

# Industry fit practices and the issues that impact on good garment fit

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## 1 Abstract

### 1.1 Purpose

This research establishes the skills sets and processes of current industry practitioners and the effect this has on the achievement of good garment fit. This is contrasted with established definitions of good garment fit, outlined in current literature, and provides evidence of areas which should be addressed through training.

### 1.2 Methodology

A methodological strategy was developed to collect and analyse data from clothing professionals currently working within the clothing industry. A convenience sample of individuals working within various garment development roles for a variety of market levels were selected. Semi structured interviews were employed to gather data on industry processes and protocols. A fit evaluation tool was developed synthesising Fastfit, a tool that allows practitioners to view moving 360° pictures of garments, and literature definitions of good garment fit. This tool enabled the collection of observational data on practitioners' skill sets. Both methods were used in the same instance.

### 1.3 Findings

The paper established that although subjects worked at different market levels, their processes were similar and often individual practices within or perceptions of the process impacted directly on the garment fit. Skill set levels also varied within the sample set even between individuals who performed similar roles, which resulted in a variation of knowledge regarding suitable fit. Results indicated that problems with garment fit are cumulative, with issues involving practitioner skills levels and bad practice impacting on garment fit.

It was identified that current academic research, centred on utilising technology for the improvement of garment fit, proffered solutions which were unfamiliar to practitioners, in terms of their skill sets and geared towards technologies not available within their workplaces. This study found that there

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has been little research focused on the practitioners themselves, their practices, the skills sets they are equipped with and the structures in which they operate.

#### **1.4 Originality and recommendations**

This paper identifies current industry practices and skills sets to inform academic researchers and educational professionals who utilise technology for the improvement of garment fit. This paper further recommends that the skill set of practitioners be considered when providing academically derived solutions to facilitate ready implementation by the industry. This would also allow the development of a curriculum compatible with the needs of industry but which is able to integrate new ideas, practices and technologies in harmony with existing human resources and practices..

## **2 Introduction**

Good garment fit is crucial to customer satisfaction as it contributes to both confidence and the comfort of the wear (Alexander *et al*, 2005). Dissatisfaction of fit is one of the most frequently stated problems with garment purchases (Mastamet -Mason *et al*, 2008) in the ready-to-wear sector.

The process of garment development is comprised of a number of stages with garment conception, development, and realisation being accomplished by a number of different practitioners using a variety of processes (Tyler, 2008). Within this process garment fit is influenced by practitioner skills and/or the processes they operate within. As a result many academic studies seek to analyse and provide solutions by concentrating on specific areas of the process, such as sizing and body shape analysis (Loker *et al*, 2005; Ashdown *et al*, 2007a; Ashdown *et al*, 2007b); the integration of pattern development and 3D body scanning technologies (Daanen and Hong, 2008; Chen, 2007); the exploration of accurate ease values for pattern development (Xu & Zhang, 2009; Chen *et al*, 2008); and the garment fitting process (Bye & LaBat, 2005; Ashdown & Mete, 2008). Many of these studies explore new and emerging technologies resulting, at times, in novel methods which require new skills and protocols

The clothing industry operates as a chain and so solutions need to be holistically developed with an overview of not just the physical processes but of the skill sets within the industry. This approach may ensure new research solutions that are easily understood and implemented thereby precipitating adoption.

## **3 Literature review**

### **3.1 Loss of skills**

Studies have shown a shortage of technical skills within the UK clothing industry (Winterton & Winterton, 2002; Skillsfast-UK, 2008). Research into the contraction of the UK clothing industry and the effect this has had on skills levels and training suggests that this is due to globalisation (Tyler, 2003; Winterton & Winterton, 2002; Jones & Hayes, 2004). This has resulted in a transfer of skills to remote sites with companies placing their production in countries with lower costs (Tyler, 2003; Winterton & Winterton; 2002; Jones & Hayes, 2004). Tyler's (2003) study, though disputing the 'terminal decline' of the UK clothing industry as a whole, conceded that the area of garment production that has cost as the main motivating factor has all but disappeared from the UK.

DesMarteau's (2000) article discusses the reasons that industry struggles in providing good fit. She suggests that skills levels have been affected because of the popularity of knitted fabrics and simplistic styling, which can lead to the expertise of pattern developers not being challenged and so remaining less advanced. Vouyouka (2007), concurred with this view and suggested a paradigm shift was necessary that would involve training and development for all levels of personnel, thereby providing understanding between departments, which would ultimately result in more innovation and better fitting garments.

