

**A STUDY OF PATTERNMAKING
AND THE CONTRIBUTING FACTORS MAKING IT
A SCARCE AND CRITICAL SKILL**

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**A STUDY OF PATTERNMAKING
AND THE CONTRIBUTING FACTORS MAKING IT
A SCARCE AND CRITICAL SKILL**

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MASTER OF APPLIED ARTS: FASHION

in the Faculty of Arts and Design
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2018

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31 October 2016

To whom it may concern

Re: Thesis by Karin Williamson

This letter serves to confirm that as requested by DUT I have recently edited the Thesis:

A study of patternmaking and the contributing factors making it a scarce and critical skill prepared by Karin Williamson.

To the best of my knowledge this work is now free of spelling and grammatical errors and reads well. I did not edit content unless there were obvious errors that required correction but where I deemed it necessary I made comments for the researcher to consider.

I am a qualified editor and proof reader.

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DECLARATION

I, Karin Williamson, hereby declare that this research dissertation is my own work and that all sources I have used or quoted have been indicated and acknowledged by means of references.

I hereby certify that this dissertation has not been submitted for a degree at any other university or institution.

Karin Williamson

ABSTRACT

Patternmaking skills have been identified as being scarce and critical by the Fibre-Processing and Manufacturing Sector Education and Training Authority (FP&MSETA 2015) and this presents a potential threat to the South African clothing industry.

Exploratory discussion with clothing industry stakeholders and subject matter experts indicated that the need for patternmaking knowledge and skills is increasing, while the availability of these skills is decreasing.

The purpose of this research was to identify education and training areas of development with respect to patternmaking. The research was informed by an extensive literature study covering three critical areas, namely, the identification of the diverse patternmaking skills required, the expectations of the clothing industry in relation to these skills, and how the education and training of patternmakers' skills can be improved.

Primary data was collected from a focus group comprised of subject matter experts in the patternmaking field and then from an online survey questionnaire to clothing industry stakeholders. Finally, an analysis of current teaching approaches and learning practices was undertaken. This was to establish what changes needed to be implemented to address the new requirements for patternmaking skills in the changing manufacturing landscape.

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ACRONYMS

AAMA	American Apparel Manufacturers' Association
CAD	Computer-Aided Design
CIP	Competitiveness Improvement Program
CMT	Cut, Make and Trim
CTCP	Clothing and Textiles Competitiveness Programme
DHET	Department of Higher Education and Training
DUT	Durban University of Technology
DTI	Department of Trade and Industry
FDI	Foreign Direct Investment
FP&MSETA	Fibre, Processing and Manufacturing Sector Education and Training Authority
GCI	Global Competitiveness Index
HEQSF	Higher Education Qualification Sub-Framework
ISCO	International Standard Classification of Occupations
ITAB	Industry Training Advisory Body
KZN	KwaZulu-Natal
MSME	Micro, Small and Medium Enterprise
PPPFA	Preferential Procurement Policy Framework Act
OFO	Organising Framework of Occupations
SASTAC	Southern African Sustainable Textile and Apparel Cluster
TVET	Technical and Vocational Educational Training
UoT	University of Technology
UCTA	United Clothing and Textile Association
QCTO	Quality Council for Trades and Occupations

CHAPTER 1 – BACKGROUND AND CONTEXT

1.1 BACKGROUND

This study investigated patternmaking and the factors which make it a scarce and critical skill within the South African clothing industry.

It is important that the two terms, scarce and critical, are considered to be different and the meanings defined. The Fibre, Processing and Manufacturing Sector Education and Training Authority (FP&MSETA) originally declared in 2013 that patternmaking was only a scarce skill, but in 2015 it was identified as being both a *scarce* and a *critical* skill.

Dictionaries define the terms *scarce* and *critical* as:-

Scarce (skills): being deficient in quantity or number compared with the demand, not plentiful or in abundance (dictionary.com 2016).

Critical (skills): refers to the decisive importance with respect to the actual outcome; now being crucial for the survival of the industry (dictionary.com 2016).

In order to understand the current situation with regard to patternmaking it is necessary to recognise the changes in the clothing industry in South Africa over the last thirty seven years (1980 - 2017).

The clothing industry environment in South Africa changed significantly over this period late 1990s the downturn really kicked in when local clothing manufacturers struggled to compete against imports from Chinese and Indian manufacturers whose prices were much lower. According to Young (2014), competition from China and India caused the decline in the once-thriving garment and textile industry in South Africa.

This resulted in many large clothing companies closing down, or downsizing and relocating to areas with cheaper running costs like Lesotho and Swaziland (Van der Westhuizen 2007). Some manufacturers even changed the focus of their business

towards niche markets while others downsized to become design houses or importers.

An email communication on 24 November 2016 by an industry consultant and lecturer, Vijay Bhagwan, concurred;

“...the union wage action during the 1990s impacted further, leading to almost doubling of wage rates. The rand losing strength against the dollar after democracy helped the industry on the export side, but that mostly benefited the companies in the Western Cape, rather than those located in KZN. During the latter part of the 1990s, due to high cost of imports of foreign manufactured items, local manufacturing became unattractive. This was because of local price points not being met and this seems to have dogged the industry until current times.”

With the industry improving towards late 2013 early 2014, Staritz and Morris (2013) observed that successful manufacturers in South Africa focused on products that required shorter runs, had a quicker response time and had higher fashion design content. Simultaneously in 2014, Young mentioned that the domestic fashion scene had started to flourish. As the fashion scene picked up, the higher fashion design detail increased the demand for patternmakers.

With this demand for patternmaking, the curriculum renewal project at Durban University of Technology (DUT) afforded staff from the Clothing Management programme the opportunity to review and revise the curriculum - including the patternmaking content. The Clothing Management programme has been in existence since 1979. There have been several versions of curriculum changes but the patternmaking content has remained relatively unchanged. The teaching methods, however, changed over the last fifteen years, with less emphasis on students' patternmaking ability, as there were relatively few job opportunities for this during the downswing in the industry.

To illustrate the diversity of thought and the complexity of conceptualising patternmaking, the perceptions of various prominent authors of patternmaking text books were explored:

Garcia and Regan (2001: 32) observed as early as 2001 that the increase in technology used in the clothing industry, was inevitably making computer skills training a requirement in patternmaking. However, in this research, manual patternmaking will be the major focus area.

Aldrich (2004: 4) defined patternmaking as an encompassing process from design concept to achieving a two dimensional (2D) shape to fit around a form, this form being the three dimensional (3D) human form.

Haggart (2004) placed emphasis on the necessity of an understanding of body proportions and measurements.

Bankel (2005) noted that patternmaking principles demanded a high level of proficiency and skill.

According to Beduschi and Italiano (2013), in an international journal for Arts & Commerce, patternmaking is a highly-developed technical skill that requires precision in drafting, pattern adaptation and pattern development processes.

Patternmaking is a highly technical skill and has developed into a scarce and critical skill in South Africa (FP&MSETA 2015). This is not uncommon nor is it an exclusively South African problem. Marino (2013) highlighted the same problems in Australia, where there was a diminishing skills base and difficulty in finding skilled people in patternmaking and related areas. Australia's Industry Training Advisory Body's (ITAB) market-effectiveness report supports Marino's comments (Deloitte Access Economics 2012). The report by Deloitte noted that patternmaking in the Australian clothing industry was a scarce skill and this was seen as a potential threat to their clothing industry. This report is, as the South African clothing industry is currently in a similar situation to that experienced by the clothing industry in Australia during 2012.

It was the concerns of Deloitte and the FP&MSETA which defined patternmaking as a high risk area that helped to focus this research study.

Exploratory discussions with external industry stakeholders, patternmaking subject matter experts, representatives from full-line manufacturers, design houses and education institutions confirmed that patternmaking was again seen as one of the fundamental areas in the clothing industry. The experts emphasised the importance and value of patternmaking. They voiced concern regarding the lack of patternmaking knowledge and skill in the clothing industry.

1.2 PROBLEM STATEMENT

Patternmaking is a vital component in the production process of the clothing industry. It is currently regarded as both critical and a scarce skill, without which, both the clothing production process and the entire clothing value chain will be negatively impacted.

This study evaluates patternmaking in terms of both its decisive importance and scarcity within the clothing industry.

1.3 AIM OF THE STUDY

Pattern makers raised a variety of perceptions about exactly what patternmaking entailed, what skills and training were needed and how patternmakers could be developed. Common knowledge of these fundamental issues is critical before solutions can be developed to address these concerns which will reinvigorate the clothing industry in South Africa.

This research aims to investigate the multifaceted nature of patternmaking and the related knowledge and skills required by the clothing industry. Ultimately this research can be used to guide and inform the development of interventions to address the shortage of patternmakers in the clothing industry.

1.4 CRITICAL RESEARCH QUESTIONS

The critical questions that need to be addressed are:

- What are the contributing factors and specialised professional skills that relate to patternmaking?
- What is the perception of industry personnel to these factors and skills?
- What patternmaking training and education interventions could potentially meet the needs of industry?

1.5 OBJECTIVES

The objectives of the study are:

1. To develop a matrix and flowchart to identify the factors relating to patternmaking that contributes to it being a scarce and critical skill.
2. To use the matrix and flowchart as tools to develop an online survey questionnaire to gather data from a wider industry audience.
3. To use this data to analyse patternmaking as a skill in order to make recommendations for possible interventions.

1.6 SIGNIFICANCE OF THE STUDY

Tedesco, Operti and Amadio (2014) remarked that the curricula offered by traditional organisations are increasingly perceived as being outdated with regard to knowledge, skills, abilities, values and behaviours critical to successful job performance. Social, economic and technological changes and increased international competitiveness over the past decade have made the need for education crucial to all countries, particularly those in the developing world. Higher education institutions need to prepare students for an ever-changing future and workplace (Ford and Botha 2007).

This research will clarify the common understanding of patternmaking skills in the clothing industry. It will also identify the various scarce patternmaking skills and indicate why they need to be integrated into new programmes. South Africa's

Universities of Technology (UoT) are aligning their qualifications to the new Higher Education Qualification Sub Framework (HEQSF). Application of the realigned content of the UoT courses will better equip students to participate in the technological world.

Short courses could be developed, with reasonable immediate effect, to upskill and train current industry staff. The implementation of the outcome of this research into a skills development programme could benefit the industry in both the short and medium terms.

1.7 RESEARCH METHODOLOGY

This is a qualitative study situated within an interpretive research perspective (Blessinger 2015). It falls into the methodology defined by Greenbaum (2000: 236) as 'research that has an objective to gain insight into attitudes and feelings, not to develop numerical data'. Qualitative methodologies include focus groups, mini-groups and one-on-one interviews, questionnaires and descriptions in words and pictures. This type of research is uniquely described by Pellissier (2007) as a craft whereas quantitative research is a science.

Within this research a focus group, one-on-one interviews and an online questionnaire were used as a data collection instruments/ tools and as a means to satisfy a qualitative research methodology.

Greenbaum (2000) explained that focus groups are normally used in the early stages of product and concept development of a questionnaire. In this research the focus group provided an overall perception of manufacturers of varying sizes about their understanding of patternmaking concepts and skills and their scarcity in South Africa.

A focus group was used followed by two one-on-one interview sessions. The focus group members were able to formulate their own thoughts and articulate their motivations without being lead or swayed by the moderator [the researcher] (Pellissier 2007).

The method used in this research is focused on trying to represent the clothing industry and its environmental needs as accurately as possible in a way that will

assist in the development of a curriculum with a structure of teaching/ training in patternmaking that will eventually make patternmaking skills less scarce and will alleviate the critical need for patternmakers in the country. Pellissier (2007) sums it up by stating that the research becomes the interpreter between the consumer (education) and the client (clothing industry).

1.8 DELIMITATIONS

The eThekweni Metropolitan region is one of the two large concentrations of clothing industry businesses in South Africa. The other region is in the Western Cape. Due to time and budget constraints, the study is limited to the eThekweni Metropolitan region. The research includes large, full-line companies and smaller design centres/ houses.

1.9 DEFINITION OF TERMS USED

Patternmaking is the process of developing a two dimensional (2D) flat pattern – usually made in paper or cardboard – in order to construct a three dimensional (3D) garment in a variety of fabrics, and which imparts various characteristics to the finished garment.

The process of the patternmaking activity is multifaceted and complex. This research attempts to determine some of the variances of this activity.

The following terms are significant in this study:

Basic block – According to (Aldrich 2011), a basic block pattern is the foundation pattern constructed in two dimensions (x and y-axes) to fit an average body, be it for ladies, men or children. The patternmaker then uses this as a foundation (block) to make the pattern for a technical design also referred to as a technical drawing (TD). Similarly, Beazley and Bond (2003) sum up a pattern as a foundation pattern that reflects the size, shape and posture of the human figure without the inclusion of style features or any detail.

Drafted pattern – This is a pattern that is drafted from scratch (using a body specification) and has the correct fit and style lines for a specific customer base (Pritchard 2013).

Grading – This is a process where a master pattern (final pattern) is increased or decreased from the sample size to achieve a variety of different sizes for mass production. This process is now usually done by computer-aided design (CAD) grading systems in medium and large companies. However, the CAD systems are only tools in the hand of the grader. Waddell (2004) remarked that the grader is an irreplaceable expert in the grading process and primarily needs patternmaking skills.

Master pattern – This is the final pattern that will be used to grade and make up the final garment/ production (Aldrich and Aldrich 1996).

Mock-up – This is a trial/ 'toile' garment to assess the accuracy of the style analysis/ adaptation done to the pattern (Aldrich 2004)

Pattern – A pattern is a combination of 2D flat shapes usually made in paper or cardboard. It has to ensure that the desired silhouette, fit, hang-and-fall and detail of the garment match the original fashion design illustration or idea. The pattern also has to have instructions built into it as to how the garment will be assembled. This is achieved by the use of various coded markings or notches to indicate which pattern pieces need to go together, and drill holes to indicate pocket positions and dart positions.

The term 'patternmaking' is the process of developing a pattern to construct a garment. Patternmaking is a creative and analytical interpretation of the technical part of design and includes drafting basic blocks and style adaptations that form part of this whole process (Aldrich 2008).

Rough pattern – This is a pattern that has all the changes made according to the customer's needs but is not yet ready to go into production.

Style analysis/ adaptations – This is the ability to 'read and understand' a fashion drawing and to visualise the adaptations that need to be done to the basic block for the correct placing of details of the style (Defty 1988).

Technical Drawing (TD) – This is an accurate graphic presentation of a designer’s fashion drawing in correct proportion to the human figure form (Defty 1988).

1.10 CHAPTER SUMMARIES

Chapter 1: Background and Context

This chapter presents a summary of the research. It includes a brief synopsis and scope of the study, the aim and objectives, the problem statement, critical research questions, and background.

Chapter 2: Literature Review

This chapter focuses on a review of academic literature pertinent to the study.

- Clothing industry shape, size and influences.
- Competencies/ skills needed for patternmaking.
- The role of human capital.
- Teaching patternmaking.

Chapter 3: Research Methodology

This chapter presents a method of research and sampling, and indicates how data collection and data analysis was carried out (reflecting on reliability, validity, ethics and delimitations).

Chapter 4: Data Analysis and Discussion of Results

This chapter focuses on the analysis of data from the focus group interview, online questionnaire and all secondary data.

Chapter 5: Conclusion and Recommendations.

This chapter concludes the study and provides key insights emerging from the study and suggests future research possibilities.

CHAPTER 2 - LITERATURE REVIEW

2.1 INTRODUCTION

This literature study provides a background and foundation on which this research is based. The main areas relating to the research include the background to the clothing industry, the influences that might affect patternmaking and the contributing factors supporting patternmakers. The competencies and knowledge relating to patternmaking are also reviewed.

2.2 CLOTHING INDUSTRY'S SHAPE, SIZE AND INFLUENCES

According to Altman (1993), the South African clothing industry historically benefited from the protection imparted by high import tariffs while the National Party apartheid government's Import-Substitution measures were in place. He mentioned that the industry's decline from the late 1980s extending into the 1990s was associated with import penetration. Altman (1993) pointed out the following influences as contributing factors causing the decline:

- The clothing industry was previously insulated due to trade sanctions imposed on the apartheid government and protective tariffs.
- Clothing businesses had a conservative nature, electing to survive rather than to maximise profit, and opting for static flexibility over dynamic flexibility. This static flexibility placed an emphasis on labour cost flexibility, historically achieved through decentralisation to low-wage areas, such as neighbouring states, and decentralisation.
- Lack of accessing new strategies such as marketing, operational change and skills development.

