn that body shapes with excessive lordosis (swayback) or excessive kyphosis (hump back) cannot achieve the balanced side profile view. Excessive fat deposits on any part of the body could also cause body imbalance. The front part, for example, could contain more fat deposits than the back region, causing the figure to assume a backward stance in an attempt to counteract the weight balance.

As for all the other body characteristics, the different arc categories were obtained by calculating the degree to which the values in the distribution deviated from the arithmetic mean. Small arc = **<** (Mean ± SD); medium arc **=** (Mean ± SD) and the large arc = **>** (Mean ± SD). Results about body's balance categories at key body regions **(Table 5.2):** indicate that the front bust (65%) and front waist (92.5%) arcs were moderately larger than the back arc at the bust line and waistline regions, with strong correlations (r = 0.86) of both the back and front arc dimensions at the bust line and the waistline back and front arc dimensions (r = 0.94). The back hip arc was moderately (82%) larger than the front hip arc, with also strong correlations (r = 0.82) between the back arc and front arc measurements at hip regions. The large upper torso's front bust and waist imply that apparel worn by a woman with such shape characteristics is likely to pull towards the front making the side seam skewed. At the hip region, the apparel is likely to pull towards the back, thereby making the side seam skewed towards the back. Statistically, the three back arc dimensions and the front arc dimension showed no significant (0.0001< 0.05) associations.

TABLE 5.3: PERCENTAGE DISTRIBUTION OF BUST CUP CATEGORIES (n = 107)

Cup categories	Standards within range values	Count (%)
A	0 to < 5.0 cm	0 (0%)
B	≥ 5.0 cm to < 7.0 cm	1 (1%)
C	≥ 7.0 cm to < 9.0 cm	6 (6%)
D	≥ 9.0 cm to < 11.0 cm	36 (33%)
DD	≥ 11.0 cm to < 14.0 cm	42 (39%)
E and above	≥ 14.0 cm to ≤ 28 cm	23 (21%)

Bust cup (**Table 5.3**): Cup size and brassière size are determined by the size of the breasts. The dimension determining cup size is obtained by subtracting the under-bust dimension from the bust circumference dimension at the fullest part (Solinger, 1988:77; Spillane, 1995:85). In this study, the differences between the under-bust dimension and the bust dimension ranged from 5.00 cm to 28.00 cm. The cup sizes (**Table 5.3**) were then categorised according to standards given by Spillane (1995:85), but within the range values obtained by subtracting the under-bust dimension.

The results presented in **Table 5.3** show that participants with cup size **DD** (39%) and above (21%) were in the majority (60%), followed by participants with cup size **D** (33%). Participants with cup size **C** and **B** were least represented. These figures may suggest that Kenya's career women experience tight fit problems at the bust region. Comparisons were made between bust depth and cup size to determine whether they would yield similar results. From the bust extension, there were 81% participants with large busts, while 60% of the participants had cup size **DD** and above**.** However, both the techniques of identifying bust size indicated that the majority of the participants had large bust sizes.

5.2.2 Body shape identification

Body shapes have in the past been classified into the prevalent five figure types (hourglass, triangle, rectangular, apple and inverted triangle) by drop values. A drop value is the difference between the hip circumference and the bust circumference or the difference between the bust and the waist (Chun-Yoon & Jasper, 1993; Winks, 1997; Beazley, 1998; Gupta & Gangadhar, 2004; Yu*,* 2004:185). In this study, the different body shapes were defined based on the key dimensions: bust for the upper torso, waist for both upper and lower torso, and the hip for the lower torso. However, since body shapes and proportions vary with different countries and even regions within countries (Zwane & Magagula, 2006; Shin & Istook, 2007; Honey & Olds, 2007), it was necessary to understand the parameters from the literature that define and describe the five prevalent body shapes (hourglass, triangle, rectangular, apple and inverted triangle). The identified descriptions were then used to determine standards within the maximum and minimum (range values) dimensions of the drop values calculated **(Table 5.4)** for the purpose of identification of the distinctive body shape(s) of this study.

Specific drop values used for the categorisation of body shapes in this study are given in **(Table 5.4)**. Shin and Istook (2007) reported that the rectangular shape's waist measures nine inches (23 cm) less than the bust. Rasband and Liechty (2006:25-26) state that the waist of the hourglass body shape measures over 10 inches (25 cm) less than the hip or the bust. Using the range (maximum and minimum) dimensions of the drop values, in combination with Shin and Istook's (2007) and Rasband and Liechty's (2006) recommendations, it was possible to identify the different body shapes as presented in **Table 5.4**.

TABLE 5.4: PERCENTAGE DISTRIBUTION OF BODY SHAPES (n = 123)

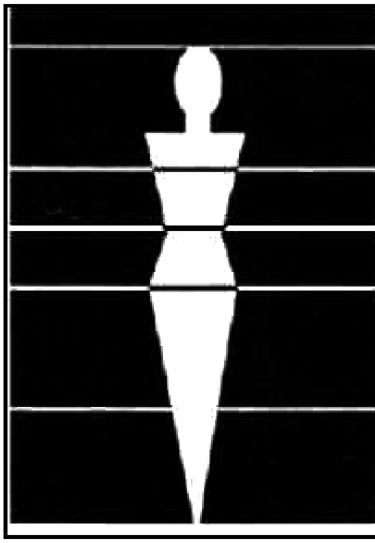
BODY SHAPE CATEGORIES				
Triangular and inverted triangle body shape categories 1st step: Triangle and Inverted triangle depend on bust and hip relationship and are opposite each other. Once these two body shapes were sorted out, they were not subjected further to waist and bust relationship				
Univariate analysis of drop values	Mean	SD	Maximum	Minimum
Hip subtract the bust	5.6 cm	8.8 cm	26.0 cm	-8.0 cm
Mean (5.6) +SD (8.8) = ≥ 14.0 cm to ≤ 26.0 cm (Max*)	Triangle (Large hips)			
Mean (5.6) - SD (8.8) = -8.0 cm (Min*) to > 3.2 cm	Inverted triangle (large bust)		2 (1.5%)	
Apple, Rectangular and Hourglass shape				
2nd step: Apple, Rectangular and Hourglass shape rely on bust and waist relationship, Rectangular = Waist 23.00cm less than the bust (Shin & Istook, 2007), Hourglass = waist 25 cm less than the bust (Rasband & Liechty, 2006). Categories were guided by the standards within the range values				
Univariate analysis of Bust subtract the waist drop values	6.0 cm	13.0 cm	36.0 cm	-13.0 cm
Standards within the maximum and minimum dimensions of the drop values	Body shape		Count (%)	
-13.0 cm (Min*) to ≤ 4.7 cm	Apple (Large waist)		2 (1.5%)	
> 23.0 cm to 36.0 cm (Max*)	Hourglass (Narrow waist)		2 (1.5%)	
> 4.7 cm to ≤ 23.0 cm	Rectangular/ Straight (Average waist)		93 (74%)	

* Min = Minimum range value; Max = Maximum range value

Table 5.4 clearly portrays that the rectangular body shape was the most (74%) prevalent body shape in the sample, followed by the triangle body shape (21.5%). The other body shapes (apple, hourglass and the inverted triangle) had the least representation of 1.5% each. Since most ready-made apparel is manufactured based on the hourglass body shape proportions, Kenya's career women are therefore likely to experience fit problems with ready-made apparel.

5.2.3 Height proportions

The ideal shape (fit model) used as a design base by the apparel industry has a well-proportioned/well-balanced body, both horizontally and vertically. Although height proportions are used mostly by artists and illustrators, imbalanced height proportions could also lead to fit problems. **Figure 5.2** illustrates height proportions in relation to the full height (Lyle & Brinkley, 1983:63; Le Pechoux & Ghosh, 2002:4).



Bust line is midway between shoulders and waistline (¾ of the full height)
Waistline is midway between the bust line and the hipline (⅝ of the full height from the apex of the head to the ground).
Hipline is the mid-point of the total figure's height (½ full height dimensions from the apex of the head to the ground).
Knee line is the mid-point between the hipline and the ground (¼ of the human's full height from the apex of the head to the ground).

FIGURE 5.2: IDEAL BODY SHAPE'S HEIGHT PROPORTIONS

(Adapted from: Lyle & Brinkley, 1983:63)

Using the height proportional relationship concept from Lyle and Brinkley (1983:63) and Le Pechoux and Ghosh (2002:4), the results of the height proportions of this study are presented in **Table 5.5**.

TABLE 5.5: PERCENTAGE DISTRIBUTION OF HEIGHT PROPORTIONS (n = 123)

Height proportions	Exact count (%)	Above count (%)	Below count (%)
Under-bust height (¾ height)	0	0	123 (100%)
Waist height (⅝ height)	0	103 (84%)	20 (16%)
Hip height (½ height)	6 (5%)	102 (83%)	15 (12%)
Knee height (¼ height)	0	123 (100%)	0

The results presented in **Table 5.5** above indicate that all (100%) the participants' bust height dimensions were below the ¾ standard of the ideal figure's normal bust position. This may therefore affect the size of the armhole, as well as the dart positions and style lines of a foundation pattern. The majority (84%) of the participants' waist heights were above the ⅝ height standard of the ideal figure's normal waist position, while only 16% of the participants' waist heights were below the ideal figure's waist position. This means that the majority of the participants' waistlines were situated higher than the ideal body's normal position, which may require re-identification of the waist dart positions and style lines in a base pattern.

Concerning the hip height, the results also indicate that the majority (83%) of the participants' hip height dimensions were above the ½ standard (ideal figure's) height position, while only 12% had hip heights below the standard. Only 5% of the participants had hip heights at exactly ½ the standard height position of the ideal figure. This implies that the majority of the participants had their hiplines situated above the ideal figure's normal position, a typical characteristic of a Western rectangular shape (Rasband & Liechty, 2006:25). However, this could affect the style lines and side seam shaping in a foundation pattern. Concerning the knee height, all (100%) the participants' knee heights were above the standard ¼ heights, indicating that the majority of the participants' lower parts of their legs were longer than the ideal figure's normal position. The knee height position does not affect the fit of an apparel item, but could be used as a style guide point. It should be noted that these calculations were based on the exact standards stated above, and no tolerance allowance was provided.

5.2.4 Summary of body shape identification from body dimensions (Primary objective 1 (Sub-objective 1))

In summary, this study found that the majority of the participants were of medium height (75%) and had a distinctive rectangular body shape (74%). Participants with a triangle/pear body shape were the second most common type (20.5%) although they were less represented. Other characteristics that prevailed with the distinct body shapes (rectangular and triangle), were the large buttocks (69%), large thigh bulge (85%), large bust as indicated by the bust extension (81%), and large cup size (60%). The body shape was also characterised by a larger front arc at the bust and waistline regions, whereas the back arc dimension was large at the hip region. The body shape's height proportions showed that waistline, hip-line and knees were higher than the normal, ideal figure's height positions, whereas the bust line was situated below the normal height position.

5.3 IDENTIFICATION AND DESCRIPTION OF THE DISTINCTIVE FEMALE BODY SHAPE (S) OF PROFESSIONAL WOMEN IN KENYA FROM PHOTOGRAPHS (OBJECTIVE 1 (SUB-OBJECTIVE 2))

Photographs were taken from 89 career women within the ages of 25-55. Their ages were categorised into three groups namely: young adults aged between 25 and 32 years, a middle group aged between 33 and 40 years, and mature group aged 41 years and above. The middle-aged (33–40) were highly (43%) represented, while the young adults (25–32) were the secondly (32%) represented. The mature group (41 years and above) had the lowest (25%) representation. All the digital images were transferred to the computer for the purposes of cleaning, refining and organising them for evaluations.

In this study, it was decided that a Kappa statistic of 0.75 was the cut-off point for acceptable agreement between the two trained professional evaluators. This implied that all the evaluations with the Kappa statistic of ≥ 0.75, and significant ($p \leq 0.05$) agreements between the two evaluators, were accepted, while evaluated attributes with Kappa < 0.75 were rejected, but were further subjected to a group of professional expert evaluators to assess and to reach consensus on a given characteristic for final decisions. The categories of body features and body shape identified are presented according to the sequence of the body shape assessment scale (**Appendix 3D**).

5.3.1 Body build/size categories (V4 on the body shape assessment scale)

Participants were grouped into visual size categories, as body size plays an important role in the designing and distribution of ready-made apparel to the correct marketplaces (Winks, 1997). Presented in **Table 5.6** are the body build/size categories that emerged from the evaluations of the sample data. The results indicate that there were almost equal representations of each body build. Forty one per cent of the participants appeared to be of medium size, 33% of the participants appeared slender, while 26% appeared to be large in size. The inter-rater reliability between the two evaluators was good, as indicated by the Kappa statistic of 0.86. Statistically, there was significant ($p > 0.0001$) agreement between the two evaluators.

TABLE 5.6: PERCENTAGE DISTRIBUTIONS OF BODY BUILD/SIZE CATEGORIES (n = 89)

Visual body size/build categories	Evaluator 1 Count (%)	Evaluator 2 Count (%)	Average (%)	Inter-rater reliability	p
Slender group (small size)	29 (33%)	30 (34%)	33%	0.86	0.0001*
Average (medium size)	34 (38%)	38 (43%	41%		
Large group (plus size)	26 (29%)	21 (23%)	26%		

* Statistically significant ($p \leq 0.05$)

Body build/size among different age groups: Comparisons were made between the different age groups and the body build/sizes to determine whether there were any significant associations between body build/sizes and age.

The results are presented in **Table 5.7,** show that the majority (63%) of the young adults (25-32) were in the smaller sized group, while 55% of the middle-aged group (33-40) appeared to be of medium built. Fifty two per cent and 43% of the mature group (41+) appeared to be of large and medium build, respectively. Statistically there was significant ($p > 0.0001$) agreement between the two evaluators. These results may possibly suggest that as females mature, their weight tends to increase much more than in young adults (**Figure 5.3**).

TABLE 5.7: BODY BUILD/SIZE AMONG DIFFERENT AGE GROUPS

AGE (YEARS)	Small (%)				Medium (%)				Large (%)			
	Evaluator 1	Evaluator 2	Average (%)	p	Evaluator 1	Evaluator 2	Average (%)	p	Evaluator 1	Evaluator 2	Average (%)	p
25-32 (n = 29)	61	64	63 %		28	25	26%		11	11	11%	
33-40 (n = 38)	17	17	17%	0.0001*	48	62	55%	0.0001*	34	21	28%	0.0001*
41 + (n = 22)	5	5	5%		41	45	43%		54	50	52%	

*Statistically significant (p ≤ 0.05)

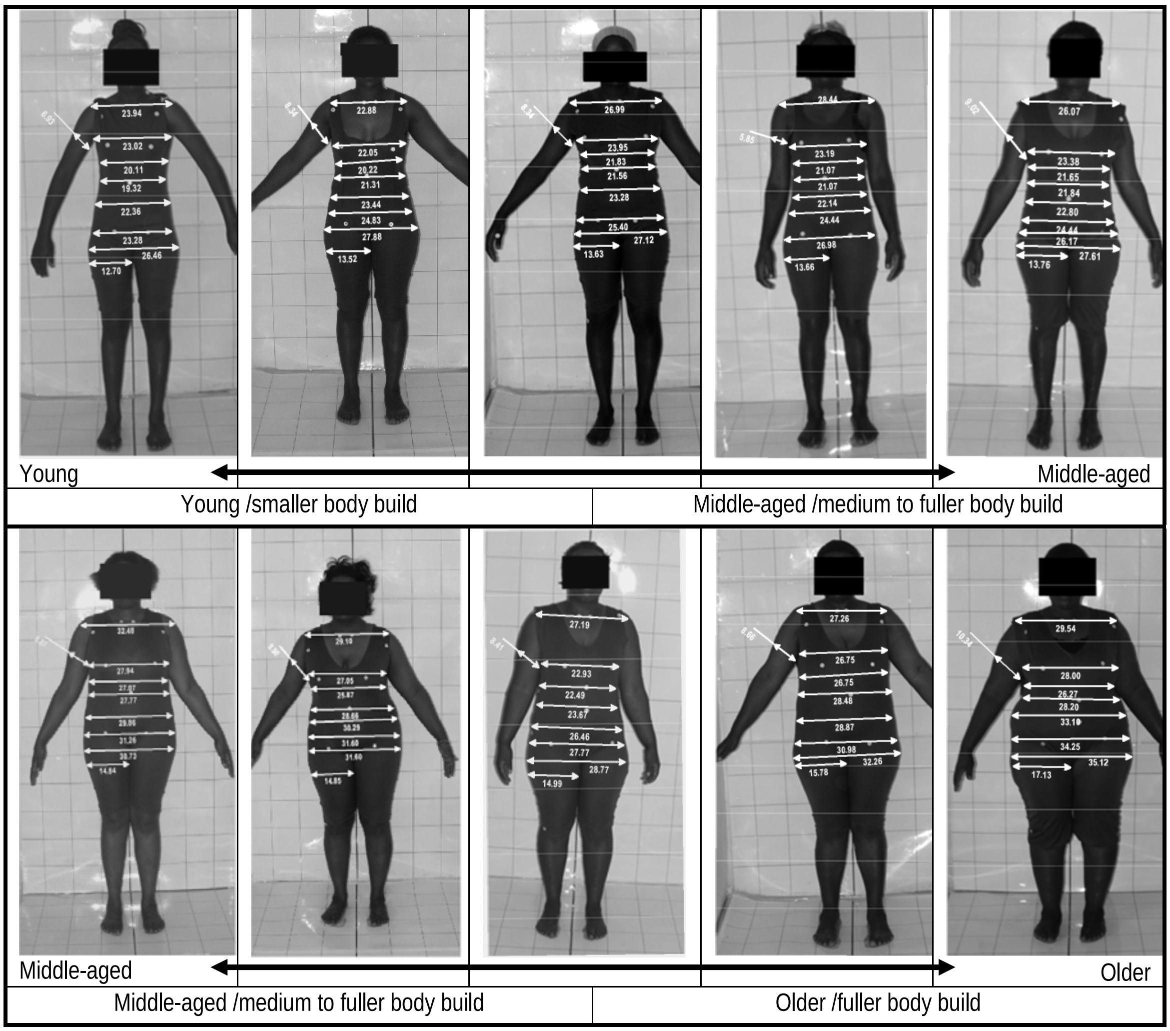


FIGURE 5.3: BODY BUILD/SIZE VERSUS AGE

5.3.2 Bust/shoulder width versus hip width appearance, and waist size versus hip width (V5 and V6 on the assessment scale)

When using body dimensions, body shape classifications are based on a derived parameter drop value (Winks, 1997; Beazley, 1998; Gupta & Gangadhar, 2004). However, visual analysis does not use the drop values as in the case of dimensions, but uses visual analysis to provide an estimate of how the bust/shoulder and waist sizes compare to each other. The two attributes were subjected to a group of professional expert evaluations because inter-rater reliability was below the Kappa statistic of ≥ 0.75 (0.66 and 0.68). The results are presented in **Table 5.8**.

TABLE 5.8: PERCENTAGE DISTRIBUTION OF THE BUST/SHOULDER AND WAIST SIZE APPEARANCE VERSUS THE HIP WIDTH APPEARANCE (n = 89)

Categories		Evaluations by a group of professional experts (%)	Possible body shape
Bust/ shoulder size versus hip size	Narrow	12 (13%)	Triangle/Pear
	Similar	74 (83%)*	Rectangular, Hourglass or Apple
	Wider	3 (3%)	Inverted triangle/Barrel
Waist size versus hip size	Narrow	8 (11%)	Hourglass
	Similar	62 (84%)	Rectangular
	Wider	4(5%)	Apple

* Subjected to waist size versus hip size

Table 5.8 clearly demonstrates that 83% of the participants' bust/shoulder sizes appeared similar in width to their hip sizes, suggesting the possibility of rectangular, apple or hourglass body shapes. Participants with bust/shoulders appearing narrower than the hips were 13% (this could suggest the possibility of pear/triangular shapes). The least represented group (6%) were those with busts appearing wider than the hip size, suggesting a possible inverted triangular/barrel shape. At this stage, it was unclear as to whether the majority of the participants could possibly be identified with the rectangular, hourglass, or apple body shape.

To isolate the rectangular shape from the hourglass and the apple body shapes, the waist thickness was further compared to the hip width appearance (**V6 on the body shape assessment scale)** – only on the 74 (83%) participants with waist size similar to bust size. The results indicate that the majority of the participants with waist size appearing similar to the hip size were 84% (signifying a possible rectangular body shape). The participants whose waist size appeared narrower than the hip size were 11% (indicating a possibility of an hourglass body shape). Participants whose waist size appeared wider than their hip size were 5% (suggesting a possible apple shape). This indicates that the majority of the participants had a rectangular body shape.

5.3.3 Stomach and buttocks appearances (V7 and V8 on the body shape assessment scale)

Stomach size and shape plays an important role in the design of apparel items. Its size, shape and position would affect the fit of the apparel item around the waist region. Its size could also affect the crotch line as well as the hang of apparel (Rasband, 1994:66, 68). Buttocks size and shape is also an important body characteristic that affects the fit of apparel around the hip region, the crotch line and even the drape (Rasband & Liechty, 2006:324). Results of visual stomach and buttocks shape evaluations are presented in **Table 5.9**.

TABLE 5.9: PERCENTAGE DISTRIBUTION OF COMMON STOMACH AND BUTTOCKS SHAPES (n = 89)

Categories		Evaluator 1 Average (%)	Evaluator 2 Average (%)	Average (%)	p	Inter-rater reliability
Visual shape of the stomach	"D"	65 (73%)	59 (66%)	70%	0.0001*	0.81
	"b"	15 (17%)	19 (21%)	19%		
	Flat	9 (8%)	11 (13%)	11%		
Visual shape of the buttocks	"d" (large)	81 (91%)	81 (91.5%)	91%	0.0001*	0.94
	No "d"(Average	8 (9%)	8 (8.5%)	9%		
	Flat	0 (0%)	0 (0%)	0 (0%)		

*Statistically significant ($p \leq 0.05$)

The stomach "**D**" shape is defined from the body's profile view, where the front part of the body is characterised by an extension of fullness appearing like a letter "**D**" from below the bust line extending down to the crotch line. Stomach "**b**" shape is defined from the body's profile view, where the stomach's fullness (roundness) begins below the waistline, appearing like a letter "**b**". **Table 5.9** clearly depicts that the majority (70%) of the participants had stomach protrusions appearing similar to the letter "**D**"**.** The inter-rater reliability for these evaluations was good, as indicated by a Kappa statistic of 0.81. Statistically there was significant ($p > 0.0001$) agreement between the two evaluators. Participants with stomach protrusions appearing similar to the letter "**b**" and flat were only 19% and 11% respectively. The results suggest that Kenya's career women are likely to experience tight fit problems with ready-made apparel along their front torsos.

The buttocks' "**d**" shape is defined from the body's profile view, with the buttock distinction or conspicuity that appears like the letter "**d**" as it stands out or extends at the lower back section. **Table 5.9** clearly shows that the majority (91%) of the participants appeared to have large buttocks appearing like the letter "**d**". Participants whose buttocks did not appear like the letter "**d**" were 9%, while none of the participants appeared to have flat buttocks. The inter-rater reliability for the evaluations was good, as indicated by a Kappa statistic of 0.94, while there was significant ($p > 0.0001$) agreement between the two evaluators. The results suggest that Kenya's career women are likely to experience tight fit problems around the hip and the crotch lines of apparel.

Stomach shape among different age groups: Comparisons were made between the different age groups and the stomach prominence to determine whether there were any associations between stomach shapes and the different age groups. The "**b**" stomach shapes were combined with flat stomach shapes, because from **Table 5.9**, the "**b**" and flat stomach shapes were least represented (30%). They were also grouped together because they appeared similar. The results are presented in **Table 5.10**.

TABLE 5.10: PERCENTAGE DISTRIBUTION OF COMMON STOMACH SHAPES ACCORDING TO AGE GROUPS (n = 89)

Age (years)	Stomach "D" shape Averaged (%)	Stomach "b" and flat shape Averaged (%)	p
25-32 (n = 29)	50 %	50%	0.0001*
33-40 (n = 38)	91%	9%	
41 + (n = 22)	93%	7%	

* Statistically significant ($p \leq 0.05$)

Table 5.10 shows that the majority (93%) of the mature age group and the majority (91%) of the middle-aged group had stomach protrusions that appeared like the letter "**D**", while only 50% of the young adults had stomach protrusions appearing like the letter "**D**". Among the young adults, 50% had stomach protrusions appearing like the letter "**b**". Statistically, there were significant ($0.0001 \leq 0.05$) associations between age group and the presence of the stomach shape "**D**". It is possible that the mature females' fat deposits tend to spread all over the front torso much more than in the younger group, as shown in **Figure 5.4**.

5.3.4 Upper back curvature and the back waist curvature/shape (V9 and V10 on the body shape assessment scale)

Upper back and the back waist curvatures are important characteristics that would affect the fit of apparel items around the shoulder blades, the midriff region at the back as well as the balance of an apparel item from the profile view. Inter-rater reliability for these two variables between the two evaluators was lower (0.69 and 0.68) than the Kappa statistic of 0.75, and therefore, they were subjected to a group of professionals' expert assessment. The results are presented in **Table 5.11**.

TABLE 5.11: PERCENTAGE DISTRIBUTION OF THE UPPER BACK AND THE BACK WAIST CURVATURES (n = 89)

Categories		Three expert evaluators	
		Frequency	Percentage (%)
Upper back shape curvature	Fully rounded upper back	70	79%
	Moderately rounded upper back	13	15%
	Straight upper back	6	6%
Back waist curvature	Deep hollow waist	67	75%
	Moderately hollow waist	19	21%
	Straight/flat/non-hollow waist	3	4%

Table 5.11 above shows that the majority (79%) of the participants appeared to have a fully rounded upper back, while the moderately rounded upper backs and flat backs were least represented. It is also apparent that the majority (75%) of the participants had a deep hollow back waist, while participants with a moderate hollow back waist and a straight back waist were least represented. It appears that the pronounced rounded upper back and the large buttocks (**Table 5.9**) result in the deep hollow back waistline. However, a consumer with the rounded upper back in combination with a hollow waistline is likely to experience tight fit problems at the shoulder blade region and loose fit (sagginess) around the waistline. The balance of the apparel is also likely to be affected as a result of this body configuration.

Upper back and back waist curvatures among different age groups (**Table 5.12**): Comparisons of the upper back and the back waist curvatures were made between the different age groups to determine whether there were any significant associations between the upper back and back waist curvatures among the different age groups. The results are represented in **Table 5.12**.

The results (**Table 5.12**) show that there were more (59%) of the young adults (25-32) with fully rounded upper back, followed by the middle-aged (33-40) group (53%) with fully rounded upper backs, and only 34% in the mature group had rounded upper backs. However, more (55%) of the mature (41+) and about half (47%) of the middle-aged (33-40) groups had moderately rounded upper backs, while only few (38%) of the young adults (25-32) had moderately rounded upper backs. From these results, it may be reasoned that as the females get older, the upper back possibly tends to fill up with fat deposits or the muscles slacken, making the shape at the back appear moderately rounded or flat (**Figure 5.4**).

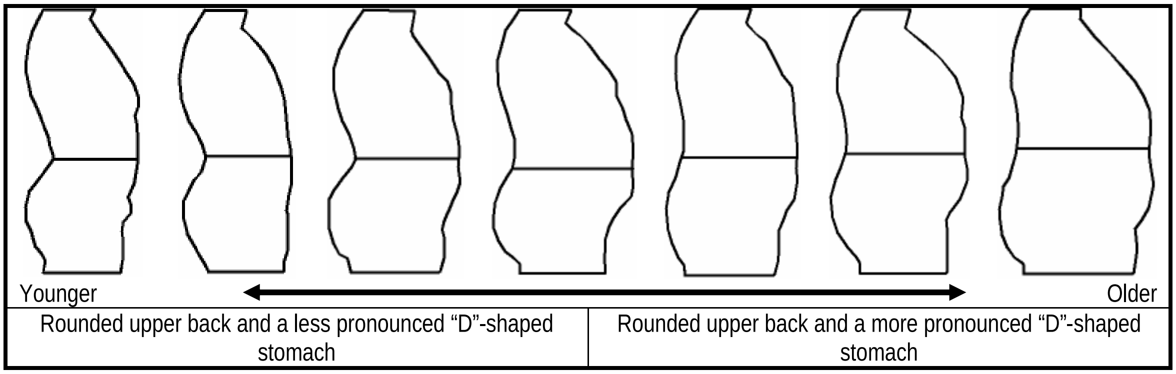


FIGURE 5.4: PROFILE VIEW CHARACTERISTICS AMONG DIFFERENT AGE GROUPS

TABLE 5.12: PERCENTAGE DISTRIBUTION OF THE UPPER BACK AND BACK WAIST CURVATURES AMONG DIFFERENT AGE GROUPS (n = 89)

Categories		Age groups (years)		
		25-32 (n = 29)	33-40 (n = 38)	41 + (n =22)
Upper back curvature	Fully rounded upper back	59%	53%	34%
	Moderately rounded upper back	38%	47%	55%
	Flat upper back	3%	0%	11%
Back waist curvature	Deep hollow waist	46%	48%	39%
	Moderately hollow waist	46%	45%	48%
	Flat waist/non-hollow	8%	7%	13%

Regarding the back waist curvature, it is clear that there was almost equal representation among the middle-aged (48%), the young adults (46%) and the mature group (39%) concerning the deep hollow back waist region. Approximately the same balanced percentage distribution pattern was also observed with the mature group (48%), the young adults (46%) and the middle-aged group (45%), regarding a moderately hollow back waist region.

5.3.5 Thigh bulge, upper arm and shoulder categories (V11, V12 and V13 on the body shape assessment scale)

Thigh size/bulge is an important characteristic that would affect the fit of apparel at different points of the hipline region (Rasband & Liechty, 2006:324). Shoulder shape, size or its direction is also an important characteristic that would affect the drape and fit of apparel. Inter-rater reliability for these two variables (0.62 each) was below the Kappa statistic of 0.75 – hence the need to subject the participants' images to a group of expert evaluators. Upper arm size affects the fit of apparel items at the sleeve's upper arm or at the crown region (Rasband, 1994:106-108), thus the need to understand consumers' upper arm sizes. The results of the thigh bulge, shoulder and upper arm categories are presented in **Table 5.13**.

TABLE 5.13: PERCENTAGE DISTRIBUTION OF THE UPPER ARM, THIGH BULGE AND SHOULDER SHAPE CATEGORIES (n = 89)

Categories		Evaluator 1 Average (%)	Evaluator 2 Average (%)	Average from a group of professional expert evaluators (%)	P	Inter-rater reliability
Upper arm size	Thin	0 (0%)	1 (0%)	0%	0.0001*	0.86
	Average	38 (43%)	34 (38%)	41%		
	Full	51 (57%)	54 (61%)	59%		
Thigh bulge	Large	-	-	38 (43%)	Three expert evaluators	
	Moderate	-	-	30 (33%)		
	Flat	-	-	21 (24%)		
Shoulders shape	Normal	-	-	52 (58%)	Three expert evaluators	
	Squared			22 (25%)		
	Sloped	-	-	15 (17%)		

*Statistically significant ($p \leq 0.05$); (-) not applicable

Table 5.13 indicates that the majority (59%) of the participants had full biceps/upper arms, while participants with moderate**/**average biceps/top arm were 41%. No participants had thin upper arms. The inter-rater reliability for the evaluations was good, as indicated by a Kappa statistic of 0.86. Statistically there was significant ($p > 0.0001$) agreement between the two evaluators. This implies that Kenya's career women are likely to encounter tight fit problems around the biceps region.

Concerning the thigh bulge, it is clear that the largest group (43%) of the participants had large thigh bulges, while 33% participants appeared to have moderate thigh bulges. Only 24% of the participants had flat thighs. Large thigh bulges in combination with large buttocks would exaggerate fit problems around the hip and crotch line of apparel. Regarding the shoulder shape, the majority (58%) of the participants had normal shoulder shapes. Only 25% and 17% had squared and sloped shoulders respectively. These results suggest that Kenya's career women are likely to encounter minimal shoulder fit problems.

5.3.6 Body shape form (variable 14 on the body shape assessment scale)

Body shape form has been seen as a solution to the fit problems of ready-made apparel (Simmons, Istook & Devarajan, 2004a; Simmons, Istook & Devarajan, 2004b; Connell *et al*., 2006). On the body shape assessment scale, the last question required a holistic (profile and silhouette) description of the body shape and possibly a category within the five prevalent types (hourglass, rectangle, triangle, apple and inverted triangle) to be assigned to each shape evaluated. The inter-rater reliability from the two expert evaluators for this variable was a Kappa statistic of 0.42 – below the 0.75 cut-off point. Therefore it was subjected to a group of professionals' expert evaluations. The results are presented in **Table 5.14**.

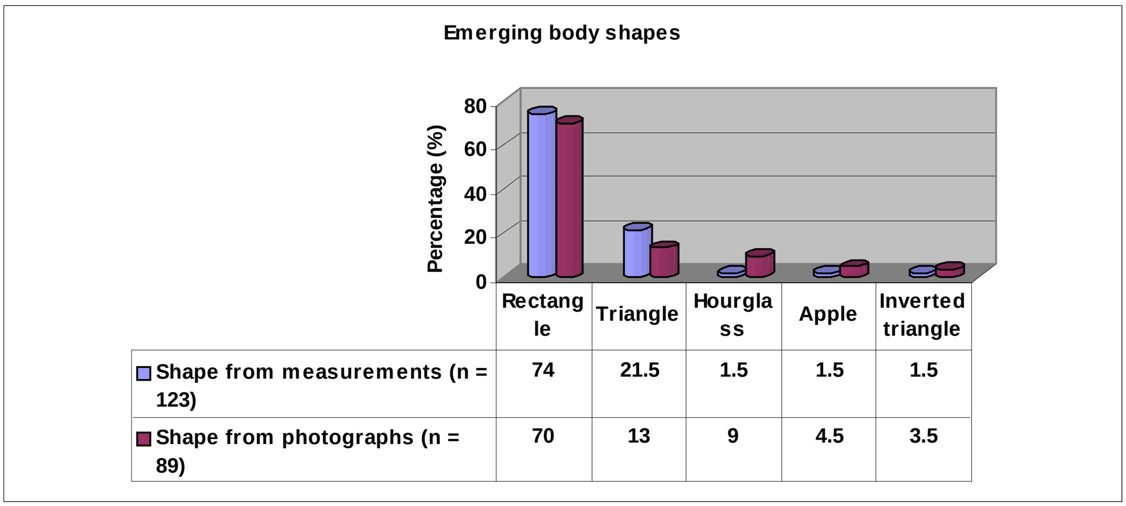
TABLE 5.14: PERCENTAGE DISTRIBUTIONS OF BODY SHAPE CATEGORIES (n = 89)

Body shape categories	Frequency	Percentage (%)
Rectangular/straight	62	70%
Pear / triangle	12	13%
Hourglass	8	9%
Barrel / inverted triangle	3	3.5%
Apple	4	4.5%

It is clear from **Table 5.14** that the majority (70%) of participants appeared to have a rectangular body shape, while participants who appeared to have a pear body shape were 13%. The rest of the body shapes were hardly represented. The predominant body shape that emerged from the evaluations was the rectangular body shape. Although the pear/triangle body shape was less represented in this study, it emerged as the second most distinctive body shape. Considering that ready-made apparel designs are based on the hourglass body shape, Kenya's career women with their rectangular shape are therefore likely to encounter fit problems.

5.4 DESCRIBING ASSOCIATIONS BETWEEN THE DISTINCTIVE SHAPES EMERGING FROM BODY DIMENSIONS AND THOSE EMERGING FROM THE PHOTOGRAPHS OF THE CAREER WOMEN (OBJECTIVE 1 (SUB-OBJECTIVE 3))

Figure 5.5 represents the results of the comparisons of the distinctive body shapes obtained from the body dimensions and those obtained from the photographs, calculated as percentages.



	Rectangle	Triangle	Hourglass	Apple	Inverted triangle
Shape from measurements (n = 123)	74	21.5	1.5	1.5	1.5
Shape from photographs (n = 89)	70	13	9	4.5	3.5

FIGURE 5.5: EMERGING BODY SHAPES FROM THE DIMENSIONS AND EVALUATIONS

Figure 5.5 above indicates that the rectangular body shape was the most distinct body shape emerging from both the dimensions (74%) and the evaluations of the photographs (70%). The second most distinct body shape emerging from both the dimensions (21.5%) and the evaluations of the photographs (13%) was the triangle body shape – although the percentage representation differs. The rest of the body shapes were least represented.