Both Winterton and Winterton (2002) and Skillsfast-UK (2008) state that industry has accepted the argument for more trained technical personnel. Winterton and Winterton's (2002) survey of clothing businesses revealed companies were highly concerned over skills shortages and how this leads to quality issues. Nevertheless, despite these concerns, companies were reluctant to provide adequate training to remedy this situation (Winterton & Winterton, 2002). As the UK clothing industry is dominated by small businesses they typically have limited resources with which to train staff (Skillsfast-UK, 2008). They instead rely on a trickle down from skilled practitioners who have been trained by larger organisations (Skillsfast-UK, 2008). However, due to industry contraction larger companies are training less new practitioners (Skillsfast-UK, 2008; Winterton & Winterton, 2002). So, without any formal induction practitioners are required to obtain the knowledge whilst they work. Therefore, it is possible that the skill set of the practitioner acts as a further constraint thereby impacting on garment fit. In addition, the clothing industry currently works within tight time constraints brought about by business strategies, such as Fast Fashion, introduced to reduce buying cycle processes and compress lead times to get product to store and satisfy customer demand at its peak (Barnes & Lea-Greenwood, 2006). With many high street retailers adopting such strategies it is unsurprising that the allocation of time for training is not prioritised as practitioners are constrained by tight deadlines.

It has been identified that the clothing industry uses out-of-date body size charts, a practice that is known to affect garment fit (Goldsberry *et al*, 1996; Simmons *et al*, 2004; Ashdown *et al*, 2007a; Workman & Lentz, 2000; Faust *et al*, 2006). Some companies use no body size chart at all. Workman and Lentz's (2000) study found many of the measurements required for determining size are garment measurements, not body measurements. This may be due to companies using bought sample garments to obtain the initial measurements (Faust *et al*, 2006) and involves a company buying a competitor's garment specifically for the garment's measurements which are used as a basis for developing their own size charts (Frings, 2008, Glock & Kunz, 2005). Companies may, on occasion, disassemble the garment and draft an entire pattern from the disassembled pieces (Frings, 2008; Glock & Kunz, 2005). By copying the competitor's design they are also copying the competitor's fit (Workman & Lentz, 2000), which saves a company time from having to engineer similar fit into a new block.

There are multiple drawbacks to this approach. Clothing textiles are prone to deforming (Orzarda, 2001) and fabric properties play a large part in garment fit due to changes in dimensional stability (Fan *et al*, 2004; Geršak, 2002). With this in mind, measurements from a bought garment sample are therefore difficult to obtain with absolute accuracy. It follows that if a company uses these measurements as the basis of a garment size chart the probability of inaccurate fit is highly likely. As copying garments is not uncommon (Glock & Kunz, 2005), and is taught on some clothing courses and is a component of some pattern-making textbooks (Marcketti & Parsons, 2006), it is hardly surprising that problems of poor fit are so widespread.

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### **3.2 Sizing and body measurement**

Technology such as 3D body scanning is perceived as the panacea to the problem of sizing (Faust *et al*, 2006). Its advantages are it is quicker, more objective and facilitates more privacy when compared to traditional anthropometric methods (Fan *et al*, 2004; Simmons & Istook, 2003). Prior to 3D body scanning technology, sizing surveys were performed manually and were time consuming and largely inaccurate if not undertaken by a skilled operator (Istook & Hwang, 2000). This is perhaps one of the reasons companies compile their own size charts empirically, adjusting them every few seasons but never really targeting the actual size of person they are catering for (Faust *et al*, 2006). Due to this practice, sizing systems from each company vary, resulting in a lack of standardisation in size codes and categories thereby excluding some customers from their offer due to poor fit (Kinley, 2003).

The UK clothing industry in association with government and academic institutions has funded a large scale survey of the current population in order to ascertain the population's average body size and shape (Sizemic, 2010). Size UK, undertaken by Sizemic in conjunction with industry and academic partners, scanned male and female individuals from ages 16-85+ to provide body dimension data (Sizemic, 2010). This indicates the UK clothing industry has recognised the need for current anthropometric data in the development of its size charts.