Barnes (2005) noted that strategies to develop skills had not been pursued adequately and the industry had suffered from low levels of capital investment. It is also important to understand that the South African clothing industry underwent a difficult restructuring process over the past decade. Morris and Reed (2009) highlighted the combined impact that domestic and international factors had on the

local clothing industry, manifesting into declining export in the clothing sector, in relation to the total manufacturing output of South Africa.

In an email communication on 24 November 2016, an industry consultant and lecturer, Vijay Bhagwan, confirmed that “during the latter part of the 1990s high imports of foreign manufactured clothing caused local manufacturing to become unattractive.” Bhagwan also observed that “the closure of large companies led to an exodus of the skills required sustaining and improving the industry.”

Although the main competition faced at the time was cheaper clothing with better quality, the outcome might have been totally different if the response had rather been an intensive effort to upskill workers and the promotion of innovation. The sector could then have had a skills-led competitiveness that would have backed a move to higher income and higher quality clothing (Morris and Reed 2008).

Morris and Reed (2009) stated that “Paradoxically, underinvestment in both human and physical capital in the South African clothing and textile sector has deepened the crisis precipitated by globalisation and currency weakness, and the sector has been incapable of dealing with rising import penetration.” They concluded that South Africa faced various challenges which prolonged and deepened the skills crisis, and also that there was a serious need to develop skills in the clothing industry that existed. Garcia and Regan (2001) had said that the role of improving human technical expertise and keeping abreast of the latest technology had become very important in the global market place. Truett and Truett (2010) concurred that for the industry to operate with technical and economic efficiency, skilled and competent technologists are needed.

Van der Westhuizen (2007) stated that the clothing industry is highly labour intensive and is therefore considered a vital industry by many developing countries which typically have an abundance of labour. The Department of Trade and Industry (DTI) identified as far back as 2003 that the clothing and textile industry was a priority sector for the unemployed. South Africa, with its low rate of employment – especially among the youth – should encourage absorption of an even greater proportion of the population by growing the clothing industry. Ramdass (2007) explained that the

reasoning behind this is the fact that the clothing industry is the cheapest and easiest sector in which to create jobs. Coetzee (2014) determined that the clothing industry has a low cost barrier to entry, making it easily accessible to new job seekers.

Ramdass and Kruger (2011) focused attention on the historical factors that played a role in the decline of the clothing industry that stemmed from the trade sanctions during apartheid which insulated the clothing industry from needing to become internationally competitive. The protective tariffs led to strategies such as marketing, operational change and specifically the development of skills not being pursued. Investment in machinery was done on an ad hoc basis only which meant that the industry was using inadequate and outdated machinery.

Lamar (1998) observed that some of the factors that constrained African participation in the international clothing industry were inadequate infrastructure, remoteness, persistent corruption and a perception that Africa has a dubious business history.

When he was the president of the Clothing Trade Council of South Africa, Randeree predicted that the upgrading of skills and technology could improve the industry in South Africa (Ramdass 2007).

Ramdass (2007) also drew attention to the fact that the clothing industry is labour intensive and therefore a desirable industry in the development of the South African economy. However, the highly skilled labour force required in the construction of quality fashion garments, with expertise in the use of specialised machinery and operational skills, was not readily available. This was because there has been little investment in the past in skills development on the part of the industry itself and on the part of government.

In 2007 Trevor Manuel, Finance Minister at the time, observed in a speech that the clothing and textile industry was a major player in the creation of jobs in South Africa. However, stakeholders in government, industry and labour have learnt challenging lessons; it is very important that the clothing industry needs to plan for its survival through the effective use of its intrinsic strengths (Ramdass 2007).

Ramdass and Kruger (2011) noted that jobs were created through production for niche markets, domestically and internationally. This observation is even more valid today. The production done by Cut, Make and Trim (CMT) manufacturers plays an important role in the clothing industry. Clothing manufacture centres on the design and marketing of niche fashion items, produced by flexible, well organised factories that can accommodate frequent style variation and small orders. In order for CMTs to become successful producers for niche markets, it must be kept in mind that such high-end garments entail production of more intricate designs with constantly changing styles but will retail at higher prices. Therefore, in CMTs multi skilled workers are required, whose capabilities need to be regularly upgraded, and who have to be remunerated in accordance with their skill levels. These various high styled garments also require workers to have an understanding of patterns which means that patternmakers with a higher level of patternmaking and construction skills are required.

In KwaZulu-Natal and the Western Cape the clothing industry is well established. The largest clothing and textile sector can be found in the eThekweni Metropolitan region in KwaZulu-Natal. In January 2013 there were 14 000 jobs on the line with close to 340 factories due to close in the KwaZulu-Natal region. This nearly brought the industry to its knees. Paruk, as cited in Naran (2013), confirmed that most manufacturing was done overseas and clothing manufacturers were not able to compete with these cheap imports. Naran (2013), who chairs the United Clothing and Textile Association (UCTA), found that clothing labels primarily read 'Made in China', as well as India, Mauritius and Bangladesh.

The South African clothing industry often exclusively supplied Lesotho and Swaziland with work (due to their proximity to SA), making use of their low-cost labour market. Originally many of these were satellite plants from the big manufacturers created in Lesotho and Swaziland to supply export markets when trade sanctions were applied against South African manufacturers. These plants then became a means of labour for the local market at better rates than the metropolitan regions. In addition, the decentralisation of companies to rural locations such as Hammarsdale, Isithebe, Tongaat, Ladysmith and Newcastle all provided lower cost employment opportunities as a source of labour. Most of these outlying

companies experience difficulty finding technical staff in their regions. These firms specialised in short, more complex production runs, with a high fashion content (Morris and Reed 2009) & (Fernandez-Stark, Frederick and Gereffi 2011).

Lesotho attracted Foreign Direct Investment (FDI) for the clothing value chain, predominantly from Taiwan in the Cut Make and Trim (CMT) segment. Foreign investors initially chose Lesotho because of political circumstances including sanctions on South African trade and the trade agreements. It was not in response to lower production costs or any other competitive advantages. Lesotho could upgrade to higher value-added activities through relationships with South African companies who had a deeper presence in Lesotho, and were more interested in investing in upgrading. However, while South African companies started relocating production to Lesotho to service South African retailers after 2004 in order to lower production costs (especially labour) and take advantage of regional trade agreements, there are relatively few South African firms currently operating in Lesotho (Morris and Reed 2009).

The clothing industry in South Africa is affected in a similar way to America but in a different timeframe. The Technical Advisory Committee of the American Apparel Manufacturers Association (AAMA) noted the following: in 1993 an individual plant in the U.S. may be owned by a company that also sources products from “abroad” from its own offshore plant, or from independent contractors. Thus a clothing plant is just another sourcing option that must earn its keep by being competitive in cost, quality and responsiveness (Lamar 1998).

Clothing producers became uncompetitive in the mid-1980s. Ramdass and Kruger (2011) revealed an example of Australia’s government deciding to gradually reduce import barriers in the clothing and textiles industry. Clothing manufacturers faced a predicament in their operations and began shutting down, while the larger organisations could outsource their production volumes to countries like China and India. The Australian retailers used the opportunity to procure clothing and textile products offshore and dominated the local markets while traditional suppliers began to face competition from “house” labels.

The South African situation is similar to Australia's, whose timeframe is just a few years earlier. While Australia gradually reduced the import barriers, in South Africa it was more immediate. All patterns and sample garments were made overseas. This is when patternmakers were not really needed in the South African industry due to the whole process being outsourced. The industry became a very large global business as clothing companies and retailers responded to changes and challenges in the world market (Ramdass and Kruger 2011).

In 2014 the South African Department of Trade and Industry (DTI) approved a R200 million (approx. US\$ 19 million) grant and a 5-year plan for the establishment of a Southern African Sustainable Textile and Apparel Cluster (SASTAC). The purpose of the national cluster was to help the South African clothing industry improve its competitive capability in the global sustainable textile and clothing manufacturing sector (MENA Report 2014).

The initiative was funded through DTI's Competitiveness Improvement Programme (CIP), as part of the overall Clothing and Textiles Competitiveness Programme (CTCP). The CTCP aimed to stabilise employment and to improve the country's overall competitiveness in the clothing, textile, footwear and leather goods manufacturing industries.

The main aim of the CTCP initiative was to build capacity and improve the South African textile and apparel industry to:

- Effectively supply local and international consumers with fully traceable sustainable apparel and household textile products;
- Effectively supply government with fully traceable sustainable textile and apparel products that adhere to the 100% local content designation as stipulated by the Preferential Procurement Policy Framework Act (PPPFA) regulation; and
- Facilitate the development of sector and/or supply chain specific Sub-National Clusters.

The objectives of SASTAC included establishing and managing shared national resources to provide an enabling environment for members and other sub-national

clusters, incubating opportunities for sustainable Micro, Small and Medium Enterprise (MSME), participation and employment creation from farm to retail, and maximising the production capacity development and beneficiation of local raw materials, starting with cotton and then broadening its scope to include all other natural and synthetic fibres. This was a very good initiative in principle and could show substantial returns on the investment (MENA Report 2014).

2.3 PATTERNMAKING

2.3.1 Manual Patternmaking Process/ Flow

In order to concentrate on patternmaking skills, an understanding of patternmaking needs to be created and defined. Then the processes that go into making a pattern need to be looked at. There are alternative terms that exist and are used when talking about patternmaking, these being pattern technology (the study or use of industrial skills) and pattern cutter (the slang word used in industry to describe the actual person making/ cutting patterns (*Reader's Digest* 1996)).

The term patternmaking has been chosen by the researcher due to its more complex definition. The following definition and processes by different authors would apply to both manual and Computer Aided Design (CAD) patternmaking.

Thong-Hwee, Eng-Wah and Yong-Tsui (1995: 54-56) simplistically stated that "...patternmaking is the process of transforming a fashion concept into a three dimensional (3D) garment. Patternmaking is a creative process that refers to several stages before getting to the final product – the garment. The stages are drafting blocks, styling these blocks, cutting, folding, copying, modifying and experimenting with shape and form to get a set of pattern pieces that will reflect the fashion concept."

On the other hand, Rissanen (2010: 3) simplified the sources of patternmaking activities into four types but combinations of any three of these sources could occur.

The patternmaker may make a pattern from:-

- An idea, sketch or Technical Drawing:
 - A verbal or sketched communication by the designer.
- Specification sheet:
 - Communication sheet Document to communicate all information pertaining to a garment done by the apparel industry (such as: technical drawing, product category, size specification, critical and secondary body or garment measurements, operation breakdown)
- Draping:
 - Fabric pieces draped on a dummy.
- Rip-off:
 - Pattern taken from an existing garment.

Patternmaking is a technical skill that is carefully developed and requires precision and accuracy in the initial drafting process of basic blocks (Boorady and Hawley 2008). Patternmaking is also referred to as a mix of analytical and creative thinking by Gully (2009).

2.3.2 Computer Aided Design (CAD) in the patternmaking process

In the 1970s Computer Aided Design (CAD) emerged with patternmaking, grading and marker making activities being computerised. CAD was a way to simplify and create a paperless environment in the patternmaker's development of garments. Patternmakers could conceptualise, create and modify styles with the click of a button (Johnson and Moore 2001). It was neater, quicker, more efficient and easy to store for future digital retrieval – but CAD is still dependent on the operator's manual patternmaking knowledge and skill.

Although this research focused on the manual skill of patternmaking, Computer Aided Design (CAD) needs to be mentioned. In the industry, while CAD plays a role in the general making of patterns, manual patternmaking is still a precursor to computer aided design. The manual process of patternmaking needs to be

understood so that the computer process becomes much easier to manipulate and implement to create a new pattern. Various paradigms exist – some patternmaking specialists believe a patternmaker can begin their training on computer, others believe a strong manual patternmaking background is essential. The debate as to when to introduce CAD to a trainee patternmaker is far from being agreed upon. What is important is that the value of CAD in the future of the industry is not negotiable – it is imperative (Johnson and Moore 2001).

2.3.3 Importance of patternmaking

The research of Albanese, O'Neill and Hines (1998) as cited in Boorady and Hawley (2008) found that in 64 institutions of higher education in the United States, patternmaking was required in three different areas of study: fashion design, clothing and textiles, and apparel manufacturing. The information tabulated below represents their findings to indicate the important role of patternmaking in higher education courses.

#	Areas of study	% of flat patternmaking required
1	Clothing/Apparel Manufacturing	100%
2	Fashion Design	95.7%
3	Clothing & Textiles	61.5%
4	General Design	13%
5	Retailing area of study	11.3%

Table 2.1: Patternmaking's important role in higher education (Information tabulated from Boorady and Hawley (2008: 132)).

Fashion design is only recently being researched and through this process different types of patternmaking practice have become obvious in higher education. At the moment, the teaching of patternmaking typically happens in a practical lecture-lab. The instructor teaches the steps and students duplicate the work. Patternmaking courses are slowly moving in the direction of an internet-based layout, for which students no longer attend class sessions at a certain time or place. Such innovative ways of providing education have typically always been provided through a text-based format. Boorady and Hawley (2008) looked at how visual topics, such as patternmaking, can be dealt with going into the future. Their article explores the possibilities for the use of animation software for teaching patternmaking, suggesting

involvement into virtual reality and hologram use, as teaching technologies in higher education. Cavanagh and Peté (2016) actually explored how digital natives - fashion students - choose to learn by constructing videos of patternmaking.

2.4 PATTERNMAKING SKILLS

In this research it is important to have an understanding of the different types of skills that are required by patternmakers. Patternmaking skills fall into skill-based performance, one of three categories that distinguish human behaviour, and according to Rasmussen (1983) the three typical levels of functioning skills that emerge are:

- Skill-based performance,
- Rule-based performance and
- Knowledge-based performance.

Skill-based performance represents a sensory-motor behaviour during activities which, following a statement of an objective, take place as a smooth, automated and highly integrated pattern of activities (Rasmussen 1983). Skill-based performance is closely related to the psychomotor domain within Bloom's Taxonomy theories.

Secondly, rule-based performance has a sequence in a familiar work situation and is controlled by a stored rule or procedure. Performance is thus goal-oriented. Rasmussen (1983) says that the skill-based performance happens without the person's conscious attention.

In knowledge-based performance, the goal is explicitly formulated and then a plan is developed to take into consideration all the variances.

2.4.1 Definitions of skills

Skills are defined as a craft, especially a trade or technique in a job requiring manual dexterity or requiring special training in which a person has competence and experience such as patternmaking.

The term “craft skill” related to specific pieces of applied knowledge within a craft, but it is now frequently used in a broader sense. Rugg (2014) observed that originally craft skill was viewed “too low level” to be included in academic knowledge. However, there has been a growth of interest in craft skills, particularly in academic craft skills, that has shown that these skills (including patternmaking) are more important for academic learning than previously assumed (Rugg 2014).

It is further noted that the South African Organising Framework for Occupations (OFO) defines skills as the ability to carry out the tasks and duties of a given job (South African Department: Higher Education and Training 2013). These will be discussed in more depth in 2.4.4.

Patternmaking skills do not only include the requirement of manual dexterity but also the ability, in conjunction with high level cognitive skills, to visualise two dimensional (2D) flat patterns as a three dimensional (3D) garment.

2.4.2 Skills required in patternmaking

Way back in 1968, Roger Sperry and his colleagues at the California Technological Institute found that each hemisphere of the brain seemed to have highly specialised functions. They found that, depending on which hemisphere was dominant within an individual, they could be presumed to have the following mental and personality characteristics according to this dominance.

- If the left hemisphere was dominant this indicated that someone is highly verbal, primarily a sequential learner is time conscious, all-or-none (outcome) oriented, prefers logical and analytical thinking, and is basically rational.
- If the right hemisphere was dominant this indicated that someone is not easily able to express experiences in verbal form, has excellent spatial

memory and highly developed sensory (particularly spatial) recall. This person is proficient at synthesis and intuitive processing' (Caine and Caine 1991: 33).

Based on the above, patternmakers tend to need both hemispheres to be intuitive, analytical and creative.