5.4.1 Comparing the characteristics of the distinctive body shape emerging from the body dimensions and from the evaluations of the photographs

Considering that body dimensions are one-dimensional elements, it would not be possible to isolate contours and precisely locate the positions of body characteristics such as buttocks and bust contours along circumferential dimensions. Images taken from different angles facilitate comprehensive scrutiny on the size/depth of any contours and any outlines that appear on the body. It is therefore possible to segregate body characteristics with the use of two body shape identification techniques, namely using body dimensions and evaluations of photographs. Characteristics that were identified using both techniques are presented in **Table 5.15**. Characteristics that were not possible to identify concurrently using both techniques were: the bust and the height proportions (identified through body dimensions), the body builds, stomach, upper back curvature, back waist curvature and the top arm (identified through visual evaluations of the photographs).

TABLE 5.15: DISTINCTIVE BODY FEATURES IDENTIFIED USING BODY DIMENSIONS AND VISUAL EVALUATIONS OF PHOTOGRAPHS

Body shape's features	Category	Body dimensions (%) (n = 123)	Visual evaluations (%) (n = 89)	Differences (%)
Thigh bulge	Small	0%	24%	24%
	Moderate	85%	33%	52%
	Large	15%	43%	28%
Buttocks	"d" (large)	69	91	22%
	Moderate	29	9	22%
	Flat	0	3	3%
Shoulder	Normal	67	58	9
	Squared	14	25	11
	Sloped	19	17	2
Profile view balance	Front upper torso	100	88	12

Table 5.15 indicates that the majority of the participants had a moderately large thigh bulge, 85% from the body dimensions and 52% from visual evaluations of photographs. It was also clear that large buttocks recorded high percentages of 91% from visual evaluations and 69% from body dimensions. Shoulder shape categories maintained almost equal percentage scores, with the normal category taking the lead (67% participants from the body dimensions and 58% from the visual evaluations). Regarding the arc dimensions, the majority of the participants' front bust and stomach arcs were larger than the back (back width) and waist arcs from both the body dimensions (100%) and the visual evaluations of photographs (88%).

From these results, it is also clear that both techniques produced significant results, although there were distinct percentage differences on some of the characteristics. The percentages ranged from 2, which was the lowest, to 52 being the highest. The differences may have been caused by varying sample sizes used for body dimensions (n = 123) and photographs (n = 89). It should be noted that visual analysis provides estimates of sizes, while the actual measurements give exact dimensions.

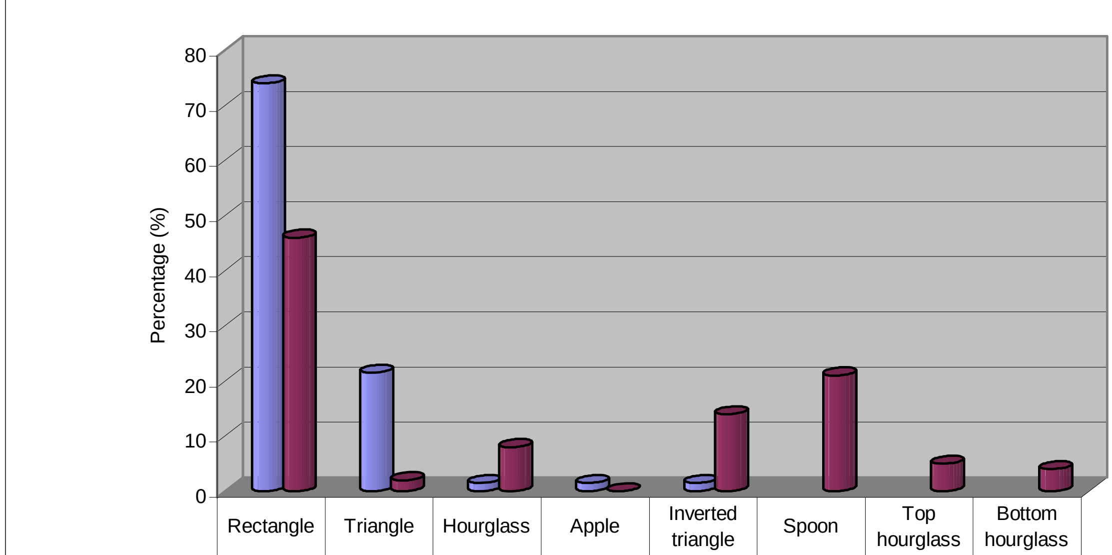
5.4.2 Summary on the identification of body shapes through body dimensions as well as evaluation of photographs

The study demonstrated that the prevalent body shape that emerged from the body dimensions and evaluation of the photographs was the rectangular body shape, which is typified by medium height, large buttocks, large thighs and large stomachs appearing like the letter "**D**". It is further characterised by a rounded upper back and a hollow back waist (lordosis curve) – making the shape appear imbalanced from the side view (**Figure 5.10**). However, more of the mature females appeared larger (**Figure 5.3**), with protruding stomachs ("**D**"), and a moderately rounded upper back (**Figure 5.4**). The majority of the younger females appeared smaller, with fully rounded upper backs and half of them had "**D**"-shaped stomachs, while the other half had "**b**"-shaped stomachs (**Figures 5.3** and **5.4**).

The results from both the body dimensions and the evaluations of the photographs further demonstrate that both techniques when combined yield even better results which can address apparel fit problems more closely. However, it is almost impossible to identify all the body shape characteristics using one method only. Considering that body scan technology is not popular in developing countries due to its cost and the technology involved (Xu *et al.,* 2002; Ashdown & Dunne, 2006), it may be reasoned that in the meantime, both the body shape identification techniques (from the dimensions as well as visual evaluations of photographs) could be used simultaneously to produce reasonably reliable results.

5.5 DISTINGUISHING AND DESCRIBING DIFFERENCES BETWEEN THE EMERGING DISTINCTIVE BODY SHAPES (FROM DIMENSIONS AND PHOTOGRAPHS) AND THE WESTERN DISTINCTIVE BODY SHAPE (PRIMARY OBJECTIVE 2)

The rectangular body shape is the prevalent female body shape among Kenyan career women. This finding is consistent with Istook's (2005) study in the United States of America. **Figures 5.6**, **5.7**, **5.8**, **5.9** and **5.10** compare the body shapes that emerged from this study with similar data from the USA. It should be noted that this study used only three basic dimensions (bust, waist and hips) for defining body shape, while the FFIT© software used by Devarajan and Istook (2004) to classify America's female shapes, used six dimensions (bust, waist, hips, high hip, abdomen and stomach). Based on the differences in classification techniques applied in the two studies and the different sample sizes, it would be unrealistic to make any conclusive comparisons.



	Rectangle	Triangle	Hourglass	Apple	Inverted triangle	Spoon	Top hourglass	Bottom hourglass
Kenya (n = 123)	74	21.5	1.5	1.5	1.5			
USA (n =6,300)	46	2	8	0	14	21	5	4

FIGURE 5.6: COMPARISON OF DISTINCTIVE FEMALE BODY SHAPES IN KENYA AND THE UNITED STATES OF AMERICA

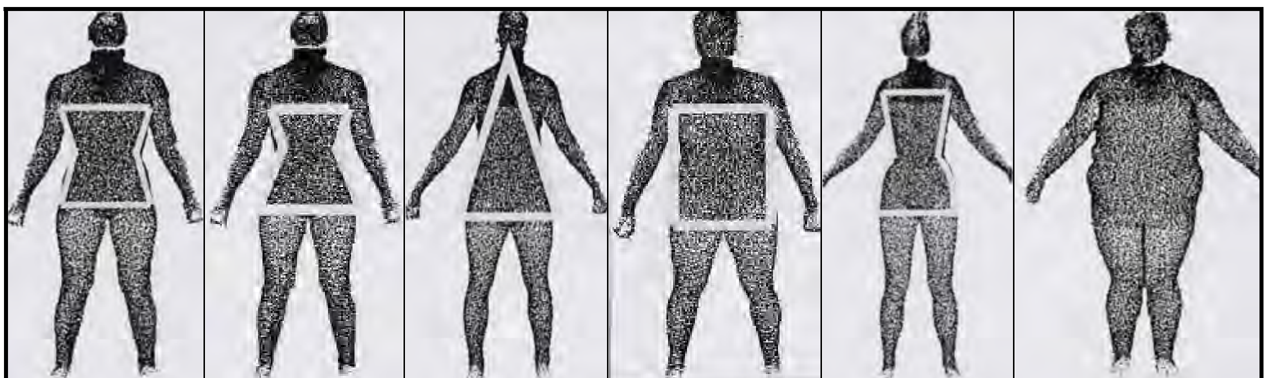


FIGURE 5.7: AMERICA'S BODY SHAPES (Simmons, Istook and Devarajan, 2004b)

The results of this study (**Figure 5.6**) show that the rectangular body shape is the strikingly distinctive body shape found in both America and Kenya. In contrast, the triangle body shape is the second most common body shape occurring in Kenya's career women, while America's second most distinctive body shape is the spoon shape, which did not feature at all in this study.

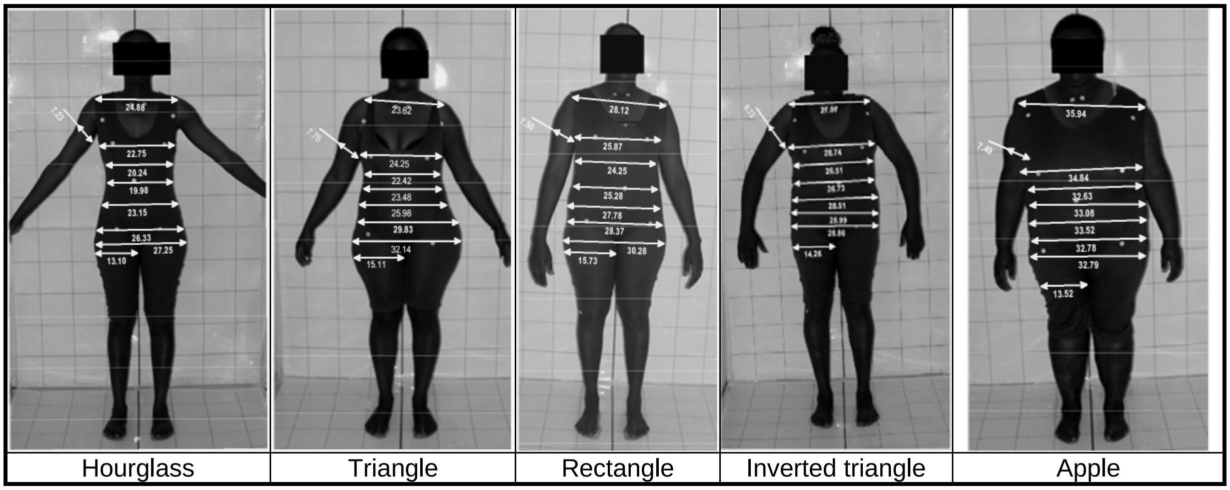
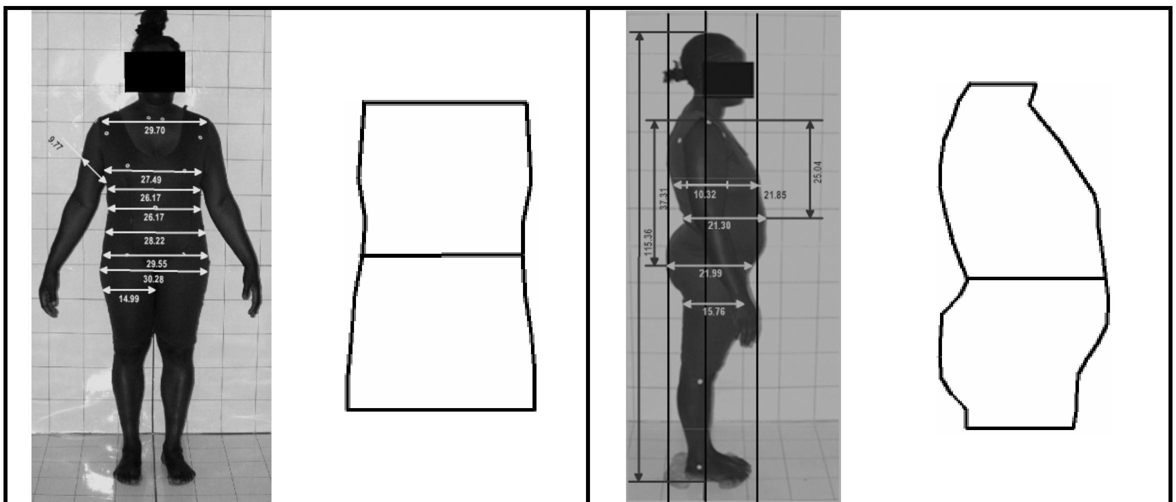


FIGURE 5.8: KENYA'S BODY SHAPES (Source: Present study)

The Western rectangular body shape, according to Rasband and Liechty (2006:25), has a strong ribcage and upper hip tapering a little towards the waist, or sometimes not tapering at all. The shoulder width appears similar to the hip measurement, with very little waist indentation. Waist circumference measures 9 inches (23 cm) less than the hip or bust circumference (Shin & Istook, 2007), the bust is small and there is no thigh bulge. The side view characteristics mentioned are the large stomach and a more flat back curvature: right from the upper back to the buttocks appears like the apple body shape's profile (**Figure 5.9**). Rasband and Liechty report that once a rectangular shape attains more weight, it results in an apple shape (Rasband & Liechty, 2006:25-26).

FIGURE 5.9: SIDE VIEW CHARACTERISTICS OF AN APPLE SHAPE ASSUMED TO BE AN APPROXIMATE REPRESENTATION OF THE SIDE VIEW CHARACTERISTICS OF THE RECTANGULAR BODY SHAPE
(Source: Simmons, Istook & Devarajan, 2004b)

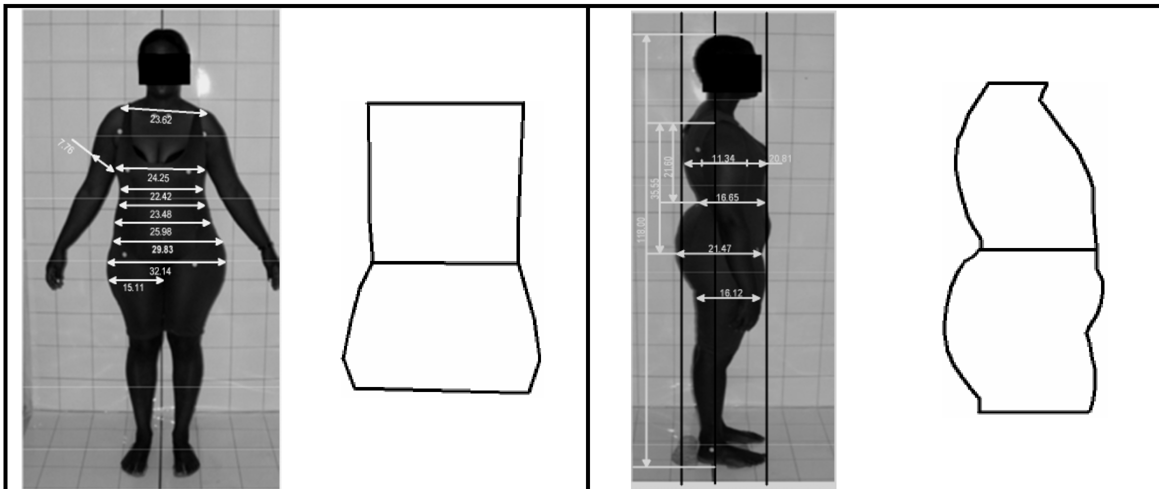
In this study (**Figure 5.10**), the emerging rectangular front view shape is characterised by a shoulder width that is similar to the width of the hips, and a small waist indentation of less than 9 inches (23 cm). The thighs on the side bulge out beyond the hip width and are full at the inside (crotch), in contrast to the Western body shape. A rounded upper back characterises the profile view, with more roundness concentrated just below the shoulder line and the chest. The back curvature tapers narrowly towards the waistline and abruptly meets the full buttock contour, resulting in a deep hollow waist region (lordosis curve). The front side of the profile view is characterised by a high abdominal contour that begins to protrude just below the bust line. It begins to curve round almost instantly, and increases as it leads down to the crotch at the centre of the body, resulting in a "**D**" appearance. A brief description of this kind of body shape would be a curvy, rectangular female body shape.



Front view	Profile view

FIGURE 5.10: CURVY RECTANGULAR BODY SHAPE

The second most prevalent shape in this study (**Figure 5.11**) is the triangular body shape, which differs from the second most prevalent spoon body shape of America. As mentioned earlier, it would be unrealistic to make conclusive comparisons because of the different sizes of population samples, techniques used to obtain body dimensions and methods of identifying body shapes by the two studies.



Front view	Profile view

FIGURE 5.11: CURVY TRIANGULAR BODY SHAPE

Although the triangular body shape was less (21.5%) represented in this study (**Figure 5.11**), the emerging triangular front view shape is characterised by narrow shoulders and hips. The shoulder, bust width and waistline region appear to be similar in width. The body immediately curves outward from the waistline downward to the hip line and further to the thigh region. The thighs on the side bulge out beyond the hip width and are full at the inside. A rounded upper back characterises the profile view, with more roundness concentrated just below the shoulder line and the chest. The back curvature tapers down narrowly towards the waistline and abruptly meets the full buttock contour, resulting in a deep hollow waist region (lordosis curve). The front profile view is characterised by a low abdominal contour that begins to protrude just below the waistline, curving round instantly and increasing as it leads down to the crotch at the centre of the body. A brief description of this kind of body shape would be a curvy, triangular female body shape.

5.6 SCRUTINISING AND DESCRIBING FIT IMPLICATIONS ASSOCIATED WITH THE EMERGING DISTINCTIVE RECTANGULAR BODY SHAPE OF CAREER WOMEN (PRIMARY OBJECTIVE 3)

Ready-made apparel items are designed based on the Western hourglass body shape that is viewed as the ideal shape (Ashdown & Dunne, 2006; Shin & Istook, 2007). Most sizing systems used in developing countries are just adaptations of the Western sizing systems (Zwane & Magagula, 2006). The latest anthropometric data collected in the USA (2003) as well as the United Kingdom has not been analysed and implemented by apparel industries as sizing systems (Devarajan & Istook, 2004; Newcomb & Istook, 2004b; Simmons, Istook &

Devarajan, 2004a; Istook, 2005). This then calls attention to the Western sizing systems that are currently in use to facilitate comprehensive comparisons with the findings of this study. Newcomb and Istook (2004a) confirmed that junior and misses standards were based on the hourglass body shape, which is viewed as an ideal shape – a phenomenon that is supported by various studies (Zwane & Magagula, 2006; Pisut & Connell, 2007). Therefore, it is appropriate that the rectangular body shape found to be prevalent in this study, be compared to the hourglass body shape (fit model) in order to facilitate a deeper understanding of the fit problems experienced by Kenya's career women.

5.6.1 Fit implications for apparel associated with the curvy female rectangular body shape

The study revealed that critical fit points of the distinct rectangular body shape of the career women in Kenya deviate from the fit points of the well-proportioned fit model's characteristics. The varied critical fit points common to the distinct body shape of this study, are the large buttocks, the thighs, the curvy back profile shape, the large stomach, unproportional key height points (bust, waist, hip and knee) and the large, low bust. The fit implications of these critical fit points associated with the rectangular distinctive body shape of this study are discussed below.

5.6.1.1 Fit implications associated with the size of the buttocks/derriere and the thighs

The buttocks and thighs are situated around the hip region and therefore influence the circumferential dimensions around the hipline. These may have similar or closely related fit implications for the apparel. Although the hipline (trochanterion) was positioned above the normal hipline (½ height) for most participants (**Table 5.5**), nonetheless, it is a typical characteristic of a Western rectangular shape. The broadest hip position (thigh bulge) situated at approximately 10 cm below the normal hipline, could possibly affect the fit of an apparel item more than the high hip position.

The buttocks/derriere: The findings of this study indicated that there were 91% and 69% of the participants with large buttocks according to visual evaluations and body dimensions, respectively. This suggests that the majority of the participants are likely to experience tight fit problems around the hip region and the crotch line. Over-sized buttocks that curve outwards more than the ideal shape's buttocks, can cause fit problems around the buttocks, hip and crotch lines. The fabric width, and the length or the curved shaping in an apparel item may not be sufficient enough to accommodate the fullness of the buttocks comfortably and attractively. The fabric is likely to be strained and pulled tight across the buttocks, causing the side seam to bow backward at the hipline level, while the skirt hemline is likely to pull up at the back and hang down longer at the front. The shallow area above the buttocks may cause excess fabric to form layers of folds as the apparel item rides up (Rasband, 1994:134-135; Rasband & Liechty, 2006:314, 324, 336). This may result in tight diagonal ripples forming towards the buttock curve on skirts, and towards the crotch on pants. The waistband may be pulled down at the back for pants, and may generally affect the length of the skirt.

***The bulging thighs*:** In this study there were 76% career women with large thighs, as judged from the visual evaluations. This suggests that the heavy thighs (inside and outside) could have fit implications due to the size and position in comparison with the ideal shape's size and position. Heavy/bulging thighs positioned lower than the normal position of the ideal shape will affect the way that pants and skirts fit. There will be less fabric width to go round the thighs, leading to tight horizontal ripples or folds forming round the upper thigh just below the hipline. There will be horizontal ripples radiating from the crotch line towards the outside thigh and the fabric may "cup" under the thighs and the buttocks. Skirts' hemlines will tend to pull on the sides (Rasband & Liechty, 2006: 340).

All the participants' knee height positions were above the normal position (¼ height) of the ideal figure (**Table 5.5**). Although there is a disparity with the ideal shape's height proportions, fit problems are unlikely to occur but may only affect style line position (shaping).

5.6.1.2 Fit implications associated with the large stomach size

The study indicated that the majority (70%) of the Kenyan career women had a high abdomen, appearing like the letter "**D**" from the visual evaluations. This suggests that the stomach protrusion exceeds the shape of the ideal shape. Apparel made on the basis of the ideal shape's proportions will therefore have less fabric length and width or even insufficient curved shaping to fit comfortably and nicely over the abdomen. In skirts and dresses, tight horizontal folds are likely to form above the abdomen as the apparel item rides up. The side seams will tend to bow forward between the hip and the waist, while angled ripples may also form towards the stomach curve. With fitted skirts or dresses, the hemline may be pulled up in front, causing a "poke out" at the centre. On pants, wrinkles may form between the crotch and abdomen. The crotch seam is likely to be pulled up uncomfortably and to cut tightly through the body (Rasband & Liechty, 2006:206, 296, 304; *Reader's Digest*, 2002:53).

Most (84%) of the participants' waist height positions were above the normal position (⅝ height) (**Table 5.5**). A dress made on the basis of the ideal shape's height proportions is likely to fit tightly at the midriff region, as style lines and darts positions would not be in harmony with the shape underneath the dress.

5.6.1.3 Fit implications associated with the large bust

In this study, there were 81% participants with large busts and 60% with cup "**DD**" and above brassieres' categories. This indicates that the majority of Kenya's career women have a large bust, which implies that they are likely to experience fit problems with apparel designs that have been based on the ideal shape. According to Rasband and Liechty (2006:194), the ideal shape's bust cup is "**B**", and the participants' bust sizes (**DD**) as observed in this study were much larger than the ideal shape's size. An apparel item based on the ideal shape's cup size "**B**" would therefore contain too little fabric and curved shaping to accommodate the larger bust. This may result in wrinkles forming around the bust line between the armhole and the bust tip, or radiating from the bust tip to the armhole and the waist. The bodice side seam may bow forward, while the waistline may pull up at the centre front (Rasband, 1994:86; Rasband & Liechty, 2006:194, 198).

The bust line height positions of all the participants were below the normal position (¾ height) (**Table 5.5**). A dress made on the basis of the ideal shape's height proportions will likely fit tightly at the armhole region and the bust region, as the positions of the darts and style lines would not be in harmony with the positions of the bust lines and breasts of the wearer. It should be noted that no tolerance allowances were given above or below the standards used. If tolerance allowances were given, fewer fit problems would be predicted, as more shapes would be accommodated within the allowed tolerances.

5.6.1.4 Fit implications associated with the rounded upper back, the hollow back waist and the imbalanced back and front features

The results of this study showed that 79% and 75% of the sample of Kenyan career women had a fully rounded upper back and a deep hollow back waist, respectively. This suggests that the majority of the participants are likely to experience fit problems with ready-made apparel designed on the basis of the ideal shape. The entire back curvature would affect the fit of an apparel item if the body shape differs from the back curvature of the ideal shape.

The rounded upper back: The upper back part of the body shape curves outward more than the ideal shape does. Apparel items designed for the ideal shape will therefore have too little fabric for the length or for the curved shaping in the upper back area to contain the fullness. Consequently, the apparel may pull tight in the upper back area; diagonal wrinkles may also form between the neck and armhole, while the waist at the centre back may pull upwards.

The hollow waist: The back curvature tapers sharply to a hollow section at the waist region – more than for the ideal shape. Apparel items meant for the ideal shape will therefore have excess fabric length and curved shaping in the lower back waist area. The apparel is therefore likely to sag, forming vertical folds just below the shoulder blades region (*Readers' Digest*, 2002:50; Rasband & Liechty, 2006:154).

Balanced postures: This refers to the alignment of the different parts of the body and the manner in which the frame is carried (Liechty *et al*., 1992:37). A correct posture assumes a balanced alignment of all the body parts over each other and could influence the physical attractiveness of apparel items (Rasband, 1994:13). Excessively incorrect posture or non-proportional body characteristics could be termed as a figure variation as it would cause fit problems (Rasband & Liechty, 2006:29). It was observed in this study that the career women's front upper torsos (profile view) were larger than the back upper torso. This means that the side seams of the ready-made apparel are likely to pull forward to accommodate the excess fullness at the front. The lower torso from the hipline is imbalanced with all the participants' back arc being larger than the front. This implies that the apparel item's side seam is likely to pull towards the back to contain the extra width at the lower back.

5.6.1.5 Fit implications associated with the large top arm

The findings of this study demonstrated that the majority of the Kenyan career women in the sample had large top arms as identified by the visual analysis. This suggests that the majority of the career women are likely to experience fit problems with the sleeves of ready-made apparel items. The top arm muscle of these women is larger or carries more weight than the top arm of the ideal shape. This means that sleeves may not contain adequate fabric to fit comfortably and attractively around the biceps region, resulting in horizontal ripples or wrinkles forming around the upper part of the arm. The front and back armhole may pull towards the arm, while a short sleeve hemline may tend to poke out in the middle (Rasband, 1994:106-108).

5.7 CONCLUSIONS REGARDING FIT IMPLICATIONS ASSOCIATED WITH THE CURVY RECTANGULAR BODY SHAPE

Considering that ready-made apparel items are designed based on the ideal (hourglass) body shape (Loker *et al*., 2005; Zwane & Magagula, 2006; Shin & Istook, 2007), career women in Kenya with the rectangular body shape are likely to be dissatisfied with the fit of ready-made apparel. This is because their body shapes differ not only from the Western ideal shape, but also from the Western rectangular shape. The following fit problems may be expected to be experienced by a woman with a curvy rectangular shape:

- Tight fit at the hip region, crotch line and thighs, which may lead to wrinkles and ripples forming around the affected area. The apparel item could tend to poke out at either center back or front due to the tight fit.
- Tight fit at the waistline that could lead to wrinkles on the waist region, apparel riding up, and inappropriate style and dart positions due to a waistline that is higher than normal (⅝ height) or larger than average. Apparel items such as blouses and jackets are likely to sag loosely, forming vertical folds at the back waist region due to the hollow waistline
- Tight bust line, tight armhole and tight pull in the upper back area, which could result in diagonal wrinkles forming between the neck and armhole region (bust region and shoulder blades) due to the large bust, rounded upper back and lower bust line position than the normal (¾ height) position.
- Tight upper arm could result in apparel with horizontal ripples or wrinkles forming around the upper part of the sleeve.
- The knee height position above the normal height position (¼ height) may result in pants' style lines (shaping) being inappropriately positioned, and apparel could be tight around the knee region.

Having looked at the critical fit points and scrutinised the fit implications associated with the curvy rectangular shape, it has become clear that it would be unrealistic for apparel industries to continue manufacturing styles that are suitable for the hourglass body shape (fit model), and expect to fit the curvy rectangular shape appropriately. The quality of apparel in respect of its fit can only be determined collectively, through dress forms, fit models and sizing systems, which all have to represent the target population's sizes and body shapes (Salusso-Deonier, 1989; Ashdown, Loker & Adelson, 2004; Bougourd in Ashdown, 2007:130, 133).

Data analysis and discussion of the findings based on phase two (questionnaire) data, are presented in Chapter 6.

Chapter 6

DATA ANALYSIS AND DISCUSSION OF THE FINDINGS BASED ON PHASE TWO DATA (QUESTIONNAIRE)

6.1 INTRODUCTION

The focus of this chapter is the statistical analyses of data, interpretation of the results and the discussion of the findings obtained from evaluating primary objectives 4, 5 and 6 of this study. In presenting the results, interpretations and discussion of the findings, this chapter attempts to direct the attention to the stated research objectives and the concomitant sub-objectives, where applicable.

6.2 DEMOGRAPHIC ANALYSIS OF THE POPULATION (Questions 1 and 2)

The analysis of the demographics of the population served as background for the examination and interpretation of the findings. The demographic information gathered from a group of career women in Kenya consisted of their ages and professional backgrounds, as presented below. These women were questioned about their perception of general fit problems with ready-made apparel, their knowledge about the communication of size (key dimensions) and fit (body shapes), and their preferences for differently fitted jackets and skirts in Kenya.

6.2.1 Age distribution (Question 1)

There were 201 respondents who completed the questionnaire. Their ages were categorised into three groups, namely: young adults aged between 25 and 32 years, a middle group aged between 33 and 40 years, and a mature group aged 41 years and above. The middle-aged (33-40) group had the highest representation (43%), while the young adult group (25-32) represented 33%. The mature (41+) group had the lowest representation (24%). The majority of the respondents were middle-aged women, and therefore likely to be more aware of the dynamics of fashion and more familiar with and critical about the fit of apparel items.

6.2.2 Career women's professional background in Home Science and/or Clothing and Textiles (Question 2)

The data on the career women's professional backgrounds in the fields of Home Science and/or Clothing and Textiles, which are thought to adequately equip individuals with skills in size and fit issues, indicates a balanced distribution between the numbers of respondents. There were 54% (n =107) with professional backgrounds in Home Science and/or Clothing and Textiles, and 46% (n = 91) without a professional background in Home Science and/or Clothing and Textiles. The assumption made here is that respondents with a professional background in Home Science and/or Clothing and Textiles would be more knowledgeable in size and fit issues and therefore more likely to experience fewer fit problems, as opposed to the respondents without a professional background in Home Science and/or Clothing and Textiles. It was also assumed that respondents without a professional background in Home Science and/or Clothing and Textiles were uninformed about size and fit issues and so more likely to encounter problems while making apparel selection in terms of styles and sizes.

6.3 ANALYSIS AND INTERPRETATION OF THE RESEARCH OBJECTIVES 4, 5 AND 6

Note: Primary objectives 1, 2 and 3 were presented and discussed in **Chapter 5**. Therefore the order of the objectives in this chapter will not necessarily be in line with their sequence in the chapter. Considering that this chapter deals with Objectives 4, 5 and 6 only, they are presented in the order in which they occur throughout this study.

6.3.1 Primary objective 4: To assess and describe career women's self-perceived fit issues with the ready-made apparel in Kenya (Questions 3, 4)

6.3.1.1 Sub-objective 4.1: To investigate career women's perception of fit with different apparel categories that are sold in various retail stores in Kenya (Question 3 and 4)

Questions 3 and 4 measured career women's perception of fit with the ready-made apparel from different sources and the ready-made apparel sold through different retail stores. The investigation was to highlight which ready-made apparel categories were perceived to have major fit problems, and to pinpoint which retail stores were perceived to sell apparel with good fit. The results analysed are presented in **Figures 6.1** and **6.2** below.

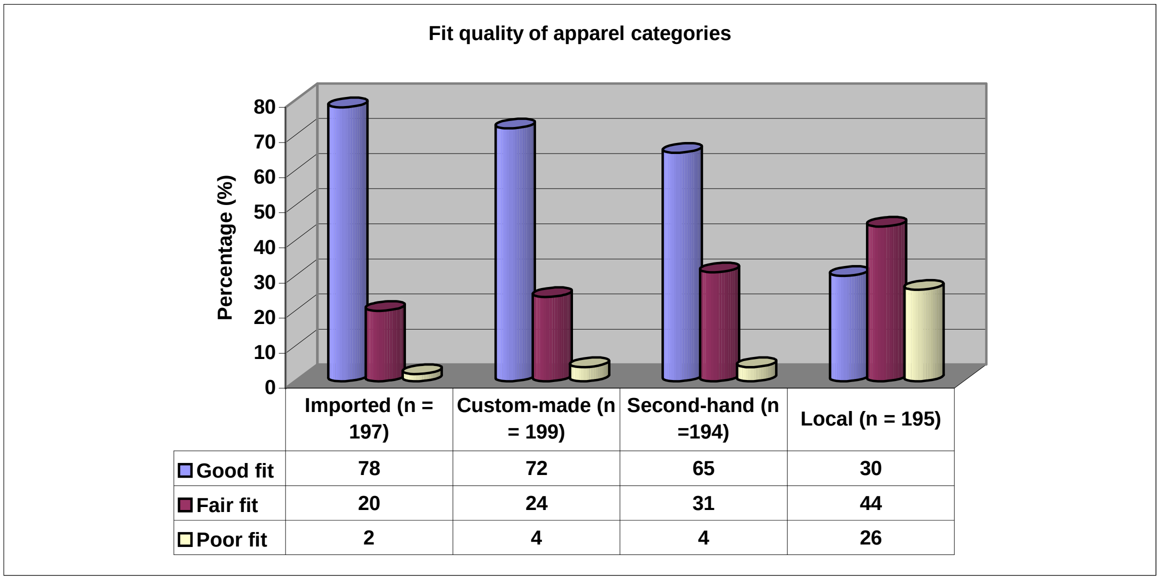
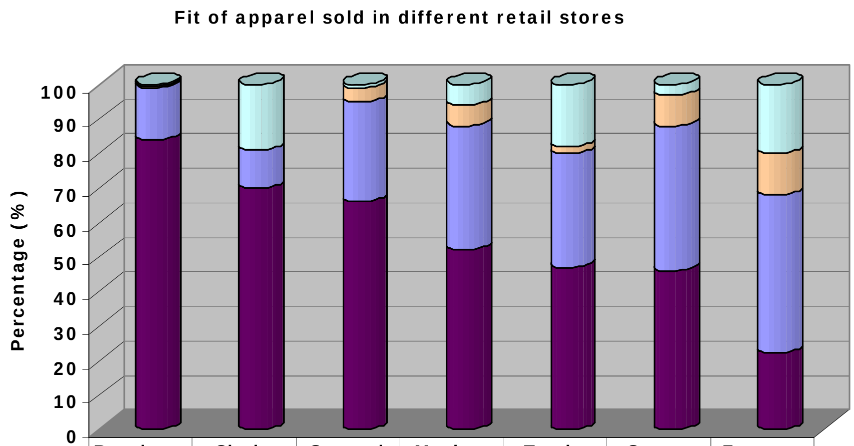


FIGURE 6.1: QUALITY OF APPAREL CATEGORIES

In **Figure 6.1** above it is clear that the imported, custom-made and second-hand apparel categories are perceived to have the best fit, as indicated by 78%, 72%, and 65% responses, respectively. Responses concerning good fit in the local ready-made apparel category counted for 30%, which is far below the imported custom-made and imported second-hand categories. On fair fit of the ready-made apparel, imported new scored 20%, custom-made 24%, imported second-hand 31%, while the majority (44%) of the respondents maintained a fair fit view on local ready-made apparel. The majority (26%) of the respondents reported that the local ready-made apparel category had poor fit, which is a sharp contrast to the imported new with a score of 2%, and the custom-made and imported second-hand with responses of 4% each. These results imply that Kenya's career women perceive imported new, custom-made and imported second-hand ready-made apparel categories as having better fit than the local ready-made apparel.

The results regarding apparel categories that are sold in various retail stores (**Figure 6.2)**, indicate that apparel sold in the boutiques, chain stores and second-hand stores had good fit, as reflected by 84%, 70% and 66% responses respectively. Apparel sold in market stalls recorded responses of 52%, trade fairs 47%, supermarkets 46%, and factory outlets with the lowest 22%. Regarding fair fit, factory outlets and supermarkets scored 46% and 42% responses, respectively, while market stalls recorded 36%, trade fairs 33% and second-hand stores 29%. Boutiques and chain stores had responses of 15% and 11% respectively.