Access to the Size UK data, however, is limited as it is proprietary and can only be purchased through Sizemic, who will provide the data in limited configurations which are price dependant and the cost of the technology has been proposed as being a barrier to adoption (Aldrich, 2008; Ashdown & Dunne, 2006). So, the results of the survey are not freely available to the industry, and therefore not freely accessible for the development of specific clothing applications by practitioners within the industry.

Accordingly, studies have been undertaken by academics to explore how best to utilise 3D body scanning technology in the quest for accurate garment sizing to improve fit. (Loker *et al*, 2005; Ashdown *et al*, 2007b). It is believed that the technology is ideal for this area as it not only provides a comprehensive list of body surface measurements but also supplies information of body shape and cross-sectional views of the subject, whereby body volume can also be calculated (Simmons & Istook, 2003). The clothing industry traditionally uses linear measurements in the development of a garment (Loker *et al*, 2005) and the tools used may be physical measurement devices, measurement commands within a pattern development system (PDS) or tables of measurement values. Drafting patterns or assessing garment fit using 3d scanning technology may seem far removed from current ways of working. Consequently, the industry's current practices, tools and skill sets must be taken into consideration if the data on body shape and volume provided by the 3d scanning technology is to be utilised within the garment development process.

### **3.3 Ease values**

3D body scanning technology has also been explored as a tool to assess body/garment relationships through the segmentation of scan images (Loker *et al*, 2005). Loker *et al* (2005) used body scanning technology to compare industry sizing against consumers' actual body dimensions and shape. Their aim was to develop and communicate a variety of statistical and visual analysis methods to describe and address the variety of body shapes and measurements that exist within sizing systems (Loker *et al*, 2005). The study used size-specific analysis of body scan data to provide additional data for the improvement of garment fit (Loker *et al*, 2005). Their methods required partially- and fully-clothed subject scan data which had been segmented at specific anatomical points (body landmarks such as

the waist). These segments were overlaid to identify variety in shape and circumference at specific anatomical points and to calculate ease values (ease being the space between the body and the garment). Analysis provided an opportunity to assess the relationship between the body and the garments, something which in industry fit meetings is not ordinarily possible, again perhaps due to limited access to 3D body scanning facilities. This study clearly indicated ease in terms of a visual and a value. However, to implement Loker *et al*'s (2005) methods practitioners would need to acquire new skills to manipulate the scans and calculate ease percentages, which they are not required to do at present. Practitioners would also have to have a good working knowledge of calculating ease in strategic areas of the pattern or garment. This could prove difficult as pattern developers generally use heuristic knowledge to incorporate ease (Kunick, 1984) and so this practice may be extrinsic to their current processes and ways of thinking.

Gill *et al* (2008) acknowledged a lack of existing sources to inform academics and practitioners of functional ease allowances (basic ease requirement related to dynamic movement) which can be contextualised and used in pattern construction. This study involved the creation of a framework for determining garment pattern functional ease and consisted of the exploration of body measurement changes from static to dynamic postures to be recorded to a database format (Gill *et al*, 2008). They found establishing ease values using this method provided practitioners greater objective control over the pattern, thereby reducing the iterative process of assessing garments for fit (Gill *et al*, 2008). Incorporating the methods for measurement and anatomical landmarking however required anthropometric training, knowledge of anatomy, and an up-to-date body measurement size chart, skills and tools which may not currently be used by industry.

### **3.4 The fitting process**

Bye and LaBat's (2005) study of the fit process highlighted flawed practice which arose due to conflicts between practitioners whose main concern is either perfecting fit or perfecting design. Their study found a culture of vagueness and a lack of agreement in what constituted good fit (Bye & LaBat, 2005). Ashdown and O'Connell's (2006) study suggested there is a variation in the protocols used to assess fit. Their aim was to assess if concentrated training on fit through various methods could produce the same results between students and experienced practitioners (Ashdown and O'Connell, 2006). Their training incorporated a standard framework, developed by Erwin and Kinchen (1969) which state the elements of line, ease, set, balance and grain need to be in equilibrium with body dimensions to achieve good fit. They recruited clothing students for the study and trained them using various methods for a short period. Practitioners and trained students assessed a garment and their judgements were compared. Their findings indicated that post-training judgments on fit were similar between both groups. Training of this nature would be beneficial for the clothing industry in that new entrants are made aware of these elements and how they affect garment fit. They show within the limitations of their study that a considered and standardised training programme can bridge the knowledge gap.