Caine and Caine (1991) further found that there are two different systems of memory: a spatial memory system and a set of memory systems for rote learning.

Humans have one memory system (the spatial system) designed to register experiences in ordinary three-dimensional space. This system is always engaged and inexhaustible and over time it increases the items, categories and procedures that might be taken for granted.

Secondly, there are facts and skills that are dealt with in isolation; these are organised differently by the brain and need much more practice.

One of the most important concepts explored through Caine's research, is that humans understand and remember better when facts and skills are embedded in the natural, spatial memory. Spatial memory is the area into which the two- and three-dimensional perception needed by the patternmaking process would fall. One cannot rote learn the process; it is always changing with the adaptations from one design to the next.

Caine and Caine (1991) also promoted experiential learning or Work Integrated Learning (WIL) as spatial memory is generally best developed through experiential learning expanded in respect to the industry. Students of patternmaking must get real life exposure at an apparel manufacturer, and specifically in the area of the patternmaking activities.

Success in developing a fully rounded patternmaking learner will depend on using all the senses and engrossing the learner in a multitude of complex and interactive experiences.

Although the whole patternmaking process might seem to be a very simplistic concept, it takes a very special individual to become a patternmaker. The person would have to be able to access their left- and right brain thinking abilities whenever needed – often simultaneously.

Coetzee (2014) concluded that there are different theories in the classification of skills. The skills mentioned in Coetzee’s thesis – soft, social and core skills – are applicable to industries in general. These skills are also important in helping to develop a skilled patternmaker.

2.4.3 Patternmaking skills shortages

It is necessary that the two terms, scarce and critical, are considered to be of extreme importance and it must be understood that there is a defined difference between them. The Fibre, Processing and Manufacturing Sector Education and Training Authority (FP&MSETA) first declared patternmaking to be a scarce skill but in 2015 it was identified as both a scarce and a critical skill.

General dictionary definitions for the terms “scarce” and “critical” are as follows:

Scarce (skills): refers to being deficient in quantity or number compared with the demand; not plentiful or in abundance (dictionary.com 2016).

Critical (skills): refers to the decisive importance with respect to the actual outcome; now being crucial in the survival of the industry (dictionary.com 2016).

- Scarce skills:

“Scarce skills refer to the areas within occupations in which there is a shortage of qualified experienced people” (FP&MSETA 2015).

Table 2.2 below outlines the top ten scarcest skills in the FP&M sector in South Africa and patternmaking (OFO code 652204) is one of them. The OFO code is used to identify scarce skill occupations across the sector.

OFO CODE	SCARCE SKILL
715302	Machinist
214908	Materials engineering technologist
653301	Machine mechanic
214101	Process engineer
683401	Upholsterer
131102	Production/ Operations manager
821501	Forester (forestry worker)
652204	Patternmaker
312201	Production/ Operator supervisor
216603	Multi-media designer

Table 2.2: Top 10 scarce skills in the FP&M sector

(FP&MSETA 2015)

- Critical skills:

“Critical skills refer to ‘top-up’ skills within an occupation which are specific to a particular occupation resulting in a skills gap” (FP&MSETA 2015). These can include cognitive skills, such as problem solving, language and literacy skills.

Table 2.3 below outlines the top ten critical skills in the FP&M sector in South Africa. Patternmaking falls into both the Technology-related expertise and Design and Innovation.

CRITICAL SKILL
Operations Management
Technology-related expertise
Design & Innovation
Supervisory/ Team Leadership
Information Technology expertise
Project Management
Production Planning
Problem Solving (Estimating)
Coaching/ Mentoring
Sales and marketing

Table 2.3: Top 10 critical skills in the FP&M sector

(FP&MSETA 2015)

Addressing the patternmaking skills shortage, or intervention.

Due to the fact that the initial research by the FP&MSETA into how to address the patternmaking skills shortage in 2012 was not successful, patternmaking has now become a scarce-and-critical skill in the clothing industry (FP&MSETA 2012).

It is hoped that through this research, interventions could be implemented to address the skills shortage.

Impact of the skills shortage on the clothing industry.

As it can take ten years or more to develop sound patternmaking knowledge and skills, it comes as no surprise to note that many patternmakers belong to an aging workforce. These employees hold the institutional memory regarding the specific company and the clothing industry which should not be lost. This knowledge should be transferred to new employees through mentorship and guidance. It is therefore important that manufacturers have a succession plan in place while the experts in patternmaking are still around (FP&MSETA 2012).

Rapid technological advancement and development has increased the need for high-level, technically skilled and multi-skilled technical employees (FP&MSETA 2015). However, these employees have to have the basics as a foundation on which they can build their technical skills. This foundation is usually developed through formal education – for example a 3 year diploma course - followed by industry experience in various capacities in both preproduction and production jobs. Successful patternmakers bring together a wide range of additional knowledge encompassing customer requirements, quality, production and fabric knowledge along with their understanding of human body shape and size.

The skills shortage in the clothing industry has had a cumulative effect on the clothing industry over the past five years (FP&MSETA 2015). In the clothing industry, manufacturers are failing to attract younger graduates into this field so they are left with an aging workforce that is threatening the sustainability of the industry. It has been noted by the FP&MSETA (2015) that patternmaking is one of the occupations

to which young entrants are not attracted. There are potentially complex reasons for this – and a topic for research on its own - but the main culprit is probably a combination of low starting salary and the perceived difficulty in mastering patternmaking. A respondent during the Focus group mentioned that “youngsters see the designer and positions in retail to have status, title and be prestigious. They don’t have the pure passion for patternmaking anymore”.

It is worth mentioning that in the Sector Skills Update report of 2015, the basic skills training for patternmakers has generated an amplified focus on design type skills and retail related positions. This phenomenon has negatively affected the clothing industry. This research has touched on the reasons why this might be happening; it was covered in two questions in the online questionnaire about remuneration and stress levels related to patternmaking positions.

The reasons cited for these difficulties included that many of the manufacturing positions are perceived as less lucrative than the retail occupations, with less attractive salaries. The technological advancement in the industry needs constant skills upgrading and multi-flexible skills, with graduates also perceived as being underprepared (FP&MSETA 2015).

2.4.4 Organising Framework for Occupations (OFO)

The Organising Framework for Occupations (OFO) is a coded occupational classification system. In the Department of Higher Education and Training (DHET) it is a tool for identifying, reporting and monitoring skills demand and supply in the South African labour market. This will prove to be more valuable in establishing common understanding as it becomes more widely adopted and utilised by all stakeholders.

The model to identify and establish patternmaking skills is informed by the Organising Framework for Occupations (OFO) published in 2013 by the Department of Higher Education and Training (DHET). DHET included the OFO for skills planning to establish a common language for discussing occupations. This is a worthy starting point to identify skills in patternmaking. The OFO was an attempt to

create a standardised framework, aligning it to an International Standard Classification of Occupations (ISCO) framework and to reflect on the important changes that have taken place in the “world of work” (South African Department: Higher Education and Training 2013). The use of this common language has added significant value for further discussion in this research.

The following information was obtained from the report from the South African Department: Higher Education and Training (2013).

“The OFO adds value to skills development planning and implementation purposes in that it:

- Provides a common language when talking about occupations.
- Captures jobs in the form of occupations.
- Groups occupations into successively broader categories and hierarchical levels based on similarity of tasks, skills and knowledge.”

The updated OFO - 2013 includes the year of publication in order to date-stamp the version. It is all an attempt to create a standardised framework which would also align with the international framework. This would benefit the ease of comparison of labour markets and skills information with international data.

The OFO - 2013 framework is based on two main concepts:

- The concept of the kind of work performed, or the job, and
- The concept of “skill”.

The classification unit refers to the jobs (reflected as occupations on the OFO) whilst the classification variable refers to the kind of work done (that is, the tasks and duties), and the classification criteria identify Major, Sub-major, Minor and Unit Groups within the two dimensions of skill, that is, skill level and skill specialisation.

- Job and Occupation
 - A job is a set of tasks and duties carried out by one person.
 - An occupation is a set of jobs whose main tasks and duties are characterised by a high degree of similarity (skill specialisation).

- Skill

The OFO defines skills as “the ability to carry out the tasks and duties of a given job.” The dimensions below arrange the occupations into two groups.

- Skill level: this is a function of the complexity and range of tasks and duties performed in an occupation.
- Skill specialisation: this is considered in terms of four conceptual concepts:
 - The field of knowledge;
 - The tools and machinery used;
 - The materials worked on or with; and
 - The kinds of goods and services produced.

The SETA’s have been required to use the OFO for their five-year Sector Skills Planning since August 2005. This is where the Department of Higher Education and Training (DHET) Scarce and Critical Skills reporting list is developed. Actually being able to track skills scarcity on the basis of demand is essential, so that equilibrium can be attained in the supply and demand of skills in the market. Education/ training must be able to respond to the patternmaking demand.

The SETA has identified a number of ways, areas and approaches to address skills scarcity, namely:

- Drivers that affect scarcity: equity considerations, movement out of the sector and retirement.
- Indicators: high vacancy rates, high replacement rates.
- Strategies: bursaries, learnerships, apprenticeships, skills programmes and TVET College engagement.

The whole purpose of using the OFO is so that across the SETAs and the different government departments, including education departments, there is a consistency in the language used. These should also align with the International Standard Classification of Occupations (ISCO).

The value of using the OFO for industry includes the following:

- Job titles are more specific and consistent.
- The curricula and assessment specifications developed for occupations could inform performance assessment processes as a benchmark.
- Labour market consistency
- Ease of generating legislated reports
- Links to occupational qualifications
- Occupational pathways, developed by the Quality Council for Trades and Occupations (QCTO) could be used to inform career management of occupational groupings in the workplace. (South African Department: Higher Education and Training 2013)

Patternmaking programmes must relate closely to the OFOs patternmaking competencies but input from the industry stakeholders is important. Refer to APPENDIX B for the competency matrix from the OFO plus other competencies which are current teaching approaches in patternmaking.

2.5 HUMAN CAPITAL

Human capital is interrelated with skill, the two go hand-in-hand. Human capital is defined by dictionary.com (2016) as “the collective skills, knowledge, or other intangible assets of individuals that can be used to create economic value for the individuals, their employers, or their community.”

Coetzee (2014) defined human capital as “... an asset consisting of an individual’s unique combination of knowledge, experience, ethics and skills (aptitude) which are not visible to the accounting system, but add considerable value to a company in terms of improving productivity levels.” The author based her definition on the following factors:

- The individual’s knowledge, experiences, capabilities, skills, creativity and innovativeness (Edvinsson and Malone 1997) as referred to in Coetzee.
- The skill, knowledge and similar attributes that affect particular human capabilities to do productive work (Schultz 1961) as cited in Coetzee.

- The knowledge and skills which an individual obtains through education, self-teaching and work experience (Masuku 2008b) as noted in Coetzee.

Van Rooyen in Business Media Live (2016) - stated that: "Instructor-led training in a high-quality environment delivers a focused student experience which empowers people and gives them the tools they need to develop themselves and their careers." Education is a human investment that in the end pays off in terms of higher productivity (Business Media Live 2016).

Masuku (2008a) remarked on the fact that there is a global phenomenon of rising capital intensity and an increased demand for skilled labour and South Africa is not excluded from this phenomenon. The demand for skilled labour has risen over the past decade. Manufacturing is one of the single biggest sectors of the economy that should stimulate growth that generates wealth in South Africa (Masuku 2008a). Clothing is a highly labour-intensive sector and thus skill-intensive in some areas like patternmaking that has seen a significant decline in employment intensity as measured by the employment-output ratio published by the Department of Trade and Industry (DTI).

Lamar (1998) pointed out in the late 1990s, that "the creation of a textile and apparel industry is the cornerstone of the 'trade not aid' re-orientation. This is all to generate employment and stimulate basic manufacturing skills that can be used in other industries." For example, it would include the motor upholstery and footwear industries which are an offshoot of the clothing industry.

Skill can be built through people. Developing and improving human capital can help clothing manufacturers develop greater capabilities and thus maintain high profits. This is especially relevant in the context of the developing world so as to be able to deliver standards on an international scale. Human capital development is no longer a luxury but rather a modern necessity. It is also a long-term strategic vision on the part of the clothing manufacturers and educators. It ensures that any skills gaps are addressed early enough before it becomes a concern (Business Media Live 2016). Development economists know that employment in the apparel industry can

stimulate other employment improvements like health and education, which leads into the actual training of patternmakers.

2.6 PATTERNMAKING TRAINING

Gully (2009: 40) researched “the epistemological issues at the core of fashion design – where a major part of the design process is an understanding of the relationship between flat pattern and form, and the intimacy of the human body.” Thus the ultimate three-dimensional (3D) experience is with the person understanding a constructed form (the garment), with the possibility of modifying that form, or being modified by it. A patternmaker doesn’t work with space but works with form – the form of the body and the form of the garment fitting that body. Gully sums it up as “form literacy”. This is the ability to generate and interpret form. It is developed through observation, drawing, patternmaking and construction (Gully 2009). The student will have the ability to look at a pattern and visually assemble it, imagining the 3D form.

Interesting to note is that Japan's Bunka Fashion College has developed and successfully used a unique approach to fashion education. The Bunka (2015) method, as it is referred to, is a very innovative way of establishing the understanding of moving “patterns”. Before designing anything, students must understand the human body/shape and how bodies move. Every student, whether they are studying design or merchandising, has to study this first. The need to know the body well is very important, thus study of the human anatomy is essential. Every year they start by taking the measurements of all the students and create mannequins that reflect the average of the class. As a result, the forms are much more reflective of real people's figures than the standard dummies used in fashion colleges so the students get to understand the human form first-hand. Designers like Kenzo and Yohji have emerged from Bunka's classrooms. The college outlook is:

“Now we are in the era that educates students to support the industry. We educate new blood to support the old blood.”

Patternmaking is a practical knowledge base that students must acquire – patternmaking and construction parallel with interpreting design skills in constructing

the garment is required. The knowledge of fabrication is also essential and how it will affect the garment construction needs to become second nature; it needs to be part of a way of working that could even seem intuitive (Bunka 2015) .

Gully sums up exactly what needs to be achieved in patternmaking education:

“Patternmaking fluency is indispensable in relation to form literacy and becomes a basic assumed skill.”

Researching these authors and approaches inspires a new way of looking at the South African patternmaking curricula. For too long most South African fashion colleges have used traditional teaching methods based either on the writing of Alyce Defty or Winifred Aldridge. A fresh approach using expansive and inclusive input from anatomy, human movement, technology and global inspiration could be developed in conjunction with the findings of this research study in order to address the needs of the South African industry.

In addition to the content, the structure of the curriculum is also relevant. The learning objectives which Bloom’s Taxonomy classifies play an important role in a subject area like patternmaking.

2.6.1 Bloom’s Taxonomy and patternmaking

2.6.1.1 Background

Bloom's Taxonomy in its various forms represents the process and objectives of learning. Benjamin Bloom in the 1950s developed his taxonomy of educational objectives. His proposal was that learning fitted into one of three psychological domains: cognitive – processing information, affective – attitudes and feelings, and psychomotor – manipulative or physical skills (Churches 2009).

2.6.1.2 Bloom’s Taxonomy

Bloom's Taxonomy is best known for the cognitive domain. This domain categorises and places in order thinking skills and objectives. His taxonomy follows the thinking process.

As Churches (2009) explains in a simplistic way: “You cannot understand a concept if you do not first remember it; similarly you cannot apply knowledge and concepts if you do not understand them.” Thinking is a category, described as a noun, placed in a scale from ‘Lower Order Thinking Skills (LOTS)’ to ‘Higher Order Thinking Skills (HOTS)’. Bloom’s cognitive thinking skills are arranged below from a lower order to a higher order as illustration in Churches (2009).

Lower Order Thinking Skills (LOTS)

- Knowledge
- Comprehension
- Application
- Analysis
- Synthesis
- Evaluation

Higher Order Thinking Skills (HOTS)

Bloom's Taxonomy was revised in the 1990s. A former student of Bloom, Lorin Anderson with D Krathwohl, revised Bloom's Taxonomy and published Bloom's Revised Cognitive Taxonomy in 2001.

Key to this revision is the use of verbs rather than nouns for each of the categories and a rearrangement of the sequence within the domain. They are arranged below in a lower order to a higher order of thinking skills.