	Boutique	Chain	Second	Market	Trade	Super	Factory
undecided	0.5	19	1	6	18	3	20
Poor fit	0.5	0	4	6	2	9	12
Fair fit	15	11	29	36	33	42	46
Good fit	84	70	66	52	47	46	22

Boutiques (n = 196), Chain = Chain stores (n = 180), Second = Second-hand stores (n = 193), Market = Market stalls (n = 190), Trade = Trade fairs (n = 184), Super = Supermarkets (n = 198), Factory = Factory outlets (n = 173)

FIGURE 6.2: FIT QUALITY OF READY-MADE APPAREL SOLD AT DIFFERENT RETAIL STORES

As for poor fit, **Figure 6.2** further show that factory outlets had 12%, supermarkets 9%, and the rest of the retail stores had responses of between 2% and 6% each. The inference is that, according to Kenya's career women, factory outlets sell ready-made apparel with poor fit, while boutiques, chain stores and second-hand stores sell apparel items with good fit.

6.3.1.2 Sub-objective 4.2: To describe fit problems that career women in Kenya encounter regarding the specific critical fit points of different parts of their bodies (Question 22)

Question 22 solicited career women's responses on how they experience fit problems at their critical fit points. For the purposes of data management and presentation, the body was split into the upper and the lower torso and the arms. **Tables 6.1**, **6.2** and **6.3** present the fit problems encountered at the upper and lower torso and the arms.

Form **Table 6.1,** it is clear that Kenya's career women experienced fit problems (too tight or too loose) – as indicated by percentage responses that range from 58% to 65% – on all the critical fit points of the upper torso. Regarding problems of tight fit, the bust region had the highest number of reports, with 37% of the responses. As far as problems of loose fit are concerned, the neckline region had the highest number of responses (43%). For the problems of length, the highest (41%) number of responses were reports of normal/acceptable fit.

TABLE 6.1: FIT PROBLEMS ENCOUNTERED AT THE UPPER PART OF THE TORSO

Fit Point	Fit problem		Frequency	Percentage	
Neckline	Tight	Fit problems	29	15	58
	Loose		87	43	
	Normal/acceptable		85	42	
Shoulders	Tight	Fit problems	50	25	60
	Loose		71	35	
	Normal/acceptable		80	40	
Back width	Tight	Fit problems	53	27	61
	Loose		69	34	
	Normal/acceptable		79	39	
Bust	Tight	Fit problems	75	37	65
	Loose		56	28	
	Normal/acceptable		70	35	
Bodice back, nape to waist	Short	Fit problems	64	32	59
	Long		54	27	
	Normal/acceptable		83	41	
Bodice front, neck to waist	Short	Fit problems	60	30	59
	Long		58	29	
	Normal/acceptable		83	41	

The inference that may be drawn from the results presented in **Table 6.1**, here is that most Kenyan career women experienced fit problems with the widths of ready-made apparel, that were reported as either too tight or too loose. On average, 61% of the Kenyan career women reported problems with fit, which is more than the 39% that reported acceptable fit. However, loose fit problems reported at the upper torso particularly around the back width, shoulders and neckline, indicate that most of the participants' upper body's characteristics deviate from what the industry use as a base pattern. This confirms the critical fit points of the curvy rectangular body shape's upper torso observed in **Chapter 5** (**paragraph 5.6**). Common body characteristics that could accelerate fit problems within the upper torso of the curvy rectangular shape include the rounded upper back, the large bust, and the large and high stomach that is positioned above the ideal figure's normal waist position.

The lower torso's critical fit points (**Table 6.2**) were more prominent than those of the upper torso. This could have contributed to fewer respondents (26%) reporting problems with tight fit than those (35%) reporting problems of loose fit with the upper torso's critical fit points. As in the case of the stated width fit problems, it is also obvious that more Kenyan career women (59%) encountered problems with length (too short or too long), than those who felt that the lengths were acceptable (fine). As observed in **Chapter 5** (**paragraph 5.2**), the majority of the respondents (74%) were in the medium height category, and the majority (84%) had waist lines positioned higher than the ideal figure's normal waist position (⅝ height) (**Table 5.5**). These could have contributed to the more (41%) responses of acceptable length than the reported shorter (31%) or longer (28%) length fitting problems.

TABLE 6.2: FIT PROBLEMS ENCOUNTERED AT THE LOWER TORSO

Fit Point	Fit problem		Frequency	Percentage	
Waist	Tight	Fit problems	60	30	74
	Loose		89	44	
	Normal/acceptable		52	26	
Stomach	Tight	Fit problems	87	43	66
	Loose		46	23	
	Normal/acceptable		68	34	
Hip	Tight	Fit problems	109	54	79
	Loose		49	25	
	Normal/acceptable		43	21	
Crotch	Tight	Fit problems	78	39	60
	Loose		42	21	
	Normal/acceptable		81	40	
Buttocks	Tight	Fit problems	86	43	67
	Loose		49	24	
	Normal/acceptable		66	33	
Thighs	Tight	Fit problems	87	43	66
	Loose		46	23	
	Normal/acceptable		68	34	
Skirt length	Short	Fit problems	60	30	61
	Long		62	31	
	Normal/acceptable		79	39	
Pants Length	Short	Fit problems	55	28	63
	Long		71	35	
	Normal/acceptable		75	37	

In **Table 6.2** above it is clear that Kenyan career women experience more (67%) fit problems (tight or loose fit) on average, at the lower torso, than acceptable fit (33%). As for problems with tight fit at the lower torso, the hip region had the highest number of responses (54%), followed by the stomach and thigh regions, with equal (43%) responses each. The waist region scored the highest (44%) number of responses for problems with loose fit. For length problems, there were almost equal representations on the reported longer skirts and pants' lengths (31% and 35%) and the reported shorter skirts and pants' lengths (30% and 28%), which may imply that Kenya's career women experienced fewer fit problems with length.

As in the case of the upper torso, it is also clear that more (69%) Kenyan career women experience fit problems at their lower torsos' critical fit points than are satisfied with a normal or acceptable fit (31%). It is further confirmed that Kenyan career women experience more (69%) fit problems with the lower torso's critical fit points than (61%) they experience at the upper torso. However, among the reported fit problems, generally Kenyan career women experienced more tight fit problems with the lower torso (42%) than with their upper torso (26%). These results confirm the critical fit points of the curvy rectangular body shape's lower torso that were observed in **Chapter 5** (**paragraph 5.6**). Common body characteristics that could accelerate fit problems within the lower torso region of the curvy rectangular shape include the large buttocks, the large thighs and the large stomach that is positioned above the ideal figure's normal waist position. These characteristics were more prominent than the upper torso's characteristics, which may further confirm the more tight fit problems reported at the lower torso than at the upper torso.

It is also apparent that there were more (62%) length problems experienced with the lower torso than the reported acceptable lengths (38%). However, there were almost equal representations on the reported short (30%), longer (31%) and acceptable (38%) skirts' and pants' lengths, which may confirm that the majority of the respondents (**Table 5.2**) were in the medium height category and therefore they were likely to experience fewer length problems. Length is also dictated by fashion trends, and thus length preference could vary with different consumers.

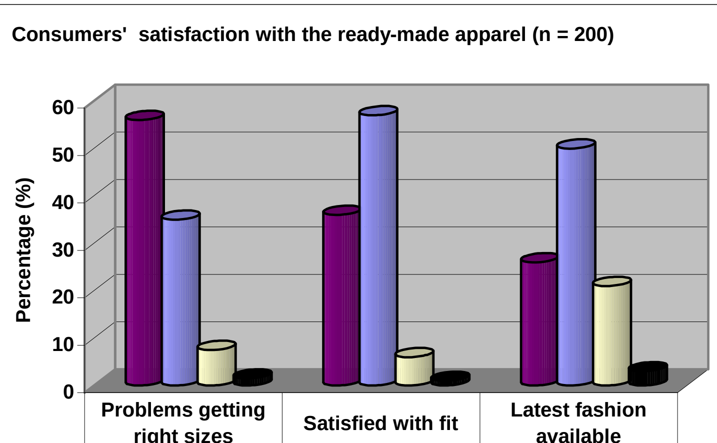
TABLE 6.3: FIT PROBLEMS ENCOUNTERED AT THE ARMS

Fit Point	Fit problem		Frequency	Percentage	
Armscye (armhole)	Tight	Fit problems	67	33	61
	Loose		57	28	
	Normal/acceptable		77	39	
Upper arm	Tight	Fit problems	83	41	66
	Loose		50	25	
	Normal/acceptable		68	34	
Elbow	Tight	Fit problems	61	30	54
	Loose		49	24	
	Normal/acceptable		91	46	
Below elbow	Tight	Fit problems	44	22	52
	Loose		61	30	
	Normal/acceptable		96	48	
Sleeve length	Short	Fit problems	65	32	61
	Long		59	29	
	Normal/acceptable		77	39	

In **Table 6.3** it is evident that more Kenyan career women (59%), on average, experience problems (tight or loose) with the arms' critical fit points than those who do not experience fit problems (41%). However, 41% of the Kenyan career women reported experiencing problems of tight fit at their upper arm, which confirms the findings observed in **Chapter 5** (**Table 5.13**) that the majority (59%) of the respondents had full/large biceps regions. The Kenyan career women also reported experiencing more (61%) problems with the length of sleeves than those who expressed satisfaction with acceptable length (39%). This could possibly be attributed to pattern grading processes in the apparel industry, which assume that the larger the size, the longer the sleeves (Loker *et al*., 2005; Schofield in Ashdown, 2007:180-188).

6.3.1.3 Sub-objective 4.3: To describe career women's degree of satisfaction with the process of finding appropriate ready-made apparel items in Kenya (Question 21)

Question 21 was used to determine consumers' satisfaction with the process of finding apparel that fit well, in terms of the search process, the availability of suitable styles and appropriate sizes, and the availability of fashionable apparel items in appropriate sizes and styles for the consumers' body sizes and shapes. The results are presented in **Figure 6.3**.



	Problems getting right sizes	Satisfied with fit	Latest fashion available
Frequent	56	36	26
Less frequent	35	57	50
Never	7.5	6	21
Undecided	1.5	1	3

FIGURE 6.3: CAREER WOMEN'S SATISFACTION WITH THE PROCESS OF FINDING APPROPRIATE READY-MADE APPAREL

The results (**Figure 6.3**) indicate that 91% (56% - frequent + 35% - less frequently) respondents experienced problems getting the right sizes and styles that fit their shapes and sizes appropriately. Respondents who reported that the latest fashions were less frequently available in their sizes were 71% (50% - less frequently available + 21% - never available). Respondents who were less satisfied with the way most ready-made apparel fit their sizes and their body shapes were 63% (57% - less frequently satisfied + 6% - never satisfied). This implies that Kenyan career women were not satisfied with the fit and availability of the latest fashions. Their dissatisfaction with the fit of ready-made apparel was confirmed by 65% (on average) reporting fit problems experienced at their bodies' critical fit points (**Tables 6.1** and **6.2**). The fit implications associated with the distinct curvy rectangular shape of the Kenyan career women such as tight fit around the hipline, bust line and stomach region (**Chapter 5** (**paragraph 5.5** and **5.6**), may also confirm career women's dissatisfaction with the fit of ready-made apparel.

6.3.1.4 Sub-objective 4.4: To explore career women's self-perceived sources of fit problems with apparel in Kenya (Question 20)

Question 20 asked whether the career women felt that the apparel industry or their body shapes were the sources of the fit problems they encountered. The results are presented in **Figure 6.4** below.

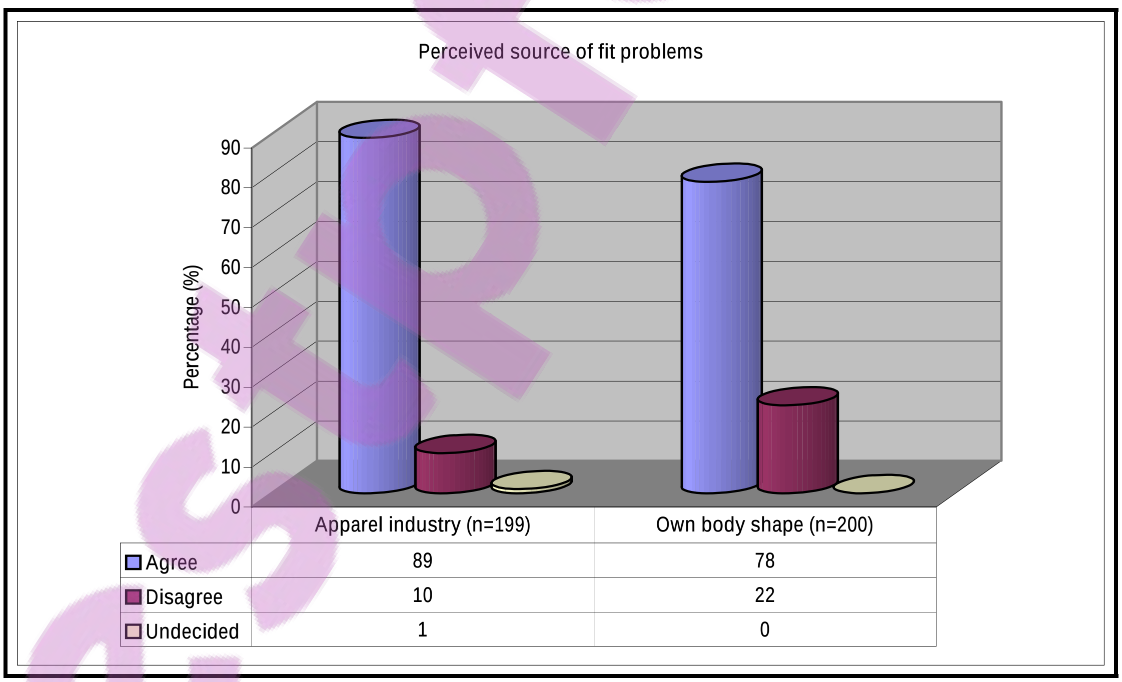


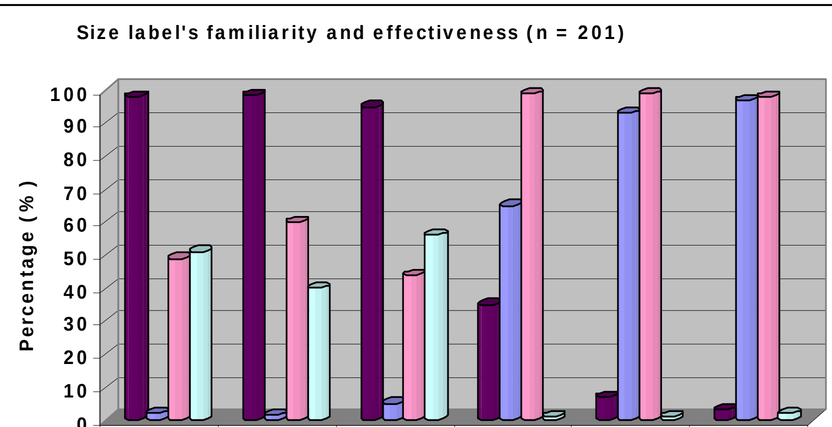
FIGURE 6.4: CAREER WOMEN'S PERCEIVED SOURCES OF FIT PROBLEMS

As **Figure 6.4** shows, respondents chose both the options of the apparel industry and own body shapes as sources of fit problems. Eighty nine per cent identified the apparel industry, and 78% identified their own body shapes as the source of fit problems. Statistically, there were significant (0.002 < 0.05) associations between body shape and the apparel industry as perceived sources of fit problems. This may suggest a possibility that career women in Kenya were confused regarding the sources of the fit problems they were experiencing with apparel.

6.3.2 Primary objective 5: To determine and describe Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes)

6.3.2.1 Sub-Objective 5.1: To explore Kenyan career women's knowledge about the communication of size (Question 6, 13, 14, 15, 16, 17 and 18)

***Familiarity with and perceived effectiveness of the size labels*:** Question 15 was used to determine from the career women's viewpoints, which size labels (size description systems) among the provided types, were familiar to them, while question 18 attempted to ascertain career women's perceptions regarding the effectiveness of size labels. The results in this regard are presented in **Figure 6.5**.



	XL	8 to 24	32 to 50	Code +	Pict +	Wordless
Familiar label	98	98.5	95	35	7	3
Non-familiar	2	1.5	5	65	93	97
Effective labels	49	60	44	99	99	98
Ineffective labels	51	40	56	1	1	2

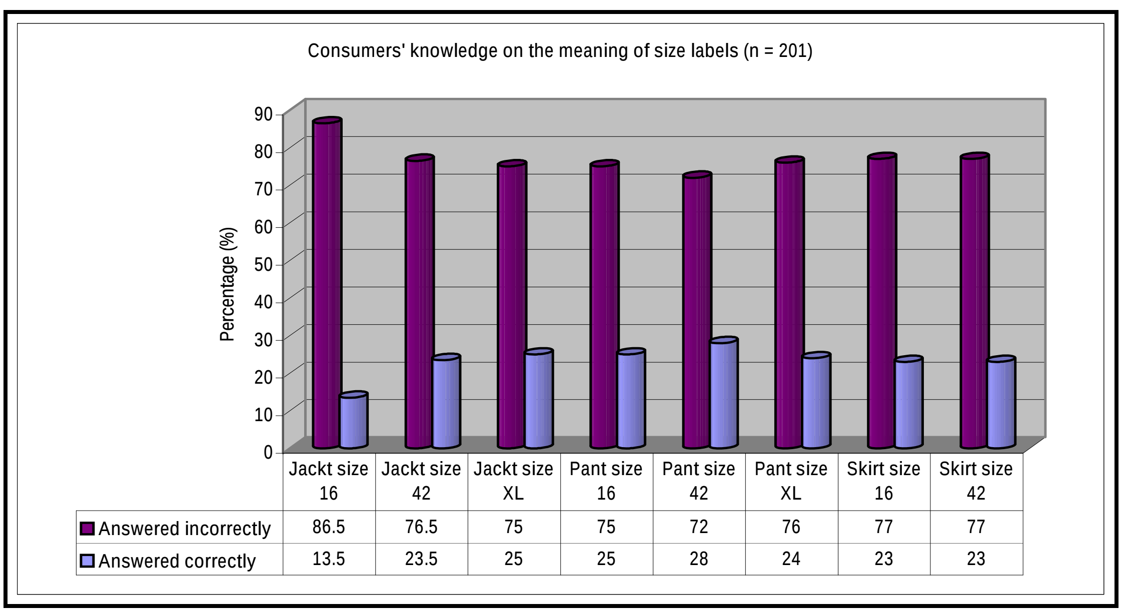
XL = Extra large lettered label, 8 to 20 = Numbered size codes, 32 to 50 = Numbered (inches) size codes, Code + = Numbered size code and key dimensions, Pict + = Pictogram and key dimensions, Wordless = wordless pictogram (illustrated body shape)

FIGURE 6.5: FAMILIARITY WITH AND PERCEIVED EFFECTIVENESS OF SIZE LABELS

It is clear from **Figure 6.5** that informative size labels, which comprise a code and measurements, pictogram and measurements, or the wordless pictogram, were less familiar size labels to the Kenyan career women, as indicated by 35%, 7% and 3% responses respectively. However, these informative labels scored 98.5% on average, as effective size labels. As for the uninformative size labels, comprising numbered (8-24), lettered (S-XL) and numbered (32-50) labels, they were the most familiar size labels, with 98.5%, 98% and 95% responses respectively. The uninformative labels on average were ranked as effective by only 51% responses, which is far lower than the responses on informative size labels.

It appears from the results that familiarity with and perceived effectiveness of size labels are two separate issues that seem to have no association with each other. There were no significant (0.21 > 0.05) associations between the women's familiarity with size label terms and their knowledge in this regard. This possibly suggests that their familiarity with size labels did not guarantee appropriate and informed apparel selection, as the size labels' meanings were not understood by the consumers.

Career women's knowledge about size labels**:** Questions 16 and 17 were used to examine the career women's knowledge about the size labels used on women's ready-made apparel. Respondents were supposed to give a correct interpretation of a given size in terms of the key dimension it represents in a given apparel item. The results are presented in **Figure 6.6**.



	Jackt size 16	Jackt size 42	Jackt size XL	Pant size 16	Pant size 42	Pant size XL	Skirt size 16	Skirt size 42
Answered incorrectly	86.5	76.5	75	75	72	76	77	77
Answered correctly	13.5	23.5	25	25	28	24	23	23

Jacket = Jacket

FIGURE 6.6: CAREER WOMEN'S KNOWLEDGE ABOUT SIZE LABELS

The results show that the majority of the respondents described the different size labels that are used on jackets, pants and skirts, incorrectly. The scores on incorrect descriptions of the different labels ranged from 72% to 86.5%, while scores on correct description of the size labels ranged from 13.5% to 28%, which is a sharp contrast. An average of 77% respondents described different size labels incorrectly. This suggests that Kenya's career women lack knowledge about the meaning of size labels.

It was assumed that the older the consumers become, the more experienced and knowledgeable they become, in terms of size labels and appropriate apparel selection. Apparently, there was no significant (0.21 > 0.05) association between the different age groups of the respondents and their knowledge about size labels. It is also likely that consumers' long experience with size labels does not necessarily guarantee certain knowledge about size labels. Ignorant consumers end up getting frustrated and confused as they flip through several assortments of styles and sizes in a retail environment without any guiding base, as they do not understand the meaning of the size codes presented to them.

Comparisons were made on the interpretation of the size codes on the size labels between professionals in Home Science/Clothing and the non-professionals, to establish whether their level of knowledge differed in this regard. There were significant (0.0136 < 0.05) associations between the knowledge of the professionals in Home Sciences and the size labels' contents. The professional Home Scientists scored higher on correct descriptions of size codes and size labels' contents than the non-professionals in Home Science. It seems therefore that formal information on size and fit can equip learners with knowledge regarding the sizing of apparel.

Career women's knowledge on their key dimensions: Question 6 asked the respondents for their key dimensions of bust, waist and hip, and these were compared with the actual measurements (obtained from them). The aim was to establish whether the career women were informed about their key dimensions, which are so necessary for identifying correct sizes. The results are presented in **Figures 6.7**, **6.8** and **6.9**.

Figure 6.7 indicates a generally linear relationship between the bust dimensions reported and those measured. However, there are outlying individuals outside the general trend. This illustrates that the reported bust dimensions had a moderate relationship with the obtained bust dimension as indicated by the coefficient of correlation (r = 0.55). Statistically, this relationship was significant (0.0001< 0.05).

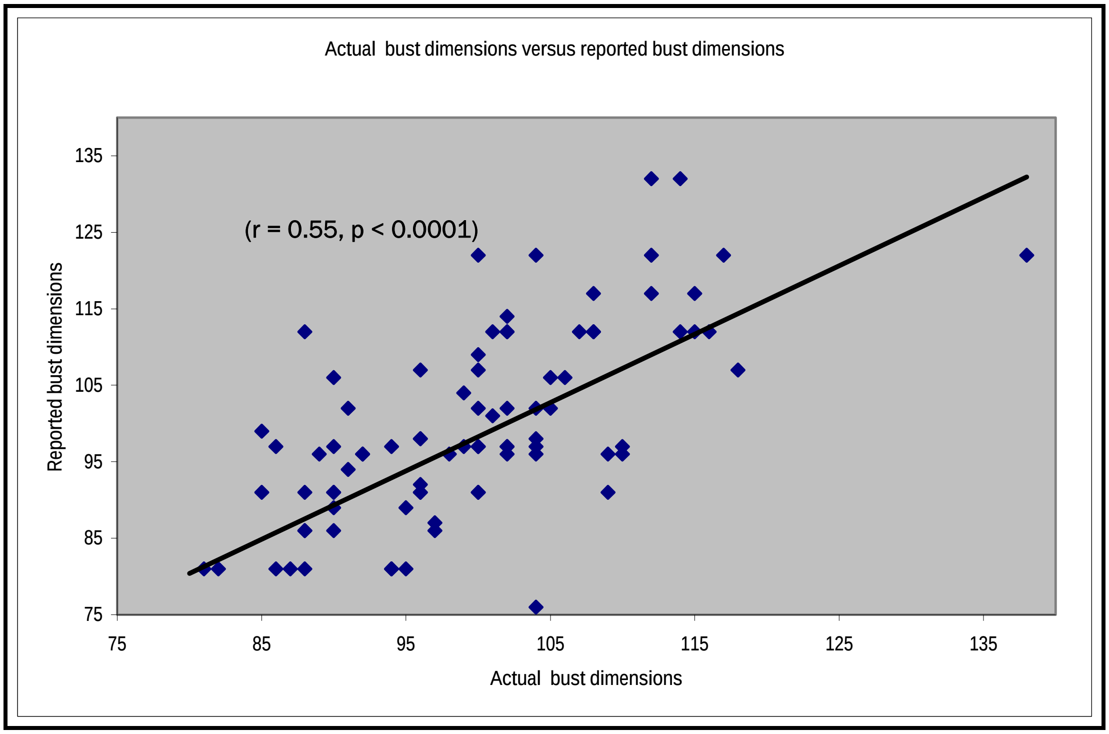


FIGURE 6.7: SCATTER PLOT COMPARING REPORTED BUST DIMENSIONS WITH OBTAINED BUST DIMENSIONS

The nature of the relationship shown in **Figure 6.7** show that there were a few respondents who accurately reported their bust dimensions; therefore one could say that Kenya's career women were partially knowledgeable about their bust dimensions.

Figure 6.8 clearly shows that there is a generally linear relationship between the reported waist dimension and the actual waist dimension. However, there are more outlying individuals in this instance. The career women's reported waist measurement and their actual waist dimension indicated a partial relationship ($r = 0.52$). Statistically, there was a significant ($0.0001 < 0.05$) relationship between the reported waist dimensions and the actual waist dimensions – suggesting that the career women were also moderately knowledgeable about their waist dimensions, as for their bust dimensions.

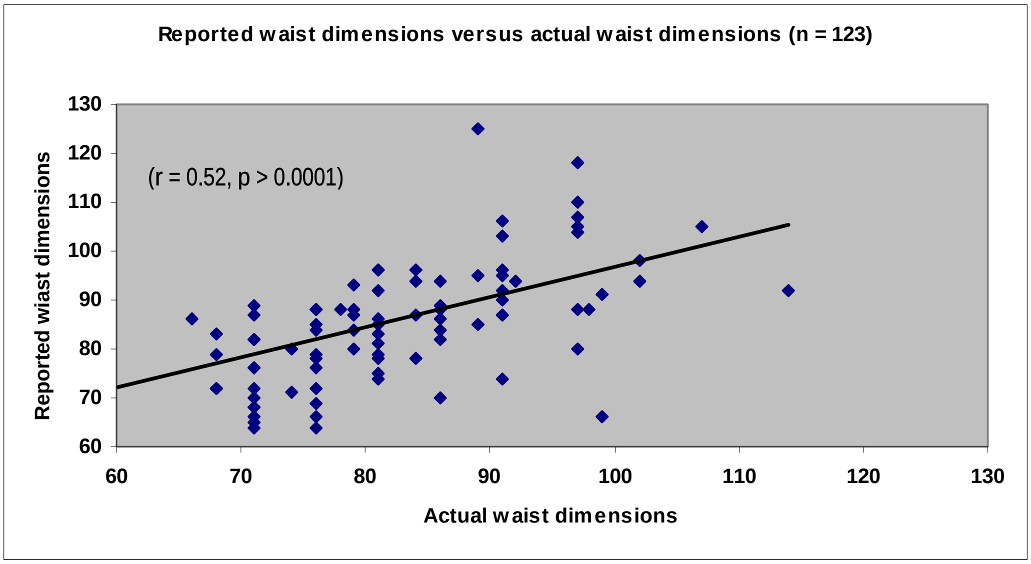


FIGURE 6.8: SCATTER PLOT COMPARING REPORTED WAIST DIMENSIONS AND OBTAINED WAIST DIMENSIONS

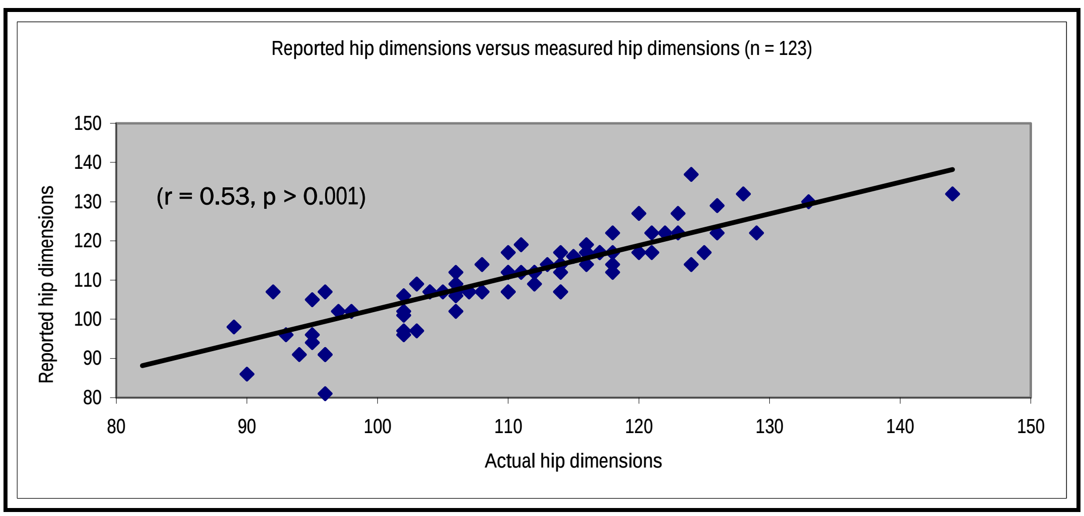


FIGURE 6.9: SCATTER PLOT COMPARING REPORTED HIP DIMENSIONS WITH OBTAINED HIP DIMENSIONS

Figure 6.9 above indicates a generally linear relationship between the reported and the measured hip dimensions. However, there are a few outlying individuals outside the general trend. This illustrates that the reported hip dimensions had a strong relationship with the obtained hip dimension, as indicated by the coefficient of correlation (r = 0.68). Statistically, there was a significant (0.0001 < 0.05) relationship between the reported hip dimension and the actual (obtained) hip dimension. The majority of the career women reported their hip dimensions more accurately than their bust and waist dimensions; hence they were more knowledgeable about their hip measurements.

Career women's knowledge about their sizes: Questions 13 and 14 solicited responses concerning career women's own sizes, expressed in even numbers 8 to 24 and 32 to 50, respectively. The actual key dimensions of the bust, the waist and the hips obtained from respondents were used to compare with their reported sizes (bust and hips). The reported sizes were converted to bust, waist and hip measurements according to Kenyan size standards (**Appendix 4A**), to facilitate comparisons with the corresponding actual body dimensions for the reported sizes. For the purposes of brevity, examples of visual representation of correlations between reported sizes in designations of even numbers (8 to 24) and in designations of even numbers (32 to 50) are presented in **Figures 6.10** and **6.11**.

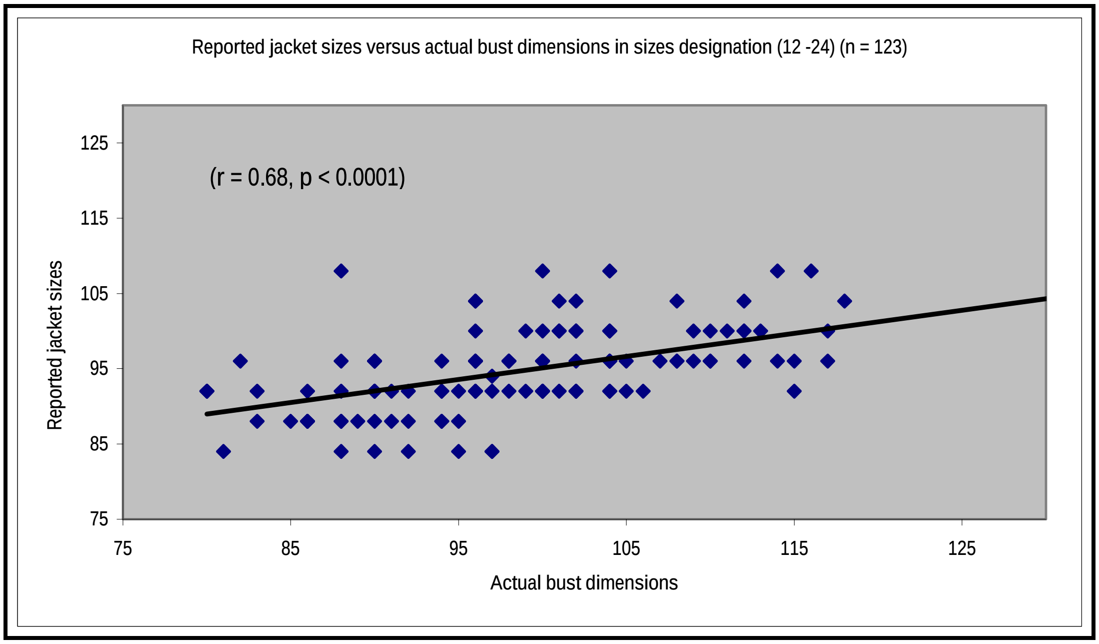


FIGURE 6.10: SCATTER PLOT COMPARING REPORTED JACKET SIZES (BUST) WITH THE OBTAINED BUST DIMENSIONS IN SIZE DESIGNATION OF 12 TO 24

Figure 6.10 shows a generally linear relationship between reported jacket sizes and the measured (actual) bust dimensions, although there are some outlying individuals outside the general trend. This illustrates that the reported jacket size had a moderate relationship with the obtained bust dimension, as indicated by the coefficient of correlation ($r = 0.53$). Statistically, there was a significant ($0.0001 < 0.05$) relationship between the reported jacket sizes and the obtained bust dimensions. As in the case of the reported jacket sizes in size designation of even numbers (12-24), the other reported apparel sizes maintained a similar pattern of linear relationship with some outlying individuals outside the general trend line

(**Figure 6.10**). There were moderate relationships between the reported apparel sizes and the obtained (actual) dimensions of bust and hip: reported dress sizes (bust) ($r = 0.51$, $p > 0.001$), reported skirt size (hip) ($r = 0.58$, $p > 0.0001$), and the reported trousers size (hip) ($r = 0.56$, $p > 0.0001$). Statistically, the relationships were significant ($p < 0.005$). The inference that can be drawn is that Kenya's career women were moderately knowledgeable about their sizes, designated in even numbers 12 to 24.

An example of the visual representation of the correlations between the reported sizes in designations of even numbers (32 to 50) is presented in **Figure 6.11**.