## **4 Methodology**

### **4.1 Subject selection**

A convenience sample of nine individuals was chosen with one of the nine (subject A) selected to pilot the study methods. The number of participants is greater than comparable research and would provide data saturation, suggested to occur with only six interviewees (Guest *et al*, 2006). Subjects were required to have five or more year's industry experience and to have attended garment fit

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meetings and to have had input in the development of the garment, as they would provide the necessary data for this study (Table 1). All subjects had experience of fitting or commenting on fit for womenswear garments for the High Street.

Subject profiles						
Subject	Role	Years in role	Company type & size	Market level	Garment category	Target Demographic
<b>B</b>	Designer/ Senior Designer	5	Small Supplier	Middle	Menswear formal shirts and trousers	18-45
<b>C</b>	Senior Designer/ Head of Design	15	Small Specialist Retailer	Middle	Womenswear Formal & casual Knitted and woven multi products	45+
<b>D</b>	Garment Technologist	20	Larger Growing Retailer	Value	Womenswear Formalwear, knitted and woven multi product	34+
<b>E</b>	Quality Controller/ Product Developer	15	Medium Sized Supplier / Importer	Value	Womenswear Formal and casual knitted and woven Multi products	15-35
<b>F</b>	Garment Technologist	30	Large Retailer/Mail order	Middle	Womenswear Formal and casual knitted and woven Multi products	25-45
<b>G</b>	Pattern Cutter/ Garment Technologist	13	Small Supplier	Value	Young womens jersey wear	15-25
<b>H</b>	Garment Technologist Product Developer	9 ½	Medium Sized Supplier Importer	Value	Menswear Casual denims Shirts and jersey wear	20-35
<b>I</b>	Sourcing Manager	20	Small Branded Supplier/Mail order	Middle-Higher	Men & Women's Performance & sports outerwear	30+

**Table 1. Subject Profiles**

#### 4.2 The creation of a fit tool

Two garments were purposively selected by two experts in garment fit, for poor fit. The garments were purchased from a well-known High Street store and were generic, basically styled and mass-produced. They consisted of a pair of black trousers and a white short sleeved blouse. Both garments were made of a woven textile and were coded size 10.

Ill-fitting garments have been used to assess and quantify fit previously by Kohn and Ashdown (1998). As fit assessment can be subjective (Fan *et al*, 2004), the experts were then provided with a chart detailing literatures definitions of correct garment fit. From this they assessed the garment on a fit model using the Fastfit images and listed all the areas of poor fit according to the criteria from literature. This was tabulated and good fit was compared with the garments actual fit (Table 2) which was paired with Fastfit visuals of the areas of poor fit (Figure 1). The trousers had six areas of poor fit and the blouse had ten. The visuals were shown to the subjects but not the table.

Many manufacturers use the hourglass shape when defining their fit model (Connell *et al*, 2001), and most clothing patterns are designed for standard posture (Fan *et al*, 2004; Kohn & Ashdown, 1998).

These two criteria determined the shape and posture of the fit model. A size 10 model was selected and filmed using Fastfit 360° (Figure 1) to enable the garments to be viewed on a personal computer (PC) at 360°. This simulated the garment fitting session.

<b>Blouse back</b>	
<b>Good fit</b>	<b>Actual fit</b>
<p>The back should appear smooth and there should be no strain or bagginess at the armhole seam (Lee &amp; Hawksley, 1984, Betzina, 2003). There should be sufficient ease to move the arms forward (Fan <i>et al</i>, 2004, Brown &amp; Rice, 2001). The fabric should lie smoothly between the creases of the body and the arm (Liechty <i>et al</i>, 1992).</p>	<p>Vertical creases were observed running along the back armhole edge, and there were diagonal creases originating under the shoulder blades and running downward to the side waist point on the side seam (Figure 1). The fabric of the garment appeared buckled and collapsed from the back waist to hem (Figure 1).</p>

**Table 2. Fit Assessment Chart – Blouse Back**



**Figure 1 Fit Assessment Visuals – Blouse Back**

### 4.3 Interviews

Subjects were interviewed separately and they had no prior knowledge of the questions. Subjects were asked the same set of questions on garment development, sizing, ease and the fit process. They were also asked where garments were sampled and made. Interviews consisted of a series of questions and visuals designed to gather data on the process or role structure the subject worked within. It also informed the interviewer of how the subject operated within that process and what strategies or tools they used. Open-ended questions encouraged subjects to reflect on how their knowledge was acquired generating further insight for the study. The interviews were recorded so the content could be coded and analysed for meanings.