Lower Order Thinking Skills (LOTS)

- Remembering
- Understanding
- Applying
- Analysing
- Evaluating (Revised position)
- Creating (Revised position)

Higher Order Thinking Skills (HOTS)

Anderson and Krathwohl (2001) considered creativity to be higher than evaluation within the cognitive domain.

The new version of this domain is more valid and applicable to the practical skill set required by patternmaking that would fall into the top category, which is about being able to create new knowledge. This would be where students would have to take the embedded knowledge, remember and understand it, and apply it to creating new patterns. Then they would need to be able to analyse and evaluate the outcome of their decisions once the pattern has been made into a mock-up or actual garment.

It is, however, the next domain, the psycho-motor domain, that will play a more significant role. Figure 2.1 illustrates this domain.

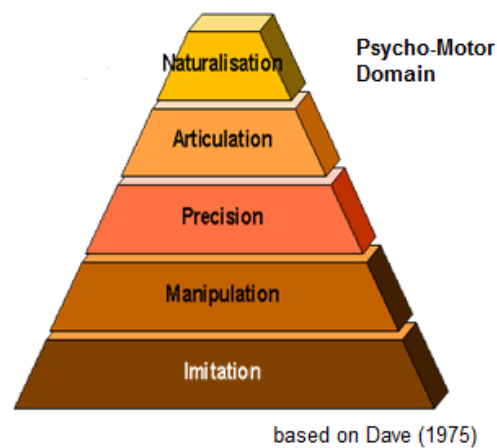


Figure 2.1: Psycho-Motor Domain

Atherton (2009) describes this domain as “one of the simplest versions that has been suggested by Dave (1975): it fits with the model of developing skill, put forward by Reynolds and Salters (1995) and it also draws attention to the fundamental role of imitation in skill acquisition.”. In patternmaking, these stages can be scaffolded as follows:

- **Imitation** is the ability to use sensory cues to guide motor activity for example, following instructions in order to get a **drafted pattern**.

- **Manipulation** is where the students will be learning the initial processes of patternmaking through **working with paper, card, scissors and measuring devices.**
- **Precision** and attention to fine detail including measurements, grainlines, effect and consequence is required at all times in the **production** of patterns and is reinforced after the first two basic stages are mastered.
- **Articulation** is the coordinated series of actions required to produce a tangible item – ultimately the **garment - through development of accurate, tested master patterns.**
- **Naturalisation** – the pinnacle – this is when a patternmaker is able to automatically perform more difficult designs and processes and the thinking process underpinning their practical activity has become almost subconscious - the skill has become **imbedded** within them.

The psycho-motor domain is quite closely related to Rasmussen (1983) skill-based behaviour theory represented during sensory-motor performance activities.

2.6.2 Patternmaking challenges

- **Student preparation/ academic background**

Ferris and Aziz (2005) observed that students' competence in the practical environment was not correlating with their performance tests and assignment work done. This performance wasn't correlating with their actual practical skills. It may be the consequence of a different emphasis on the education systems experienced by students in their educational environments and at home.

Ferris and Aziz (2005) wrote a paper about the development of the psychomotor domain. A description of their view on the domain is useful for practical work in higher education. Development of work-related competence requires practical skill development to perform a certain discipline/job. They investigated whether there is a relationship between basic task competence and factors associated with the conditions of the students' academic background. Bloom's Taxonomy provided a different approach to the determination of educational objectives based on the

behaviourist perspective of identifying what the student is able to do as a result of their education. The competence of the student to do things is dependent on the educational process developing certain capabilities, not only providing knowledge about things.

Practical teaching classes are closely linked to the psychomotor domain. The majority of students in South Africa, with their educational background, rely on rote learning and this will not help them in the practical environment of patternmaking. The competence of the student to manually do things is dependent on the educational process developing certain capabilities, not only providing knowledge about different aspects.

In higher education the psychomotor domain refers to the development of manual skills associated with the performance of the professional responsibilities required for that specific position. Patternmaking requires a coherent set of practical skills related to the discipline of the study, which will support the graduates in the world of work one day.

- **Patternmaking lecturing/ teaching – Present**

At present the teaching of patternmaking usually takes place in a practical lecture laboratory/ venue in which the instructor teaches the steps by demonstration and the students follow and duplicate the work. New styles are created by changing the basic pattern block, fullness is added, length changed, panel and style lines added while the foundation stays the same.

Boorady and Hawley (2008) noted that patternmakers need to have an understanding of the human body and its proportions, and that they also needed to have an understanding of how to measure the body, assess the fit and balance of a garment, and make alterations to the sample to ensure successful garment construction. The basic skills of patternmaking and alteration processes can be taught but with skills like fit it can take years to acquire adequate experience. It is a current challenge to reassess the way things have been done in order to potentially seek new and more effective ways.

- **Patternmaking lecturing/ teaching – Future**

Today's students do not want to experience their learning in the same way as in the past. Saunders (2006) has noted that:

“The computer age begun by the Boomers has been capitalized on by XYs – who grew up with home computers, video games, and the internet. Thus, XYs are the first to completely incorporate computers and technology into their everyday lives.”

This factor cannot be ignored and needs to be incorporated into their learning styles and their interaction with the learning environment. Students that grew up in a digital era see technology as a social tool to support relationships and interact with their peers.

Hernes (2006) in Zoepke (2007) identified three major trends relating to “influences in the international educational environment today:

- demographic changes,
- globalization, and
- rapid increase in accumulation of knowledge.”

These factors are also influencing and affecting the South African clothing industry in how it is developing and moving away from how business has previously been undertaken. The development of patternmaking educational material must keep up with these changes to match the progression of the industry that students will enter.

Kim and Lee (2004) explain how a practical course should provide students with up-to-date information and industry-specific technology, enabling a student to be ready to work as a professional upon completing the programme. This also applies to developing the necessary skills within the South African clothing industry to keep up with the requirements of the global environment.

Globalization has reduced physical and geographical boundaries and has enabled South African apparel retail companies to conduct business globally and source products internationally. South African clothing production and retail is heavily dependent upon the international industry. The role of updating technical expertise

and keeping abreast of the latest technology has become very important in the global market.

Online learning has become integrated into mainstream education but with the advantages and disadvantages of online education being much debated. However, the benefits of online course delivery are undeniable. Brown and Cloud (2004) stated that “much of the development of online courses has focused on content-intensive courses rather than skills development courses.” Potentially even a subject like patternmaking could utilize an online classroom in the future and benefit from the practical nature of the activity.

It is interesting to note that a comment made nearly two decades ago by Lamar (1998) still resonates in today's clothing economy:

“... the apparel industry can develop the South African economy, or even the African economy.”

2.7 CONCLUSION

This chapter reviewed the South African clothing industry's shape, size and different influences affecting this industry. The literature review outlined reasons for the skills shortage and current methods utilised in patternmaking to create knowledge and skills that are required by the clothing industry in the eThekweni Metropolitan region in KwaZulu-Natal. The importance of manual and CAD, including the flow/ processes of patternmaking was uncovered. Human capital and the importance of the development of patternmaking skills were highlighted. This revealed relevant information which needs to be addressed to develop and improve the clothing industry.

The following chapter focuses on the research methodology used to conduct this study.

CHAPTER 3 - RESEARCH METHODOLOGY

3.1 INTRODUCTION

The purpose of the research was to determine the multifaceted patternmaking knowledge and skills needed in the clothing industry, and to obtain the necessary data to support the extent of the shortage of patternmaking skills. The following critical questions were framed to guide the inquiry:

- What are the specialised professional skills that relate to patternmaking and what factors are contributing to a skills shortage?
- What is the perception of industry personnel to these factors and skills?
- What patternmaking training and education interventions could potentially meet the needs of industry?

3.2 RESEARCH DESIGN

This is a qualitative study situated within an interpretive paradigm. Cooper and Schindler (2011) explain that qualitative research can be interpretive because it seeks to develop an understanding through detailed descriptions. Statistics Solutions (2015) also noted that a qualitative approach to research incorporates a wide range of methodologies. Qualitative research historically reached into the psychoanalytic tradition; this type of research studies human motivation through the understanding of perceptions, opinions, beliefs and/or attitudes (Statistics Solutions 2015).

An in-depth dialogue was used to construct a meaningful and collaborative representation with experts in the patternmaking field. This is why the in-depth dialogue offered by Cohen and Crabtree (2006) was employed as a method in this study, to ultimately construct a meaningful and collaborative reality.

This research also had a dynamic view through the nature of the discussions conducted thus developing a clearer concept and understanding of the industry's perceptions, opinions and viewpoints towards what skills are required by a

patternmaker. Descriptive explanations of the findings were used to interpret the information and data gained. Industry experts provided descriptive explanations about issues that they believed affected the patternmaking skills shortage in industry. The information was interpreted by the researcher as data to respond to the research question of the study.

3.3 SAMPLING

The concept of a sample as explained and defined by Blair, Czaja and Blair (2014), is a subset of a bigger group and a set of respondents from which the researcher would like to draw information and seek conclusions.

Two sample groups were used to address the research questions:-

- A focus group discussion with industry experts and interviews with education individuals (teaching patternmaking experts), using a matrix of skills/competencies.
- An online SurveyMonkey questionnaire targeted a sample population including stakeholders from the clothing industry in the eThekweni Metropolitan region; specifically those with patternmaking knowledge.

For the focus group session, judgement sampling was used to select the six subject matter experts. It is a type of purposive sampling whereby the sample conforms to criteria required for the research (Cooper and Schindler 2011). For the purpose of this study the selection criteria required subject matter experts to have a minimum of 10 years' experience in patternmaking. "Judgement sampling is a non-probability sampling technique where the researcher selects units to be sampled based on their knowledge and professional judgment" (Explorable - Think outside the box 2017).

The six subject matter experts were identified from the following three sectors of the industry: -

- Full-line manufacturers (two patternmaking experts)
- Design centres (two patternmaking experts)
- Education institutions (two patternmaking experts).

These three areas were selected as they are representative of the wider clothing sector and to achieve patternmaking input from a wide variety of manufacturers. Coverage was from large to small manufacturers, design centres that feed into these manufacturers and education institutions that would train future patternmakers.

For the online survey, industry and other patternmaking stakeholders were identified to complete the SurveyMonkey questionnaire. Marshall and Rossman (2014) explain that questionnaires can be used to learn more about a set of characteristics, or a set of attitudes or beliefs, of a specific group. In this research all the respondents had some kind of contact with, or knowledge about, patternmaking or used patternmaking information in their work environment.

A snowball and referral sampling method was used. Biernacki and Waldorf (1981) explain snowball sampling as a method widely used in qualitative research. The method produces a study sample through referrals made among respondents who share experiences or know of other possible respondents who possess some characteristics that are of research interest (Cooper and Schindler 2011).

Cooper and Schindler (2011) observed that referral networks can be used successfully to source respondents. In this research, referrals were obtained from respondents that contributed to the survey in order to access more specific respondents with patternmaking knowledge. The researcher identified one hundred and two industry stakeholders with patternmaking experience. Fifty five respondents out of the hundred and two that received the online SurveyMonkey link replied. This is a reliable participation rate equalling 54% which, for an external survey, shows a high level of interest. Detailed analysis resulted in seven responses being eliminated due to significantly incomplete questionnaires, resulting in a response rate of 47%.

Additionally, there were some skipped responses on some questions, which even when it was necessary to compensate for this, a response rate of about 43% was achieved in most cases. Interestingly Fryrear (2015) noted that an average response rate would be between 10-15%.

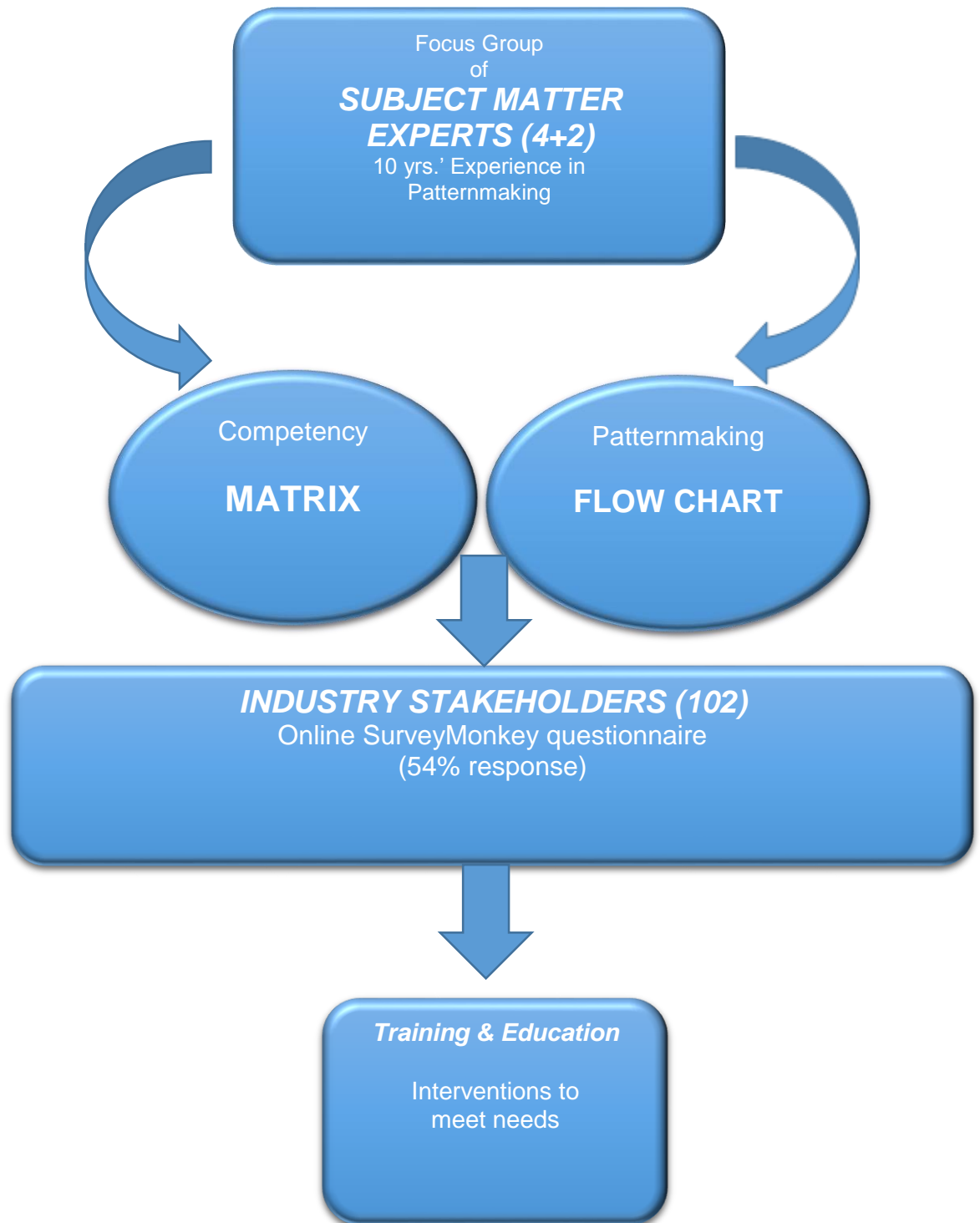


Table 3.1: - Flow Chart of sampling method and sample population

3.4 DATA COLLECTION INSTRUMENTS

3.4.1 Focus group

The first stage of this research was the discussion with the focus group. Morgan (1997) explained that a focus group can be used as part of qualitative research; it is basically a small number of respondents in an informal group discussion or interview which is more controllable.

According to Cooper and Schindler (2011), Merton was the first to coin a focus group as a “focus interview” in 1956. Marshall and Rossman (2014) described a focus group as “a conversation with a purpose” and they went on to describe the experts as “elites” who are considered to be influential, prominent and well-informed people in a specific area with years of experience. It was with this intention that a focus group session was used for this research – where a group of experts were identified to have a purposeful conversation about required patternmaking skills.

The focus group was one of the methods used to supplement the other primary method – the online survey – to complement this qualitative research process. The researcher relied on the focus group to produce insight into new innovative thinking as a result of their expert/ elite interaction and viewpoints.