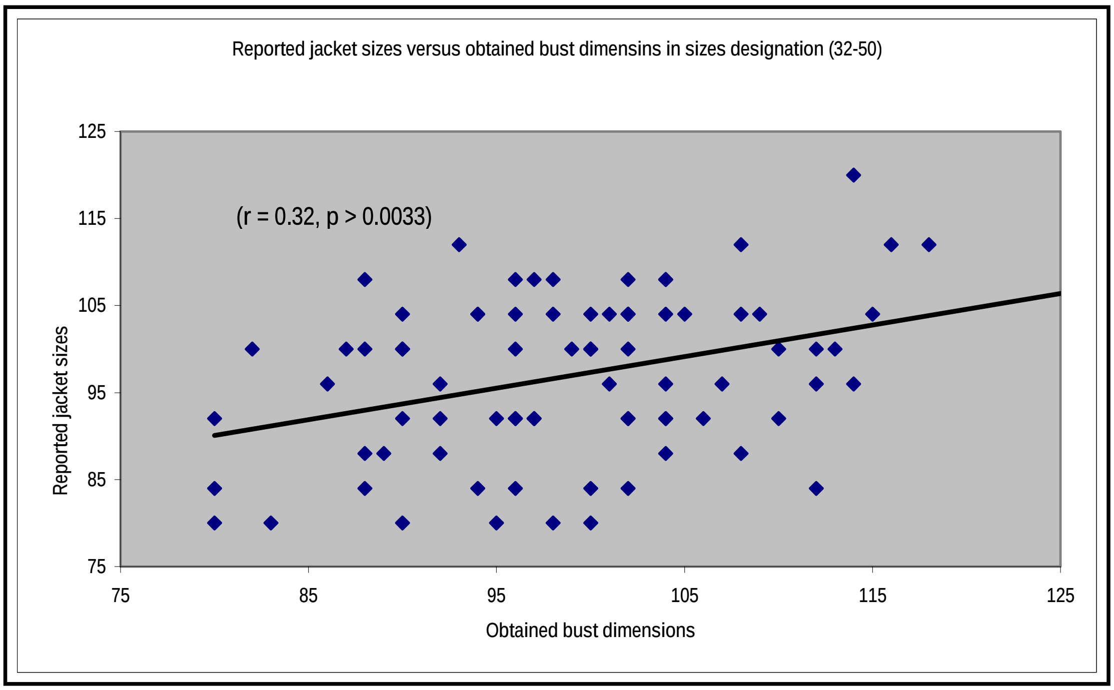
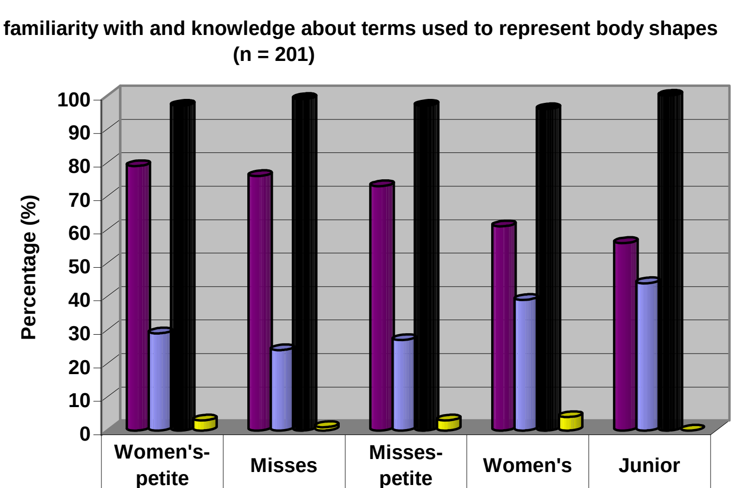


FIGURE 6.11: SCATTER PLOT COMPARING REPORTED JACKET SIZES (BUST) WITH THE OBTAINED BUST DIMENSIONS IN SIZE DESIGNATION OF 32 TO 50

Figure 6.11 demonstrates that, although there is a generally linear relationship between reported the jacket sizes and the measured (actual) bust dimensions, there are more outlying individuals outside the general trend. This illustrates that the reported jacket size had a poor relationship with the obtained bust dimension, as indicated by the coefficient of correlation ($r = 0.32$). Statistically, there was a significant ($0.0033 < 0.05$) relationship between the reported jacket size and the obtained bust dimensions. As in the case of the reported jacket in size designation of even numbers (32-50), all the other reported apparel sizes had similarly poor relationships between the reported apparel size (bust or hip) and the obtained dimensions (bust or hip): reported dress sizes (bust) ($r = 0.32$, $p > 0.0041$), reported skirt size (hip) (r = 0.44, p > .0001), and the reported trousers size (hip) (r = 0.45, p > 0.001). Statistically, there were significant relationships between the reported sizes and the obtained measurements. It appears that Kenya's career women were moderately knowledgeable about their sizes designated with even numbers 12 to 24, but were poorly knowledgeable about their sizes designated with even numbers 32 to 50.

6.3.2.2 Sub-objective 5.2: To explore Kenyan career women's knowledge about the communication of fit (Questions 5, 7, 8, 9, 10, 11 and 12)

The meaning of the terms used on size labels to represent established body shapes has been explained in **chapter 3 (paragraph 3.2.2.1)**. Question 5 had two sections. Section one was used to determine whether the career women were familiar with the terms used on size labels to represent established body shapes, while the second section was to examine whether the respondents understood the meaning of those terms. Answers were accepted as correct based on a brief description of the height, approximate age and body width characteristics according to the literature (**Chapter 3** (**paragraph 3.2.2.1**)). The results on both the respondents' familiarity with and their knowledge about the terms used on size labels are presented in **Figures 6.12**.



	Women's-petite	Misses	Misses-petite	Women's	Junior
Unfamiliar terms	79	76	73	61	56
Familiar terms	29	24	27	39	44
Incorrectly described	97	99	97	96	100
Correctly described	3	1	3	4	0

FIGURE 6.12: CAREER WOMEN'S FAMILIARITY WITH AND KNOWLEDGE ABOUT TERMS THAT REPRESENT BODY/FIGURE SHAPES

Regarding the respondents' familiarity with the terms that represent body shapes, the results show that women's-petites, misses and misses-petites were reported as unfamiliar by 79%, 76% and 73% responses, respectively, while women's and junior labels were reported as unfamiliar by 61% and 56% respondents, respectively. On average, all the terms were reported as unfamiliar by 69% responses, which is in sharp contrast to the terms reported as familiar (31%). Therefore, this suggests that terms used on size labels to indicate different body shapes were less familiar to Kenya's career women.

As for the respondents' knowledge about the terms that represent body shapes (**Figure 6.12**), it is clear that 100% and 99% of the respondents, respectively, described junior and misses labels incorrectly. Misses-petites and women's petites were each incorrectly described by 97% of the respondents, while 96% respondents incorrectly described the women's label. On average, 98% respondents incorrectly described all the terms, suggesting a high level of ignorance/lack of knowledge about body shape terms represented on size labels. There was a statistically significant (0.0001 < 0.05) association between consumers' familiarity with the size label terms (representing body shapes) and their knowledge. The nature of the association was that consumers scored higher on the familiar terms than on the unfamiliar terms. There was no statistically significant (0.63 > 0.05) association between their familiarity with size label terms and a professional background in Home Science/Clothing and Textiles, but statistically significant (0.02 < 0.05) associations were found between their knowledge and their professional background. Respondents with a Home Science/Clothing and Textiles professional background had higher scores on description of some familiar terms than those without such a professional background. The deduction could be made that a professional background in Home Science/Clothing and Textiles could possibly influence consumers' knowledge about the terms used on size labels to represent body shapes.

It was assumed that older career women would be more knowledgeable about body shape terms than the younger women. There was no statistically significant (0.42 > 0.05) association between career women's age and their knowledge about size label terms used to describe body shapes. This may suggest that the longer experience of the older group does not guarantee knowledge about the size label terms.

Career women's knowledge about illustrated body shapes: Question 8 was used to determine whether the career women could physically identify and describe the different illustrated figures within the five prevalent established body types (Triangle, Inverted triangle, Apple, Rectangle and Hourglass). **Figure 6.13** below presents the results.

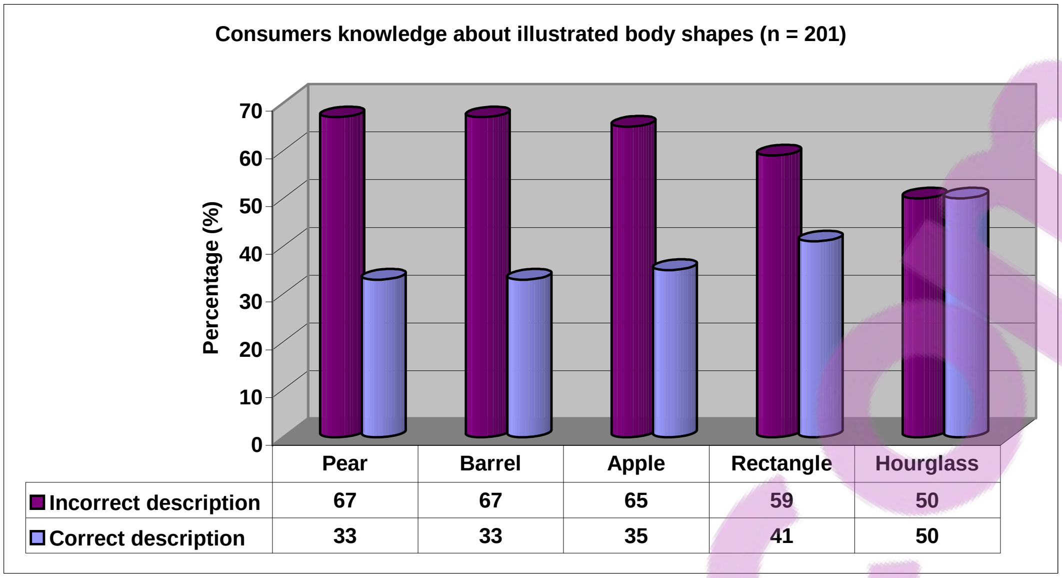
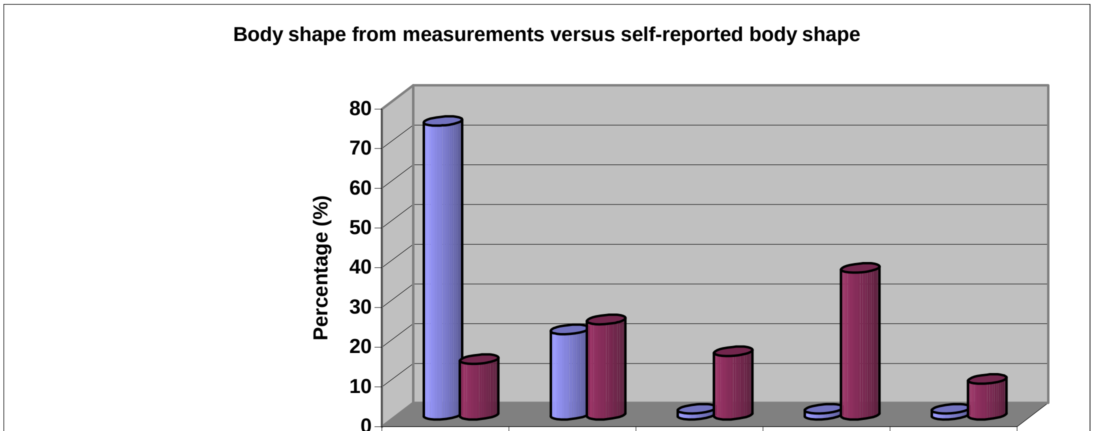


FIGURE 6.13: CAREER WOMEN'S DESCRIPTION OF THE PREVALENT ILLUSTRATED BODY SHAPES

Figure 6.13 shows that the pear and barrel body shapes were both incorrectly described by 67% of the respondents, while 65%, 59% and 50% of the respondents respectively, described the apple, rectangle and hourglass body shapes incorrectly. On average, the majority (62%) of the respondents described all the body shapes incorrectly. As in the case of size label terms that represent body shapes (**Figure 6.13**), Kenyan career women were also ignorant of the five prevalent body shapes.

Career women's knowledge about their own body shapes: Question 7 was used to determine whether the career women's self-reported own body shapes were the true representation of their body shapes. Illustrations of different figures were presented for them to select one that they felt was an approximate representation of their own body shapes. To authenticate their knowledge, the self-reported body shapes were compared with their actual figure types that emerged from the measurements and photographs.

The results presented in **Figure 6.14** indicate that respondents with a rectangular body shape were 74%, while only 14% of the respondents reported the rectangle body shape as their own. From the measurements, there were 21.5% Triangular body shapes, but 24% of the respondents self-reported the pear body shape as their own. Respondents with apple, hourglass and inverted triangular body shapes from the body measurements were least represented (1.5%).



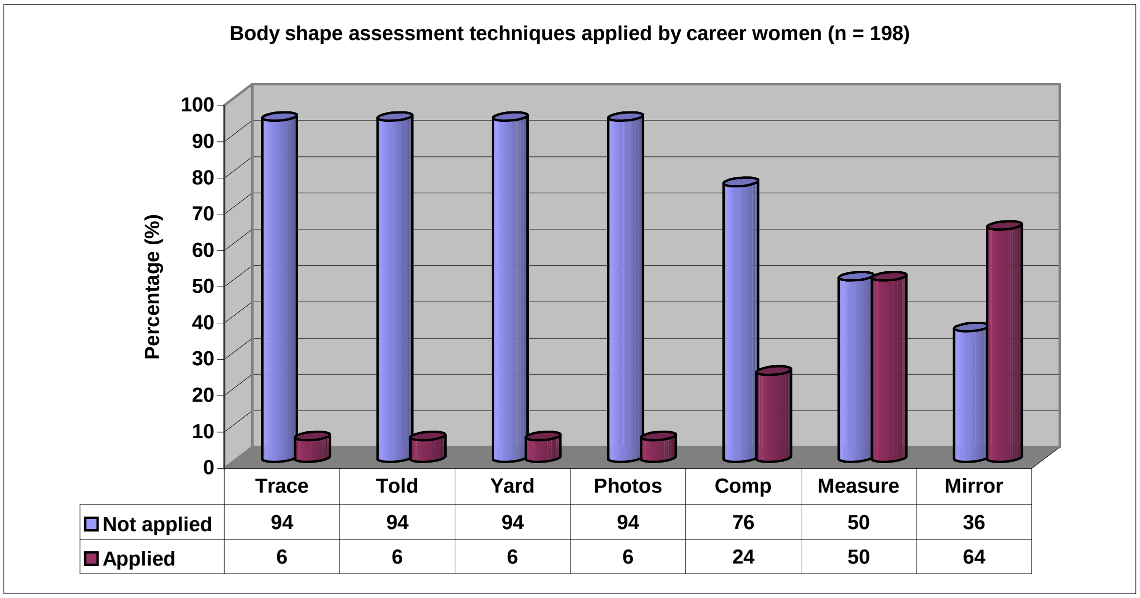
	Rectangle	Triangle	Apple	Hourglass	Inverted triangle
Body shape from the measurements (n = 123)	74	21.5	1.5	1.5	1.5
Participants' self-reported body shape (n = 183)	14	24	16	37	9

FIGURE 6.14: CAREER WOMEN'S SELF-REPORTED BODY SHAPE VERSUS THEIR ACTUAL FIGURES FROM MEASUREMENTS

From **Table 6.14**, it also shows that 37% of the respondents self-reported the hourglass body shape as their own, which is a higher percentage than the other self-reported shapes, which scored between 9% and 24%. Again, it is clear that the Kenyan career women were not only uninformed about the different body shapes (**Figures 6.12** and **6.13**), but were also uninformed and unrealistic about their own body shapes. The majority of them gave the impression that they perceive their shapes as the hourglass body shape.

Career women's application of body shape assessment techniques: Question 9 was used to further explore whether the consumers' knowledge about their own figures had been enhanced by self-evaluative techniques learnt through reading, observing or any other medium.

Shown in Figure 6.15 the results depicts that, except for the use of a mirror (64%) and the key dimensions (50%) as reported body shape assessment techniques applied by the respondents, all the rest of the techniques were least applied by the majority of the respondents. On average, 74% of the respondents did not apply self-evaluation techniques to determine their body shape.



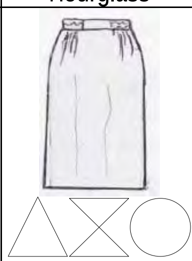
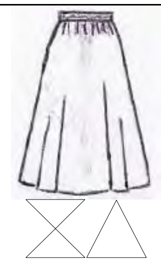
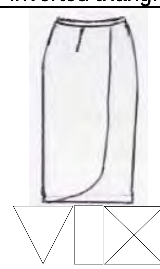
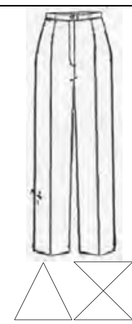
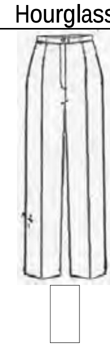
Trace = Tracing body outline against the wall, Told = told by friends, Yard = use of yardstick, photos = use of photographs, Comp = Comparing with established illustrations, Measure = use of key body dimensions, and Mirror = use of mirror in minimal apparel

FIGURE 6.15: BODY SHAPE ASSESSMENT TECHNIQUES APPLIED BY KENYAN CAREER WOMEN

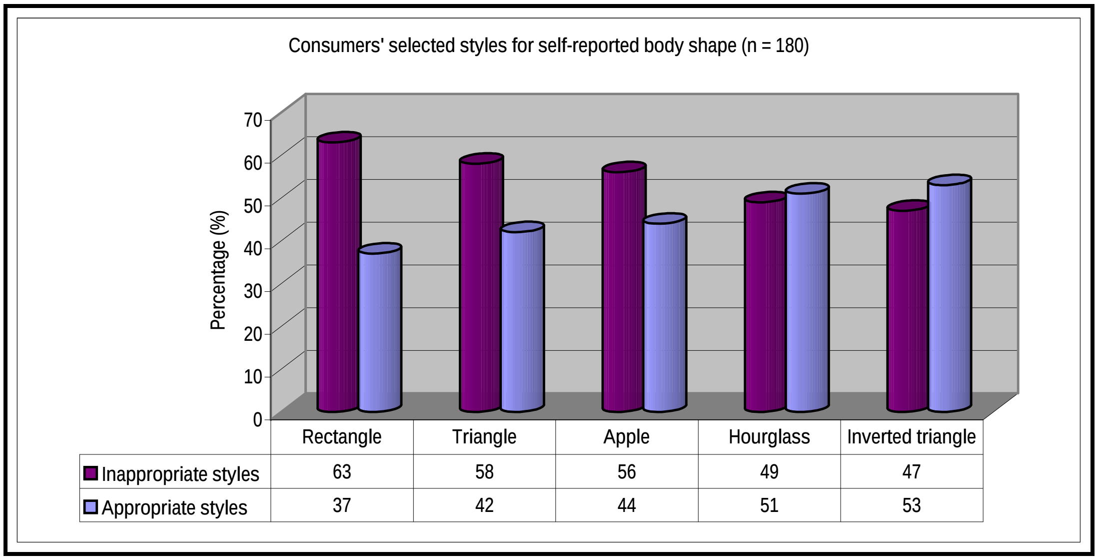
The results (**Figure 6.15**) is evident that the majority of Kenyan career women apply inadequate body shape assessment techniques. These findings therefore confirm the participants' ignorance about the prevalent rectangular body shape, or their own shapes as observed in this study (**Figures 6.13** and **6.14**).

Career women's knowledge about appropriate styles for their perceived own body shapes: Question 12 was used to further establish career women's knowledge of their own body shapes. The question asked respondents to select appropriate styles for their perceived own body shapes from different styles that were provided. Answers given were accepted as correct if the respondents chose styles corresponding to each body shape as given in **Table 6.4**. The styles assigned to each body shape underwent the professional experts' scrutiny.

TABLE 6.4: APPROPRIATE APPAREL STYLES FOR DIFFERENT BODY SHAPES

JACKETS	 1	 2	 3	 4	 5
	Triangle (Pear) Hourglass	Apple	Hourglass	Rectangular Inverted triangle	Inverted triangle
SKIRTS	 1	 2	 3	 4	 5
	Triangle (Pear) Hourglass Apple	Hourglass Triangle (Pear)	Inverted triangle Rectangular	Inverted triangle Rectangular Hourglass	Inverted triangle Apple
PANTS	 1	 2	 3	 4	 5
	Rectangular Inverted triangle	Apple Triangle (Pear)	Triangle (Pear) Hourglass	Rectangular	Inverted triangle Hourglass

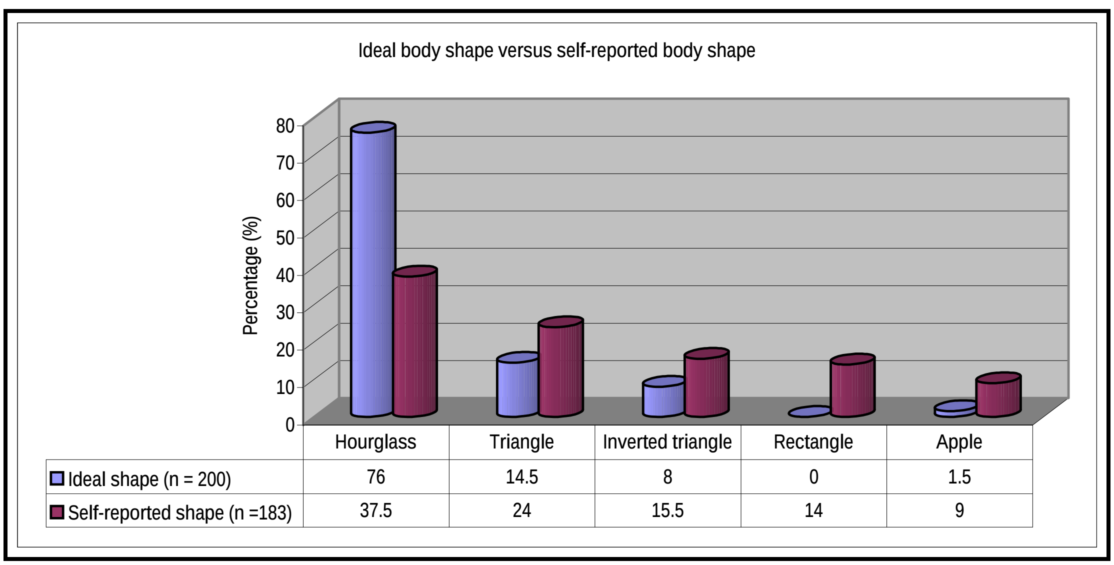
Results on selected styles are presented in **Figure 6.16** below. It is clear from the results presented in **Figure 6.16**, that 63%, 58% and 56% of the respondents selected inappropriate styles for their self-reported rectangular, pear and apple body shapes, respectively. Forty-nine per cent and 47% of the respondents selected inappropriate styles for their self-reported hourglass and barrel body shapes. On average, 54% of the respondents selected incorrect styles for their reported (perceived) body shapes. As was shown in **Figures 5.2** in **Chapter 5** and **6.14**, the most prevalent body shape in this study was rectangular (74%); however, only 37% of the respondents were able to select appropriate styles for this figure. Therefore it is once again observed that Kenyan career women were ignorant and unrealistic about their body shapes (**Figures 6.13**), but were also ignorant and unrealistic about suitable styles for their perceived body shape as well as their actual body shape.



	Rectangle	Triangle	Apple	Hourglass	Inverted triangle
Inappropriate styles	63	58	56	49	47
Appropriate styles	37	42	44	51	53

FIGURE 6.16: SELECTED STYLES FOR THE REPORTED OWN FIGURE TYPE

Career women's perceived ideal body shape: Question 10 was used to determine the career women's perceived ideal body shape and to find out whether they considered their own body shapes as ideal. The results are presented in **Figure 6.17**.



	Hourglass	Triangle	Inverted triangle	Rectangle	Apple
Ideal shape (n = 200)	76	14.5	8	0	1.5
Self-reported shape (n =183)	37.5	24	15.5	14	9

FIGURE 6.17: CAREER WOMEN'S PERCEIVED IDEAL BODY SHAPE VERSUS REPORTED OWN BODY SHAPE

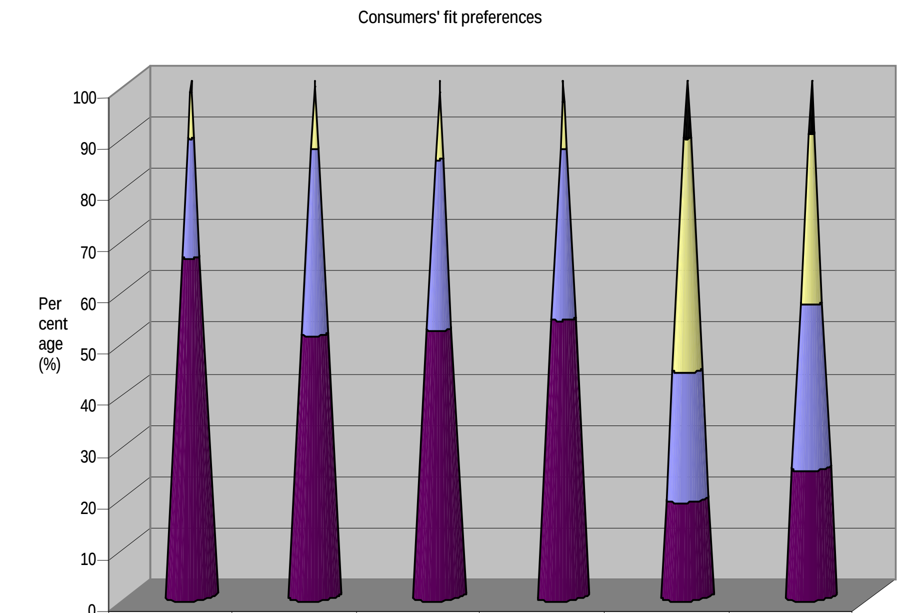
The results indicate that 76% respondents reported the hourglass body shape as their ideal shape. However, 37.5% respondents also reported the hourglass body shape as their own shape. Only 14.5% respondents reported the triangular shape as their ideal shape, while 24% reported the triangular body shape as their own body shape. Eight per cent of the respondents reported the inverted triangle body shape as the ideal shape, and 15.5% selected the inverted triangle body shape as their own shape. There were 1.5% respondents selecting the apple as the ideal shape, but 9% respondents selected the apple as their own shape. Kenyan career women were therefore not only unrealistic about their own body shapes, but they also did not perceive their own shapes as the ideal body. This could possibly indicate that Kenyan career women were dissatisfied with their own shapes (body cathexis). If apparel styles selected were not providing the expected appearance on one's body shape, as observed with the perceived ideal shape, it may generate a negative feeling towards one's body rather than to the apparel. Ultimately, one's body is blamed for the poor fit of the apparel.

6.3.3 Primary objective 6: To determine and describe how career women's preferences for differently fitted skirts and jackets may contribute to fit problems with apparel (Question 19)

Question 19 was used to explore the Kenyan career women's fit preferences for differently fitted apparel items (skirts and jackets), and to compare their fit preferences with the critical fit points of their distinctive rectangular body shape (**Chapter 5 (Figure 5.10)**), as well as their selected styles (**Figure 6.16**), in order to establish how their fit preferences could contribute to the fit problems they were experiencing.

The results are presented in **Figure 6.18**, which clearly demonstrate that the majority of the Kenyan career women preferred to wear fitted and semi-fitted skirts and jackets often, and sometimes to work. Contrary to their preferences for the fitted and the semi-fitted skirts and jackets, the majority of the respondents prefer never to wear loose fitting skirts and jackets to work. This suggests that the majority of Kenya's career women prefer fitted and semi-fitted skirts while they least prefer loosely fitted skirts to work.

The fit preferences for differently fitted skirts and jackets were examined among different age groups of the career women. Statistically there were no significant associations between age and the fit preferences for fitted skirts (0.0652 > 0.05), semi-fitted skirts (0.8966 > 0.05) or loosely fitted skirts (0.9817 > 0.05). This may possibly imply that a fit preference for differently fitted skirts is not influenced by the age of the consumers.



	Fitted skirt (n = 173)	Fitted jacket (n = 166)	Semi-fitted skirt (n =168)	Semi-fitted jacket (n = 166)	Loosely fitted skirt (n = 152)	Loosely fitted jacket (n = 167)
Undecided	2	1	2	4	11	10
Never	9	12	13	9	45	33
Sometimes	23	36	33	33	25	32
Often	66	51	52	54	19	25

FIGURE 6.18: CAREER WOMEN'S FIT PREFERENCES FOR DIFFERENTLY FITTED SKIRTS AND JACKETS

There were also no significant associations between age and fit preferences for fitted jackets (0.0652 > 0.05) or semi-fitted jackets (0.1445 > 0.05). There was a tendency ($p < 0.1$) of association between fit preferences for fitted jackets and the younger age group. There were significant (0.0247 < 0.05) associations between the mature age group and the fit preference for loosely fitted jackets. This may suggest that some of the older women prefer loosely fitted jackets, while the younger age group prefers the jackets with a tighter fit. Comfortable apparel items are possibly more important to the older group, while stylish fashion and not necessarily comfort could be a driving force for the younger group.

Kenyan career women's fit preference versus the critical fit points for their distinctive rectangular body and chosen styles: It is clear that Kenyan career women prefer to wear fitted and semi-fitted skirts and jackets to work (**Figures 6.18**). The critical fit points for the rectangular body shape deviate from those for the so-called ideal body shape. As observed in **Chapter 5**, the majority of the participants had large thighs (76%), large buttocks (91%) and large stomachs (70%), a fully rounded upper back (70%) and a large bust (60%). Where body shape characteristics are not considered in the manufacturing of ready-made apparel, a person with such prominent critical fit points is likely to experience tight fit problems around those prominent body features. If the majority of the available designs were based on the understanding of the curvy rectangular body shape, fitted skirts and jackets would be made to cater for their preferred apparel. Where no body shape characteristics are considered in the manufacturing of ready-made apparel, the curvy rectangular body shape could be accommodated more comfortably and pleasingly by loosely fitted apparel, as it contains enough ease of design (style) and wearing (comfort). In such instances, the fit problems encountered could be ascribed to inappropriate fit preferences that do not take into account consumers' body shapes and the critical fit points associated with those shapes.

Statistically, there were significant (0.048 < 0.05) associations between the fit preferences for a fitted skirt and the acceptable fit at the stomach region, and significant (0.0208 < 0.05) associations between the fit preferences for a semi-fitted skirt and the fit problem of tightness experienced at the thigh region. Respondents who reported having acceptable fit at the stomach region preferred a fitted skirt, while those with fit problems of tightness at the thigh region preferred a semi-fitted skirt. There were significant (0.0011 < 0.05) associations between the fit preferences for a semi-fitted jacket and the fit problem of tightness experienced over the bust region. Respondents who reported fit problems of tightness over the bust region preferred a semi-fitted jacket. These results may suggest that the comfort required around the stomach, the thighs and the bust regions could determine the degree of ease/comfort necessary in the skirts and jackets for some Kenyan career women.

6.4 OVERALL DISCUSSION OF THE RESEARCH OBJECTIVES

6.4.1 Assessing and describing career women's self-perceived fit issues with the ready-made apparel in Kenya (Primary objective 4)

The highly rated quality of imported new (78%), custom-made (72%) and imported second-hand (65%) ready-made apparel in terms of good fit, may be explained in terms of appealing characteristics compounded in imported apparel such as a variety of styles, good workmanship, quality fabrics and brand names (Mason, 1998:90; McCormick *et al.*, 2002), rather than in stipulations of excellent fit. The consumers' "ego" associated with imported apparel could also be seen as an issue affecting their purchasing of imported new and used apparel as opposed to the local apparel, which recorded highest poor fit responses and the lowest good fit responses (Li & Gallup, 1995; Hansen, 1999:359; Mhango & Niehm, 2005). By virtue of imported and sometimes branded labels attached to the apparel, consumers may not even reflect on any of the other necessary considerations such as fit, before purchasing the apparel item (Agbonifoh & Elimimian, 1999). De Klerk and Tselepis (2007) observed that consumers may use extrinsic aspects to select apparel items that would not necessarily satisfy their fit needs but that would rather satisfy their emotional needs.

The good fit of custom-made apparel could be ascribed to the fact that tailors gain experience through constant interaction with the body shapes and dimensions of their consumers. Tailors' frequent interaction with and observations of different body shapes and dimensions facilitate a continuous learning process, enabling them to make better-fitting apparel. Kenya's locally made apparel was ranked last in terms of good fit and recorded the highest poor fit (26%) responses, higher than all the other categories. The poor fit could be ascribed to poorly skilled personnel in the apparel industry, inadequate and outdated machinery and lack of quality raw materials in Kenya's apparel industries, as observed by Mason (1998) and McCormick *et al*. (2001). Other reasons could also be the unrepresentative sizing systems in terms of the body shapes and dimensions of the current population (Zwane & Magagula, 2006; Shin & Istook, 2007; Honey & Olds, 2007).

As for the fit of imported apparel, new and ready-made imported apparel items are sold in boutiques and chain stores, which respectively scored 84% and 70% responses on good fit. The second-hand stores recorded 66% responses on good fit, as they sell imported exclusive, second-hand, ready-made apparel. Although apparel items available in boutiques and second-hand stores may be limited in varied sizes, they do offer unique and good-quality apparel in terms of materials/workmanship (Mhango & Niehm, 2005). In addition to offering unique and good-quality apparel, chain stores ensure customer satisfaction, as highlighted by Otieno *et al.* (2005).

Market stalls were ranked fourth, with 52% responses, while supermarkets and trade fairs were ranked fifth and sixth with 47% and 46% responses respectively. It should be noted that the market stalls, supermarkets and trade fairs sell mixed apparel merchandise, ranging from local ready-made, imported new and imported second-hand apparel. The quality of the apparel varies from fair to poor, depending on the categories available in each case. Most of these stores have inadequate fitting rooms and therefore the consumers cannot adequately assess the fit of apparel items before purchasing. All these factors explain the quality of apparel sold. A factory outlet, which was ranked last (22%), sells locally made apparel items of poor quality. According to Rasband (2001a:8), the apparel merchandise in a factory outlet is cheap and is usually made of low-grade materials and shows poor workmanship.

Contrary to the Kenyan career women's perceived good fit of the imported new and second-hand ready-made apparel, as well as of the ready-made apparel items sold in boutiques, chain stores and second-hand stores, they expressed dissatisfaction with the way that ready-made apparel items fit their critical fit points. On average, the majority (65%) of the career women in the sample reported more problems with either tight or loose fit than they reported an acceptable fit (35%) at the various fit points of the upper and the lower torsos. Considering that most ready-made apparel items are based on the hourglass body shape, which is considered ideal in the apparel industry (Newcomb & Istook, 2004a & 2004b; Zwane & Magagula, 2006), such fit problems are inevitable because Kenya's distinctive body shape is a curvy rectangle type (**Chapter 5, paragraph 5.2.3.2**), with body characteristics that do not match those of the well-proportioned ideal body shape. Therefore, apparel items produced with grading based on standard linear surface increments (Schoefield & LaBat, 2005a & 2005b) would not fit these career women's distinctive shape with their unique features. Regarding fit problems with length, it is also apparent that more of the Kenyan career women (61%) encountered length-fitting problems (reported too short or too long), than those who felt that the lengths were acceptable (39%). As in the case of width problems, the length problem points in most cases to the linear proportional grading theory that underlie most pattern development systems, and have been cited as the major contributing factor to length fit problems (Bye & Delong, 1994; Loker *et al*., 2005; Schofield, 2007 in Ashdown, 2007:180, 188).

Finding apparel items that fit well can be time-consuming and frustrating, particularly to female consumers who often have to try on several assortments before finding one item that fits (Ashdown, 1998; Workman & Lentz, 2000). When the respondents were asked whether they were generally satisfied with the fit of ready-made apparel (**Figure 6.3**), 75% of the career women expressed dissatisfaction with the fit of ready-made apparel – generally in terms of the search process, the available styles and the latest fashion in appropriate styles and sizes. These results concur with the findings of Kurt Salmon Associates (1996) in the United States of America and Otieno *et al*. (2005) in the United Kingdom, that over 50% female consumers were dissatisfied with the fit of ready-made apparel. The dissatisfaction with ready-made apparel may be due to frustrations and confusions encountered during a search for apparel. Female consumers flip through several assortments of styles and sizes trying to get apparel items that may fit correctly (Ashdown, 1998; Workman & Lentz, 2000; Otieno *et al*., 2005). Frustration in their search for apparel are thought to be brought about by non-standardised sizes between styles, designers and manufacturers that employ different body measurement techniques, marketing gimmicks and varied quality control practices (Hudson, 1980; LaBat & DeLong, 1990; Solomon & Rabolt, 2004:10-11). The different size codes are also not instructive enough to guide the consumers while selecting apparel, but are rather confusing as many size codes do not directly relate to female body dimensions (Workman, 1991; Chun-Yoon & Jasper, 1995 & 1996; Holzman, 1996). In this study, the group of career women also lacked knowledge about the meaning of the terms used on size labels (**Figures 6.6 & 6.10**), which could actually serve as useful guides in the selection of apparel.

Inadequate understanding, worsened by confusion, could result in apparel items failing to meet the specific needs of the consumer (Mitchell & Papavassiliou, 1999). Experienced consumers are adept at forming choice-sets. Experience helps to make potential consumers selectively observant. Kenya's career women's perceptions concerning the sources of the fit problems they are experiencing (**Figure 6.4**), demonstrated that the majority of them felt that both the apparel industry (89%) and their body shapes (78%) were the sources of fit problems.

Informed consumers with adequate knowledge about the products they buy, have a better chance to locate the locus of the cause of the problem and perhaps link the apparel manufacture with the fit problems. Because of the Kenyan career women's lack of knowledge about size (77%) and fit (98%) issues (**Figures 6.6** and **6.12**), they may be confused concerning the source of fit problems common to the ready-made apparel, and hence attribute the locus of the problem externally by blaming the industry or internally by blaming their own bodies (Weiner, 1986). However, if the consumers blamed their bodies for the fit problems, they would negatively direct their disappointing experience encountered with apparel to their bodies, rather than to the apparel items, as stated by LaBat (1990), Fiore and Kimle (1997:30) and Yu , 2004:33). In cases where the consumers blame their bodies for fit problems, they would probably experience their bodies negatively, while they suffer financial loss and exploitation by the industry. They would also possibly develop emotional distress resulting from the continuous purchasing of substandard apparel items. Mitchell and Papavassiliou (1999) observed that inadequate, ambiguous, conflicting and misleading information often lead to consumers' confusion, whereas confusion can affect both their rights and the quality of their decisions. Confused consumers are less able to process information and are more vulnerable to making less than optimally appropriate choices in apparel styles and sizes. Ultimately, they end up with inappropriately fitting apparel.