#### **4.4 Observation**

The subjects were shown the same FastFit images on the same equipment. Images were repeatedly shown until the subject felt they had observed enough to pass comment. Magnified portions of the garments could be viewed if subjects felt details unclear. Subjects were asked for their thoughts on both garments. If poor fit was detected subjects were asked to specify location and verbalise what they thought the problem was. They were asked if they could recommend solutions, which could be applied to the pattern to eliminate the fit problem.

Observation provided the study with evidence of the practitioners' knowledge regarding the assessment of fit and the provision of appropriate solutions. It also highlighted any discrepancies of knowledge or skill set between the mix of market levels or product categories. Subjects comfort levels with the data gathering process was also observed and noted. Some results were tabulated to allow for comparative analysis.

### **5 Findings and discussion**

#### **5.1 Dual roles and skills dilution**

Contextual information on the subject indicated five out of eight subjects had two job titles and were required to work across two roles. Alternating roles included creating garments, amending them and checking their quality. These cross-departmental roles inevitably required a dilution of focus from any specific role. This study identified that companies may be attempting to overcome shortages by requiring employees to undertake more than one role. Furthermore, Winterton and Winterton (2002) stated that to make clothing practitioners who possess specialist skills branch out to become multi-skilled in another specialised area, as an addition to their role, resulted in a dilution of the skills deployed. It is therefore striking that this study has found that the majority of subjects sampled are required to work in dual roles at a specialist level in the industry. It could however be argued that the possession of multiple skills in more than one department may be beneficial. Vouyouka (2007) states that clothing practitioners, especially designers would benefit from a greater understanding and knowledge of the technical as well the aesthetic aspects of the industry, as this could improve clothing fit. However, this study found subjects who were required to work within multiple roles commented that time and manpower were very limited and that more could be done to improve fit if they had more time and personnel. Subjects required to work in one role also stated tight critical path schedules dictated they approve for manufacture garments whose fit they were not 100% happy with. All subjects worked to tight deadlines as garments needed to be approved in a timely manner so offshore production was not delayed. Resourcing new suppliers for manufacture was viewed by subjects as common practice. Responses indicated this practice introduced further delays as new working relationships needed to be bedded in.

#### **5.2 Sizing**

This study wanted to ascertain the starting point for the development of a size chart and what was perceived to be the determining factor in their creation. To establish this, the study asked specific questions (Table 3). Seven subjects stated their company provides them with a garment size chart rather than a body size chart whilst one subject stated they had access to both (Table 3). This would certainly indicate that those seven companies regard garment-based size charts as more important or relevant than body size charts.

<b><u>Does your company provide a body or garment size chart or both?</u></b>		
<b>Subject</b>	<b>Body</b>	<b>Garment</b>
<b>B</b>		✓
<b>C</b>		✓
<b>D</b>	✓	✓
<b>E</b>		✓
<b>F</b>		✓
<b>G</b>		✓
<b>H</b>		✓
<b>I</b>		✓

**Table 3**

Subjects were then asked which they thought more important in the development of a garment. Five out of eight subjects confirmed a garment size chart as being more important than a body size chart (Table 4). All eight subjects thought that bought samples adequately provided the size information necessary to develop a garment (Table 4), although only subject D thought this would be adequate as a starting point in the garment development process. Subject F stated a body size was more important in the development of a garment but later stated they were required to work from historical size charts of garments that have sold well. Most indicated that because the garment would be fitted on a model or mannequin during the fit process that would be sufficient to amend the size chart to their target customer at that point rather than at the inception of the garment. This time saving strategy utilising the measurements of bought samples for a garment size chart seems a false economy, as the garment then has to be refitted to the target customer size. This finding indicates measuring garments for size and fit is not only a frequent occurrence but has been accepted by many practitioners as good practice. Responses such as '*Nobody ever complained about the fit. It did seem to do the job it needed to do*' (Subject I) confirmed this, however, subject I also admitted that, '*It wasn't produced in a terribly professional manner*'.