Blair, Czaja and Blair (2014) re-iterated the fact that a focus group can be used as a development instrument as the group can ensure that the most important issues are included in the online questionnaire. In this research the focus group expanded/ strengthened the pretesting necessary to construct the questionnaire for the online SurveyMonkey.

An academic with more than twenty years of experience in an educational institution was included in the focus group session as an observer. Due to the researcher’s involvement with the interview/ discussion process, the observer assisted the researcher by observing the group dynamics in real time, drawing insight from conversations and non-verbal signals.

The researcher was referred to as the moderator during the focus group. Gibbs (1997) noted that the moderator requires group leadership and interpersonal skills to lead a group successfully. The discussion was led by the researcher/ moderator using a PowerPoint presentation that included discussion questions that were addressed by the focus group. It involved an exchange of ideas, feelings, experiences and opinions on patternmaking. Cooper and Schindler (2011) give insight into the fact that a focus group offers an in-depth nuance and a variety of discussions and ideas that are expressed through their own opinions. Therefore it can offer a close-up view of what participants are really thinking and feeling.

Both verbal and non-verbal communication between the participants and the moderator were observed. Tecau and Tescasiu (2015) stated that connotation is not only gauged from the participants' words but also from their facial expressions, body language, gestures, eye contact and even their silence. So a very important source of data is represented by non-verbal communication. This is one of the least addressed areas in the interpretation of signals from participants in focus group analysis (Tecau and Tescasiu 2015).

The outcome of the focus group gave valuable input into the formalisation of the patternmaking flowchart and matrix of skills/ competencies related to patternmaking that originated from the Organising Framework of Occupations (OFO) skills map, all assisting in the development of the online survey questionnaire.

3.4.2 Patternmaking flowchart and matrix of skills/ competencies

The patternmaking flowchart (see APPENDIX B) was purely a discussion tool to get an understanding of the patternmaking processes amongst the experts from different sectors of the industry. It was the precursor to the competency matrix, which included the actual skills/ competencies related to patternmaking.

The matrix can be defined as “something that constitutes the place or point from which something else originates, takes form, or develops” (Matrix 2016). In this research a competency matrix was used so that all the skills/ competencies and job profiles could be included on one visual chart (see APPENDIX C). The competency

matrix was developed firstly from the OFO skills map and later from the focus group that gave further clarity to the skills/ competencies and job profiles required by patternmakers.

3.4.3 Online SurveyMonkey questionnaire

Feedback from the focus group and comments on the matrix were used to develop the questionnaire for the online survey. The questionnaire was administered through the use of the online SurveyMonkey instrument to reflect the clothing industry's expectations relating to the expected competencies for patternmaking.

SurveyMonkey is a web survey development tool in a cloud based company, founded in 1999 by Ryan Finley. SurveyMonkey has revolutionized the way people give and take feedback, making it accessible, easy and affordable for everyone (SurveyMonkey 2016). It is for this reason as well as the nature of the study that the researcher chose to use this method.

The snowball method was used to locate respondents for the collection of data. The snowball research sampling method is a nonprobability type of process that falls well into this qualitative research model (Cooper and Schindler 2011). In order to have a sufficient number of respondents the referral method was used to best track down respondents with patternmaking skills who were currently employed. In the initial stage of the snowball sampling method, the focus group was the first point of contact and gave their permission to source individuals that could be used through the probability method. This method was used to refer the researcher to other suitable respondents with similar characteristics who then identified others. Cooper and Schindler (2011) noted that the snowball method gathers subjects as the research rolls out and gets going.

Closed questions were used for the online questionnaire. Closed questions are time consuming and more difficult to set but they were preferred by the respondents because they are easier to answer and there is no need to provide lengthy answers.

The following checklist from Fink (1995) was used as a guide to construct closed questions. Standardised data could be produced and analysed. The respondents' expectations were clearly spelled out and their answers were more reliable.

Checklist for deciding between open and closed questions:

	If the researcher answers “yes” to the following, then a closed question was used.
Purpose	Researcher wants data that are rated or ranked (on a scale of, for example, extremely important, important, not important and not applicable) – Likert scale.
Respondents' characteristics	Researcher wants the respondents to answer using a recommended set of response choices.
Asking the question	Researcher wants the respondents to answer in their own words.
Analysing the results	Researcher prefers to count the number of choices.
Reporting the results	Researcher will report statistical data.

Table 3.2. Checklist for deciding between open and closed questions

From (Fink 1995)

3.5 PILOT STUDY/ PRE-TEST

The last stage of designing an instrument like the online questionnaire was to do a pilot study/ pre-test. Cooper and Schindler (2011) noted that a pilot study can be referred to as pre-testing. The purpose of a pre-test is to run a trial with a group of respondents to determine and eliminate any essential problems in the questionnaire. It was also used to eliminate any bias questions and determine any difficulty in understanding the questions.

Blair, Czaja and Blair (2014) mentioned that a small number of candidates are used to detect flaws in the questionnaire by means of a pre-test. This is an established practice to examine the questionnaire in terms of length, flow, ease of response and clarity of instructions given. According to Cooper and Schindler (2011) issues of ambiguity and clarity must also be addressed by carefully considering and

articulating the questionnaire. Collins (2003) also indicated the importance of user friendliness of the questionnaire.

For the purposes of this research, the questionnaire was proofread and pre-tested by staff members in the Clothing Management department at DUT. Colleagues were used to avoid running the risk of depleting the supply of specialised respondents within the field of patternmaking. Cooper and Schindler (2011) discussed that the questionnaire can be proofread and pre-tested by colleagues.

3.6 DATA COLLECTION PROCEDURE

For the purpose of the study the focus group was comprised of specialist patternmakers who gave input into the development of the online questionnaire. Greenbaum (2000) explained that focus groups are normally used in the early stages of research. During the focus group a patternmaking flowchart and a skills/competency matrix were used to focus the group's attention on the topic.

Once the online questionnaire was proofread and pre-tested changes were made. The online questionnaire was then activated and an introductory email inviting respondents to participate in the online SurveyMonkey questionnaire was sent out to the respondents. Diagram 3.1 below shows the flow of the data collection procedure. The main data collection came from the online questionnaire in this research.

Blair, Czaja and Blair (2014) noted certain benefits with regard to internet web surveys which were also found to relate to the online survey used in this research. These included: - the length of the data collection period is short - it only took about three weeks; the geographic distribution sample targeted was very specific according to the research requirements; the questionnaire only took about 15 minutes to answer; increased questionnaire flexibility, sample quality and response quality; and the types of questions were non-threatening. Blair, Czaja and Blair (2014) also drew attention to certain negatives regarding internet web surveys, and these too were noted in this research. These included: - connection/ rapport with the candidates is poor and Internet surveys are accompanied by a cost factor.

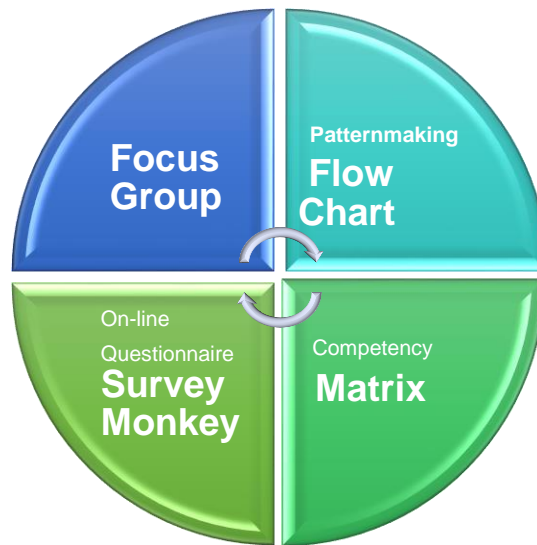


Figure 3.1 Flow chart of the data collection process

3.7 DATA ANALYSIS

Blessinger (2015) stated that data can be analysed conceptually by the researcher using codes, categories and themes that correlate with the data obtained. The researcher used categories with the same themes to analyse the data in this study. Where possible, all data exploration, analysis and interpretation of the SurveyMonkey questionnaire used visually displayed tables, pie charts and bar charts.

A voice recording of the focus group interview was made. This gave the researcher the opportunity to get involved in the discussion sessions. The researcher gave full disclosure to the respondents that a recording method was being used and full anonymity was assured.

Descriptive analysis was used to interpret the focus group findings as well as to explain the outcome of the online questionnaire. As Maree (2012) explains, descriptive analysis uses percentages, frequency and distribution to summarise the respondents' reactions and information obtained.

Through the use of descriptive statistics the researcher was able to use illustrations, graphs and descriptive analysis in the following areas of research:

- Respondents' biographical data and company information;
- Data about patternmaking skills and skills in related areas;
- Patternmakers' qualifications and available short courses;
- Factors contributing to the current status of patternmaking skills.

3.8 VALIDITY AND RELIABILITY

Maree (2012) notes the researcher must ensure quality assurance in their research by means of their self-instigated data verification, and even though qualitative research results cannot be replicated - the data must have some kind of validation.

Maree (2012) also notes the following are threats to the validity of an instrument:

- an instrument must be reliable to be valid; and
- participants could answer "yes" to all questions.

Kumar (2011) and Abowitz and Toole (2010) maintain that validity is maintained when the research instruments measure what they are intended to measure.

Maree (2012: 39) states that triangulation decreases the risk of bias. Triangulation is the process where data is collected from different sources by different methods in order to find links between the findings. Through use of this technique, the researcher can add legitimacy because various angles have been considered and the findings are fused together from diverse situations to form a more accurate totality.

For the purpose of this study, validity was addressed in several ways. Firstly – the researcher maintained a high level of quality assurance and conscious limitation of personal bias throughout the study. From planning to collection and analysis, the validity of data was monitored and checked. Secondly, the instruments used were carefully designed to be reliable - ensure that respondents had to interact with the questions to answer them appropriately. Thirdly, the instruments were designed to extract the information required to answer the critical questions explained in this

research. It was achieved first through the focus group and then through the online questionnaire. These methods, in conjunction with the literature study, also provided the triangulation which increased the validity of the research.

Maree (2012) stated that reliability is about the actual consistency of the instrument used. Reliability is also ensured when the research consistently provides the same or similar measurement even when applied at various times. In the pre-testing stages of this questionnaire all the potential problems were resolved to ensure the reliability of the study. An instrument that gives you the same or similar measurement or score each time it is administered has a strong reliability.

Through analysis of the completed questionnaires, it was clear that the respondents comprehended and were able to give “good” answers to the questionnaire. By “good” answers, Blair, Czaja and Blair (2014) refer to the reliability and validity of answers.

Although qualitative research provides rich and descriptive data, the researcher cannot make generalisations that the data associated with that study will be applicable to any other context. In that context - the findings of such studies are not deemed able to be generalised.

Therefore, although the findings of this qualitative study are not generalisable, issues of validity and reliability have been taken seriously. The results of this study have significant commonalities, gathered through triangulation of research methods, and these provide the value and research confidence required.

3.9 ETHICAL CONSIDERATIONS

- There are a number of ethical considerations that a researcher has to observe in research studies to protect the participants’ rights during the data collection process. Blair, Czaja and Blair (2014) list the following areas of consideration: Participants should not be deceived.
- Participants should be willing to take part.
- Participants should be totally informed.

- Participants should not be harmed.
- All data retrieved should be held confidentially.

To conform to and fulfil these ethical responsibilities, specific requirements were adhered to. Gatekeeper consent forms were completed, firstly by the focus group's superiors, requesting the expert patternmakers' participation in the research. Secondly the focus group respondents themselves also completed a consent form to participate in this research project (Refer to APPENDIX Ai, Aii, Aiii and Aiv). The online questionnaire offered anonymity to the respondents because there was no direct interaction with the researcher (Kumar 2011).

3.10 DELIMITATIONS

The eThekweni Metropolitan region in KwaZulu-Natal is the location of one of two large concentrations of clothing industries in South Africa. The other region is located in the Cape Town Metropolitan region of the Western Cape. Due to time and budget constraints, the study was limited to the eThekweni Metropolitan region.

3.11 CONCLUSION

This chapter described the research methodology of the study. It explained the sample method and population, discussing the procedure used in designing the instrument and the collection of data. The ethical and reliability of the data collected was also taken into consideration.

This research was able to elicit new thoughts and information from the focus group. Insight was gained into the experts' shared understanding of what patternmakers' skills should be and how these skills can be developed. The researcher remained objective and conducted the research without personal bias. The research can be used to generate new ideas to plan for the future development of the patternmaking curriculum and training.

In chapter four the data obtained from the focus group and mainly from the online questionnaire will be analysed and discussed.

CHAPTER 4 – DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

Patternmaking is an important element in the production process in the clothing industry and it has been established in this research that it is both a critical and a scarce skill. The sustainable growth of the industry is dependent on finding solutions to alleviate the shortage of patternmakers; without addressing this problem the whole value chain in the clothing industry will be prejudiced.

This research aimed to investigate the contributing factors making patternmaking a scarce and critical skill in the clothing industry. The results of this research can ultimately be used to guide and inform the development of interventions to address the shortage of patternmakers. The findings derived from the study are presented in this chapter. For the purpose of this research the data was collected in two ways: through a focus group discussion and by means of individual interviews. A semi structured questionnaire, and a patternmaking flowchart and matrix developed by the researcher were used during the focus group and interview sessions. Interviews were conducted with the educational experts who were unavailable to attend the focus group interview at the time. Afterwards an online SurveyMonkey questionnaire was developed.

The contribution from the focus group made up of industry and educational specialists and from the interview sessions, was used to develop the online survey questionnaire. The results from the online survey are qualitative in nature and descriptive statistics are presented in the form of graphs and tables.

4.2 DATA COLLECTION AND ANALYSIS

4.2.1 FOCUS GROUP

The focus group session was intended to have six respondents but ultimately there were only four that participated. Four companies from two different clothing manufacturing sectors were represented. Two respondents represented full-line

clothing manufacturers and two represented design houses. Due to the unavailability of the education specialists for the focus group session, they were accommodated by arranging individual interviews.

The table below outlines the biographical details of the focus group respondents.

#	Type of manufacturer	Position	Years' experience
1	Full-line manufacturer	Ladies wear, high fashion patternmaker – 4 years at this company.	8 years
2	Full-line manufacturer	Manager, overseeing sample set, patternmaking, grading and marker making.	20 years
3	Design House	Overseeing patternmaking and product development division.	20 years
4	Design House	Manager overseeing designers, sample room activities and patternmaking.	45 years (10 years of patternmaking experience)

Table 4.1 Focus Group – respondents

As indicated in Table 4.1, all the respondents were highly experienced. This gave the focus group session access to in-depth knowledge of patternmaking from an industry perspective. The interviews held with the two educators reaffirmed the comments from the focus group as well as the information on the flowchart and matrix. The areas highlighted areas are important and relate to technical skills, soft skills, passion for patternmaking and patternmaking relating to costing of garments.

The data was analysed into the following topics, themes or categories.

Topic 1: - All respondents agreed about the technical aspects of patternmaking: -

- Patternmakers have very little three dimensional (3D) knowledge or perspective.

- They do not know how the body works and how movement affects patternmaking.
- They do not have fabric knowledge and do not know how it will affect patternmaking.

While the information on the flowchart and matrix was correct, it may vary slightly according to company practice.

These findings about the current challenges of patternmaking in production were articulated by respondents: -

- “I am constantly interviewing people that don’t have the skills, do not have the ability to interpret a TD and lack speed and accuracy in making patterns. They don’t know how to make blocks; they have no three dimensional knowledge; they don’t know how the body works plus they do not realise that if they alter the pattern in one place, how it will affect the fit elsewhere.”
- “Sometimes they might have the technical knowledge, but don’t have the fabric knowledge of how to adapt the pattern for the fabric. Extra knowledge of how a pattern will react with different types of fabric is definitely needed.”

Topic 2: - Soft skills:

- Passion for patternmaking: This was clearly missing. As one of the specialists summed it up: “Patternmakers don’t have the passion, they don’t understand that they have to work with the cutter and machinist, cut cardboard, fabric, and learn skills and all the other elements that go with patternmaking. They have a perception of being the ‘designer’ not the patternmaker.”
- Patternmakers lack the skills to listen and communicate. As explained by a specialist: “They don’t want to listen, don’t want to be told what is right and wrong, and wanted by the customer. They get upset if they are told that their focus is off the problem.”
- Patternmakers also lack the skills to problem solve.