6.4.2 Determining and describing Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes) (Primary objective 5)

A size label is supposed to communicate size to the consumers, with clearly indicated body dimensions, as it is a manufacturer-to-consumer communication channel to enable consumers to make efficient purchase decisions (Chun in Ashdown, 2007:220). Misleading information often leads to consumers' confusion, and confusion can affect the quality of consumers' decisions (Mitchell & Papavassiliou, 1999; Mason, De Klerk, Sommervile & Ashdown, 2008). It was therefore necessary to explore which size labels were familiar to the group of Kenyan career women to establish whether the information displayed on size labels was useful enough to the consumers. The findings of this study (**Figure 6.5**) indicate that uninformative/tacit labels were on average familiar to the majority (97%) of these women, but were ranked as effective by only 51% of the respondents. The informative labels were much less familiar (7%), but overwhelmingly, 99% respondents ranked them as effective. It appears that Kenya's apparel industries continue to use the tacit labels contrary to KEBS (2001:8)/**Appendix 4B** recommendations, and regardless of the inadequacy of the information to guide consumers in their selecting and purchasing of ready-made apparel. A size label is supposed to communicate sizes and body types to the consumers, with clearly indicated body dimensions and a description of the body type that the apparel item was designed to fit (KEBS, 2001:8; Faust *et al*., 2006). It should specify whether the person is tall with large/small bust and large/small hips, short with large/small bust and large/small hips, or regular (medium height) with large/small bust and large/small hips (Glock & Kunz, 1995:108; Chun-Yoon & Jasper, 1995; Chun-Yoon & Jasper, 1996).

With the majority of the career women in the group ranking the informative labels as effective, this validates that each apparel item should bear a label that is well understood by the consumers and that will require minimal explanation to the consumers – regardless of the price, type of apparel or even the manufacturer. The Kenyan career women's preference for informative size labels affirms the findings of Chun-Yoon and Jasper's (1995) study that the majority of consumers prefer the wordless pictogram, which is self-explanatory. These findings also support the recommendations by KEBS (2001:7) and Faust *et al*. (2006) that size labels should be adequate, legible and durable to serve as future reference for the consumers.

It was necessary to gauge whether career women's knowledge concerning different labels was adequate to provide for an informed and appropriate apparel selection. However, the results (**Figure 6.6**) clearly demonstrated that career women lacked knowledge about size labels, with the majority of them (77%) giving incorrect meanings for the size codes and size contents. This highlights the fact that the size labels that are familiar to the Kenyan career women were not instructive enough to provide useful guidance for them when selecting appropriate apparel sizes.

Workman (1991), Desmarteau (2000) and Brown and Rice (2001:147-148) underline the importance of consumers' knowing their own key dimensions, and also which body dimensions are necessary for the selection of specific apparel items. It was clear (**Figures 6.7**, **6.8** and **6.9**) that the Kenyan career women in the group were only partially knowledgeable about their bust and waist dimensions, but they were more knowledgeable about their hip dimensions. These findings concur with Alexander, Connell and Ulrich's (2005) findings (in the United States of America) that women understood their hip measurement better than their bust and waist dimensions. An observation from this study (**Chapter 5 (Table 5.9)**) was that the majority (91%) of the respondents had large buttocks, which are directly related to the hip dimensions. Problems with a tight fit over the hips (54%), the buttocks (43%) and the thighs (43%), were reported (**Table 6.2**) – again confirming that these regions may call for closer attention.

A consumer with a prominent hip region is most likely to experience problems of tight fit, which may aggravate her desire to understand the measurements associated with it. Chun (in Ashdown, 2007:226) emphasises that consumers have to know their body dimensions to identify their apparel size and to be able to make appropriate size and style selections. Accurate knowledge about one's body dimensions can also facilitate a thorough and accurate assessment of apparel sizes. If size labels were informative (self-explanatory) it would be easy for the consumers to compare the information provided on them with their own key dimensions. Uninformative labels combined with consumers' ignorance about the meanings attached to the labels can contribute to consumers' confusion and inappropriate apparel selection. In the event that the consumers understand the meaning of the codes used on size labels and their contents, their knowledge about the key body dimensions becomes useful for the selection of appropriate styles and sizes (Mason *et al.*, 2008). Participants' knowledge about their sizes in different size designations (**Figures 6.10** and **6.11**) indicated that Kenya's career women were moderately knowledgeable about their sizes designated with numbers 8 to 24, but were poorly knowledgeable about sizes designated with the even numbers 32 to 50. These findings substantiate Yoon and Radwin's (1994) results that consumers' estimations of their body sizes were not accurate. Zwane and Magagula (2006) report that most developing countries in Africa use adapted versions of the British sizing systems that cannot reflect the true picture of the intended consumers in developing countries.

It has also been observed that the lack of standardisation in sizing systems occurs not only with apparel of different brands and styles, but also within apparel items of the same numbered sizes within the same brands and styles (LaBat & DeLong, 1990; Workman & Lentz, 2000; Brown & Rice, 2001), resulting in what Keiser and Garner (2003:304) refer to as size migration, where one consumer fits into a range of three or more different sizes. Depending on the cut of the apparel items or the manufacturer's sizes, a consumer's size keeps migrating between smaller and larger sizes. A practical example of such a migrating size is in vanity sizing with large dimensions being reflected in a smaller size designation (Tamburrino, 1992a & 1992b; Ashdown & DeLong, 1995; Glock & Kunz, 1995:111; Keiser & Garner, 2003:304; Faust *et al*., 2006; Shin & Istook, 2007). Because of the non-standardised sizing systems used by apparel industries, it may be difficult to draw conclusions from the consumers' reported sizes, as it is not possible to isolate sizing systems that are currently being used in Kenya.

Body shape acts as a framework for apparel, and a size label is suppose to communicate sizes and body types to the consumers, with clearly indicated body dimensions and a description of the body type that the apparel item was designed to fit (Faust *et al*., 2006). Although manufacturers/retailers hardly include body shape as a communication of fit, it was deemed necessary in this study to determine whether terms used on size labels to represent body shapes, were familiar and comprehensible to Kenya's career women. As in the case of familiarity with effective (informative) labels, the findings on body shape terms represented on size labels (**Figure 6.12**) demonstrated that the majority (69%) of the respondents were unfamiliar with female body shape terms that are represented on size labels/tags. One could speculate that apparel industries in Kenya are neglecting the recommendation by KEBS (2001:7)/**Appendix 4B**, to use instructive labels. This is consistent with the study of Faust *et al*. (2006), carried out in Canada. A lack of these terms on size labels/tags therefore would mean inappropriate apparel selection by the consumers, as they have nothing to guide them or to refer to (Mason *et al.*, 2008). A size label should not only indicate key dimensions but also a description of the body type that the apparel item has been designed for (Glock & Kunz, 1995:108; Chun-Yoon & Jasper, 1995). It is also obvious from the results (**Figure 6.12**) that almost all the respondents (98%) could not describe the size label terms representing female body shapes. Consumers' lack of knowledge about the terms representing female body shapes suggests that the consumers were uninformed about the important terms which could indicate to them the suitability of apparel items for different body shapes (Brown, 1992:54-55; Glock & Kunz, 1995:110; Brown & Rice, 2001:146; Faust *et al*., 2006; Chun in Ashdown, 2007:226).

Consumers have to know the various body shapes to ease their search for appropriate styles suitable for different body shapes. When career women were asked to describe the five prevalent body shapes presented as illustrations (**Figure 6.13**), 66% of the respondents, on average, were unable to describe the shapes correctly. This suggests that Kenya's career women were ignorant about the established body shapes. However, correct descriptions of the hourglass figure scored 50%. This could be due to the hourglass body shape being a household name in fashion marketing. The ideal figure, which is basically a slim hourglass body shape, is featured in all fashion magazines, modelling and catwalk scenarios, making it popular and a regular shape in the daily lives of the consumers (Ashdown & DeLong, 1995:48; Yu in Fan *et al.*, 2004).

Since a body shape is a framework for proportioning apparel, it must be well understood by users in terms of their body proportions. For an apparel item to attain a good fit, the body and the apparel selected must be in a harmonious relationship. A consumer without knowledge could assume that all people have bodies similar to that of the fit model or to their perceived ideal shape (Mason *et al*., 2008). These assumptions could lead to them purchasing apparel suitable for the fit model or the perceived ideal shape, rather than based on their own shape. A consumer who is ignorant about the elements of good fit is also likely to select apparel based on other factors such as colour, style and current fashion, leading to physically attractive apparel as it is displayed in the retail environment, and a disappointing look when worn on the actual body. Knowledge about the different body shapes would facilitate comparison of the proportions between different body shapes, and would ultimately ease apparel selection. When one compares the group of consumers' perceived (self-reported) body shapes with their identified body shapes, it is apparent (**Figure 6.14**) that they do not perceive their own body shapes realistically – possibly due to a confusion regarding different body shapes. The state of confusion and unrealistic self-identity could possibly be the cause of their inappropriate apparel selection (Mason *et al.*, 2008).

The self-reported hourglass body shape by the majority of the respondents could have been attributed to its fame in the fashion world and in the marketing of fashion (Ashdown & DeLong, 1995:48; Yu in Fan *et al.*, 2004). In the Alexander, Connell & Ulrich (2005) study done in the USA, about 50% of the women self-reported their body shapes as an hourglass, and yet the majority of them had rectangular figures. It may be reasoned that continuous apparel production and promotions based on the ideal hourglass body shape continue to deprive the consumers of their true identity. Persistent advertisements based on the hourglass shape deny consumers a chance to see themselves more realistically – and hence they dress inappropriately. A basic knowledge about the elements and principles of design applicable to the various body shapes would enable consumers to select more suitable styles and sizes of apparel.

As in the case of the key dimensions necessary for identifying appropriate size, consumers must also be able to identify their body shapes accurately in order to select suitable apparel items. There are several ways that consumers could acquire knowledge about their body shapes. Keen retailers, through magazines and marketing pamphlets, could sensitise their clients by providing information on different ways to establish their own figure types. It is believed that, if a consumer could apply several techniques for the assessment of her own body shape, then her chances of selecting appropriate apparel would be high. The application of several techniques enhances a deeper understanding of one's body shape and of how the body's proportions relate to one another (Lyle & Brinkley, 1983:58-60; *Reader's Digest*, 1988: 46-47, 82-83; Liechty *et al*., 1992:33-38).

Respondents were asked to report the body shapes assessment techniques that they had applied, to establish whether their knowledge about their own body's shapes had been enhanced by self-evaluative techniques learnt through reading, observations or any other medium. It is believed that when individuals are more informed about self-assessment techniques to determine body shape, they will be more accurate in identifying their own body shapes – and hence be more skilled to select appropriate and suitable apparel items. Apart from the use of a mirror for the assessment of the body shape by the majority (64%) of the respondents, other methods of body shape evaluation have been scantily used, as confirmed in this study (**Figure 6.15**). The use of a mirror alone is inadequate to facilitate a comprehensive assessment and a deeper understanding of the characteristics of one's body and the proportions that contribute to the actual body shape. More than seven evaluation techniques have been reported to enhance a thorough knowledge about body shapes and hence, skills in appropriate selection of ready-to-wear apparel. For example, tracing the body outline against the wall; using a yardstick to compare hips, bust and shoulders; dressing in minimal clothing and assessing the shape using a long mirror; studying photos taken in minimal apparel; comparing the body shape with established types; and asking friends/experts to analyse your shape (Lyle & Brinkley, 1983:58-60; *Reader's Digest*, 1988:46-47, 82-83; Liechty *et al*., 1992:33-38; Rasband, 2001b: 20-23, 31-32;). These findings showed that Kenya's career women hardly apply any body shape evaluation techniques for the assessment of their own body shapes, and confirms their ignorance about their own body shapes (**Figure 6.14**) – hence their selection of inappropriate apparel.

Inappropriate apparel styles distract attention, emphasise a figure problem and undermine the confidence of the wearer. A well-fitted style hides a body shape's problems, and directs attention away from the problem areas, thus contributing to the psychological and social well-being of the wearer (Rasband & Liechty, 2006: 8). Apparel styles should alter the negatively perceived proportions of the body and provide a sense of satisfaction to individuals who do not fit within the cultural ideals of size and weight (Fiore & Kimle, 1997:331). When consumers understand the different body shapes, their own body shapes and the elements and principles of design appropriate for the different shapes, they would wear satisfactory apparel styles. In this study, respondents were asked to select appropriate styles from different styles that were provided based on the five prevalent body shapes (hourglass, apple, triangle, rectangle and inverted triangle). It was reasoned that if the respondents were able to select appropriate styles for their reported body shapes from the three categories provided (jackets, skirts and trousers), it would also be possible that they were knowledgeable concerning their own body shapes and the appropriate selection of well-fitting apparel styles. The findings of this study (**Figure 6.16**) illustrate that 54% respondents were not knowledgeable about the appropriate selection of suitable apparel styles for their self-reported body shapes. Only 37% of the respondents were able to select appropriate styles for the distinct rectangular shape that emerged in this study. As in the case of knowledge about the illustrated prevalent body shapes, Kenya's career women were not only ignorant about their own body shapes, but also about suitable styles for their body shapes – and therefore, they would likely experience fit problems with apparel.

The physical structure of the ideal body shape may be quite familiar to most consumers, but they may not understand what characterises the ideal shape and how their own shapes deviate from it. Consumers' lack of knowledge about the various body shapes and about their own body shape, as observed in this study, may highlight their inability to comprehend proportional comparisons between the ideal body shape and any other shape. The consumers assume that the commonly presented ideal shape represents all the other shapes, and therefore they perceive it as the only perfect one. This has an implication with the fit of apparel because a consumer will purchase apparel items that are suitable for their perceived ideal body shape rather than for their own shape. In this study (**Figure 6.17**), the results indicated that the majority (76%) of this group of Kenyan career women perceived the hourglass body shape as an ideal figure, but they did not perceive their self-reported body shapes or their distinct rectangular shape (from dimensions and photos) as the ideal body shape. The perception of the hourglass shape as the ideal shape may be attributed to the fact that the current marketing of fashion uses it for advertisements. This, according to Fiore and Kimle (1997:3), provides a symbol of expectation for women and has negative implications, as the women purchase apparel items that would look attractive on the ideal body shape – but looks disappointing on their own body shapes. When a woman tries to dress her body with the available apparel items, the comparison to the ideal is inevitable, and this signals to the woman that something is wrong with her body, rather than with the apparel itself. This may undermine the confidence of the wearer and cause unnecessary emotional suffering for an individual.

6.4.3 Determining and describing how career women's fit preferences for differently fitted skirts and jackets may contribute to fit problems in Kenya (Primary objective 6)

Fit preference is subjective and varies from one person to another. The comfort or ease that a person requires in an apparel item depends on the physical characteristics of that individual's body (critical fit points) as well as internal influences such as personal preferences, expectations and the look that that individual desires (Alexander, Connell & Presley, 2005). Kenya's career women's preferences for differently fitted skirts and jackets (**Figure 6.18**) indicate that the majority of the respondents prefer fitted and semi-fitted skirts and jackets, while they least prefer loosely fitted skirts and jackets. An observation made in this study (**Chapter 5)**) indicates that large buttocks, stomachs, thighs and bust characterise the distinct rectangular shape. The loose fit problems experienced around the shoulders, the back width and neck line regions also highlights that the upper torsos of the career women in Kenya were smaller than the base pattern used in the apparel industry. These characteristics deviate from the characteristics of the so-called ideal shape that is used for pattern design and apparel creation. Consumers with these prominent body characteristics and wearing fitted or semi-fitted skirts and jackets are likely to experience problems with tight fit at the area of prominence. The consumer's preferred needs regarding fit would be catered for If the available designs were based on the prominent characteristics of this specific body type (curvy rectangular body shape). In the absence of the distinctive body shape as a design guide, the curvy rectangular body shape could be accommodated more comfortably and pleasingly by loosely fitted apparel as they contain enough wearing (comfort) and design (style) ease. It is possible that consumers' fit preferences are dictated by fashion trends rather than their knowledge about appropriate apparel styles for their shapes and their critical fit points. In such instances, fit problems encountered could be ascribed to consumers' inappropriate fit preferences that do not take into account their body shapes and the critical fit points associated with their shapes.

The body's size and shape and the perceived needs of the consumer determine appropriate apparel styles and sizing in terms of the fabric's properties, the amount of ease required for comfort, movement and an attractive appearance (Huck, *et al*., 1997; DeLong *et al*., 1993). The fit preferences of the consumers must therefore be synchronised into overall suitable and accepted styles. Regarding the chosen styles, the majority (63%) of the respondents were unable to select suitable styles for the distinctive rectangular body shape, but about half (51%) of them were able to select styles for their perceived body shape (hourglass). These findings may suggest that fit problems encountered by the Kenyan career women could be ascribed to their fit preferences that do not take into account their body's actual characteristics. Considering that consumers were able to select suitable apparel for the hourglass shape (fit model), it reveals that Kenya's career women's fit preferences could be influenced by fashion trends rather than by the comfort needed from fashionable apparel. Internal influences such as fashion trends, expectations and the look that one desires also influence consumers' fit preferences (Alexander, Connell & Presley, 2005). Physical (aesthetic) characteristics or the emotional experience that the consumers expect or get from purchasing certain apparel may also contribute to their preference for a certain degree of fit in specific apparel rather than considering the body's actual characteristics (Pisut & Connell, 2007; De Klerk & Tselepis, 2007). It should be recognised that body-hugging apparel items were in fashion at the time of data collection and are still currently in fashion. In this respect, problems encountered at critical fit points could be attributed to consumers' inappropriate fit preferences that do not take their critical fit points into consideration. Consumers' ignorance on the appropriate degree of fit required in different apparel styles, and the basic elements and principles of design applicable for different body shapes, could also lead to inappropriate fit preferences and consequently, fit problems.

Chapter 7

CONCLUSIONS, EVALUATIONS, CONTRIBUTIONS TO THEORY AND RECOMMENDATIONS

7.1 INTRODUCTION

The aim of this research was two-fold. The first phase had three objectives (1, 2 and 3) with the aim of:

- Identifying and describing distinctive female body shapes of career women in Kenya, using body dimensions and photographs;
- Describing the differences between the emerging distinctive body shapes (from measurements and photographs) and the Western distinctive shapes; and
- Describing and analysing the fit implications associated with the emerging distinctive body shapes of Kenya's career women.

The second aim (phase two) entailed three objectives (4, 5 and 6) aimed at:

- Assessing and describing career women's self-perceived fit issues with the ready-made apparel in Kenya;
- Determining and describing Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes); and
- Determining and describing career women's fit preferences for differently fitted apparel items in Kenya.

A quantitative approach was used throughout the study. In the first phase, a body measurement form was used to record the body measurements obtained from the participants. An assessment scale was also used to record visual assessment data from the photographs. For the second phase, a structured questionnaire was used to collect data for the purposes of assessing and describing perceptions regarding general fit problems with the ready-made apparel in Kenya, determining and describing career women's knowledge about the communication of size (key body dimensions) and fit (body shapes), and describing career women's fit preferences for differently fitted apparel items in Kenya.

7.2 GENERAL CONCLUSIONS REGARDING PHASE ONE DATA

7.2.1 Conclusions regarding the distinctive female body shape of career women in Kenya (Objective 1)

It can be concluded that the most dominant body shape that emerged from this study is a curvy rectangular shape. Although the most prevalent body shape in Western society is also rectangular, Kenya's rectangular body shape differs significantly from the Western shape. The Western rectangular shape is nearly straight when viewed from the side, front and back. Contrary to the Western body shape, Kenya's rectangular shape is curvier, particularly from the side view, with large buttocks ("**d**") and a rounded upper back region, giving rise to a well-defined hollow back waist region. The front is typified by a well-pronounced stomach, similar to the letter "**D**" (**Figure 5.5**). As observed in this study, the round upper back regions tend to become less pronounced, while the stomach gets more rounded ("**D**"), as the female matures (**Figures 5.3** and **5.4** in **Chapter 5**). The rounded upper back and the "**D**" stomach shape were significant with the older women, while the well-defined hollow waists were not significant in or confined to any specific age group only.

7.2.2 Conclusions regarding differences between the distinctive body shapes of Kenya's career women and the Western (American) distinctive body shapes (Objective 2)

In conclusion, it is clear that the rectangular body shape is the most prevalent body shape, both in this study and in the United States of America. The second most prevalent shape in this study is the triangular shape, which differs from the American second most prevalent spoon shape (**Figure 7.1**). As discussed earlier, in **Chapter 5** (**paragraph 5.5**), this study used only three measurements (bust, waist and hips) for defining body shape, while America's classified female shapes used six measurements (bust, waist, hips, high hip, abdomen and stomach), hence a comparison cannot be done on all aspects. However, as seen in **Figure 7.1**, the American rectangular shape appears straight, all the way from the shoulders to the hip line. The distance between the hip and waistline appears shorter, with no clearly defined hipline or waist indentation. Kenya's rectangular shape –contrary to the American shape – appears curvier, particularly around the hip and thigh areas. The waist to hipline distance appears longer, with a well-defined thigh bulge. It should be noted (**Figure 7.1**) that the American figures are standing with the legs apart; thus the appearance of the hip outline shape is not realistic. Since the second most distinctive body shape in America differs from Kenya's second most distinctive body shape, critical comparisons will not be made, although from the pictures given (**Figure 7.1**), one could say that both body shapes (Spoon & Triangle) have wider hips than bust and shoulders.

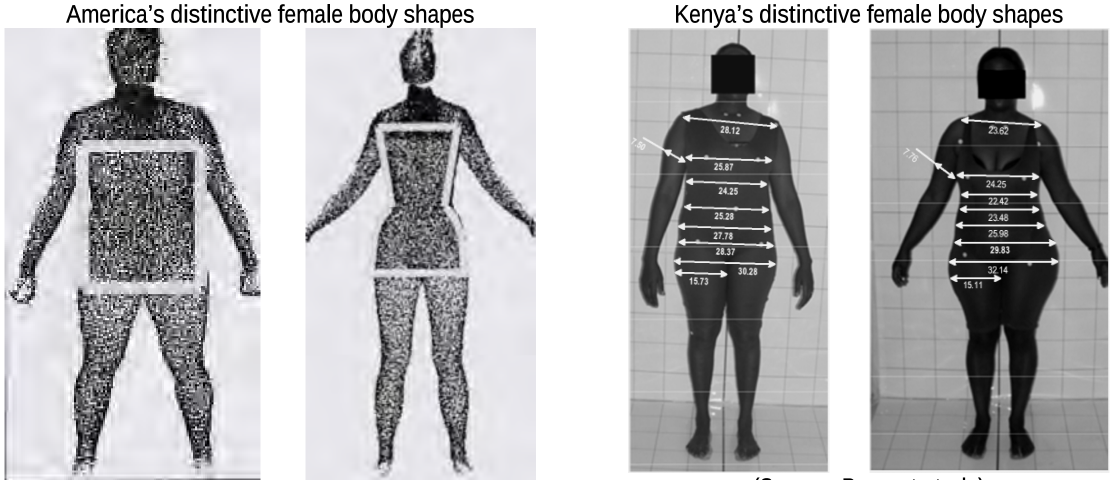


FIGURE 7.1: DISTINCTIVE FEMALE BODY SHAPES IN AMERICA AND KENYA

A side view characteristic found with the American distinctive rectangular body shape is the large stomach, which could be "**D**"-, "**B**"- or "**b**"-shaped, as observed by Connell *et al*. (2006). It is also characterised by flat back curvature, right from the upper back to the buttocks, appearing like an apple body shape's profile view (**Figure 7.2**) (Simmons *et al.,* 2004). Rasband and Liechty (2006:25-26) report that once a rectangular shape attains more weight, it results in an apple shape (Rasband & Liechty, 2006:25-26). The front view of Kenya's distinctive rectangular shape is characterised by a similar width over hips and shoulders, with a small waist indentation. The thighs bulges out on the side beyond the hip width and are full on the inside (at the crotch), in contrast to the Western body shape. A rounded upper back characterises the profile view, with more roundness concentrated just below the shoulder line and the chest. The back curvature tapers narrowly towards the waistline and abruptly meets the full buttock contour, resulting in a deep hollow waist region. The front view in profile is characterised by a high abdominal contour that begins to protrude just below the bust line. It begins to curve round almost immediately and increases as it leads down to the crotch at the centre of the body, resulting in a "**D**" appearance (**Figure 7.2**).

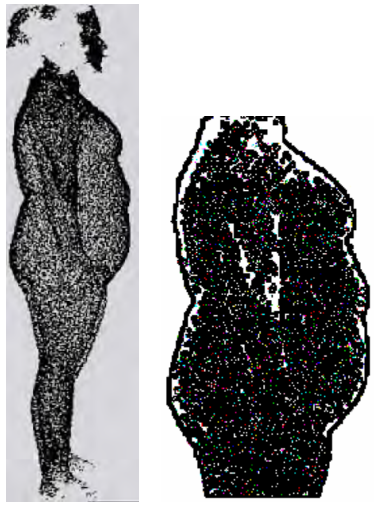
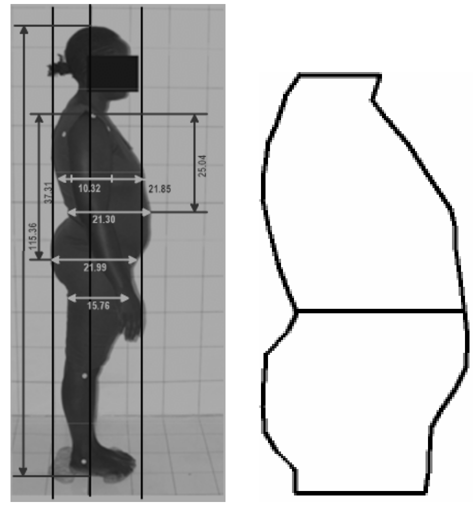
America's rectangular body shape's side view characteristics	Kenya's rectangular body shape's side view characteristics
	
Smooth and gently curved back, almost straight with less rounded upper back and gently curved buttocks. The front is characterised by a "D"-shaped stomach.	Curved back straight with rounded upper back, hollow waistline and rounded buttocks ("d"-shaped). The front is characterised by "D"-shaped stomach.

FIGURE 7.2: SIDE VIEW CHARACTERISTICS OF AMERICA'S AND KENYA'S DISTINCTIVE RECTANGULAR BODY SHAPES

7.2.3 Conclusions regarding apparel fit problems associated with the distinctive body shapes of Kenya's career women (Objective 3)

Apparel based on the hourglass body shape as a fit model used for the production of ready-made apparel (Alexander *et al*., 2005; Zwane & Magagula, 2006), makes fit problems such as tight hips, crotch, bust and stomach experienced by Kenya's career women, inevitable. A curvy rectangular body shape with well-pronounced body characteristics such as large buttocks, rounded upper back, hollow waistline and "**D**"-shaped stomach, is likely to experience fit problems around these regions.

As predicted in **Chapter 5** (**paragraph 5.6**), major fit problems that could be expected to be experienced by a woman with a curvy rectangular shape could include tight fit at the hip region, crotch line and thighs, which may lead to wrinkles and ripples forming around the affected area, a tight fit at the waistline that could lead to wrinkles around the waist region, apparel riding up, and inappropriate style and dart positions due to a large stomach ("**D**"), tight bust line, tight armholes and tight pull in the upper back area. Diagonal wrinkles may also form around the prominent regions of the body.

In confirmation of the predicted fit problems, the Kenyan career women expressed dissatisfaction with the way that ready-made apparel items fit their critical fit points. The majority of the career women reported fit problems more than they reported acceptable fit at the various fit points of the upper and the lower torsos. There were problems of tight fit reported at the lower torso's critical fit points (hip/buttocks and thigh regions), and also problems of tight fit reported at the bust line region, which integrates fit problems around the rounded upper back and the large bust. With the confirmation of the predicted fit problems, it becomes apparent that it would be unrealistic for apparel industries to continue manufacturing styles and sizes that are suitable for the hourglass body shape (fit model), and expect to fit the curvy rectangular shape appropriately. Having observed the differences between both the distinctive rectangular shapes (America's and Kenya's), it also became obvious that the body shapes indeed do differ, and that there is a need to evaluate and understand body shapes of different market segments rather than make-do with estimates. The quality of apparel regarding its fit, can only be attained collectively, through dress forms, fit models and sizing systems, which must represent the target population's sizes and body shapes (Salusso-Deonier, 1989; Ashdown *et al.*, 2004).

It can be concluded that the apparel industry's ignorance about the distinctive body shape's characteristics would lead to inappropriate design features and inappropriate fit quality strategies employed in the industry. The body shape serves as a design guide for the production of suitable styles, using appropriate fabrics and suitable sewing techniques and notions. Understanding the prevalent body shape and body features of a population in a specific market, could serve as a guide to the apparel industry's designs, fit models and dress forms for fit-testing strategies, and for distributing correct sizes and styles accurately to the marketplaces. The Western view of the hourglass body shape as ideal shape or representing all body shapes, can lead to designing and distribution of apparel that will not fit the consumers appropriately.

7.3 GENERAL CONCLUSIONS REGARDING PHASE TWO DATA

7.3.1 Conclusions concerning career women's self-perceived fit issues with the ready-made apparel in Kenya (Objective 4)

Kenya's career women consumers expressed dissatisfaction with the unavailability of appropriate styles for their sizes and shapes. The critical fit points of Kenya's career women's curvy rectangular bodies (buttocks, thighs, upper back, hollow waist, stomach, bust and non-proportional height positions) deviate significantly from the so-called ideal figure's (hourglass) body characteristics. Consumers' dissatisfaction with the fit of ready-made apparel is further confirmed by the many reported fit problems encountered at the different critical fit points of the consumers' bodies. The reported problems of tight fit at the hip/thighs, buttocks, upper arm and bust regions also confirm the prominent buttocks, thighs, bust, upper arm and the rounded upper back regions that are common to the distinctive shape in this study. Since most of the ready-made apparel items are based on the "perfect" (hourglass) figure, the fit problems encountered by Kenya's career women are inevitable on a body shape with features that do not match the proportions of the ideal figure.

Dissatisfaction with the fit of apparel could also be attributed to frustrations encountered during an apparel search. Inadequate information given on Kenyan garment labels would likely contribute to consumers' frustrating dilemma during apparel selection. Women consumers in Kenya lack knowledge about the meaning of tacit labels and cannot comprehend and link the meaning of the labels to the given size codes and their own measurements. Although Kenya's career women perceive the fit of imported, custom-made and second-hand ready-made apparel categories as good, the actual fit of imported, custom-made and second-hand apparel could be worse than reported, as confirmed by their expressed dissatisfaction with the unavailability of appropriate styles and sizes. The personal attention and fitting processes involved while garments are constructed may result in women perceiving the fit of custom-made apparel as better. Extrinsic features such as emotional satisfaction, rather than the intrinsic (fit) aspects of apparel, may contribute to the positive perception of fit with both imported and second-hand apparel – rather than its actual fit (De Klerk & Tselepis, 2007). Kenya's career women's "ego" drive towards the imported apparel could be the main reason behind the perceived good fit (Agbonifoh & Elimimian, 1999; Hansen, 1999:359; Mhango & Niehm, 2005). In practice, the lack of a representative anthropometric database (size tables and body shapes), and the unrepresentative and uninformative communication of size and fit are the major sources of fit problems (Salusso-Deornier, 1989; Ashdown, 2000).

Significantly, Kenya's career women perceive both their body shapes and the apparel industry as the source of the fit problems, thereby confirming their state of confusion. Confusion regarding the source of the fit problems could attribute the locus of the problem externally by blaming the apparel industry, and internally by blaming their bodies in a negative way (Weiner 1986). Consumers, who are equipped with adequate knowledge about the products they are buying, are likely to link the cause of the problem to the manufacturer. Confused and unskilled consumers are less able to process information and are more vulnerable to making less than optimum apparel style and size choices.

7.3.2 Conclusions regarding Kenyan career women's knowledge about the communication of size (key body dimensions) and fit (body shapes) (Objective 5)

Although Kenya's career women preferred informative size labels, it can be concluded from this research that Kenya's career women lack knowledge about the meanings of various size descriptions that are familiar to them. They are partially knowledgeable about their bust and waist dimensions, but are more knowledgeable about their hip dimensions. Problems with tight fit reported at the regions of the hips, the buttocks and the thighs of the consumers, confirm that these regions are calling for closer attention. A consumer with a prominent hip region is likely to experience problems with tight fit, which may aggravate her desire to understand the dimensions around it. Various factors may contribute to consumers' problems with regard to the fit of their clothes and to their problems regarding the finding of suitable sizes that fit their bodies. According to Ashdown (2000), these factors may be the population's measurements, the design features, the fit issues and the communication of sizing and fit – in other words, the information that is communicated to consumers and that they can interpret and use as knowledge when purchasing apparel items. In the case of the Kenyan consumer of female apparel, the lack of knowledge (which implies that there is no meaningful communication between the apparel industry and the consumer), is probably an important contributing factor to her problems with getting the right size and her dissatisfaction with the fit of apparel.

Familiar size labels showed no significant associations with consumers' knowledge about the meaning of size labels and the age (experience) of the consumers. Being familiar with, and long experience of size labels or apparel selection, and being knowledgeable about size codes, are clearly different concepts, implying that being exposed to information in the consumer socialisation process does not automatically result in an informed consumer who has the knowledge needed when trying to make informed decisions. With this, it can be concluded that getting information and being familiar with the way that it is presented, do not automatically mean correct interpretation of the information, to the extent that it can be viewed as meaningful knowledge that can successfully be applied in a decision-making situation. It can also be concluded that, although they prefer the more informative and descriptive size labels, female Kenyan apparel consumers are familiar with most of the non-informative descriptive size labels that are currently used to indicate the sizes of most female apparel items.

As in the case of tacit labels, the apparel industries in Kenya are neglecting the recommendations by KEBS (2001:7) to use instructive labels. The lack of body shape terms on size labels/tags would mean inappropriate apparel selection by the consumers, as they have nothing to guide them. A size label should not only indicate key dimensions but also describe the body type that the apparel item was designed for (Glock & Kunz, 1995:108; Chun-Yoon & Jasper, 1995). Although manufacturers/retailers hardly include body shape as a communication of fit, size label terms that represent body shapes were not familiar or comprehensible to Kenya's career women. This means that career women in Kenya cannot relate their own shapes to the available ready-made apparel styles. Unawareness of their own shapes could possibly indicate ignorance about the basic elements and principles of design, which would be useful in the selection of appropriate apparel styles. Kenya's career women's preference for the hourglass body shape is also a signal that they view their shapes unrealistically – and hence their inappropriate apparel selection. Consumers who are knowledgeable about their own body shapes and skilled in the application of the basic elements and principles of design, are likely to make effective selection of appropriate apparel items, while they would also express satisfaction with their body shapes. Presenting uninformative size labels to ignorant consumers on size and fit may create a state of confusion regarding the sources of fit problems and maintain their lack of skills to tackle the problems. However, if size labels were informative, then women would possibly measure themselves more carefully and perhaps get to internalise their key dimensions and understand their shapes. There was a significant relationship between consumers' professional background and their familiarity with size labels and knowledge about the meaning of body shape terms. Some of the terms used to represent body shape on the size labels were familiar to professional home scientists who also understood the terms. It must therefore be appreciated that formal education on size and fit issues could equip learners with useful knowledge.

A consumer's knowledge plays, from an expectancy disconfirmation point of view, an important role in the expectations that the consumer forms about a product, in this case apparel products. Knowledge also plays an important role when the consumer has to evaluate the apparel item at the point of purchase, and again when she wears the garment and has to decide whether she is satisfied or dissatisfied, and where the cause of the problem lies. A consumer with inadequate knowledge, in this case inadequate knowledge about sizing and fit, would not be able to make informed decisions regarding the size and fit of a garment – thus she stands a better chance to make the wrong choice. Without adequate knowledge of her own body measurements, knowledge of how a garment is sized, and an understanding of the meaning of the terms used on the size label, the consumer would also not be able to know why a garment does not fit properly and would therefore be unable to correct the problem in future purchases.

Oumlil, Williams and Oumlil (2000) underline the need for, and the value of, consumer education, and state that it can become an effective and viable tool through which marketing strategies can be implemented, to the extent that it can become a form of self-promotion and advertising. Professional background in Home Science had significant associations with consumers' knowledge on size labels and terms that represent body shape, signifying that formal education on size and fit could equip learners with useful knowledge. As suggested by Oumlil *et al*. (2000), education should be part of any company or retailer's competitive strategy, with the advantage that it would help to obtain, and keep, satisfied customers, would contribute to a favourable attitude formed amongst the consumers and would help to reduce confrontations between customers and apparel suppliers.