<b><u>Which size chart do you think is more important in the development of the garment?</u></b>	
<b>Subject</b>	<b>Responses</b>
<b>B</b>	Garment – <i>'I think that the garment size chart during my working practice would make life easier because the fit model[s]... weight would go up and down'</i> .
<b>C</b>	Body - <i>'but we have a garment size chart and it is a size chart that has developed throughout the years'</i> .
<b>D</b>	Garment - <i>'The size charts that we refer to are always production size charts. So they will have come from initially a proto sample provided by a supplier'</i> .
<b>E</b>	Garment - <i>'We basically work on fixing samples. We take measurements from samples and grade then accordingly. And we fit on the body or on the dummy'</i> .
<b>F</b>	Body - <i>'I think body'</i> .
<b>G</b>	Body - <i>'but 4 weeks turnaround makes it impractical, you need basic garment size chart'</i> .
<b>H</b>	Garment - <i>'we get the buying samples from where we develop; we fit it and where we develop our own spec sheets from there'</i> .
<b>I</b>	Garment - <i>'It wasn't produced in a terribly professional manner'</i> .

**Table 4**

It was established garment block/pattern dimensions were mainly created from purchased samples. Subjects' response suggests this is an acceptable practice. Simmons *et al* (2004) stated that regardless of who defines fit it must always begin from basic human measurements and proportions and part of the reason the clothing industry struggles with fit is because they have strayed so far away from human measurements. Connell *et al* (2001) stated that the loss of direct engineering knowledge to link patterns with body size and shape contributes to problems industry has with clothing fit. This study concurs with Simmons *et al* (2004) and Connell *et al* (2001) in identifying the problem of fit being a conflation of a movement away from basic human measurements and the loss of direct engineering knowledge. If companies do not work with body size charts it is unlikely that they will adopt new technologies such as the 3D body scanner as these technologies provide processes and tools which are unfamiliar to industry's existing practices.

### **5.3 Ease**

The question of ease in terms of definition and application was posed. This was to establish if subjects understood and considered the element of ease allowance within size charts and garment patterns. The findings indicated mixed response, with reference being made to the use of ease as a production term and ease as the extra measurement over the body measurement. Subjects who discussed the latter definition explained they had learned to apply ease either by rote (learned from senior colleagues) or in a heuristic manner and therefore offered no definite calculation method. Learning ease values in this manner has serious consequences for the UK clothing industry as skills are being lost due to off-shoring samples. Correct ease allowances are integral to correct fit (Brown & Rice, 2001) and if this is not clearly understood fit is compromised.

#### **5.4 Fit meetings**

The study found the garment would undergo two fit assessments in two fit meetings. This first meeting was prior to the retailers' fit meeting to check the garment measured the specifications and to reduce any worries on the part of the supplier. Given the time constraints imposed by the clothing industry to speed up clothing deliveries to the consumer, this seems an unnecessary waste of time as subjects were assessing the same garment twice.

Subjects were often anxious about using new off shore manufacturers; this is because subjects stated that the factories they used could not consistently be relied upon to produce a garment to the exact specifications. The responses identify communication, subjectivity and lack of on-sight control as being issues which affect the way a garment will fit. Subjects C, D and E, who work in both the middle and value end of the market, gave anecdotal evidence of these issues and their responses indicated frustration, which was not helped by having to work within tight time constraints.

Interview results also show all subjects used one fit model to fit garments of a base size on. In all cases the model was not measured on a frequent basis. By not monitoring the model's measurements it is unclear if problems in garment fit are due to changes in the model's dimensions or general poor garment fit. Subjects did not consider this as a problem but did acknowledge that it would be preferable to fit samples on more than one person thereby checking fit on a broader range of body shapes. However, subjects stated the use of more than one fit model was a '*luxury*' (Subject D) and '*the best scenario*' (Subject F) and would only be possible if there were major problems with fit.

Findings identified a culture of arbitrary size chart creation, a haphazard approach to block development and disagreements over fitting a garment leading to the redesigning of garments rather than fitting. Therefore, it is unsurprising that practitioners have misidentified the measuring of fit models as being of little consequence in the fit process and so further exacerbating fit problems.