Topic 3: - Costing was noted as being of relevance to patternmaking in that pattern engineering can save fabric and production time. Additionally, fit is vital for ensuring good retail sales and customer satisfaction and retention.

Respondents articulated findings as follows: -

- “Patternmakers firstly need to make patterns, grade or pre-grade them – have the basic grading skills, follow on with costing, because you have to give information to the person who is doing the rating.”
- “The designer and patternmaker make decisions regarding the fit of the garment which influences cost.”

It is important to note the link between the comments from the Focus Group and the findings in the literature particularly with regard to Boorady and Hawley (2009); Gully (2009) and Bunka (2015). These key areas were used as a guide to develop the actual SurveyMonkey questionnaire for the investigation with a wider audience.

4.2.2 SURVEYMONKEY: ON-LINE QUESTIONNAIRE

The online survey was conducted through a cloud-based company called SurveyMonkey, which used a web survey to derive data for this research. All respondents were from the clothing industry within the eThekweni Metropolitan area.

One hundred and two (102) links to the survey were sent out and fifty three (53) respondents completed the survey. This equalled a 52% response rate. Detailed analysis resulted in five responses being eliminated due to significantly incomplete questionnaires, resulting in a response rate of 47%. There were some additional skipped responses, which were deemed insignificant to the final result. According to Fryrear (2015), this shows a high level of interest for an external survey. The response rate to this questionnaire might be indicative of how motivated the industry and patternmaking stakeholders are to improve the shortage of patternmakers.

Descriptive analysis was used to evaluate the data. The analysis is discussed under the following four sub-headings incorporating the six sections of the questionnaire below:

- Biographical data (SurveyMonkey Section 1 & 2)
- Patternmaking Skills (SurveyMonkey Section 3)
- Industry Perceptions (SurveyMonkey Section 4 & 6)
- Patternmaking Education and Training (SurveyMonkey Section 5)

The first two sections of the questionnaire address the biographical background of respondents that answered the questionnaire. The following four sections address the three critical questions of the research as outlined below.

The critical questions are:

- What are the contributing factors and specialised professional skills that relate to patternmaking?
- What do industry personnel think about these factors and skills?
- What patternmaking training and education interventions could potentially meet the needs of industry?

4.3 DATA ANALYSIS

4.3.1 BIOGRAPHICAL DATA (SURVEYMONKEY SECTION 1 & 2)

This section addresses the biographical background of respondents that answered the questionnaire in order to contextualise the findings. Of the 48 respondents, 21 (44%) stated they are active patternmakers, of which two thirds are female and 10 (48%) have more than 20 years of experience. Two thirds of the 21 patternmakers have six or more year's patternmaking experience. This has provided a strong base for validity of the data. The age distribution of the 48 respondents was relatively equally spread with two thirds of the respondents being older than 30 years – in both the patternmakers and non-patternmakers groupings. The respondents who claimed over 20 years of patternmaking experience could be add significant value to the industry as mentors, sharing their knowledge with those who have less experience.

From the total number of respondents – as seen in Figure 4.1 - nearly two thirds (63%) have been in the industry for more than 6 years, and half have more than 11 years' experience. Not all respondents have been specifically making patterns during

this time but as seen in Figure 4.2, their patternmaking knowledge is extensive with 75% recording moderate to expert knowledge and expertise. This experience, both industry in general and patternmaking specifically, has ensured credible and valuable input in this research.

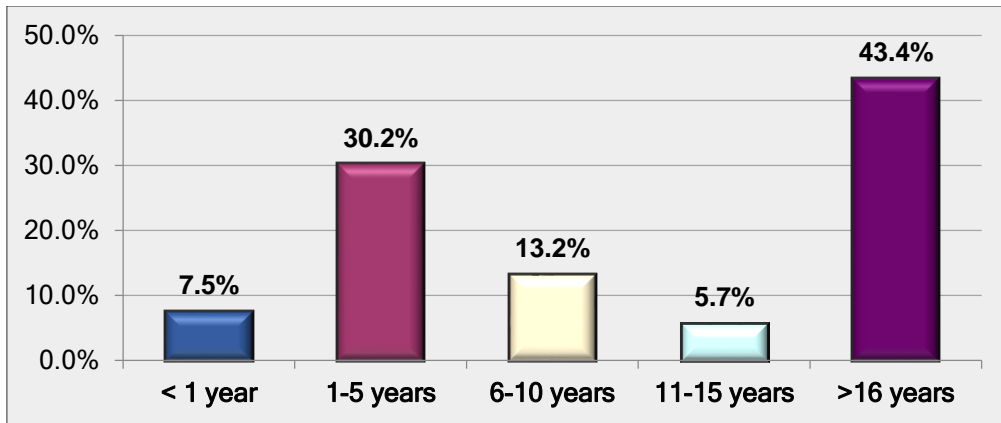


Figure 4.1 Total number of years' experience in the clothing industry

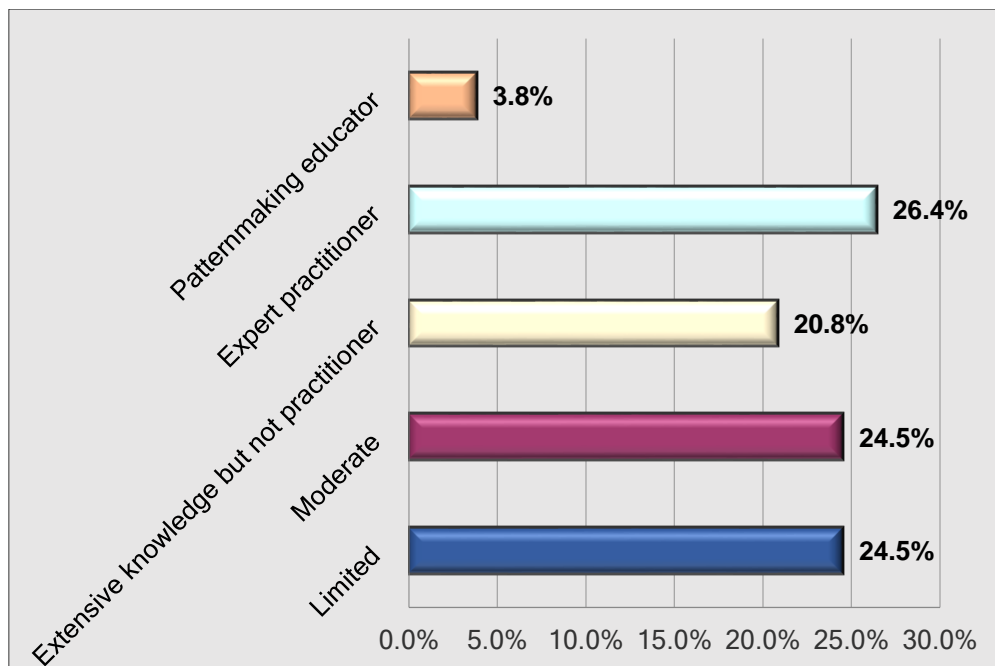


Figure 4.2 Respondents' understanding of patternmaking

From the above figures, the breakdown of the respondents' understanding of patternmaking indicated that expert practitioners formed the largest grouping at 26.4% and together with patternmaking educators and respondents with an extensive knowledge but who are not patternmaking practitioners, comprise 51%.

Most of the respondents hold National Diplomas (54%) with another 29% holding BTech Degrees. Two respondents listed Masters level qualifications as their highest qualification. Of the patternmakers, 62% have Diplomas and 29% have BTech degrees with one having a Grade 10/ Standard 8 qualification. This respondent started working in the industry straight after school and worked their way up into the patternmaking department. This information indicates that while industry has traditionally been staffed by graduates with 3 year diplomas – there is a slow transition to staff gaining further formal higher education. Although the BTech degree has been available since 1996, the demand has been relatively low from industry experienced or orientated employees. This shows a potential gap in the market for the correct type of further staff development.

With regard to job profiles, only the most relevant jobs of Patternmaker, Patternmaker (educator), Designer, Garment Technologist, Production Supervisor, Quality, and Merchandiser were analysed. This comprised 32 respondents. Of these, there are an equal number of designers and patternmakers (21.9%, or seven respondents each). The highest number of respondents, nine (28.1%), are garment technologists. There are one response each from Quality and Merchandising. Refer to Figure 4.3 below for the different job profiles.

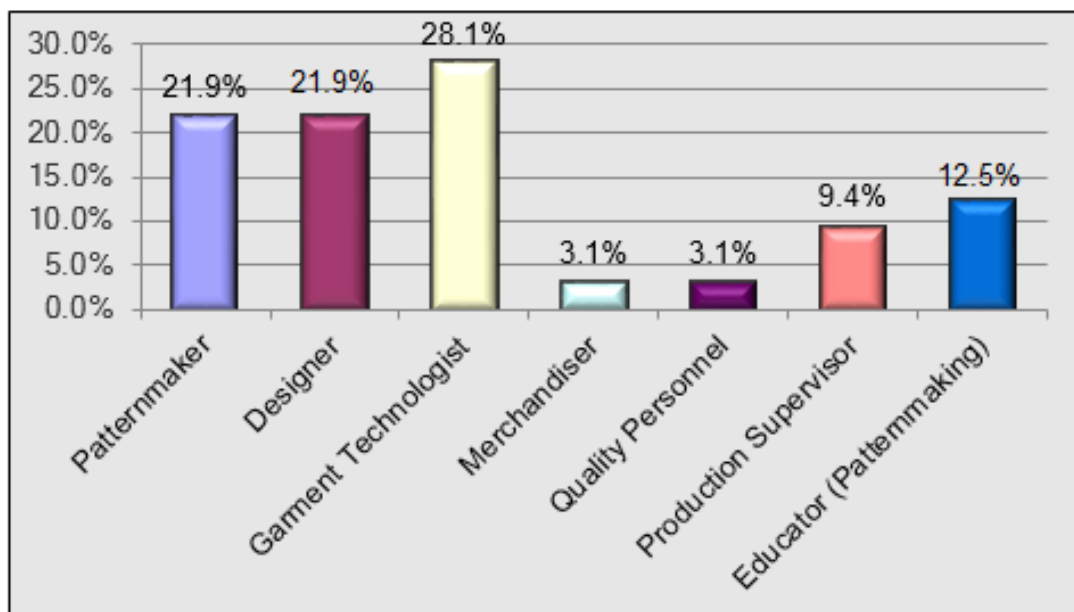


Figure 4.3 Current job profiles of respondents

The remaining respondents indicated other job profiles, not captured in Figure 4.3 but included business owners, buying managers, technical managers, group/ sales managers, and all have insight or background in patternmaking. Respondents that are self-employed tend to be all-rounders and have patternmaking skills.

Of the respondents who completed the survey, 80% percent either are patternmakers or are from companies that employ patternmakers. These companies would be full-line manufacturers, design houses and education providers. Full-line manufacturers employed 43% (22 respondents) and design houses employed 31% (16 respondents). There are 6 respondents employed in education, of which 3 incorporate both manual and CAD patternmaking. Of the 6 respondents employed in Retail, three are garment technologists in their company's quality divisions.

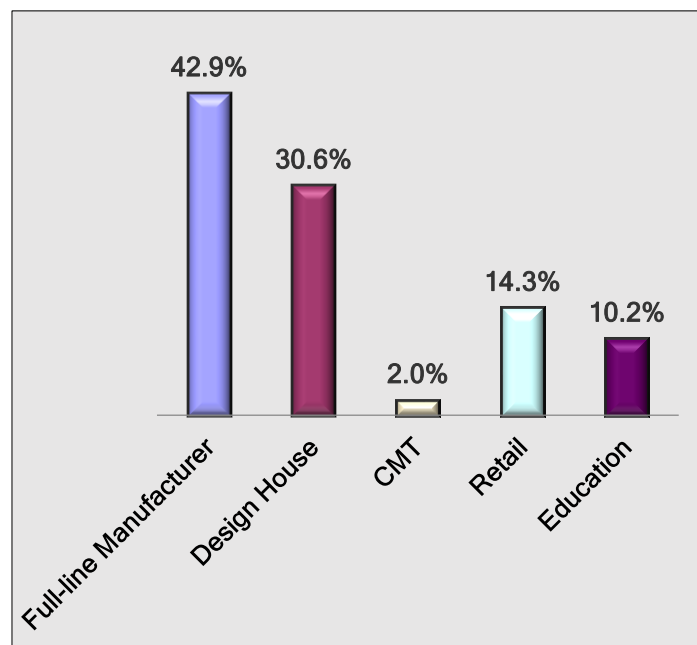


Figure 4.4 Respondents' company type distribution

Of the 22 respondents from full line companies, 45% (10) of their companies employ over 500 staff, and another 27% (6) indicated employment of between 201 and 500 staff. Of the 16 respondents from design houses, 25% (4) of their companies employ between 51 and 200 staff, with 2 of these companies employing over 200 staff. Only 24% (12) of all these companies have less than 20 workers.

Of the 41 businesses with patternmakers, the majority employ either one (30%) - or more than five (33%) patternmakers. The rest of the companies employ two (9%); three (14%) and four (14%) patternmakers.

Although this current research concentrates mainly on the manual patternmaking process - which is the foundation of computerised patternmaking too - it is acknowledged that there is a growing demand for patternmakers to make the transition to computers earlier. This will be incorporated into future curriculum design. At present, computer aided design and patternmaking systems are mostly found in large companies, but this is expected to increase in the near future. CAD related questions were asked to elicit information that could assist with further research. A total of 60% of the respondents stated that their companies use CAD patternmaking systems of which 19 stated their companies use the Lectra system, 5 stated their companies use Gerber and 2 stated their companies use Assist. Another 3 respondents stated their companies used another system.

All of the bigger companies (with over 200 employees) utilise CAD systems and the sixteen (48%) respondents representing these companies noted four or more patternmakers with most patternmakers' only using the CAD patternmaking systems. (Refer to Figure 4.5). Most manual patternmaking is done in the smaller companies.

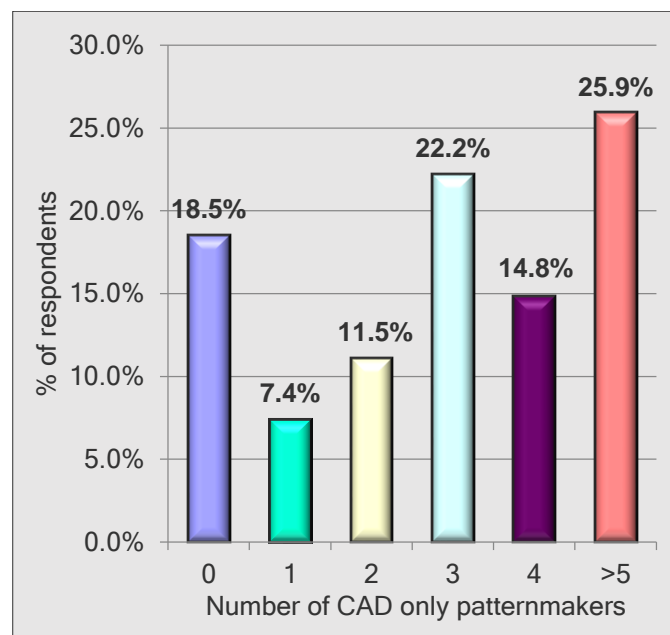


Figure 4.5 Number of patternmakers working only on CAD systems

It is rewarding to note that from the respondents of this small study, more than 105 patternmakers have been identified, of whom more than 45 are manual patternmakers. The purpose behind the profile data is to establish the validity of the respondent's knowledge and experience in patternmaking, as well as to provide a brief snapshot of the state of the situation at current. This area could be further researched and more data gathered to provide even deeper understanding of the size and shape of the patternmaking fraternity. This has however revealed some interesting information of possible needs with respect to training and education opportunities.

4.3.2 PATTERNMAKING SKILLS and KNOWLEDGE

This section addressed *Critical Question 1: - What are the contributing factors and specialised professional skills that relate to patternmaking?* In this section the term "skills" incorporates the practical skill, the prerequisites, the knowledge and experience and the attitudes and values required of a patternmaker.