7.3.3 Conclusions regarding Kenyan career women's fit preferences for differently fitted apparel items in Kenya (Objective 6)

With reference to the fit preferences of Kenya's career women, it may be concluded that they prefer fitted and semi-fitted skirts and jackets. The predominant rectangular body shape of the Kenyan career women can be fitted comfortably and appealingly with more fitted apparel, if the majority of the available designs were based on this specific body type. The curvy rectangular body shape's prominent characteristics such as the large buttocks, the rounded upper back, hollow waistline, large upper arms and large bust should therefore be well understood by the apparel industry so as to cater for their preferred needs. It is also possible that consumers' fit preferences are dictated by fashion trends rather than by a knowledge of the appropriate apparel styles for their shapes or their critical fit points. Where no body shape considerations are considered while manufacturing ready-made apparel, the curvy rectangular body shape could be accommodated more comfortably and pleasingly by loosely fitted apparel as it contains enough wearing (comfort) and design (style) ease. Significantly, those who reported acceptable fit at the stomach region preferred fitted skirts, while those who reported tight fit at the thigh and bust regions preferred semi-fitted skirts and jackets, respectively. This may indicate that comfort required around the stomach, bust and thigh regions could determine the degree of ease necessary in skirt and jacket for some career women in Kenya. Fit problems encountered could therefore be ascribed to the unavailability of appropriate styles designed for the curvy rectangular shape, and inappropriate fit preferences that do not take into account consumers' curvy rectangular body shape and its critical fit points.

7.4 OVERALL CONCLUSION OF THE STUDY

The given framework (**Figure 7.3)** will be used to direct the overall conclusions drawn from this study.

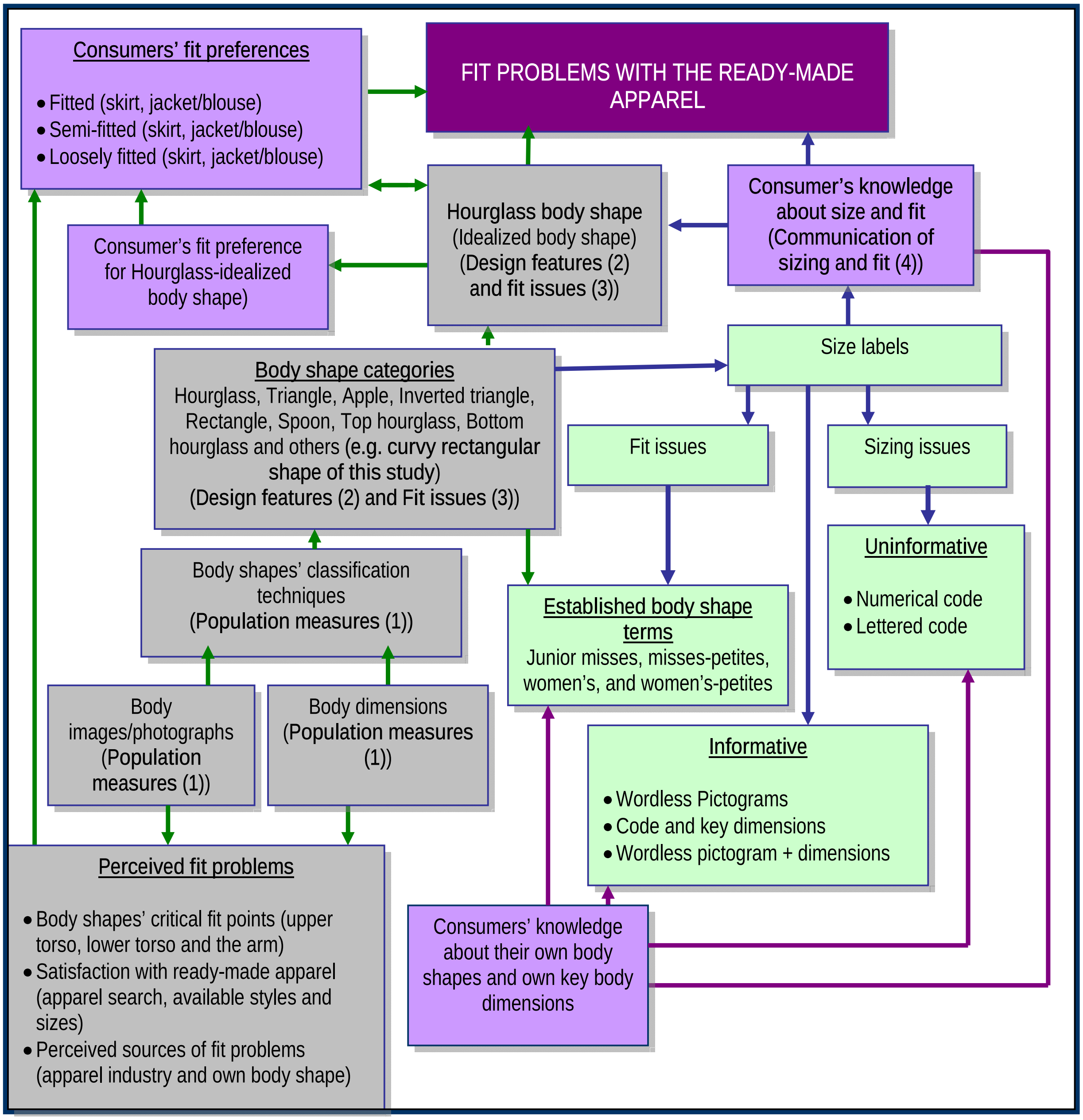


FIGURE 7:3: FACTORS THAT MAY CONTRIBUTE TO WOMEN'S DISSATISFACTION WITH THE FIT OF APPAREL

The framework (**Figure 7.3)** was developed with the theory (Ashdown, 2000), the objectives and the findings of the study in mind, and it serves as a means to understand the various factors that contribute to women's dissatisfaction with the fit of apparel in Kenya and other parts of the world. These overall conclusions will revolve around Ashdown's (2000) model which includes four major factors, namely, population measures, design features, fit issues and communication of size and fit. Overall conclusions will also include consumers' perspective on matters that could affect apparel's size and fit, such as knowledge about communication of size and fit, preference for an hourglass body shape, fit preferences and perceived fit problems.

After the overall conclusions, it will be followed by an evaluation of the limitations and success of the quantitative research style, data collection methods, sample selection, data analysis, the quality of the study and the achievement of the objectives. The study's contribution to the existing theory is also discussed, while recommendations are made to the apparel industry (manufacturers and retailers), the government and the consumers.

7.4.1. Overall conclusions based on Ashdown's (2000) four major factors revolving around sizing systems

7.4.1.1. Population measures and the distinctive body shape

Population measurements as one of the four major components of Ashdown's (2000) model demand that the body dimensions should be obtained from the three-dimensional body in an explicit way that will facilitate body shape classifications. Accurate reflection of the three-dimensional body's characteristics would be achieved when the apparel has been made based on all the elements of fit (grain, set, line, balance and ease) and dressed on the body (Erwin *et al*., 1979). It can be concluded that Kenya's apparel industry, as well as foreign companies that export their apparel merchandise to Kenya, do not understand Kenya's distinctive curvy rectangular female body shape, nor its representative body measurements. Most sizing systems available in Kenya do not include a classification of body shapes, which is the core component of a successful sizing system (Chun-Yoon & Jasper, 1996; Istook & Hwang, 2001). According to Kenya's sizing standards (KEBS, 2001), anthropometric data was last collected in 1975, which means it is outdated. Zwane and Magula (2006) report that most apparel industries in developing countries actually adapt western sizing systems without considering variability of body shapes and sizes that exist in their markets. Fit problem in Swaziland has also been found to be as a result of mismatch between the actual measurements of Swazi women and the key dimensions of existing size charts. As observed in this study, Swaziland women's body shapes also do not conform to the Western idealized hourglass body shape and measurements (Zwane & Magula, 2006).

A sizing system entails the assignment of body dimensions to a group of body shapes representing a market segment (Ashdown, 2000; Keiser & Garner, 2003:30; Salusso-Deonier, 2005; Petrova, 2007:57). It has been reported that a sizing system that sets out to satisfy its target market must be up to date, precise in its measurements and body shape classification (proportions) and must represent the population it was designed for (Salusso-Deonier, 1989; Delk & Casill, 1999; Schofield, *et al*., 2006). Apparently, size and fit problems is an international outcry. Studies carried out in developed countries (USA, UK and Canada) also indicate that sizing systems used are as old as the 1940s' and 1950s'. Although national anthropometric surveys have been carried out recently in most of these developing countries, most apparel industries are still reluctant to implement the data as sizing systems and hence persistent fit problems (Newcomb & Istook, 2004a; Otieno, *et al*., 2005; Ashdown & Dunne, 2006; Faust *et al*., 2006; Shin & Istook, 2007).

7.4.1.2. Design features and the distinctive body shape

Design features, being the second most important factor highlighted in Ashdown's (2000) model, necessitate that the body's framework (three-dimensional characteristics) be rightfully translated into patterns for the construction of well-fitting apparel. Lewis (2007:319) states that the body shape and the apparel silhouette worn become attached and united so that the body shape beneath the apparel enhances the aesthetic appeal of that particular apparel, while the apparel silhouette enhances the aesthetic appeal of the entire person. Considering that the body measurement tables in Kenya are based on an outdated anthropometric database in combination with a lack of classified body shapes, it is possible that sizing systems currently in use could be an adaptation of the 1975 data, borrowed or adapted from other countries. This means that apparel items available in the Kenyan markets are based on estimations rather than on facts. Body shape terms represented on the size labels are not familiar to Kenya's consumers, clearly indicating that size labels attached to the garments before being dispatched, do not indicate the body shape of the intended consumers. Without body shape as a design guide, it is possible that the styles produced are based on approximations and arbitrary distributions to the market place, thus confirming consumers' dissatisfaction with the fit of ready-made apparel.

Apparel is the product of a design process and the fabric's properties, and its quality is measured by its appearance and comfort on the body shape. The body shape functions as a frame for the apparel (Salluso-Deonier, 2005), and the fabric's properties and the apparel's style must be in harmony to produce aesthetically pleasing, comfortable and well-fitting apparel. Currently, media and apparel companies worldwide use a well proportioned but relatively slim hourglass body shape for their fashion shows and catwalks (Brown & Rice, 2001:154; Yu, 2004:33; Loker *et al.*, 2005). This is viewed in Western society as ideal (Yu, 2004:33; Zwane & Magagula, 2006; Pisut & Connell, 2007). Armstrong, (1995:33) define the ideal figure female body structure with well-balanced features. The perfect body is assumed to provide a silhouette that will fulfil everyone's desired image of perfection, but in reality it denies the consumers with diverse body shapes and sizes, the opportunity to see and understand their body structures sensibly (Lewis, 2007:319). Apparel designed, modelled and sized according to this idealized body shape would certainly not fit consumers with varied body shapes and sizes. As earlier mentioned the reluctance by most apparel industries to implement anthropometric data into useful sizing systems, size and fit problems inevitably continues to bother consumers irrespective of regions and countries.

7.4.1.3. Fit issues and the distinctive body shape

The fit issues being the third important part of Ashdown's (2000) model involve fit quality management strategies that call for certain fit testing techniques such as the use of fit models and dress forms. Fit is the apparel's silhouette and size, and these have to be right for the humans' body shapes and dimensions (Kadolph, 1998:550; Keiser & Garner, 2003:315; Solomon & Rabolt, 2004:196). Therefore, the fit models and/or the dress forms used for fit testing must conform to the body characteristics of the distinctive figures and sizes of the target market. It may be concluded therefore that, without representative body measurements or an identified body shape, it would be almost impossible to formulate and administer fit quality strategies.

Representative anthropometric data and identification of distinctive body shapes of any specific target market form the foundation of the successful production and distribution of ready-made apparel. Understanding prominent body characteristics of a prevalent body shape plays an important role in the production and distribution of appropriate and correct numbers of apparel styles and sizes to a specific marketplace. The body shape serves as a design guide for the pattern development and consequently, well fitting apparel. It is therefore critical to analyse and understand the body proportions of the dominant shape in any country rather than the assumptions that all shapes are ideal (Hourglass), as these determine the overall design values that can be incorporated into garment production, the development and implementation of quality assurance measures right from illustration stage (style decision), pattern creation, fabric selection and dispatch.

7.4.1.4. Communication of sizing and fit, the distinctive body shape and the key body dimensions

Communication of sizing and fit, being the fourth important factor in Ashdown's (2000) model, requires that measurements and body shapes indicated on the size labels reflect the true picture of the target market (population). The garments made in the industry require that body measurements be translated from a body measurement table into patterns, and finally into garments. Size labels are attached to the garments whilst in the assembly process. The information given on the labels must therefore reflect the correct original dimensions and body shape that they purport to represent. Failing this, the apparel item will land on consumers whose dimensions and body shapes differ – hence, fit problems.

It can be concluded that uninformative size labels are presented on Kenya's ready-made apparel – labels that are not instructive and cannot be useful during garment selection. Although Kenya's female consumers prefer the more informative, descriptive size labels, the uninformative size labels are familiar to them. Istook (2002:65) highlights the importance for manufacturers to communicate to their consumers, how each apparel item was designed to fit. This communication is an indispensable step in meeting the fit expectations of consumers. Misleading information often leads to consumers' confusion, which can affect the quality of consumers' purchase decisions (Mitchell & Papavassiliou, 1999). Continuous presentation of the uninformative labels in Kenya may be viewed as deliberate refusal by the apparel industry to adhere to the recommendations by KEBS (2001:7). Also observed in Canada (Faust *et al*., 2006), USA (Newcomb & Istook, 2005; Shin & Istook, 2007) and Swaziland (Zwane & Magagula, 2006), apparel industries do not adhere to measurements assigned to the recommended size codes.

The lack of body shape terms on size labels/tags would mean inappropriate apparel selection by the consumers, as they have nothing to guide them. A size label should not only indicate the key dimensions but also a description of the body type that the apparel item was designed for (Glock & Kunz, 1995:108; Chun-Yoon & Jasper, 1995). Consumers have a right to clear and understandable information regarding the product that they are buying, and this should appear on the product itself. It is therefore advisable for the apparel retailers to clearly indicate the body dimensions and body shapes of their target consumers and to ensure that size labels attached to the garments are communicating the correct information effectively. In other words, there must be a plausible relationship between anthropometric data, the size charts and the sizes presented on the apparel. Informative size labels based on representative anthropometric data inform the consumer about the dimensions used, and about the body shape that the apparel will fit best. In conclusion therefore, obsolete sizing systems and ignorance about the prevalent body shape in Kenya are leading to the use of vague size labels that do not only confuse the consumers, but also do not represent their true measurements and body shapes.

Variations that exist between apparel sized with the same codes from one company or different companies could be traced to the use of obsolete and/or wrong measurements, either initiated by the manufacturer or the retailer. Methods of obtaining body dimensions are not standardised amongst stakeholders (manufacturers and retailers), thereby creating leeway for most apparel industries (manufacturer/retailer) not to adhere to the suggested (voluntary) standard size communication systems (Faust *et al*., 2006). The pattern development, grading, fabric spreading, cutting and assembling procedures employed by different manufactures are inconsistent, resulting in confusing sizing systems in the marketplace (Hudson, 1980:112; Solinger, 1988:128; Brown, 1992:29; Glock & Kunz, 1995:390). Failure of quality control measures due to lack of guidance provided by representative size tables and body shapes could easily permit errors to slip through from one section of apparel processing to the other, ending up in consumers' hands in a retail environment.

It is clearly the responsibility of the retailer and the manufacturer collectively to work together in ensuring that body shapes and body dimensions used in the construction of the apparel, are effectively communicated through size labels to the consumers. Retailers are direct customers of the manufacturers, as they provide size and style specifications to the manufacturers. Manufacturers have the responsibility of producing the apparel as per these specifications. Since retailers are the order initiators, they are required to give size and style specifications based on accurate shapes and sizes of the target market.

7.4.2 Overall conclusions based on Consumers' perspective regarding matters that could affect apparel's size and fit

7.4.2.1 Consumer's lack of knowledge about the communication of sizing and fit

It can be concluded from this research that female Kenyan apparel consumers lack knowledge of their own and different body shapes, the meanings of various size descriptions used on labels, and also lack knowledge of their own key body dimensions which serve as indicators of appropriate sizes. Various factors may contribute to consumers' problems with regard to the fit of their clothes and to their problems regarding the finding of suitable sizes that fit their bodies. According to Ashdown (2000), one of the factors affecting size and fit is the communication of sizing and fit – in other words, the information that is communicated to consumers that they can interpret and use as knowledge when purchasing apparel items. Workman (1991), Desmarteau (2000) and Brown and Rice (2001) underline the importance of consumers' knowledge of their own measurements, and of which body measurements are necessary when choosing certain garments. In the case of the Kenyan female apparel consumer, the lack of knowledge (which implies that there is no meaningful communication between the apparel industry and the consumer) is probably an important contributing factor to her problems with getting the right size and also her dissatisfaction with the fit of clothes.

7.4.2.2 Consumers' preference for an hourglass body shape

The body, as frame structure for proportioning apparel, must be well understood by the user in terms of shape and proportions. A consumer without knowledge could assume that all people have bodies similar to that of the fit model or to that of the perceived ideal shape. Career women consumers in Kenya perceive the hourglass body shape as ideal, and as a reflection of their own body shapes; therefore they select apparel styles that are suitable for the hourglass body shape. They are not only uninformed about their own and others shapes, but are also unrealistic about their own shapes. Unrealistic perception of the self could lead to purchasing apparel suitable for the fit model or for the perceived ideal shape – rather than for the own actual body shape. Consumers who are unaware about the different body shapes are likely to also be ignorant about the elements of good fit, and hence will select apparel based on other factors such as colour, style and current fashion, eventually purchasing apparel with fit problems. Knowledge about the different body shapes facilitates a comparison of the proportions between different body shapes, which ultimately eases apparel selection.

7.4.2.3 Consumers' fit preferences

The study has shown that Kenya's career women prefer fitted and semi-fitted skirts and jackets. This could be influenced by fashion trends rather than the comfort needed from fashionable apparel, as confirmed by the selection of styles that are suitable for the hourglass shape (fit model) rather than for their actual shapes. Physical (aesthetic) characteristics or emotional experience that the consumers expect or get from purchasing certain apparel may also contribute to a preference for a certain degree of fit in specific apparel (Pisut & Connell, 2007; De Klerk & Tselepis, 2007). If the available designs were based on the curvy rectangular body shape's prominent characteristics, the consumer's preferred fit needs would be catered for. In this respect, problems encountered at the critical fit points would be attributed to inappropriate fit preferences that do not consider the distinctive body shape's critical fit points. Consumers' lack of knowledge about the appropriate degree of fit required in any apparel style, and the basic elements and principles of design applicable for different body shapes could also lead to inappropriate fit preferences – and consequently, fit problems.

7.4.2.4 Consumers' perceived fit problems

It may be concluded that Kenyan career women perceived fit of the imported new and second-hand ready-made apparel as good, although they are generally dissatisfied with the way the ready-made apparel items fit their critical fit points. The Majority of the career women, however, report more problems with either tight or loose fit than they report acceptable fit at the various fit points of the upper and the lower torsos. Consumers' dissatisfaction confirms the fact that the distinctive Kenyan female body shape (curvy rectangle) in deed differs, not only from the idealised ideal hourglass figure, but also the western rectangle figure (Newcomb & Istook, 2004a & 2004b; Zwane & Magagula, 2006). As reported by Kurt Salmon Associates (1996) in the United States of America, Otieno *et al*. (2005) in the United Kingdom and Faust *et al*. (2006) in Canada, it appears therefore that consumers' dissatisfaction with apparel's fit is becoming a global problem.

As observed through out this study, fit problems arise from:

- Lack of distinctive body shape and body dimensions necessary for designing and distributing appropriate styles and sizes to a specific market from which the shapes and sizes were obtained
- Use of uninformative size labels presented on garments, which are not understood and not preferred by the consumers
- Consumers' lack of knowledge – not only about the size codes, but also about their dimensions and body shapes, and therefore they will make the inappropriate apparel selection
- Inappropriate style choices based on the perceived ideal figure rather than on the actual body shape
- Consumers' lack of knowledge about the appropriate degree of fit required in any apparel style, and about the basic elements and principles of design applicable for different body shapes, and their inappropriate fit preferences that do not consider a distinctive body shape's critical fit points

7.4.2.5. Consumer's perceived sources of fit problems

Kenya's career women are confused about the source of fit problems, so they attribute the locus of the problem externally by blaming the apparel industry, and internally by blaming their bodies in a negative way (Weiner, 1986). Informed consumers with adequate knowledge about the products they buy are likely to link the cause of the problem to the manufacturer. Confused consumers are less able to process information and are more vulnerable to making less than optimum apparel style and size choices. As female consumers continuously purchase substandard apparel fostered by their state of confusion, they could get emotionally distressed, incur financial losses and be exploited by the apparel industry (Mitchell & Papavassiliou, 1999). A consumer who believes that the manufacturer or retailer is responsible for the fit problem would probably direct negative emotions to the apparel industry. This also has negative consequences for the manufacturer because the consumer would probably engage in negative post-purchase complaint behaviour, such as boycotting the retailer, switching to another brand and even telling friends (Laufer, 2002).

7.5 EVALUATION OF THE STUDY

Evaluation is necessary for the purposes of follow-up and could serve as a guideline for similar future studies. This study is hereby evaluated in terms of the quantitative research style (sample selection, data collection and data analysis), the quality of the data and the achievement of the objectives.

7.5.1 Research strategy

***Phase one*:** Generally speaking, this study was exploratory and descriptive in nature because researching body shape, size and fit issues is new in Kenya. In quantitative research, reliability is exceedingly important, objective facts are measured with the emphasis placed on certain variables. The research has to be value-free, independent of the context and the researcher has to be detached, thus enhancing the objectivity of the study. In this phase of the study, the aim was to identify and describe Kenya's career women's distinctive body shapes from body dimensions and photographs, distinguishing how they differ from the Western distinctive body shapes, and to analyse the fit problems associated with those shapes.

This part of the study focused on the variables contained in the body dimensions form (**Appendix 3A**), and the body assessment scale (**Appendix 3D**), for purposes of identifying and describing a distinctive Kenyan career women's body shape. According to Neumann (2000:126), variables are central to quantitative research; these variables were identified in the literature (anthropometric studies, standards and body shape assessment training manual), and measured by using relative dimensions and indicators presented in the body dimensional form and body shape assessment scales. The quantitative research style ensured that the researcher was objective when analysing the distinctive body shape and distinct body features. The body dimensions, according to the body measurement form, were much more than required for identification of the body shape. It took a long time to obtain accurate measurements – exhausting the participants as well as the measurer. It would be recommended that photographs be taken first as a prerequisite step for the key body dimensions. A thorough scrutiny of the photographs will serve as a guide for the necessary elements required for the study. Expert evaluators could be involved in the decision-making process of identifying and sorting out only the essential key dimensions.

Phase two*:* The second phase of the study employed a quantitative research style, focusing on the variables obtained from the fit problems of apparel, the communication of size and fit, and fit preferences. A structured questionnaire was used to get the broader picture of the respondents' perceived fit problems, their knowledge about the communication of size and fit, as well as their fit preferences for differently fitted apparel items. The questionnaire measured specific dimensions of apparel fit problems, communication of size and fit, as well as fit preferences, as explained in the literature review (**Chapters 2** and **3**), and clearly indicated in a schematic framework (**Figure 3.24**). The questionnaire measured objective aspects, for instance, rating the fit of different apparel categories in Kenya, reporting fit problems experienced at critical fit points of the body, and reporting the meaning of size codes. Questions relating to consumers' knowledge about terms used on size labels, representing different body shapes, and consumers' fit preferences for differently fitted skirts and jackets were asked. This part of the study focused on the variables obtained from apparel's fit problems, the communication of size and fit and fit preferences. According to Neumann (2000:126), variables are central to quantitative research, which were identified in the literature (Ashdown's model (**Figure 2.1**) and the schematic framework (**Figure 3.24**)). These variables were measured by using relative dimensions and indicators and were presented in a language that was more comprehensible to the respondents.

Being an exploratory study, a structured self-administered questionnaire was the best option as respondents could complete it without any outside influence. The researcher and/or research assistant could solve unclear issues arising from the questionnaire. Although the researcher and the assistant were available, some of the questions were left unanswered. The respondents felt that some questions were too long. This method can be time-consuming to initiate, but meaningful information can be acquired from many respondents in a relatively shorter time if the questionnaire is much shorter.

7.5.1.1 Choice of the research sample for the study

Initially, probability-sampling techniques were used for both phases of the study, but due to the sensitive nature of phase one data, non-probability sampling (snowball technique) emerged within the already probability-sampled group (see paragraph 4.5.5).

Phase one: Although it is recommended that the sample size for a quantitative research study should be representative of the entire population (Mouton, 1996:136; Wimmer & Domnick, 2000: 94), non-probability sampling techniques could be used in a preliminary or pilot study. In such instance the results cannot be generalised to a larger population, but should rather be viewed as indicative of the specific group tested (Wimmer & Domnick, 2000:82-83). Although the intended sample size for phase one was 301, 123 and 89 participants were measured and photographed respectively. The smaller number of participants in this study can be attributed to the sensitive nature of obtaining body dimensions and photographs from women who are almost nude. These smaller numbers were reached through persistent negotiations and persuading the participants (see **Chapter 4, paragraph 4.4.5.**). The snowball sampling method applied was considered to be adequate. Non-probability sampling techniques will still be applicable for any follow-up studies of this nature, since taking body measurements and photographs are manually executed and remain sensitive. Given adequate time, skills, funds and the use of body scan technology, it is possible that probability-sampling techniques could be applied with a larger sample. A feasibility study on the acceptance of body scan technology should be carried out while socio-cultural issues of the target market need to be understood and considered (Fiore & Kimle, 1997:86; Marshal *et al.*, 2004:94).

Phase two: The second phase of this study, which involved the use of a questionnaire, had 201 (67% of the initial 301 sample size) respondents. The sample size was selected using probability sampling techniques and hence was thought to be adequate for data analysis.

7.5.1.2 The choice and application of the data collection techniques

Since willing respondents increase the reliability of the study, as observed by Mouton (1996:145), no respondents were forced to take part in the study. A research permit from Kenya's Ministry of Education was shown to the gatekeepers (Head teachers) as well as the participants at every school visited. The researcher further explained the aim and importance of the study to the gatekeepers as well as the participants before commencing the fieldwork. Appropriate ethical measures were taken to ensure that participants' rights were not violated in any manner.

Phase one: Before the research commenced**,** the researcher consulted professional anthropometrists from the Company of Ergonomic Technologies (Ergotech), South Africa, for training in body measuring techniques, particularly in identifying and locating landmarks on the body, and how to take the measurements accurately. The training was based on the standardised anthropometric measuring techniques using appropriate, recommended measuring instruments (Beazley, 1996; ISO, 1990; RMSS, 1994-Ergotech). The researcher completed an Anthropometry Accreditation Course (AAC) – level one (**Appendix 3C**). The course consisted of both theory and practical sessions on landmarking and measuring the human body. The techniques used were based on the International Standards for Anthropometric Assessment (ISAK, 2001). The measurements selected for the study were carefully prepared (after consultation with various professionals in the field of apparel, namely study leaders and Ergotech experts, and consulting relevant literature and different anthropometric standards). Traditional anthropometric measurements have been used in many studies (as stipulated in most sizing standards), ensuring reliability and validity of the studies (Winks, 1997; Beazley, 1998; Simmons & Istook, 2003). The same approach was adopted in this study, strengthening its reliability and validity. Instruments that were used, such as the standing anthropometer, underwent quality testing and were recommended by the anthropometrist.

A specific literature search on anthropometric studies and female body shapes was done. This enabled the researcher to develop a comprehensive body measurement form and body shape assessment scale for the purposes of data collection. As stated earlier, it was difficult to take body dimensions and photographs of career women in minimal clothing. In their reluctance to participate in the study, they cited cultural and religious beliefs as their main concern. Continuous persuasion, negotiations and even the use of incentives were sometimes used to convince participants to participate in the exercise. The body dimensions form, and the policies laid down for the purposes of photographing, were subjected to rigorous scrutiny by both study leaders before the fieldwork commenced. That enhanced the reliability and validity of the study. The body shape assessment scale was also developed based on a thorough literature review and after scrutinising the photographs. It was peer-reviewed by professional experts in the field of apparel design to ensure that evaluations made on the body shapes were valid and reliable.

Before commencement of the fieldwork, the researcher also underwent photography training, which was administered by a professional photographer. To obtain reliable photographs for the purposes of identifying and describing the distinctive body shapes of the Kenyan career women, participants were photographed using standardised methods while dressed in minimal apparel (body suits/leotards), and assuming/taking different positions/views (front, back and side/profile). The use of an assessment scale with well-defined variables (body shapes and distinct features) facilitated proficient judgements on the overall body shape and body units/components that are critical to the fit of apparel (Gazzuolo *et al.*, 1992; Kuma, 1999:39; Anderson *et al.*, 2001; Ashdown, Loker & Adelson, 2004). It was very difficult to keep the participants still in their posture while photographing, which forced the researcher/photographer to operate between focusing the camera and helping the participants to keep them motionless before photographing them. These movements could be reduced with automated photographing, if a studio setting was stationed with all the equipment placed in a booth. The body dimensions obtained and the evaluations made with the use of the body shape assessment scale were seen as relevant and reliable. All the body dimensions that were taken were recorded, while trained professional experts guided by the body shape assessment scale, adequately did the evaluations of the photographs.

***Phase two*:** Theoretical clarity and descriptions of relevant aspects that were identified through the literature search, helped to recognise appropriate measures to facilitate the development of a comprehensive questionnaire covering all concepts of the study. Some questions that had previously been used in related research were adapted in this study. Questions that aimed at measuring consumers' satisfaction with fit had been used by LaBat (1989), Kurt Salmon Associates (1996) and Otieno *et al*. (2005). Measurement of consumers' fit preferences and self-reporting of key body dimensions had been used by Anderson *et al*. (2001) and Alexander *et al*. (2005). The questionnaire's top page had the University of Pretoria's logo (letterhead) and an introductory letter stating the purpose of the research, giving an assurance of anonymity, an appeal to participate in the study and an acknowledgement of participation.

Before the research commenced, the questionnaire had been scrutinised by the researcher's study-leader, the co-study leader, a statistician and the subject specialised lecturers at the Department of Consumer Science, University of Pretoria (peer evaluation). The questionnaire was also pilot-tested on twenty third-year students enrolled for Apparel Management at the University of Pretoria, and while in the field (in Kenya), the questionnaire was further pilot-tested on 10 career women to enhance its quality and reliability. Except for two questions (questions 11 and 22) that were answered poorly, the questions were all relevant. The participants reported that the two questions were too long. The theory (literature) used helped the researcher to understand and describe the emerging distinct body shapes and certain characteristics emerging from the objectives highlighted in the questionnaire.

7.5.1.3 Choice of statistical methods employed

The data was analysed using acknowledged statistical tests that were chosen after examining the body dimensions obtained, the body shape assessment scale and the questionnaire. The number of variables involved the measurement scales that were used, and the nature of relations between variables (Agburu, 2001:85). Statistics were used to investigate whether distributions of categorical variables differed from one another. The statistical analysis of data, a characteristic of quantitative research, was adequate for the study. In some cases, hypotheses were tested, while in others, hypotheses could not be tested due to the fact that there were sparse cells in some categories (**Chapter 4, paragraph 4.6 (Tables 4.3 and 4.4)**). Hypothesis testing was done at the 5% level of significance. The statistical methods used and the boundaries set at the 5% level of significance by specific statistical tests, helped the researcher to determine when the results were statistically significant. The research problem was solved when logical deductions, derived from the theory, were linked to concrete evidence obtained from the results.

Phase one: The selection of appropriate drop values (from the body dimensions) and the statistical methods used for identification of the body shapes were based on a thorough literature review, and hence considered reliable, as they had been applied in other similar studies (Beazley, 1997; Winks, 1997; Gupta & Gagandhar, 2004). The body dimensions were summarised by the use of descriptive statistics, thereby enabling comparison across the variables (Trochim, 2005:212). Range values measured the dispersion of variables, while the mean values measured the central tendencies of variables. The standard deviation used in conjunction with the mean value reflected the degree to which the values in a distribution differed from the mean, thereby facilitating categorisation of variables such as large bust, medium bust and small bust or short, medium and tall (Bryman & Cramer, 1997:85; Bryman & Bell, 2007:359-360). The distinctive curvy rectangular shape emerged from the study as the dominant body shape, as it had the highest representation from the measurements (74%) and photographs (70%).

Assessments from the trained professional evaluators were also subjected to inter-rater reliability tests (Kappa), for the purposes of analysing the strength of agreement between different evaluators. This was to further enhance the reliability of this study (Ashdown & DeLong, 1995; Landis & Koch, 1977). Statistical analysis of the body measurements alongside expert evaluations of the photographs produced almost identical results, which enhanced the triangulation of phase one data, and ensured that the results were reliable.

Phase two: The approach of the study was judged successful because the researcher conducted a thorough literature search on specific concepts of the study that guided the researcher to make logical deductions and develop appropriate measurement scales. The first step was to define the concepts that were to be measured, and then potential scale items were created to determine indicators around the fit of apparel, knowledge about the communication of size and fit, and fit preferences. The questionnaire measurement scales included nominal (yes or no) type questions and categorical (Likert-type) scales that directed the decision to use specific statistical methods. Chi-Square statistics were used to investigate the disparity of categorical variables between two independent groups, such as comparing size and fit knowledge between Home Science professionals and non-professionals. Pearson's correlation coefficient was used to measure the degree or extent of relationship between variables such as consumers' self-reported key body dimensions versus their actual key dimensions.

7.5.2 Quality of the data

7.5.2.1 Quality of phase one data (body dimensions and photographs)

As part of preparation for the research, the researcher consulted a professional anthropometrist, undertook training in anthropometric studies and did a short course in photography. Instruments used for obtaining measurements and techniques recommended by international standards were observed, as discussed in **Chapter 4** (**paragraph 4.5.1.1**). Standardised photographing setting and guiding principles were also observed, as explained in **Chapter 4** (**Paragraph 4.5.1.1 (Figure 4.6**).

The researcher also selected and screened the professional evaluators for the purposes of evaluating the body shapes based on their long-term professional skills and experience, thereby ensuring the trustworthiness of the outcome of the study. A comprehensive training manual and assessment scale were compiled based on an extensive literature search, and a thorough study and scrutinising of field photos. The training manual and assessment scale were tested and subjected to experts' assessment prior to their implementation in this study. Statistical analysis of body measurements alongside expert evaluations of photographs produced almost identical results, thus enhancing the triangulation of phase one data.

7.5.2.2 Quality of phase-two data (Questionnaire)

Validity: In order to ensure that each measurement accurately reflected the concept it intended to measure (measurement validity), the following different types of validity were observed in the questionnaire instrument:

- **Face validity:** The instruments were pre-tested by a group of experts and were also pilot-tested on third-year apparel design students and a small group of career women in Kenya. This was to ensure that the measurement instruments actually measured what they purported to measure. Only instruments purporting to measure fit issues of women's ready-made apparel, the communication of sizing and fit, and fit preferences were used.
- **Content validity:** To ensure content validity, all the concepts presented in the conceptual framework (**Figure 3.24**) were specified in a construct definition. This facilitated the development of indicators (questions and statements) from all the parts of the definitions (relating to the objectives of the study), as recommended by Neumann (2000:142-143) and Babbie and Mouton (2001: 122-123).
- **Criterion validity:** Being the pilot study, there was no standardised criterion known to measure the construct validity accurately, to permit comparison with the measurements for this study. However, some of the questions that had been used successfully in related studies were adapted for this study.
- **Construct validity:** To determine the degree to which instruments used for this study, successfully measured the theoretical construct they were intended to measure, definitions with clearly specified conceptual boundaries were provided (**Figure 3.24** and **Table 4.1**), in order to isolate the convergent validity. Evidence obtained from the results that link to the theory indicates the degree to which the instruments were successful.

Reliability: According to Neumann (2000:164), reliability is an indicator of dependability or consistency. It indicates the likelihood that a given measurement technique will repeatedly yield the same description of a given phenomenon (Mouton, 1996:144). In this study, the following strategies were applied to ensure reliability:

- The questions used in the questionnaire were predominantly closed questions. Some of them had been previously used in related studies.
- The questionnaire was pre-tested by a group of experts and pilot-tested on career women.
- A research permit from Kenya's Ministry of Education was obtained (**Appendix 1C**, while the questionnaire's top page had the University of Pretoria's logo (letterhead)

and an introductory letter stating the purpose of the research.