#### **5.5 Subjects thoughts on Fastfit**

Subjects were interested in experiencing Fastfit as they had no access to the technology. It was suggested the technology would be useful for working with overseas factories as small problems could be observed and remedied quickly. Many thought the visual of the trousers was harder to see and subject I refused to assess the garment because of this. They all said they would not approve a final sample using this technology alone and some said it would be more informative for them if they could touch the garment.

#### **5.6 Trousers fit assessment**

Subjects did not identify every area of poor fit. Subject F who had the most experience (30 years) and subject D (20 years) located the majority of poor fit areas (three out of six) and provided very comprehensive fit amendments using verbal descriptions and illustrations. It may be significant that both subjects worked for large organisations and had only one role to perform.

#### **5.7 Blouse fit assessment**

The second garment was easier to assess, perhaps due to colour choice. All subjects assessed the garment's fit. Most but not all areas of poor fit were identified with subjects D and F locating six out of ten areas of poor fit. Amendments to remedy poor fit were varied in method and level of detail. The results again identified Subjects F and D as being the most knowledgeable. Recognition of the fit issues appeared to be directly related to the personal perceptions of the subject and their familiarity

with the fit problems. Accuracy in locating fit problems may therefore be correlated with length of time in the role.

This portion of the study found that there are pronounced variations in the levels of skills of practitioners and that poor fit can be undetected or misdiagnosed if the practitioner has had little training in fit or is new to the role. The findings also provided evidence that industry is employing practitioners who are not equipped with the necessary level of skill needed to consistently assess, amend and approve garments that are of a good fit. This finding concurs with Winterton and Winterton's (2002) research which stated practitioners who are at a specialised level in the clothing industry dilute their skills if they are required to take on multi-skilled roles.

## **6 Limitations and Summary**

As this paper has focused on the UK industry, it should be admitted that this may limit the findings in terms of the global industry; however it is likely there are similarities in practice with workers throughout the global supply chain. The relatively small number of participants may limit the scope of this work, although they are representative of workers within the UK High Street with varied experience. Future research may seek to include a greater number of participants with a more focussed selection to ensure a more targeted insight.

It was determined that regardless of market position or size, the fragmentation of the product development process has contributed negatively to fit in a number of ways. As the different roles are split across sites, many of which are in other parts of the world, practitioners are being distanced from the pattern development process. This de-coupling of designer and pattern cutter, sample machinist and garment technologist, production manager and quality controller, and so on, has resulted in a loss of cohesion throughout the product development process with practitioners being both anxious and resigned to losses in quality and fit. This loss of cohesion is further exacerbated through the industry practice of sourcing and re-sourcing factories for manufacturing in pursuit of cheaper production costs. All of these pressures combine to limit the amount of time available to practitioners to perfect fit and indeed a number have stated that fit is often sacrificed to commercial decisions so the product is produced on time.

The key finding identified by this study has been the overwhelming evidence of the fact that industry appears to show disregard for the use of body size charts in the generation of garments. Added to this ease is either misunderstood or added in an arbitrary fashion. This is especially interesting, as current academic research has been approaching the problem of fit from the belief that industry is using out-of-date body size charts and has been attempting to provide solutions for industry based upon this incorrect assumption. Furthermore, the latest advances in technology that aim to supply solutions to the problems of fit, technologies such as the 3D body scanner, are also approaching the problem from the perspective of the body whereas this research shows that practitioners rarely approach the generation of garments from this perspective. Whilst accepting that the current industry practices are no doubt short-sighted, particularly in the way these practices impact upon the skill sets of those involved and compound the problems of fit, it must be accepted that the success of Fast Fashion and similar sectors of the industry have created a culture that is ingrained and entrenched. It will not be easy to convince the industry to change its thinking when its current model appears so profitable.

In conclusion, academia appears to be confronted with two ways to approach this problem. In the short term, it may be necessary to refocus and attempt to provide solutions to the problem of fit that

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are tailored to current practices rather than providing solutions tailored to the practices academia believes industry has. This refocusing could provide solutions that could be implemented now, with the current skill sets available and within the current model. In the longer term, it must be considered that academia needs to lead industry towards a new model, based on the body rather than the garment, implemented through the application of new technologies and new practices. This will be the more difficult remedy to the problem of fit as it will require a paradigm shift in both mindset and culture because it will involve new methods of garment generation to be taught at the training stage and extrinsic methods to be adopted by those already practising in industry.

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