4.3.2.1 The important patternmaking skills required by a patternmaker.

The patternmaking skills required as shown in Figure 4.6 below are in the order of the actual patternmaking process, as outlined by the industry specialists during the focus group session. During this session the researcher used the flowchart to ascertain the patternmaking process, which then developed a clearer understanding of the different areas, competencies and specific skills are required.

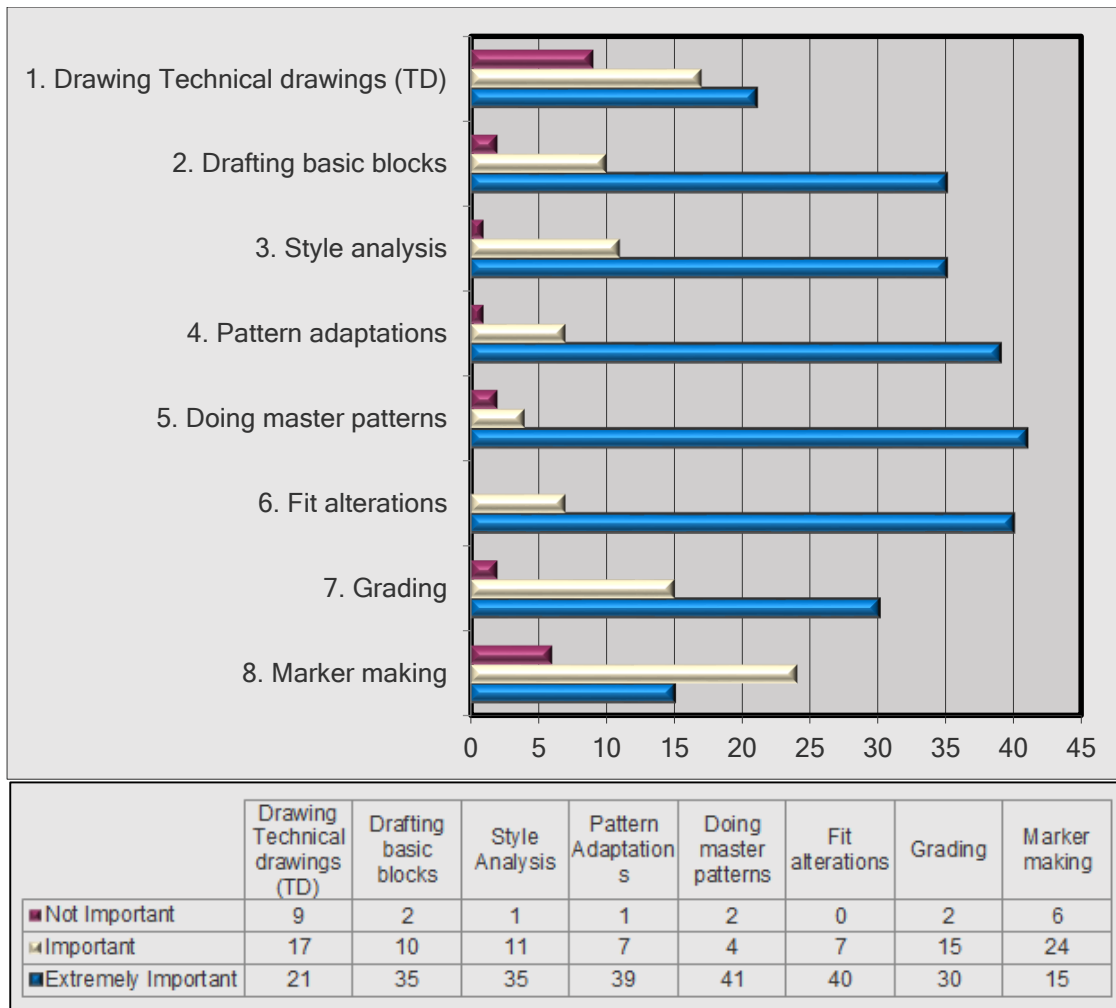


Figure 4.6 Patternmaking skills required by a patternmaker

Referring to the graph in Figure 4.6, respondents rated that doing master patterns, alteration for fit and pattern adaptations are extremely important. Of interest is the fact that drafting basic blocks and doing style analysis are equally rated as only being of second highest importance. Grading skills, followed by technical drawing, and finally understanding marker making follow thereafter. Notably, minimally 80% but on average about 96% of all the listed skills were rated as either important or extremely important. Of the 9 respondents who list TD as not important – only 2 are patternmakers and are from medium to large companies – possibly where the designers are responsible for TDs and not the patternmakers. It was expected that drafting blocks would have been given a higher priority as this is where the incorporation of the choice of retail or manufacturer’s sizing and related body dimensions would be built into the block development. It is the fundamental basis of the entire patternmaking process.

In addition to the above, the focus group outlined the technical factors of patternmaking in 4.2.1 topic 1. They highlighted three critical areas being knowledge of :

- 1) the three dimensional effect of patternmaking (relating to both body and garments),
- 2) the influence of human movement on patternmaking and
- 3) the effect of fabric on patternmaking. All these aspects are very technical and highly integrated.

4.3.2.2 The important prerequisites for patternmaking.

Due to the focus of this research, 78% respondents identified that patternmaking interest would be seen to be extremely important. Creative design aptitude goes hand-in-hand with two- and three-dimensional perception, which cannot be separated from an understanding of body and garment proportion.

There were, however, six respondents who felt that creative aptitude was not important and seven respondents who felt that design aptitude was not important (refer to Figure 4.7 below).

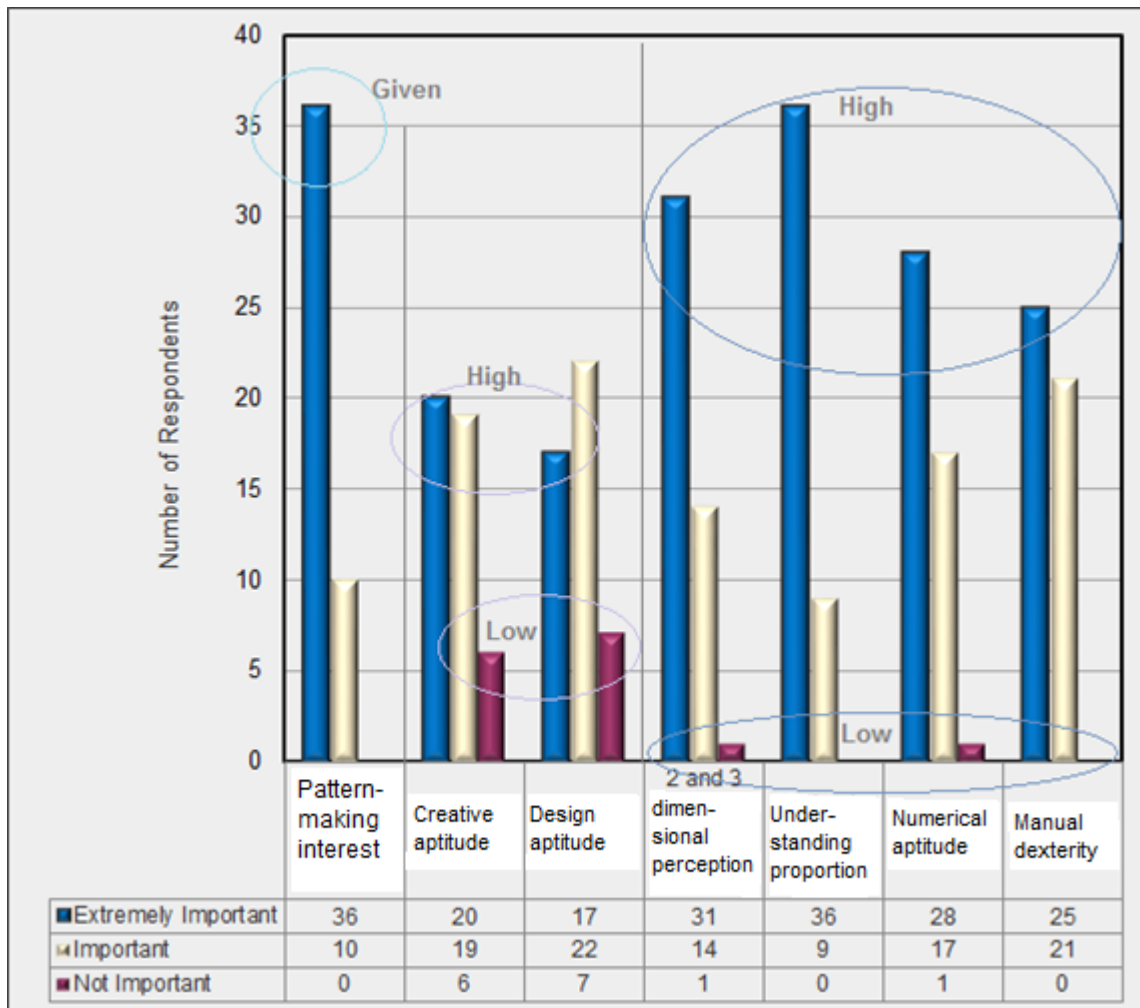


Figure 4.7 Prerequisites for patternmakers

As discussed in this research in chapter 2, the following areas are specialised professional skills which have been found to be areas contributing to patternmaking ability. In the data obtained from the respondents, these were rated either important or extremely important. The capabilities are: manual dexterity (100%), numerical aptitude (98%), and two-&-three-dimensional perception (98%). Numerical aptitude is the ability to reason and apply simple numerical concepts. In patternmaking the use of basic numeracy skills consists of understanding fundamental arithmetic in order to understand the dimensions and proportions of body and garments.

4.3.2.3 Supporting knowledge / experience required by patternmakers

Patternmakers make two-dimensional patterns for garments that have to fit the three-dimensional human body. In Figure 4.8 below, referring to the numbers on the graph it is clear that fit concepts (no.1), garment construction (no.2), sizing standards (no.3), fabrication (no.4) and quality (no.5) were rated as the top supporting knowledge required by patternmakers.

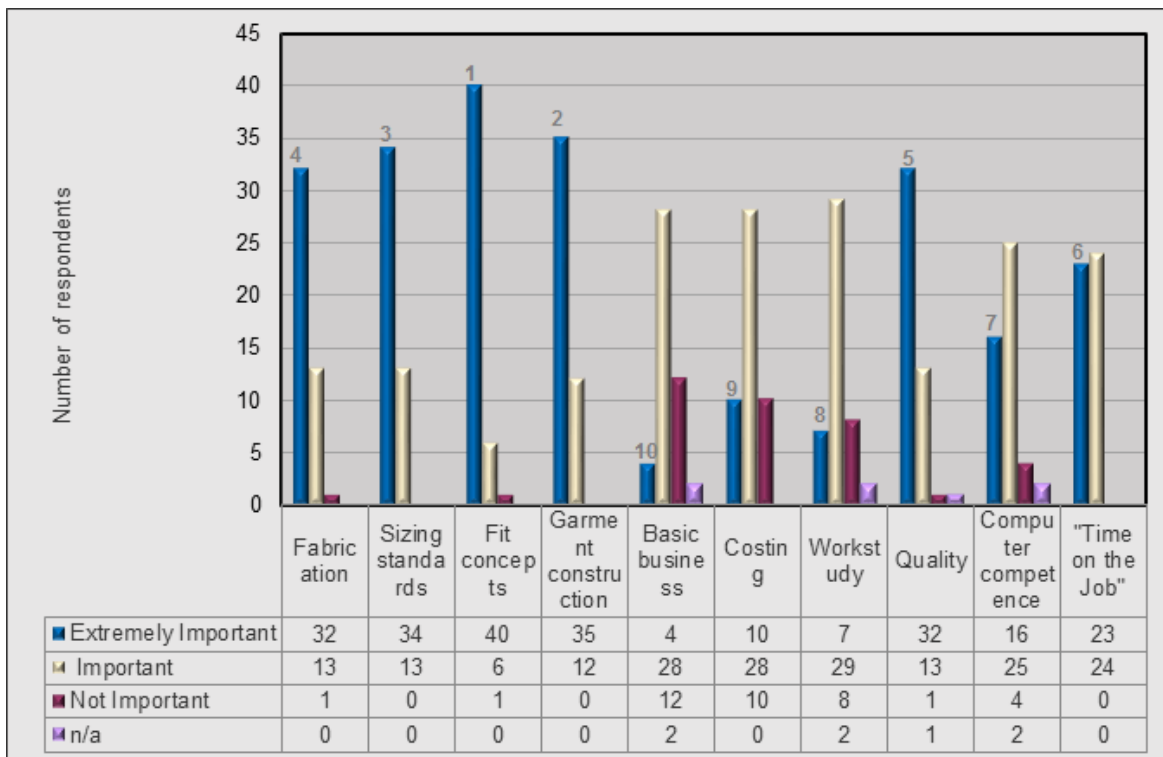


Figure 4.8 Supporting knowledge/ experience required by a patternmaker

“Time on the job” (no.6), which means the actual time spent in the industry as part of a patternmaker’s training, was rated important. It would help the patternmaker to understand how the clothing industry operates. Computer competency (no.7) was also rated as important due to the fact that CAD patternmaking systems are used in the industry.

Work study (no.8), costing (no.9) and basic business knowledge (no.10) were ranked as less important but knowledge of these business areas would assist a patternmaker to understand how to cut costs through using pattern adaptations.

In point 4.2.1 topic 3 - Costing was noted by the focus group experts as being relevant to patternmaking in that pattern engineering can save fabric.

This information will be used to support further curriculum development.

4.3.2.4 Soft skills

The respondents were required to rate the importance of the soft skills – traits/ emotions/ values – required by a patternmaker. These are illustrated in Figure 4.9 where accuracy (no.1) and attention to detail (no.2) were seen as extremely important. This is an accurate reflection of the traits required by a patternmaker. Being a good listener (no.3) and having good verbal communication skills (no.4) were highly rated, and this would be due to the fact that patternmakers do not work on their own. They need to constantly communicate about a style and the pattern analysis being done. Passion for clothing (no.5), integrity (no.6) and creative flare (no.7) was also rated. There is a definite link with the focus group’s comments and the traits highlighted by the respondents. Under focus group topic 2 - the passion for patternmaking was discussed and in focus group topic 3 - listening and communication was emphasised.

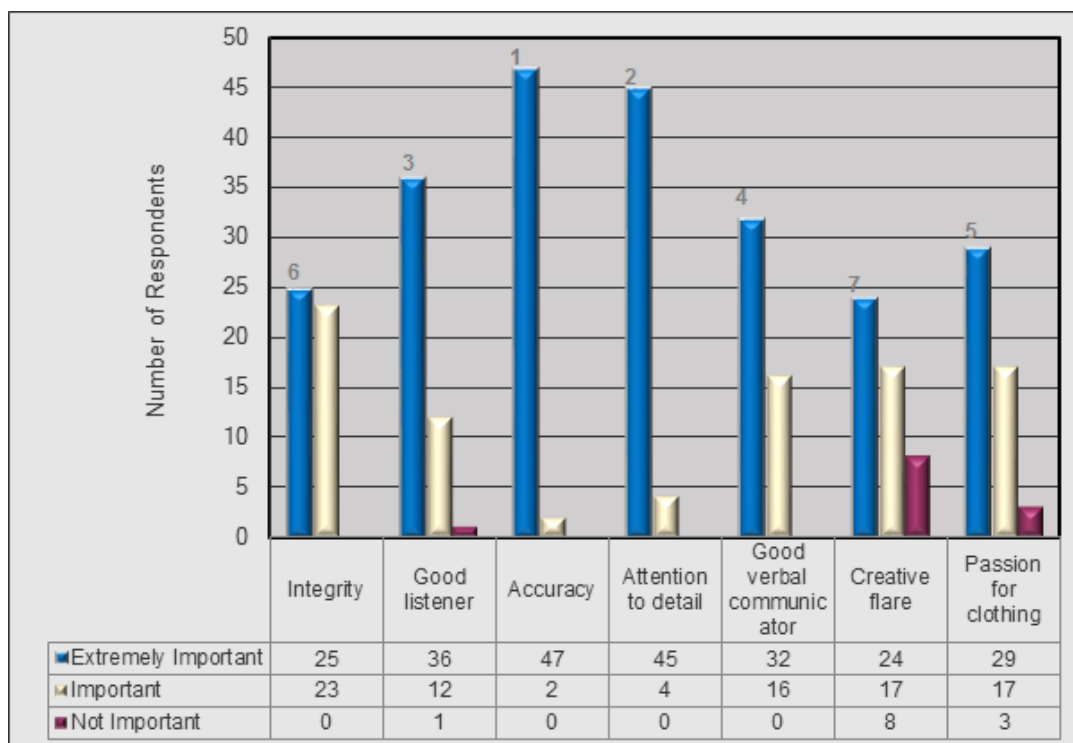


Figure 4.9 Soft skills – traits/ emotions/ values - required by a patternmaker

All of the skills, knowledge and experience noted in this section correspond with that noted in the literature survey, and the focus group. The data has provided good descriptive statistics which will be utilised to develop curriculum. It is expected that further research will be able to explore these in more depth.