- Well-established methods of data collection were used and standard statistical coding methods were also applied.
- Hypothesis testing was done at the 5% level of significance.
- A non-probability sampling technique (snowball) was used in this study. It used a smaller sample size, but this technique is acceptable in this case because it is a preliminary study and Kenya's career women were difficult to access due to the sensitive nature of the study (**Chapter 4, paragraph 4.4.2**). The results therefore are indicative of Kenya's career women in the western (Eldoret and Kisumu) and central (Nairobi) regions.

7.5.3 Achievement of the objectives of the study

In order to solve the research problem stated in **Chapter 1**, primary objectives and sub-objectives were set for the study. Each primary objective and concomitant sub-objectives were addressed in the body dimensions form, the body shape assessment scale and the questionnaire used in the study. The results indicate that valuable data related to the primary objectives and sub-objectives was collected. The data enabled the researcher to interpret the results and draw conclusions related to the different objectives. The results, their interpretation and eventually the conclusions drawn also made it possible to make recommendations to the apparel industry as the manufacturers and marketers of ready-made apparel, and to governmental agencies and private consumer-oriented organisations as service providers (consumer rights activists), so as to serve effectively the needs of the career women segment in Kenya.

From the discussion and interpretation of the results, general conclusions and overall conclusions (**Figure 7.3**), it is evident that the researcher successfully achieved the primary objectives and sub-objectives stated. Information that was obtained from the results can contribute to the existing theory on issues around apparel sizing and fit, the relevant research methodology and consumer education theory.

7.6 THE CONTRIBUTIONS OF THE STUDY TO EXISTING THEORY

The value of the quantitative research style used in this study is that it enables the researcher to quantify the data and to link the data to the specific concepts used in the study. The value of research can be increased when the results are meaningfully linked to the concepts of the established theory related to the research. The findings of this study can contribute to theory in the following fields:

- the theory of fit
- Ashdown's sizing systems theory
- the theory of size labels
- research methodology theory
- consumer education theory

7.6.1 The theory of fit

Dissatisfaction with apparel's fit is one of the most frequently stated problems with garment purchases. Women have been reported to be the most dissatisfied consumers (DeLong *et al*., 1993; Otieno *et al*., 2005; Alexander *et al*., 2005). Body shape is a framework for proportioning apparel (Salusso-Deonier, 2005). This study confirms that different markets have different body shapes and unique characteristics that affect the fit of apparel. Therefore, researchers and apparel manufacturers – upon understanding prevalent and unique body characteristics – should develop sizing systems that can address the fit problems of different markets.

Issues of pattern and garment alterations could improve as design values required for different body shapes are developed. It would, for example, enable manufacturers to understand and identify the underlying factors between the standard (hourglass) body shape's hip or buttocks size and the prevalent body shape in any market environment. Also, relating fit models and dress stands to the dominant body shape in a specific market and ensuring that fit tests are carried out, would be a vast improvement.

7.6.2 Ashdown's sizing systems theory

Ashdown (2000) sees sizing systems as the focus around which all the other factors concerning sizing and fit evolve. She has identified the main factors affecting sizing systems and consequently the fit of ready-made apparel to be: the population measurements (body measurements), the design features (construction of the apparel), the fit issues (fit quality management), and the communication of sizing and fit (size labelling). This study has identified specifically body shape as another important component affecting fit. The body shape should stand out as one of the major factors revolving around sizing systems, in the same way that population measurements stand out. It could also feature under population measures, pointing out both the body measurements and body shape as the core components. As mentioned throughout this study, population measurements, as one of the factors highlighted in Ashdown's (2000) model, require that the three-dimensional body (shape) be accurately measured for the purposes of developing size tables and classification of body shapes, which must serve as guides for design, pattern and apparel development. The design features being the second most important aspect in Ashdown's (2000) model involve using the body shape for design, style development and correct distribution of styles to the correct market. The fit, as a third important factor, demands that the body shape characteristics are understood for the purposes of formulating quality assurance strategies, such as identifying fit models representing prevalent shapes in a market, identifying appropriate dress forms for fit testing and draping. Communication of sizing and fit being the fourth component in Ashdown's (2000) model, it demands that the sizes and body shapes communicated should represent the actual measurements and the body shapes.

7.6.3 Theory of size labels

Chun-Yoon and Jasper (1996) and Glock and Kunz (1995) state that a size label is a tool that should not only indicate the dimensions it was sized for, but should also describe the body type that the garment was designed for. This study realised that familiar information on size labels were tacit and less preferred by consumers as a means of size communication. For the female Kenyan apparel consumer, being familiar with something and having knowledge about something are clearly two different things. The implication is that being exposed to information in the consumer socialisation process does not automatically result in an informed consumer with the knowledge that is needed when trying to make informed decisions.

Consumers have a right to clear and understandable information regarding what they are buying, and preferably such information should appear on the product itself. It is therefore not only about who is to be blamed for consumers' lack of knowledge about important sizing and fit issues or their misinterpretation of current labelling systems, but also what the types of size labels are presenting to the consumer. Consumers prefer instructive size labels, but ironically, existing sizing systems are not only non-standardised and vague, but also do not make sense to the consumers. The addition to this theory is to highlight that size labels, whether informative or non-informative, first must be representative of the target market, and secondly, should be understood by the consumers. The apparel industries in any marketplace should focus not only on presenting consumers with information, but on assisting them to understand the information, and providing them with the skills to utilise the information.

7.6.4 Research methodology theory

In this study, body assessments were done through visual sensory evaluations done in five different steps. Sensory evaluation is the assessment using a human's good judgement or the sensitivity of human senses, which implies the evaluation of selected characteristics of a product under controlled conditions by a panel of judges (ASTM, 1981:3; Leibowitz & Post 1982:4; Lyon, Menneer, McEwan, Metheringaham & Lallemand, 2000:1). In this regard, this study has contributed to the existing sensory evaluation theory in that the techniques devised in this study provided an orderly framework to evaluate perceived physical characteristics within different body shapes.

From the raw photographs, it was almost impossible to extract all the details as exhaustively as possible, and therefore the researcher formulated unique methods that eased the process of evaluation. Microsoft Office tools photo editor made it possible to get an edged shape (**Figure 4.10** in **Chapter 4**) from the photo negatives (obtained by right-clicking on an icon in a left-hand corner of the photo). The resulting body shapes and body features had clearer outlines, which permitted more auxiliary scrutiny. The IGRAFX Designer 5 software was used to extract only the pre-determined/-identified and important characteristics from the photos, making the assessment of the photos even clearer.

The body shape identification technique, using both body measurements and assessments of photos, can be viewed as more reliable, as it enhances the triangulation of the study. Anthropometric studies uses standardised methods and instruments, which can sometimes be unavailable due to various reasons. This study used an improvised and quality-tested, standing anthropometer for all the height measurements (**Figures 4.4** and **4.5**). The photographing studio setting (**paragraph 4.6**), and the rules set for the photographing were uniquely designed for this study. Obtaining bust extension and buttocks extension measurements, for example, were exceptional for this study.

7.6.5 Consumer education theory

According to Yeatts *et al*. (1992), in order to use a product effectively, consumers must have knowledge of the products and the intent to use them. Apparel marketers and public agency directors can educate career women in the areas of sizing and fit so that they could select appropriately fitting apparel items. Career women consumers in particular, would have potentially much to gain from well-orchestrated consumer education efforts jointly endorsed by all the concerned parties (apparel marketers, government agencies as well as consumer-oriented organisations). Consumer education programmes can provide significant benefits, including identification of market information, complaint and consumer redress procedures, and understanding a more technology-based consumer environment (Oumlil & Williams, 2000).

It was evident in this study that the career women in the group lacked knowledge about size and fit. Skills in identifying body shapes, size labels' contents as well as key dimensions to identify a size would help consumers to be perceptive about size and fit issues and hence save time spent on apparel selection. Loker *et al*. (2005) observed that participants were able to give accurate dimensions when instructions on how to take body measurements were given as opposed to when instructions were not provided. Consumer education and counselling programmes may also include information about and referral services for wardrobe planning, wardrobe management and strategies for dressing different female body shapes. Advantages of viewing consumer education as part of a competitive strategy has been seen to help retailers obtain and keep satisfied customers, contribute to the favourable attitude formed among consumers toward a product or company, and to help reduce confrontations with consumer advocates.

7.7 GENERAL RECOMMENDATIONS

Although the conclusions made in this study cannot be generalised to a broad population, certain recommendations can be made at this stage to:

- the ready-made apparel marketers (industry) in Kenya and the foreign companies that export their apparel items to Kenya
- government agencies such as the Kenya Bureau of Standards as well as consumer-oriented organisations

7.7.1 The ready-made apparel industry (manufacturers and retailers)

Apparel designers must distinguish how the Kenyan career women's curvy rectangular shape differs from the Western rectangular body shape, and furthermore, how it deviates from the so-called ideal (hourglass) body shape. Understanding the underlying differences in body shape could help designers to translate the distinct body characteristics of the curvy rectangular shape into better-fitting apparel items for the Kenyan career women. Fit models as well as dress forms chosen for fit testing and modelling in the apparel industry, should reflect the characteristics of the prevalent curvy rectangular shape. It could also be recommended that apparel manufacturers adjust their current sizing systems to cater for the Kenyan career women's distinctive curvy rectangular body shape, rather than continue with the production of inappropriate apparel meant for the ideal (hourglass) shape. Although this was a study in Kenya, it may be reasoned that most developing African nations lack a classification of their body shapes and therefore experience challenges with apparel fit. A country such as South Africa with people of diverse cultures also needs to follow the example set out in this study.

It is further recommended that apparel industries in Kenya and other developing nations ensure that their sizing systems are representative of their target populations' sizes and body shapes. This could be updated through collecting anthropometric data from their target markets, or adapting their existing size systems to suit their consumers' sizes and body shapes. They should also ensure that size labels used are in accordance with consumers' preferences and the recommendations by KEBS (2001)/**Appendix 4B**, and Faust *et al*. (2006). Since retailers and manufacturers use size labels for product differentiation, consumers should therefore be educated on what size labels presented on their apparel mean and how the size labels relate to their body dimensions and shapes.

Communication to the consumer through labelling should contain sizing and fit information that is clear, informative and understandable – information that is currently not given through the non-informative, lettered and numbered size codes in use. This means that the consumer should be able to easily identify the size of the garment. It could include size symbols, such as the pictogram, that would quickly communicate to the consumer the key body dimensions that the garment was designed to fit. Secondly, keeping women consumers' lack of knowledge regarding their own key body dimensions in mind, retailers and companies would benefit by also providing their customers with the skills to utilise the information. In addition to understanding the sizing code on the label, apparel consumers should know which body dimensions are used to size a garment, and also how to determine their own body dimensions, in order to make an appropriate size choice. This would call for a creative, but not impossible, joint attempt by retailers and their consumer advisors – an initiative that could not only benefit the apparel consumer, but also the specific company and/or retailer, and ultimately the industry as a whole.

Although this was a case of the Kenyan female apparel consumer's lack of knowledge regarding important sizing and fit issues, concern about female consumers' many problems regarding the fit of their clothes is not restricted to Kenya, while the plea that the apparel industry should at least try to address some of these problems (amongst which, the communication of sizing through informative size labels), is a worldwide phenomenon.

Confusion can affect both consumers' rights and the quality of consumers' decisions. Confused consumers are less able to process information and hence more vulnerable to making less than optimum choices. Therefore, marketers within the apparel sector need to identify the effects associated with confusion, consumer reaction to confusion and how marketing issues could be used to counteract this. Consumers who are knowledgeable about size and fit would therefore be able to select well-fitting apparel and would be able to identify the sources of fit problems, and act accordingly. Therefore, it is recommended that consumer education on size and fit be used as part of apparel industries' promotional strategies to win and retain consumers, while the consumers become equipped with knowledge.

While the apparel industry is expected to produce apparel within the consumers' fit preferences, the consumers on the other hand should be equipped with skills essential for dressing appropriately. It is acknowledged that fit preference is subjective and varies from one person to another. It is also sometimes influenced by internal factors such as personal preferences, expectations and the fashion trend (Alexander *et al.,* 2005). However, the comfort or ease that a person requires in an apparel item depends mainly on that individual's body's physical characteristics (critical fit points). Apparel designers must therefore incorporate consumers' fit preferences within their designs, and that could result in appropriate fashionable styles for the curvy rectangular Kenyan body shape that was identified, or any other prevalent shape identified in any market environment. Since comfort is one of the attributes of fit, fabric stretch characteristics could be incorporated into the consumers' preferred fitted skirts and jackets to provide comfort, while the closer fit required by the consumers could still be maintained.

Since the majority of apparel industries use the hourglass shape for marketing purposes (LaBat & DeLong, 1990; Fiore & Kimle, 1997:30; Alexander & Connell, 2005), it could be recommended that more realistic expectations of the consumers in any market be taken into consideration, by presenting models with the predominant body shape in a full range of the sizes available within the target market.

7.7.2 Government agencies and consumer-oriented organisations

To serve effectively the needs of the career women segment, governmental agencies and private consumer-oriented organisations such as service providers must understand the barriers that prevent the consumers from exercising their rights. Being a pilot study in Kenya, this research project highlights many other areas of potential study. It would be recommended to the Kenyan government (Kenya Bureau of Standards) that a national anthropometric survey be carried out. Alternatively, anthropometric surveys could be carried out on a small-scale basis, covering specific market regions for the purposes of establishing representative sizing systems (size tables as well as body shape categories) applicable to those regions. Kenya's Bureau of Standards needs to adjust their current sizing systems to cater for the curvy rectangular body shape.

The advantages of consumer education as part of a competitive strategy are perceived to help obtain and keep satisfied customers, to contribute to the favourable attitude formed among consumers toward a product or company, and to help reduce confrontations with consumer advocates. Consumer education and counselling programmes that should also include information and referral services need to be developed to equip the consumers with the appropriate knowledge that could help them make informed purchasing decisions.

It has been observed that knowledgeable consumers are adept at forming choice-sets (De Klerk & Tselepis, 2007). Skills in decoding size labels and the key dimensions in order to identify a size would help consumers in selecting apparel with the correct size and fit. Loker *et al*. (2005) observed that participants were able to give accurate dimensions when instructions were given on how to take measurements, as opposed to when instructions were not provided. Through counselling and educating consumers on the meaning of the different size codes, and identifying their key dimensions and own body shapes, consumers would be able to link different size codes to their measurements and shapes, and finally select appropriate apparel styles and sizes.

Consumer education and counselling programmes may also include information and referral services such as wardrobe planning and management strategies that give instructions on appropriate dressing for different body shapes. Issues such as body cathexis/self-esteem could also be incorporated into the education programmes to help the consumers appreciate their shapes/images, and to dress accordingly.

7.8 LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FUTURE STUDIES

It should be noted that there are certain limitations to this research that also provide a basis for further research. Studying apparel's size and fit problems as regards the female body shape is a new phenomenon in Kenya. The most striking limitation of this study was access to the participants. The sensitive nature of measuring and photographing women in minimal clothing demands understanding their culture and beliefs. It also requires sufficient financial means to give the participants incentives, a longer time for negotiations (persuasion) and a more versatile studio setting. However, if sensitising programmes were administered ahead of time and alongside with the use of modern and efficient technology, more participants would likely participate.

The results on the distinctive body shape (phase one) were based on only 123 measured and 89 photographed career women of only two regions of Kenya. It is suggested that similar research be conducted on a larger sample, and perhaps using modern technology such as body scanners. The results on the questionnaire (phase two) were only based on the opinions of the high school female teachers within two regions of Kenya, assumed to represent career women in Kenya. Again, it is suggested that similar research be conducted in all the regions and with a more representative sample.

Finally, the aim of this study was to identify the distinctive female body shape of Kenyan career women and to analyse apparel's fit problems associated with it. It was also to assess career women's perceptions regarding general fit problems with the ready-made apparel, explore their knowledge about the communication of size and fit and to determine their fit preferences for differently fitted apparel. These factors were used to establish how they could contribute to fit problems of the ready-made apparel in Kenya. In spite of the limitations mentioned, and possibilities for improvement of the methodology, the results of this study should be used as a pilot study to improve the size and fit of apparel in Kenya as well as other developing African countries.

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Appendix 1A

QUESTIONNAIRE

University of Pretoria
Pretoria 0002 Republic of South Africa
http://www.up.ac.za
Natural and Agricultural Sciences

Official use only

REGION [ ] V1 [ ] 1

Respondent number [ ] [ ][ ][ ] 2-4

Dear participants,

My name is Anne Mastamet Mason from Moi University Eldoret and currently undertaking PhD studies at University of Pretoria, Republic of South Africa. As part of my studies, I'm required to carry out research on a specific field. My research topic is to examine problems encountered by professional females with regards to size and fit of both local and imported ready-made apparel, which are sold in Kenya. Findings of this study are hoped, to be used in address sizing and fit issues of the ready made garments in Kenya.

I therefore request you to fill in the questionnaire as freely and honestly, as possible. There are no right or wrong answers for all the questions provided. All answers that you provide will be treated as confidential without exposing anyone's names. Thank you for your participation.

Please answer the questions provided by marking "X" against appropriate answers

1. Please indicate the year of your birth 19__________________ V3 [ ][ ] 5-6

2. Have you ever done Home Science or Clothing and Textiles course, either in high school or as a profession? Please mark with an "X"

		X
1	Yes	
2	No	

V4 [ ] 7

3. How would you rate the following **garments' fit**? <u>Please mark your opinion with an "X"</u>

	1 Excellent	2 Good	3 Fair	4 Poor	5 Undecided			
Ready-made local outer wear garments						V5		8
Ready-made imported outer wear garments						V6		9
Custom-made garments (Fundi)						V7		10
Second-hand garments						V8		11

4. <u>Please mark with an "X"</u> how you would rate **the fit** of the outerwear garments sold in the following retail stores.

	1 Excellent	2 Good	3 Fair	4 Poor	5 Undecided			
Supermarkets like Naku-matt and Uchumi (Y-fashions)						V9		12
Boutiques						V10		13
Market stalls like Kenyatta and Nyayo markets						V11		14
Trade fairs like sunbeam						V12		15
Factory outlet stores (Whole sellers)						V13		16
Second hand clothing stores						V14		17
Chain stores like Woolworths and Truworths						V15		18

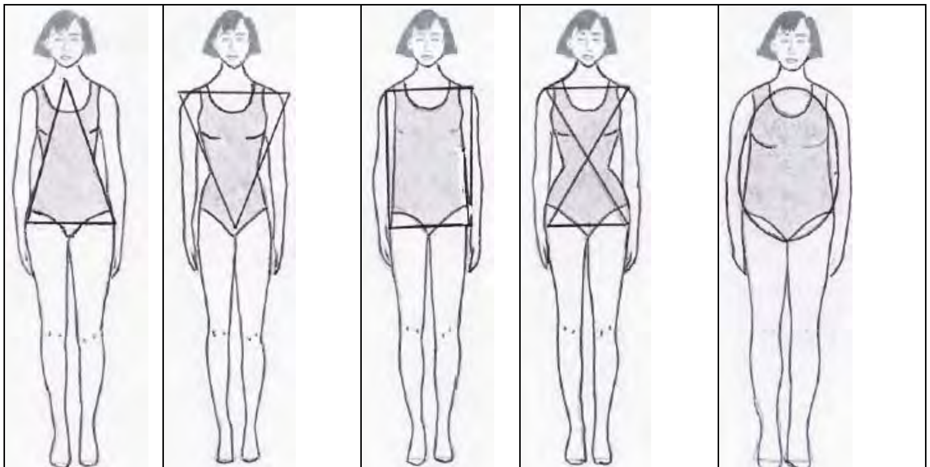
5. The following terms in column 1 sometimes appear on garment's labels. <u>Please mark those that you are familiar with, with an "X"</u> in column 2 and give the meaning of those that you are familiar with in column 3.

COLUMN 1	COLUMN 2		COLUMN 3								
Terms that appear on garment's labels	X (R=1, W=2)		Meaning of the terms								
Junior	1		2		V16		19	V17		20
Misses	3		4		V18		21	V19		22
Misses-Petites	5		6		V20		23	V21		24
Women's	7		8		V22		25	V23		26
Women's-Petites	9		10		V24		27	V25		28
None of the above is familiar	11							V26		29

6. <u>Please indicate your measurements</u> of the following body parts. (To be coded in cm)

Bust		V27				30-32
Waist		V28				33-35
Hip		V29				36-38

7. Examine the given figure types, and then <u>mark "X" in the boxes below</u>, against a figure type that approximately describes **your own** figure.



1	2	3	4	5			
					V30		39

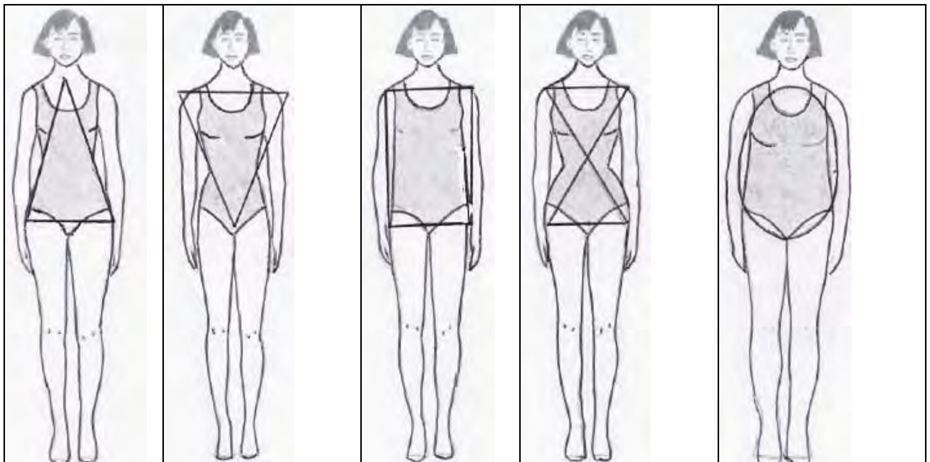
8. Please name the five figure types provided in **question 7** above, using <u>not more than three words</u>.

	Naming of the figure types (R=1, W=2)			
Figure 1		V31		40
Figure 2		V32		41
Figure 3		V33		42
Figure 4		V34		43
Figure 5		V35		44

9. Which of the following factors have you applied, to establish your figure type? You may choose more than one. <u>Please indicate with an "X"</u>

	X (1)			
Having my figure traced while standing against the wall for analysis		V36		45
Studying my figure in a mirror's reflection whenever I have minimal clothing on		V37		46
Having my body measurements taken frequently		V38		47
Scrutinizing my photographs which, I have taken in closely fitted garments		V39		48
Comparing my shape with those of the established figures		V40		49
Using yard stick to compare my shoulders & hips, determining direction the yardstick assumes		V41		50
None of the above applies		V42		51
Other, specify		V43		52-53

10. Which of the figure types shown below, do you consider as an ideal figure in your own opinion? <u>Please mark with an "X"</u> in the boxes provided below each figure type.



1	2	3	4	5

V44 54

11. How do your proportions compare to your **chosen ideal figure**? <u>Please mark "X"</u> against each of the following body characteristics which would best describe your own body proportions in comparison to those of your chosen ideal figure.

SHOULDERS		X
1	Narrow (smaller)	
2	Broader (wider)	
3	Similar	

V45 55

WAIST		X
1	Small	
2	Large	
3	Similar	

V46 56

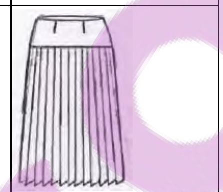
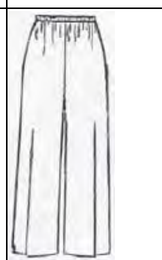
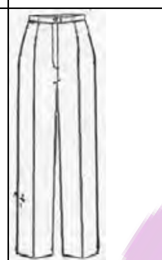
BUST		X
4	Extra small	
1	Small	
2	Large	
5	Extra large	
3	Similar	

V47 57

HIP SIZE		X
4	Extra narrow	
1	Narrow	
2	Wide	
5	Extra wide	
3	Similar	

V48 58

12. Please choose **one style** from each of the following categories (jackets, skirts and pants), which you think is suitable for your **figure type**. Please mark with an "X" in the boxes below each style

Jackets						
	1	2	3	4	5	V49 [ ] 59
Skirts						
	1	2	3	4	5	V50 [ ] 60
Pants						
	1	2	3	4	5	V51 [ ] 61

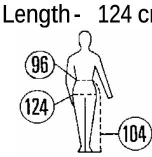
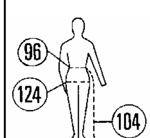
13. Please indicate with an "X" your usual size in the following garment items. (To be coded in actual sizes)

	SIZES										
	8	10	12	14	16	18	20	22	24	Other, specify	
Jacket/blouse											V52 [ ][ ] 62-63
Skirt											V53 [ ][ ] 64-65
Trousers											V54 [ ][ ] 66-67
Dress											V55 [ ][ ] 68-69

14. Please indicate with an "X" your usual size in the following garment items. (To be coded in actual sizes)

	SIZES										
	32	34	36	38	40	42	44	46	48	Other, specify	
Jacket/blouse											V56 [ ][ ] 70-71
Skirt											V57 [ ][ ] 72-73
Trousers											V58 [ ][ ] 74-75
Dress											V59 [ ][ ] 76-77

15. The following size description systems (labels) sometimes appear on women's outerwear garments. <u>Please mark "X"</u> against those size description systems (labels) that are **commonly used** on outerwear ready-made apparel

		X (1)	
Letter coded labels such as, small (S), medium (M), large (L) Example	XL		V60 ☐ 78
Numbered coded labels such as, 14, 16, 18, 20, 22, 24, ____ Example	16		V61 ☐ 79
Numbered coded labels such as, 36, 38, 40, 42, 44, 46, 48, 50, ____ Example	42		V62 ☐ 80
Size code and important measurements Example	<u>Size code-14</u> Bust 92 cm Hip 97 cm Length 96 cm		V63 ☐ 81
Illustrated figure, size code and measurements of some important body parts of a specific garment Example	<u>Size 24</u> Waist - 96 cm Hips - 124 cm Length - 124 cm  		V64 ☐ 82
Illustrated figure, size code and measurements indicated on the figure Example	<u>Size 24</u>  		V65 ☐ 83

16. Please mark "X" on column 3, against only one appropriate measurement, presented in column 2, which are used to determine size description systems given in column 1.

Column 1 (Size description systems)		Column 2 (Meaning)(Right = 1, Wrong = 2)		Column 3 (X)	
Size 16 on a jacket	16	Shoulder measurements	2		
		Bust measurements	1		V66 __ 84
Size 16 on a pair of trousers	16	Waist measurements	2		
		Hip measurements	1		V67 __ 85
Size 42 on a jacket	42	Shoulder measurements	2		
		Bust measurements	1		V68 __ 86
Size 42 on a pair of trousers	42	Length measurements	2		
		Hip measurements	1		V69 __ 87
Extra large size on a blouse	XL	Bust measurements	2		
		The size of the body	1		V70 __ 88
Extra large size on a pair of trousers	XL	Hip measurements	2		
		The size of the body	1		V71 __ 89

17. Please mark "X" on column 3, against only one appropriate answer in column 2, for the questions given in column 1.

Column 1	Column 2 Right = 1, Wrong = 2)		Column 3 (X)	
What does a number 16 on a Jacket indicate?	16 inches (41 cm) shoulders	2		
	40 inches (102 cm) bust	1		V72 __ 90
What does a number 16 on a Skirt indicate?	26 inches (66 cm) waist	2		
	44 inches (112 cm) hips	1		V73 __ 91
What does a number 42 on a Jacket indicate?	18 inches (46 cm) shoulders	2		
	40 inches (102 cm) bust	1		V74 __ 92
What dos a number 42 on a Skirt indicate?	42 inches (107 cm) waist	2		
	44 inches (112 cm) hips	1		V75 __ 93

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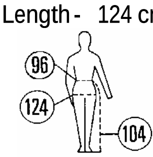
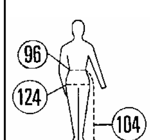
18. How would you rate the following size description systems' effectiveness in terms of guiding you to select well-fitting outerwear garments? Please mark your answer with an "X".

		1 Extremely effective	2 Effective	3 Ineffective	4 Extremely ineffective	5 Undecided		
Letter coded labels such as, small (S), medium (M), large (L) Example	XL						V76	94
Numbered coded labels such as, 14, 16, 18, 20, 22, 24, ____ Example	16						V77	95
Numbered coded labels such as, 36, 38, 40, 42, 44, 46, 48, 50, ____ Example	42						V78	96
Size code and important measurements Example	Size code-14 Bust 92 cm Hip 97 cm Length 96 cm						V79	97
Illustrated figure, size code and measurements of some important body parts of a specific garment Example	Size 24 Waist - 96 cm Hips - 124 cm Length - 124 cm 						V80	98
Illustrated figure, size code and measurements indicated on the figure Example	Size 24 						V81	99

19. Please rate the following statements regarding your **preference** on differently fitted garment items. Please mark your answer with an "X".

	More often	Often	Sometimes	Never	Undecided			
JACKET								
I prefer to wear a fitted jacket to work						V82		100
I prefer to wear a semi fitted jacket to work						V83		101
I prefer to wear a loose fitting jacket to work						V84		102
SKIRT								
I prefer to wear a fitted skirt to work						V85		103
I prefer to wear a semi fitted skirt to work						V86		104
I prefer to wear a loose fitting skirt to work						V87		105

20. Please respond to the following statements in relation to fit problems common with ready-made garments. Please mark with an "X".

	Strongly Agree	Agree	Disagree	Strongly Disagree	Undecided			
I never find well fitting garments, because my body in proportionally unbalanced (some parts are too small and others are to big e.g. my hips are too big for my waistline.						V88		106
I never find well fitting garments because the sizes available in the market has problems (e.g. none fit both my waist and my hips comfortably without adjustments like elastic in waistline)						V89		107

21. Please indicate with an "X", how frequently you experience the following **fitting problems** with ready-made garments.

	Most Frequent	Frequent	Less Frequent	Never	Undecided			
I have problems purchasing outer-wear garments that fit my figure/size type well						V90		108
I am satisfied with the way most of my garments fit my figure/size type						V91		109
The latest fashions are available in my size						V92		110

22. Please mark "X" in column 3, against only one fit problem in column 2, which you commonly experience with the ready-made garments at specific locations, presented in column 1.

COLUMN 1 (Garment locations)	COLUMN 2 (Fit problems) (R=1, W=2)		COLUMN 3 (X)		
Neckline	Too tight	1			
	Too loose	2		V93	111
Shoulders	Too tight	1			
	Too lose	2		V94	112
Back width (Shoulder blades)	Too tight	1			
	Too loose	2		V95	113
Bust	Too tight	1			
	Too loose	2		V96	114
Nape to waist	Too short	1			
	Too long	2		V97	115
Front neck to waist	Too short	1			
	Too long	2		V98	116
Armscye (Armhole)	Too tight	1			
	Too loose	2		V99	117
Upper arms	Too tight	1			
	Too loose	2		V100	118
Elbow	Too tight	1			
	Too loose	2		V101	119
Lower arm	Too tight	1			
	Too loose	2		V102	120
Sleeve length	Too short	1			
	Too long	2		V103	121
Waist	Too tight	1			
	Too loose	2		V104	122
Abdomen	Too tight	1			
	Too loose	2		V105	123
Hip	Too tight	1			
	Too loose	2		V106	124
Crotch line	Too short (tight)	1			
	Too loose (long)	2		V107	125
Buttock	Too tight	1			
	Too loose	2		V108	126
Thigh	Too tight	1			
	Too loose	2		V109	127
Skirt length	Too short	1			
	Too long	2		V110	128
Trousers length	Too short	1			
	Too long	2		V111	129

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Appendix 1B

INTRODUCTORY LETTER TO THE MINISTER OF EDUCATION

MOI UNIVERSITY
CHIEF ACADEMIC OFFICER

Tel: (053) 43001-8
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Email: caco@mu.ac.ke

P.O. Box 3900
Eldoret
KENYA

14th September

Dear Sir/Madam

TO WHOM IT MAY CONCERN

This is to confirm that Anne Mastamet Mason is a Moi University member of staff. She is currently undertaking PhD. Studies in university of Pretoria – Republic of South Africa. She has come back to Kenya shortly to carry out research as part of her studies.

Please accord her necessary assistance to enable her collect data for her thesis.

DR. J. M. BOIT
For: CHIEF ACADEMIC OFFICER

Appendix 1C

RESEARCH PERMIT FROM KENYA'S MINISTRY OF EDUCATION

CONDITIONS

1. You must report to the District Commissioner and the District Education Officer of the area before embarking on your research. Failure to do that may lead to the cancellation of your permit.
2. Government Officers will not be interviewed without prior appointment.
3. No questionnaire will be used unless it has been approved.
4. Excavation, filming and collection of biological specimens are subject to further permission from the relevant Government Ministries.
5. You are required to submit at least two (2)/four(4) bound copies of your final report for Kenyans and non-Kenyans respectively.
6. The Government of Kenya reserves the right to modify the conditions of this permit including its cancellation without notice.

GPK 6055—3m—10/2003

REPUBLIC OF KENYA

RESEARCH CLEARANCE PERMIT

(CONDITIONS—*see* back page)

PAGE 2

THIS IS TO CERTIFY THAT:
Prof./Dr./Mr./Mrs./Miss ANNE MASTAMET MASON

of (Address) MOI UNIVERSITY
P.O. BOX 3900, ELDORET

has been permitted to conduct research in
KISUMU Location,
NAIROBI, UASHIN GISHU District,
NYANZA, NAIROBI, R/VALLEY Province,
on the topic FEMALE BODY FORMS IN RELATION TO THE FIT OF READY MADE APPAREL IN KENYA

for a period ending 31st December, 20 05

PAGE 3

Research Permit No. MOEST 13/001/35C 49
Date of issue 30th September, 2005
Fee received Shs. 1000

Applicant's Signature

M. O. ONDIEKI
FOR: PERMANENT SECRETARY
MINISTRY OF EDUCATION SCIENCE AND TECHNOLOGY
Permanent Secretary
Ministry of Education
Science and Technology

MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY

Telegrams: EDUCATION", Nairobi

Fax No.
Telephone: 318581
When replying please quote

REPUBLIC OF KENYA

JOGOO HOUSE
HARAMBEE AVENUE
P. O. Box 30040
NAIROBI
KENYA

MOEST 13/001/354 497/2

30th September, 2005

Anne Mastamet Mason
Moi University
P.O. BOX 3900
ELDORET

Dear Madam

RE: RESEARCH AUTHORIZATION

Following your application for authority to conduct research on "Female body forms in relation to the fit of ready made apparel in Kenya".
This is to inform you that you have been authorized to carry out research in Kisumu, Nairobi, and Uashin Gishu Districts for a period ending 31st December, 2005.

You are advised to report to the Provincial Commissioner, the Provincial Director of Education Nairobi , the District Commissioners, and the District Education Officers Uashin Gishu and Kisumu Districts before commencing your study.

On completion of your research project, you are expected to submit two copies of your research report to this Office.

Yours faithfully

M. O. ONDIEKI
FOR: PERMANENT SECRETARY

Appendix 1D

RESEARCH PERMIT FROM ELDORET MINISTRY OF EDUCATION REGIONAL OFFICE

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

Telegrams: "EDUCATION", Eldoret
Telephone: Eldoret 61842
Fax: Eldoret 053-61842
When replying please quote
Ref. No. UG/ADM/ED/CERT/3/V.2/160
and date

DISTRICT EDUCATION OFFICER
UASIN GISHU DISTRICT
P.O. Box 371-30100
ELDORET

17th October, 20.05.

The Principal
Moi Girls High School
Chebisaas High SChool
Kapsoya Secondary School
Wareng Secondary School
Uasin Gishu High School
Hill School
Umoja Secondary School
Cheplaskei Secondary School
Kapsaos Secondary School
G.K. Magereza Secondary School

RE: PERMISSION TO CONDUCT RESEARCH : ANNE MASTAMET MASON

The above named student is currently pursuing a Doctorate degree (PHD) on " Female body forms in relation to the fit of ready made apparel in Kenya" at University of Pretoria in collaboration with Moi University. She wishes to carry out the research on the specific areas as shown above.

The purpose of this letter is to request you to allow her carry out the research in your Institution.

Kindly accord her all the necessary assistance.

J.K. CHEMUREN
FOR: DISTRICT EDUCATION OFFICER
UASIN GISHU.

Appendix 1e

RESEARCH PERMIT FROM KISUMU MINISTRY OF EDUCATION REGIONAL OFFICE

MINISTRY OF EDUCATION SCIENCE AND TECHNOLOGY

Telegrams:..
Telephone: Kisumu (057) 43409
When replying please quote

DISTRICT EDUCATION OFFICE
P.O. BOX 1914
KISUMU

REPUBLIC OF KENYA

REF:KSM/MISC/29/1/(26)

25th October, 2005

The Principals:
St.Teresas Girls Secondary School
Kisumu Day Secondary School
Kisumu Boys High School
Joyland Special Secondary School
Joel Omino Mixed Secondary School
Xaverian Secondary School

RE: ANNE MASTAMET MASON
RESEARCH AUTHORISATION

With reference to the Permanent Secretary's MOEST letter, Ref. MOEST 13/001/354/497/2 dated 30th September, 2005 refers.

The above named who is a lecturer at Moi University have been authorized to carry out research in your institution(s) on "Female body forms in relation to fit of ready made apparel in Kenya".

Please accord her the necessary assistance.

MAHMOUD K. ESIMGABANAH
For: DISTRICT EDUCATION OFFICER
KISUMU DISTRICT.

c.c. The Provincial Director of Education
Nyanza Province
P.O. Box 575
KISUMU.

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Appendix 2A

ORIGINAL SAMPLE PLAN

Region 1- Western (Eldoret and Kisumu) = 302						Region 2 (Nairobi) = 346 Start school 15, every 3rd school		
Eldoret: start school 5, every 3rd school			Kisumu: Start school 9, every 3rd school					
School	F total	Sample	School	F total	Sample	School	F total	Sample
1			1	24	12	1	40	20 odd/even flip a coin
2			2			2		
3			3			3		
4			4	24	12	4	26	13 odd/even flip a coin
5*	24	12	5			5		
6			6			6		
7			7			7	36	13 every third starting with 15
8	28	14	8			8		
9			9*	28	14	9		
10			10			10	42	14 every third starting with 4
11	26	13	11			11		
12			12	28	14	12		
13			13			13	30	10 every third starting with 6
14	26	13	14			14		
15			15	23	11	15*	26	13 odd/even flip a coin
16			16			16		
17	24	12	17			17		
18			18	27	13	18	23	11 odd/even flip a coin
19			19			19		
20	20	10	20			20		
21			Totals	154	76	21	28	14 odd/even flip a coin
Totals	148	74				22		
Western =302, 150 in every 2. Odd or even numbers on female staff list-flip a coin to determine which to choose.						23		
						24	26	13 odd/even flip a coin
						25		
						26		
						27	22	11 odd/even flip a coin
						28		
						29		
						30	24	8 every third starting with 8
						31		
						32		
						33	23	11 odd/even flip a coin
						34		
						35		
						Total	151	

Appendix 2B

LIST OF SCHOOLS AT GRASS ROOT LEVEL

NEW LIST OF SCHOOLS: REGION 1,WESTERN-ELDORET		
	SCHOOL	NUMBER OF FEMALE TEACHERS
1	Chebisaas High School	25
2	Moi Girls High School	35
3	Hill School	25
4	Kapsoya Secondary School	18
5	Wareng Secondary School	23
6	Sixty-Four Secondary School	24
7	Uasin Gishu High School	28
8	Umoja Secondary School	20
9	Cheplaskei Secondary School	20
10	Kapsaos Secondary School	18
11	G. K Magereza Secondary School	24
	Total	260
NEW LIST OF SCHOOLS: REGION 1,WESTERN-KISUMU		
	SCHOOL	NUMBER OF FEMALE TEACHERS
1	Bar Union Secondary School	24
2	Xaverian Secondary School	18
3	Dago Thim Mixed Secondary School	24
4	Kisumu Day Secondary School	25
5	Dr Aloo Gumbi Mixed Secondary School	28
6	Joel Omino Mixed Secondary School	26
7	Kisumu Girls Secondary School	30
8	Joyland Special Secondary School	23
9	Nyamasaria Mixed Secondary School	24
10	Kisumu Boys Secondary School	28
11	Obwolo Mixed Secondary School	26
12	St Theresa's Kibuye Girls Secondary School	27
13	Ogada Mixed Secondary school	27
	Total	330

NEW LIST OF SCHOOLS: REGION 2, CENTRAL-NAIROBI		
	SCHOOL	NUMBER OF FEMALE TEACHERS
1	Kenya High Girls School	32
2	Upper Hill Secondary School	25
3	State House Girls High School	27
4	Ngara Girls High School	24
5	Nairobi Boys High School	23
6	Pumwani Secondary School	18
7	Moi Nairobi Girls High School	30
8	Pangani Girls High School	28
9	Precious Blood Girls High School	27
10	Huruma Girls Secondary	26
11	Jamhuri High school	10
12	Ofafa Jericho Secondary School	16
13	Embakasi Secondary School	22
14	Buruburu Girls Secondary School	10
15	St Georges Girls Secondary School	30
16	Aquinas Secondary School	25
17	Alliance Boys High School	20
18	Alliance Girls High School	32
19	St Theresa's Boys Secondary School	24
20	St Theresa's girls Secondary School	16
21	Lenana Boys High School	26
22	Dagoretti High School	23
23	Moi Forces Academy School	28
24	Starehe Boys High School	21
	Total	563

Appendix 2C

SAMPLING PLAN WHILE AT GRASS ROOT LEVEL, RESPONSES TO THE QUESTIONNAIRE AND PARTICIPATION IN THE MEASUREMENT AND PHOTOGRAPHIC EXERCISE

REGION 1 – ELDORET						
List of the Schools	Number of female teachers in all the schools	Number of female teachers from the sampled schools	Distributed questionnaires	Filled /received questionnaire	Photographs	Measurements
1	25					
2* 5	35	35	18	12	7	9
3	25					
4	18					
5** starting point) 1	23	23	12	11	6	8
6	24					
7* 2	28	28	14	8	4	7
8	20					
9* 3	20	20	10	7	4	5
10	18					
11* 4	24	24	12	8	4	5
Total	260	130	66	46 (69.7%- responses)	25 (37.9%- participants)	34 (51.5%- participants

REGION 1 – KISUMU						
List of the Schools	Number of female teachers in all the schools	Number of female teachers in sampled schools	Distributed questionnaires	Filled questionnaires	Photographs	Measurements
1	24					
2**(starting point) 1	18	18	10	6	3	5
3	24					
4* 2	25	25	15	9	6	9
5	28					
6* 3	26	26	16	9	2	7
7	30					
8* 4	23	23	13	7	5	6
9	24					
10* 5	28	28	17	8	4	8
11	26					
12* 6	27	27	16	8	5	7
13	27					
Total	330	147	87	47 (54%- responses)	25 (28.7% participants)	42 (48.3% participants)

REGION 2 – NAIROBI						
List of the Schools	Number of female teachers in all the schools	Number of female teachers in sampled schools	Distributed questionnaires	Filled questionnaires	Photographs	Measurements
1	32					
2*6	25	25	14	9	4	5
3	27					
4* 7	24	24	13	8	3	4
5	23					
6* 8	18	18	11	8	0	3
7	30					
8* 9	28	28	17	11	4	5
9	27					
10* 10	26	26	15	11	5	4
11	10					
12* 11	16	16	9	7	4	4
13	22					
14* 12	10	10	6	6	0	0
15	30					
16** starting point 1	25	25	14	10	4	4
17	20					
18* 2	32	32	18	13	4	4
19	24					
20 * 3	16	16	9	7	3	5
21	26					
22* 4	23	23	13	9	3	4
23	28					
24* 5	21	21	11	9	5	5
	563	264	150	108 (72%-response	39 (26% -participa	47 (31%-participa

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Appendix 3A

BODY MEASUREMENT FORM

OFFICIAL USE ONLY

REGION		V1	1
SUBJECT NUMBER		V2	2-4

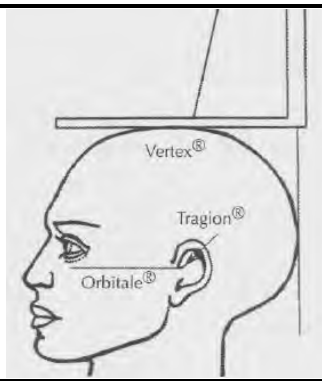
	MEASUREMENTS TO BE RECORDED N CENTIMETRES	CM		
	A. VERTICAL MEASUREMENTS			
1	Height (Stature)		V3	3-7
2	Nape to ground (Cervical height standing)		V4	8-10
3	Shoulder (acromion) to ground		V5	11-13
4	Chest girth level to ground		V6	14-16
5	Bust level to ground		V7	17-19
6	Under bust level to ground		V8	20-22
7	Natural waist to ground		V9	23-25
8	Lower waist to ground		V10	26-28
9	Upper hip to ground		V11	29-31
10	Hip to ground		V12	32-34
11	Largest thigh level to ground		V13	35-37
12	Inside leg to ground		V14	38-40
13	Knee height (midpatella)		V15	41-43
14	Largest (widest) calf level to ground		V16	44-46
15	Nape to natural waist the back		V17	47-49
16	Scye depth (front)		V18	50-52
17	Scye depth (back)		V19	53-55
18	Nape to bust point at the front		V20	56-58
19	Nape to natural waist at the front through bust point		V21	59-61
20	Crutch length		V22	62-64
21	Body rise		V23	65-67
22	Centre back waist (natural) to hip		V24	68-70
23	Under arm land mark (side seam) to the waist		V25	71-73
24	Under arm land mark (side seam) to the floor		V26	74-76
25	Outside leg from the waist to hip on the side seam		V27	77-79
26	Outside leg from the waist to knee on the side seam		V28	80-82
27	Outside leg from the waist to ankle on the side seaam		V29	83-85
28	Outside leg from the waist to the floor on the side seam		V30	86-88

MEASUREMENTS TO BE RECORDED N CENTIMETRES		CM					
B. GIRTH AND ARC MEASUREMENTS							
29	Neck base girth		V31				89-91
30	Armscye circumference		V32				92-94
31	Upper arm girth at the largest part		V33				95-97
32	Wrist girth		V34				98-100
33	Back chest arc (from right to the left side seams)		V35				101-103
34	Front chest arc (from right side to the left side seams)		V36				104-106
35	Upper chest girth		V37				107-109
36	Back bust level arc (from right to the left side seams)		V38				110-112
37	front bust level arc (from right to the left side seams)		V39				113-115
38	Bust girth at fullest part		V40				116-118
39	Back under bust arc (from right to the left side seams)		V41				119-121
40	Front under bust arc (from right to the left side seams)		V42				122-124
41	Under bust girth		V43				125-127
42	Back natural waist arc (from right to the left side seams)		V44				128-130
43	Front natural waist arc (from right to the left side seams		V45				131-133
44	Natural waist girth		V46				134-136
45	Back lower waist (omphalion) arc (from right to the left side seams)		V47				137-139
46	Front lower waist (omphalion) arc (from right to the left side seams)		V48				140-142
47	Lower waist (omphalion) girth		V49				143-145
48	Back upper hip level arc (from right side seam to left side seam)		V50				146-148
49	Front upper hip level arc (from right side seam to left side seam)		V51				149-151
50	Upper hip girth at 10cm below natural waist		V52				152-154
51	Back upper hip level arc (from right to the left side seams)		V53				155-157
52	Front upper hip level arc (from right to the left side seams)		V54				158-160
53	Hip grith (normal)		V55				161-163
54	Hip girth (broadest point)		V56				164-166
55	Upper thigh girth at the widest part		V57				167-169
56	Knee girth		V58				170-172
57	Calf girth		V59				173-175
58	Ankle girth		V60				176-178

MEASUREMENTS TO BE RECORDED N CENTIMETRES		CM					
C. WIDTH AND LENGHT MEASUREMENTS							
59	Across back shoulders		V61				179-182
60	Back width (cross back at mid way between nape and scye level)		V62				183-184
61	Shoulder length		V63				185-187
62	Across front shoulders (from right to left acromions)		V64				188-200
63	Cross chest at the front at mid way between neck base and scye level		V65				201-203
64	Width of bust prominence (from right to the left bust tips)		V66				204-206
65	Side seam to the bust point taken from the side (bust extension)		V67				207-209
66	Side seam to the hip prominence measured from the side (Waist to flat back ground surface measured at 90 degrees from the background) (buttock extension)		V68				210-212
67	Nape to wrist (7th cervical to wrist)		V69				213-215
68	Inside arm length (under arm to the wrist)		V70				216-218
69	Shoulder (acromion to wrist)		V71				219-221
70	Shoulder slope		V72				222-224

Appendix 3B

RULES OBSERVED WHILE TAKING BODY DIMENSIONS



The subjects must stand erect with the head in Frankfort plane

A. HEIGHT AND VERTICAL MEASUREMENTS				
	Type of measurement	Instruments (equipment and tools to be used)	Method of taking measurements (Technique)	Reference
1	Height (stature)	Improvised anthropometer and Stature metre interchangeably	The measurement was taken on the vertical distance from a standing surface to the top of the head. The subjects stood erect with the head in Frankfort plane. The heels were together with the weight distributed equally on both feet	RMSS, 1994; Beazley, 1996
2	Nape to ground (Cervical height standing)	Improvised anthropometer	The measurement was taken on vertical distance from a standing surface to the 7th cervical landmark. The subjects stood erect with the heads in Frankfort plane measured from the back of the subject.	RMSS, 1994; Beazley, 1996
3	Shoulder to ground	Improvised anthropometer	The measurement was taken on vertical distance between a standing surface and the cervical landmark (acromion) on the spine at the base of the neck. The subjects stood erect with the heads in the Frankfort plane measured from the back of the subjects	Beazley, 1996
4	Natural waist to ground	Elastic on the natural waist indentation, the adjustable metal tape and	The measurement was taken on vertical distance between a standing surface and the landmark on the natural waist. The subjects stood erect with heads in the Frankfort plane measured from the back of the subject.	Beazley, 1996
5	Hip to ground (Trochanterion height)	Improvised anthropometer	The measurement was taken on vertical distance between a standing surface and the right thigh. The subjects stood erect looking straight ahead. The heels were together with weight distributed equally on both feet.	RMSS, 1994
6	Inside leg to ground	Improvised anthropometer	The measurement was taken when the subject was in a relaxed position with legs slightly apart. Then measurements were taken from the crotch to the soles of the feet.	ASTM-D 5219, 1994
7	Knee height (Midpatella)	Improvised arnthropometer	The measurement was taken on vertical distance between a standing surface and midpatella landmark at the centre of the right knee. The subjects stood erect with the heels together and the weight distributed equally on both feet	RMSS, 1994).
8	Nape to natural waist (Cervical to natural waist at the back)	Metal tape measure	The measurement was taken on distance from the 7th cervical vertebra, the tape measure was placed vertically down the back to the waist at the natural indentation level while the subjects stood erect	RMSS, 1994; Beazley, 1996.

A. HEIGHT AND VERTICAL MEASUREMENTS				
	Type of measurement	Instruments (equipment and tools to be used)	Method of taking measurements (Technique)	Reference
9	Scye depth (Nape to armcye level	Elastic through the right and under arms positions and parallel to the floor. Improvised anthropometer	The measurement was taken from the 7th cervical vertebra, vertically down through the centre back line to the elastic on chest line.	ISO 8559, 1989; RMSS, 1994; Beazley, 1996
10	Nape to bust point (Cervical to breast point	Metal tape measure	The measurement was taken from 7th cervical vertebra round the base of the neck to the nipples	ASTM-D5219, 1994; RMSS, 1994
11	Nape to natural waist (Cervical to natural waist-anterior	Metal tape measure	The measurement was taken from 7th cervical vertebra round the base of the neck to the natural waist at the front while the subjects stood erect.	ASTM-D5219, 1994; RMSS, 1994
12	Crutch length	Metal tape measure	The measurement was taken from the centre of natural waist level at the front of the body, through the crotch (between the legs) to the centre of the back at the natural waist level.	ISO 8559, 1989; RMSS, 1994;
13	Body rise	Elastic on the natural waist indentation, Metal tape measure	The measurement was taken while the subjects were seated on a hard surface and erect. Then the measurement was taken straight from the natural waist level at the side of the body to the flat surface.	ASTM- D5585, 1994
14	Centre back waist (natural) to hip	Elastic on the waist, metal tape measure	With the subject's back facing the measurer, the measurement was taken vertically between the lower edge of the elastic on the waist to the centre back hip landmark	Beazley, 1996
15	Outside leg to knee length	Metal tape measure	The measurement was taken from the natural waist to midpatella (knee) circumference level following contour of the hip.	RMSS, 1994
16	Outside leg to ankle (a) and to the floor (b)	Metal tape measure	The measurement is taken from the natural waist to ankle level or to the floor accordingly.	RMSS, 1994;

B. HORIZONTAL (GIRTH) MEASUREMENTS				
	Type of measurement	Instruments (equipment and tools to be used)	Method of taking measurements (Technique)	Reference
17	Neck base girth	Metal tape measure	With subject facing the measurer, the measurements of the neck was taken over the cervical at the back and at the top of the collarbone at the front were taken	ASTM-D5219, 1994
18	Armscye circumference	Metal tape measure	It was measured through under arm mid-point and vertically over the shoulder through landmarks at shoulder points, mid of scye at both front and back., while the subject stood upright with the arms hanging naturally.	RMSS, 1994;
19	Upper arm girth	Metal tape measure	The subjects stood with their right sides to the measurer. The measurement was taken horizontally around the upper arm (biceps or mid way between the elbow and shoulder point).	ASTM-D5219, 1994; ISO in Beazley, 1996
20	Elbow girth	Metal tape measure	The subjects stood with their right sides to the measurer with hands bend so that the fingers touch her right shoulders. The measurement was then taken around the widest part of the elbow passing over the elbow landmark and the crease line of the bent elbow.	ISO in Beazley, 1996
21	Wrist girth	Metal tape measure	The measurement was taken over the prominence of the inner and the outer fore arm bones.	ASTM-D5219, 1994
22	Upper chest girth (chest level)	Metal tape measure	The subjects stood with backs to the research assistant and facing the measurer. The measurement was taken over the chest level above the bust line. The measurer checks with assistant that the tape is correct across back at scye level	ASTM-D5219, 1994; Beazley, 1996
23	Bust girth	Met al tape measure	The subjects stood with backs to the assistant and facing the measurer. The measurement was taken over the fullest part of the breasts and parallel to the floor. The measurer checks with assistant that the tape is correct across back at scye level	ASTM-D5219, 1994; Beazley, 1996
24	Under bust girth	Metal tape measure	The subjects stood with backs to the assistant and facing the measurer. The measurement taken just below the fullest part of the breasts and parallel to the floor.	ASTM-D5219, 1994; Beazley, 1996

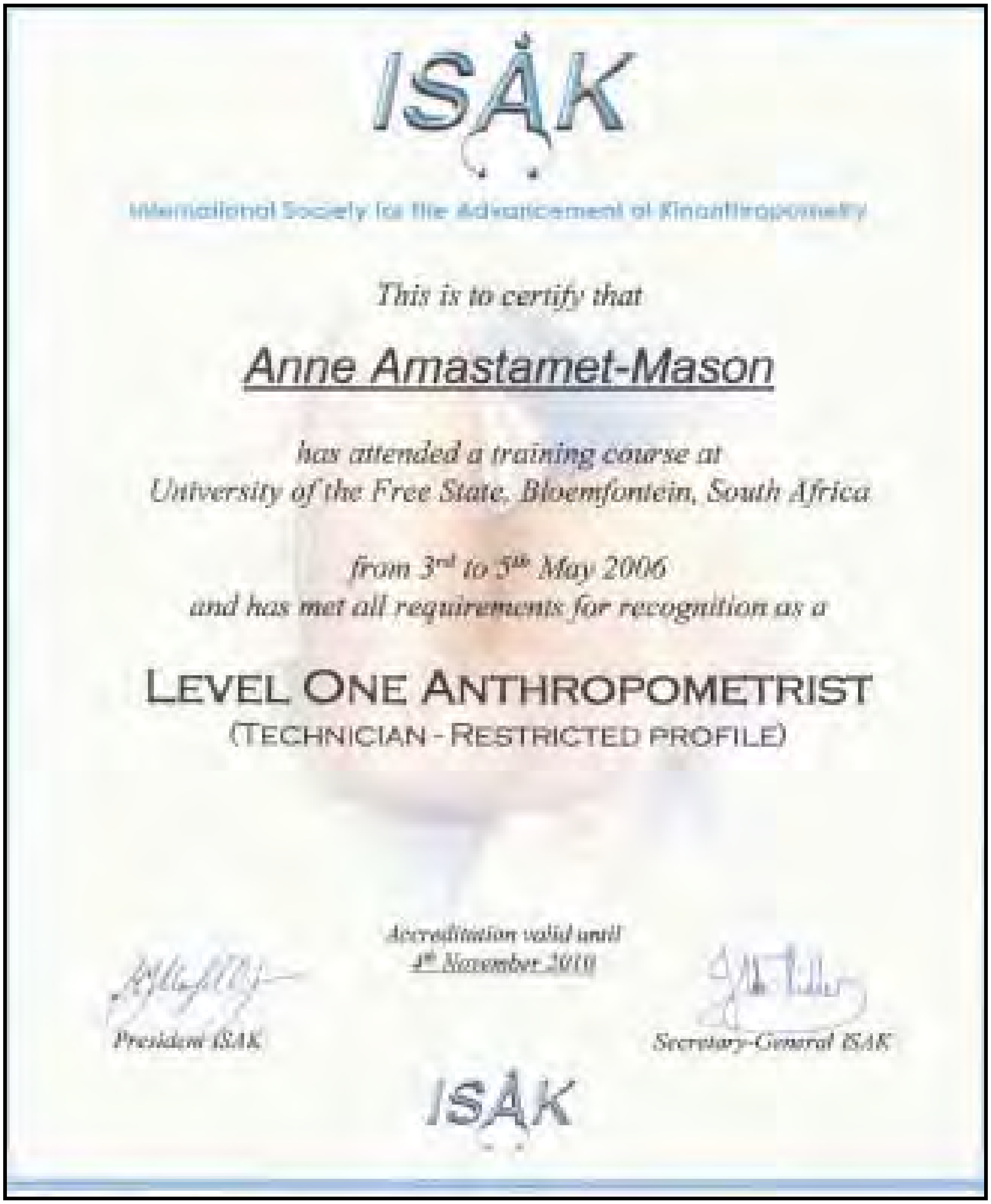
B. HORIZONTAL (GIRTH) MEASUREMENTS				
	Type of measurement	Instruments (equipment and tools to be used)	Method of taking measurements (Technique)	Reference
			The measurer checks with assistant that the tape is correctly placed at the back.	
25	Natural waist girth	Metal tape measure and elastic for locating the waist indentation	The measurer confirms the waist indentation as the elastic sits comfortably in natural waist positions. This area is located between the lowest rib and hip also identified by bending the body to the side. Subject stood with backs facing the assistant. The metal tape measure is held round the waist level firmly but not tightly. The measurer checks with assistant that the correct back waist level are maintained.	ISO8559, 1989 ASTM-D5219, 1994
26	Lower waist (omphalion) girth	Metal tape measure	The measurement was taken round the body at level of omphalion (belly button).	RMSS, 1994;
27	Upper hip girth at 10cm below natural waist	Metal tape measure	The measurement was taken round the body at 10 cm below the natural waistline. The measurer checks that the tape remains in proper level at the back through the help of the assistant	Beazley, 1996; RMSS, 1994;
28	Hip girth	Metal tape measure	This part is located at approximately, 10cm below the upper hip level. Also located as the fullest part of the buttocks. With the subject facing the measurer, the tape measure was held firmly over the hip level landmarks ensuring that it was also correctly placed at the back with the help of an assistant.	Beazley, 1996; RMSS, 1994;
29	Upper thigh girth	Metal tape measure	The measurement was taken around the thickest part of the right upper thigh at gluteal (buttock) crease point	RMSS, 1994; Beazley, 1996; Gordon *et al.,* in Simmons and Istook, 2003
30	Mid-thigh girth	Metal tape measure	The measurement was taken at midway between the hip level and knee while the subjects stood upright.	RMSS, 1994
31	Knee girth	Metal tape measure	With the legs straight, the circumference of the knee over the kneecap (Patella) and parallel to the floor was taken.	ASTM-D5219, 1994
32	Calf girth	Metal tape measure	The subjects stood facing the measurer with legs slightly apart. The measurement was taken horizontally around the thickest part of right calf	ISO8559, in Beazley, 1996
33	Ankle girth	Metal tape measure	The subjects stood facing the measurer with her legs slightly apart. The measurement was taken around the widest part of the right ankle passing over the ankle landmark	ISO8559, in Beazley, 1996

C. WIDTH AND LENGTH MEASUREMENTS				
	Type of measurement	Instruments (equipment and tools to be used)	Method of taking measurements (Technique)	Reference
34	34. Across back shoulders	Metal tape and segmometer interchangeably	The subjects stood upright and straight with backs to the measurer. The measurement was taken between the left and right shoulder (acromion) landmarks.	ISO8559, 1989
35	35. Back width (cross back at mid way between nape and scye level	Metal tape and segmometer interchangeably	With the subject's back facing the measurer, the measurement was taken between left and right landmarks placed midway shoulder and scye level.	ASTM-D5219, 1994; Beazley, 1996
36	Buttock extension	Metal tape measure	With the subjects looking straight ahead and shoulders relaxed, the measurement was taken from the side at the hip joint to the end of buttock extension	
37	Shoulder length	Metal tape measure	With the subjects looking straight ahead and shoulders relaxed, the measurement was taken from the base neck landmark to the landmark at the shoulder point (acromion)	RMSS, 1994
38	Across front shoulders	Metal tape and segmometer interchangeably	With the subject facing the measurer, the measurement was taken horizontally between left and right shoulder landmarks.	Beazley, 1996

	C. WIDTH AND LENGTH MEASUREMENTS			
	Type of measurement	Instruments (equipment and tools to be used)	Method of taking measurements (Technique)	Reference
39	Bust extension	Metal tape	With the subjects looking straight ahead and one arm stretched forward, the measurement was taken from the side seam to the breast tip	
40	Cross chest at the front at mid way between neck base and scye level	Metal tape and segmometer interchangeably	With the subject facing the measurer, the measurement was taken from left and right landmarks in between the shoulder points and scye level.	Beazley, 1996
41	Width of bust prominence	Metal tape and segmometer interchangeably	With the subject facing the measurer, the measurement was taken horizontally from left and right most prominent parts of the breasts (nipples).	ASTM-D5219, RMSS, 1994
42	7^{th} cervical to wrist (nape to wrist)	Metal tape measure	Subject stoodd with right sides to the measurer with arms bent at 90 degrees at the elbow. Measurement was taken from the 7^{th} cervical land mark over the shoulder (acromion) landmark to the wrist land mark	RMSS, 1994
43	Inside arm length	Metal /Fibre glass tape measure	This measurement was taken between the mid axilla fold (ampit) to the distal end of the stylion landmark at the wrist. The subject stood erect with arms rested against the body	RMSS, 1994
44	Shoulder to wrist	Metal/Fibre glass tape measure	Subjects stood with right sides to the measurer with arms bent at the elbow. Measurement was taken from the shoulder point (acromion landmark) through the elbow to the wrist land mark	RMSS, 1994 ISO8559,

Appendix 3C

ANTHROPOMETRIC QUALIFICATIONS OF THE RESEARCHER



ISAK

International Society for the Advancement of Kinanthropometry

This is to certify that

Anne Amastamet-Mason

has attended a training course at
University of the Free State, Bloemfontein, South Africa

from 3rd to 5th May 2006
and has met all requirements for recognition as a

LEVEL ONE ANTHROPOMETRIST
(TECHNICIAN - RESTRICTED PROFILE)

Accreditation valid until
4th November 2010

President ISAK

Secretary-General ISAK

ISAK

Appendix 3D

BODY SHAPE ASSESSMENT SCALE

Officeial use only

REGION | V1 | 1

Photograph code | V2 | 2-3

Panellist code | V3 | 4-5

The body shape appear to fit into which group? (Please mark one)

		X
Slender group (small size)	1	
Average (medium size)	2	
Large group (plus size)	3	

V4 | 6

Study the following **Front**, **Side(profile)** and **Back views** of each of the provided photographs and mark with an **"X"** a statement that best describes the **part-to-part** proportions of the body shape

PART-TO PART EVALUATION

Shoulders/bust appear-----------------------------------(please mark one)

		X
Narrower than the hips	1	
Same width as the hips	2	
Wider than the hips	3	

V5 | 7

The waist appear--please mark one)

		X
Narrower than the hips	1	
Same width as the hips	2	
Wider than the hips	3	

V6 | 8

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Study the following **Front**, **Side(profile)** and **Back views** of each of the provided photographs and mark with an **"X"** a statement that best describes the **part-to-whole** proportions of the body shape

PART-TO WHOLE EVALUATION

Stomach(abdomen) appear---(please mark one)

		X
No fullness looks straight or flat	1	
Fullness ('b') below waist	2	
Fullness ('D') extending from the bust line to the crotch level	3	

V7 ☐ 9

Derriere (Seat/Buttocks) appear--(please mark one)

		X
Flat with very small or no fullness at all	1	
Average protrusion with moderate rounded shape	2	
Full protrusion extending ('d") larger fullness extension	3	

V8 ☐ 10

Upper back appear--(please mark one)

		X
Straight upper back (Flat)	1	
Moderately rounded upper back	2	
Fully rounded upper back	3	

V9 ☐ 11

Thighs bulge appear---(please mark one)

		X
Small bulge (flat) no thigh bulge or same as hip	1	
Average bulge (large bulge extending moderately beyond the hip)	2	
Large bulge (extends excessively beyond the hip)	3	

V10 ☐ 12

Top arms (biceps) appear--(please mark one)

		X
Thin (bony) with little flesh)	1	
Average with softly curved shape. No excess flesh	2	
Full with heavy upper arms or muscular curves	3	

V11 ☐ 13

Shoulders appear---(please mark one)

		X
Squared	1	
Normal	2	
Sloping	3	

V12 ☐ 14

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Using your own words, please assign the shape a name/category that would holistically describe the central features critical to the garment's fit when viewed from the front, side and back (For example, Hourglass with "D", "b" front, "d" back, rounded upper back and hollow back waist.

	V13		15
	V14		16
	V15		17
	V16		18
	V17		19
	V18		20
	V19		21
	V20		22
	V21		23
	V22		24

Appendix 4A

KENYA BUREAU OF STANDARDS SIZES

DKS 08-411:2000

TABLE 2 . BODY MEASUREMENTS FOR WOMEN OF AVERAGE FIGURE (HEIGHT 162 cm TO 172 cm)
All measurements in centimetres

Size	8	10	12	14	16	18	20	22	24	26	28
Bust girth	80	84	88	92	96	100	104	108	112	116	120
Waist girth	62	66	70	74	78	82	86	90	94	98	102
Hip girth	88	92	96	100	104	108	112	116	120	124	128
Underbust girth	70	74	78	82	86	90	94	98	102	106	110
Thigh girth	42	44	47	50	53	56	59	61	64	67	70
Neck-base girth	35	35.5	36	36.5	37	38	39	40	41	42	43
Armscye girth	34	35	36	38	40	42	44	46	48	50	52
Upper arm girth	23	24	25	26	27	28	29	30.5	33	34.5	36
Across back	30	31	32	33	34	35	36	37.5	39	40.5	42
Shoulder width	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16
Arm length	57	57	58	58	59	59	60	60	61	61	62
Crotch length (total)	64	66	68	70	72	74	77	80	83	86	89
Neck to waist	35.5	36	36.5	37	37.5	38	38.5	39	39.5	40	40.5
Crotch height (from ground)	73	73.5	74	74.5	75	75.5	76	76.5	77	77.5	78
Outside leg Length	99	99.5	100	100.5	101	101.5	102	103	104	105	106

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TABLE 3. BODY MEASUREMENTS FOR SHORT WOMEN (HEIGHT 148 cm TO 161 cm)
All measurements in centimetres

Size	8	10	12	14	16	18	20	22	24	26	28
Bust girth	80	84	88	92	96	100	104	108	112	116	120
Waist girth	62	66	70	74	78	82	86	90	94	98	102
Hip girth	88	92	96	100	104	108	112	116	120	14	128
Underburst girth	70	74	78	82	86	90	94	98	102	106	110
Thigh girth	42	44	47	50	53	56	59	61	64	67	70
Neck-base girth	35	35.5	36	36.6	37	38	39	40	41	42	43
Arm cycle girth	33	34	35	37	39	41	43	45	47	49	51
Upper arm girth	23	24	25	26	27	28	29.5	30.5	33	34.5	36
Across back	30	31	32	33	34	35	36	37.5	39	40.5	42
Shoulder width	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16
Arm length	52	52	53	53	54	54	55	55	56	56	57
Crotch length (total)	62	64	66	68	70	72	75	78	81	84	87
Neck to waist	33	33.5	34	34.5	35	35.5	36	36.5	37	37.5	38
Crotch height (from ground)	67	67.5	68	68.5	69	69.5	70	70.5	71	71.5	72
Outside leg Length	94	94.5	95	95.5	96	96.5	97	97.5	98	99	100

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TABLE 4. BODY MEASUREMENTS FOR TALL WOMEN (HEIGHT 173cm TO 186cm)

All measurements in centimeters

Size	8	10	12	14	16	18	20	22	24	26	28
Bust girth	80	84	88	92	96	100	104	108	112	116	120
Waist girth	62	66	70	74	78	82	86	90	94	98	102
Hip girth	88	92	96	100	104	108	112	116	120	124	128
Underbust girth	70	74	78	82	86	90	94	98	102	106	110
Thigh girth	42	44	47	50	53	56	59	61	64	67	70
Neck –base girth	35	35.5	36	36.5	37	38	39	40	41	42	43
Arm cycle girth	35	36	37	39	41	43	45	47	49	51	53
Upper arm girth	23	24	25	26	27	28	29	30.5	33	34.5	36
Across back	30	31	32	33	34	35	36	37.5	39	40.5	42
Shoulder width	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16
Arm length	62	62	63	63	64	64	65	65	66	66	67
Crotch length (total)	66	68	70	72	74	76	79	82	85	88	91
Neck to waist	38	38.5	39	39.5	40	40.5	41	41.5	42	42.5	43
Crotch height (from ground)	79	79.5	80	80.5	81	81.5	82	82.5	83	83.5	84
Outside leg length	106	106.5	107	107.5	108	108.5	109	109.5	110	111	112

Appendix 4B

KENYA BUREAU OF STANDARDS SIZE LABELS

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7. LABELLING

7.1 METHOD – The size designation of each garment shall be indicated clearly ,conspicuously and in plainly legible form on a label, or on a swing ticket.

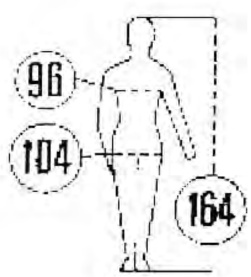
7.1.1 The label shall bear the country of manufacture.

7.2 ATTACHMENT – The label or swing ticket shall be securely attached to the garment and so positioned as to be easily readable.

7.3 ADDITIONAL INFORMATION – Information additional to the size designation may be separately indicated on the label. provided that it does not in any way reduce the prominence and conspicuousness of the size designation. Such additional information may include body measurements considered to constitute useful information.
Garment care information shall be added to information on the size designation in accordance with KS 08-68, Textile care labelling code.

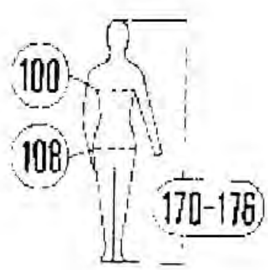
7.4 EXAMPLES OF LABELS – The examples of labels given in Figures 1,2,3 and 4 illustrate methods of labelling.

(a) Women's jacket



SIZE	[illegible]
Bust	[illegible]
Hip	[illegible]
Height	[illegible]

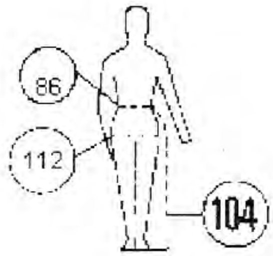
(b) Woman's coat or dress



SIZE	[illegible]
Bust	[illegible]
Hip	[illegible]
Height	[illegible]

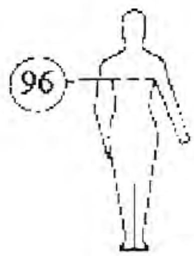
DKS 08-411:2000

(c) Woman's slacks



SIZE	20
Hip	112
Waist	86
Outside leg	
Length	104

(d) Woman's cardigan



SIZE	16
Bust girth	96