4.3.3 INDUSTRY PERCEPTIONS

This section speaks to *Critical Question 2 - What do industry personnel think about these factors and skills?*

4.3.3.1 Patternmaker's years' experience

A significant difference was found between the patternmaker respondents and the non-patternmaker respondents with regard to this question. Overall the results are shown in Figure 4.10 below.

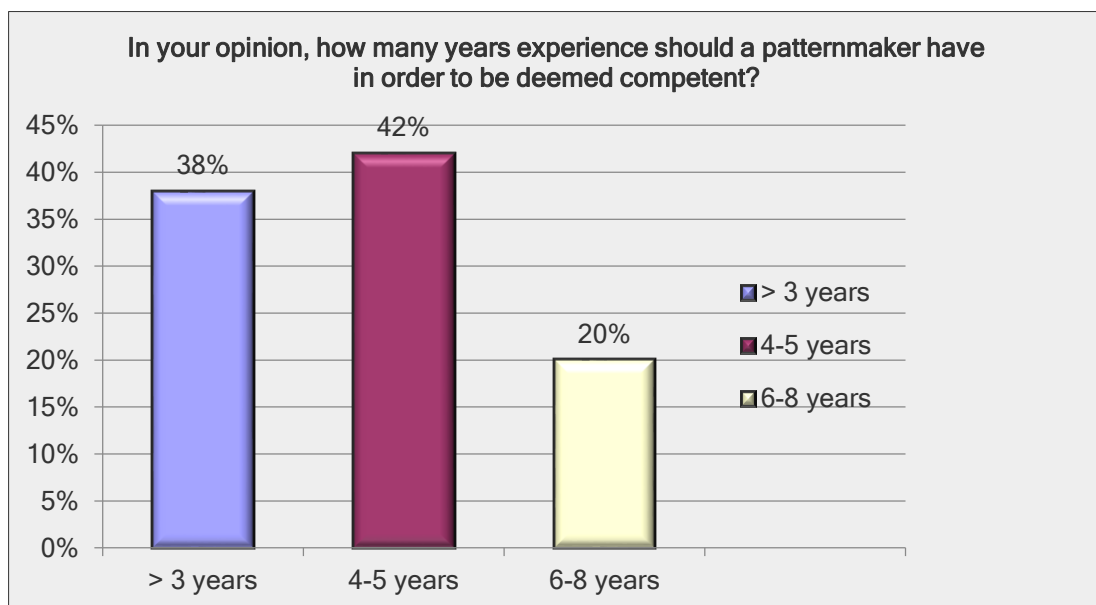


Figure 4.10 Competent patternmaker's years' experience.

However – of the non-patternmakers - 52% considered less than 3 years' experience would be adequate, 36% considered 4-5 years' experience would be adequate and only 12% felt that 6-8 years would be needed before a patternmaker could be described as competent. Of the patternmakers - 20% considered less than 3 years' experience would be adequate, 50% considered 4-5 years' experience would be adequate and 30% felt that 6-8 years would be needed before a patternmaker could

be described as competent. This could indicate that patternmakers are far more aware of the complexity of the skill than non-patternmakers.

Three respondents specified 'other' and comments included: "After a couple of years they can be competent in the patternmaking for the simpler products" and "It should be determined jointly by the employer and the employee. If the patternmaker can perform all the duties laid out in the job profile with a high degree of proficiency and the employer is satisfied with the patternmakers performance, that should influence the decision to deem a patternmaker qualified or not".

4.3.3.2 Respondents' perceptions

Nearly 100% of respondents reacted positively to the statements that patternmaking is more than just doing pattern alterations and that grading is part of patternmaking. High level of agreement were seen on the statements that a good patternmaker plays a fundamental role in increasing sales at retail level (89%); and that manual patternmaking skills are needed to obtain a profitable garment (85%).

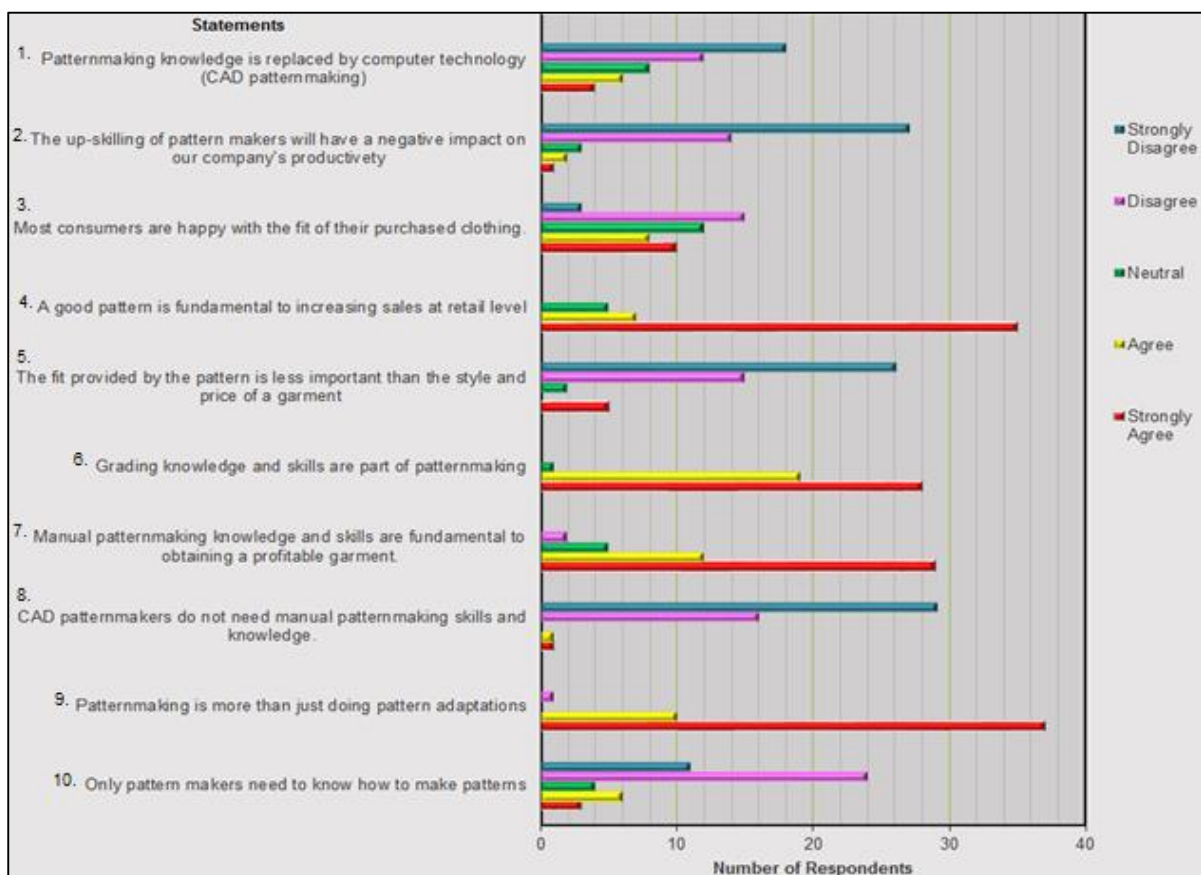


Figure 4.11 Respondents' reactions to statements

High levels of disagreement were seen about CAD operators not needing manual patternmaking skills (98%); that upskilling patternmakers would negatively impact productivity (87%); and that the fit is less important than the price (85%). Disconcertingly, 22% agreed that CAD is replacing patternmaking knowledge – and half of those respondents were patternmakers – and a similar result was achieved for “only patternmakers need to know patternmaking”. On the positive side – the greater majority disagreed with both these statements. With respect to the respondents perception of consumers satisfaction with fit – the field was almost equal with 38% on both agree and disagree – and the balance being neutral. These all show potential for future development.

A respondent commented that: “Patternmaking is a very scarce skill to find, especially someone who has extensive knowledge of both manual and computerized patternmaking.”

This comment leads into patternmaker recruitment information. These questions are valuable tools to assess at ground level what companies feel. The respondents were asked whether they struggled to recruit new patternmakers when a position became available and 71% of the respondents from companies employing patternmakers answered in the positive (Refer to Figure 4.12). The demand is higher than the supply and companies are struggling to fill vacancies.

In Chapter 2 scarce skills were defined as being deficient in quantity or number compared with the demand. This sentiment was carried through the comments of the respondents: “There are too few graduates” and another saying “There is a lack of trained personnel” and lastly “There is no availability of skilled patternmakers”.

A respondent commented: “Until recently salaries have been low for this position and not many positions available due to the decline in the SA clothing industry, and production went to CHINA. Wasn't a very desirable position to take up any longer? But recently, local manufacture has started becoming important again and now we don't have enough good patternmakers for the jobs available. We need to reinvest in training as we are short skilled.” This summarises the current situation – a lack of

training and investment in, and marketing of, patternmaking as a career over the last ten years has led to the scarcity of skills which is now a problem in the industry.

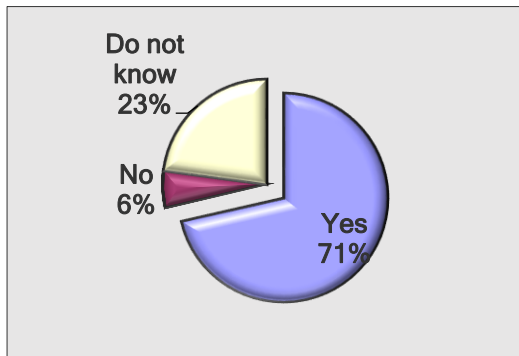


Figure 4.12 Struggle to recruit new patternmakers

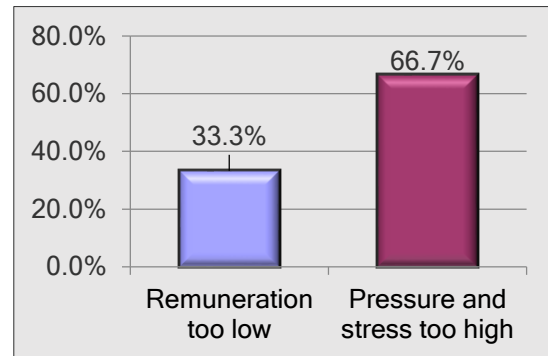


Figure 4.13 Reasons for high patternmaker turnover

There were 67% respondents who reacted that the pressure and stress attached to the position of a patternmaker was too high and the balance of 33% responded that the level of remuneration is too low. (Refer to Figure 4.13). The patternmakers noted an almost equal selection of salary (5 respondents) and stress (6 respondents) thus making up most of the “salary” total respondents but only half of the “stress” total respondents. These staff clearly feels undervalued.

A patternmaker noted: “Patternmaking is a highly skilled job and requires a great deal of knowledge across the board of all the manufacturing and related activities. Patternmakers are highly underrated and often poorly remunerated. It is a key industry skill i.e. no pattern, no production!”

A respondent commented in capitals that the: “PRESSURE AND STRESS IS QUITE HIGH”. This stress is also due to the “no pattern, no production” pressure on a patternmaker. The multifaceted nature of the job also brings additional stress – there are so many things that can go wrong.

The respondents' opinion about the salary of experienced patternmakers was very interesting. Of the non-patternmakers, 56% suggested that the salary should be R20 000 or more per month, depending on experience; 33% suggested that between R12 000 and R20 000 per month was adequate; and only 11% selected a salary

lower than R12 000 per month. Of the patternmakers, only 35% suggested that the salary should be R20 000 or more per month, depending on experience; 45% suggested that between R12 000 and R20 000 per month was adequate; and 20% selected a salary lower than R12 000 per month. The patternmakers could have claimed higher salaries were more appropriate to the demands of the job. This could be an interesting topic for further research to determine if patternmakers are by nature not financially motivated, or if they find it difficult to motivate their own value to their employers. This must be seen in light of the previous question where over half are feeling they have low remuneration or high stress.

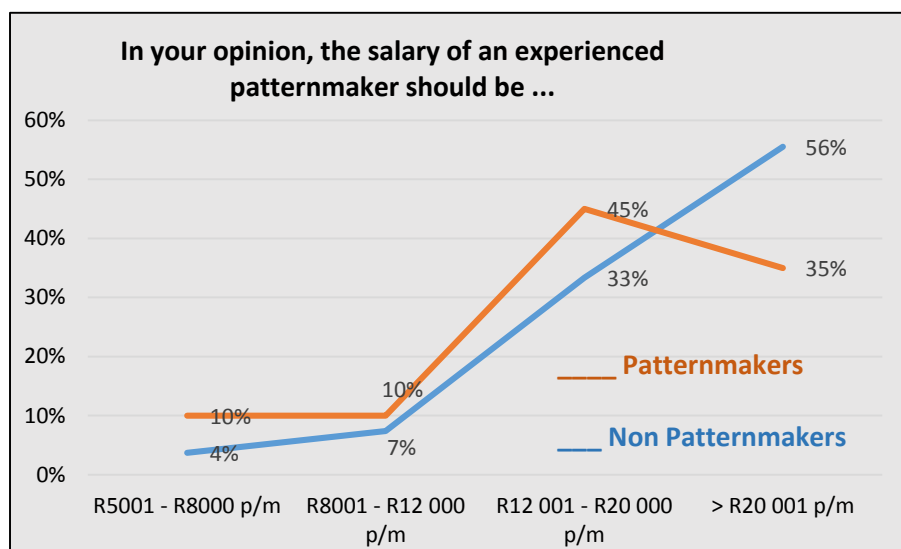


Figure 4.14 Salary scale of an experienced patternmaker

4.3.3.3 Scarcity of patternmaking skills.

Figure 4.15 below was derived from the information in Figure 4.11.

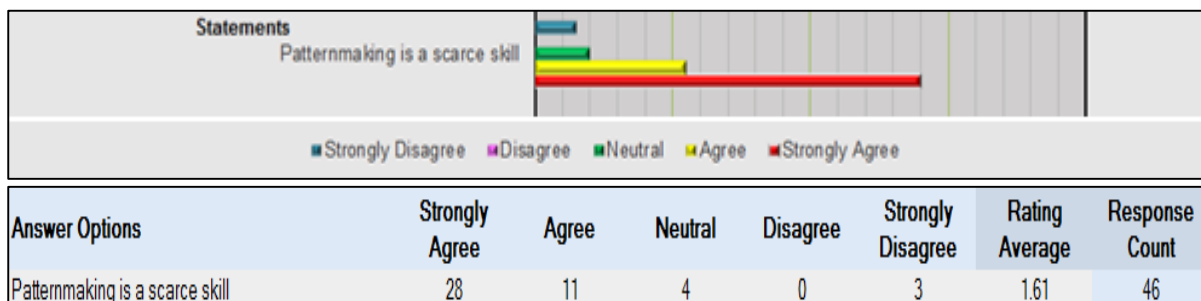


Figure 4.15 Respondents' reactions to the scarce skill statement

Observing Figure 4.15 above the following conclusions were made:

- 1) 28 (61%) respondents strongly agreed that patternmaking is a scarce skill.
- 2) 85% of the respondents agreed or strongly agreed that patternmaking is a scarce skill.
- 3) Of the three respondents that strongly disagreed, two were non-patternmaking educators. This was unexpected.

Factors contributing to this scarcity were investigated and are reported on in Figure 4.16 below. Much of this also correlates with discussion under Figure 4.13. The first three factors discussed lean towards the positive aspect and include:

- No.1 – The competencies lost in the economic downturn are now missed in the upswing of the clothing industry – 21 (47%) respondents strongly agreed with the statement and a further 38% agreed. This is almost undeniable.

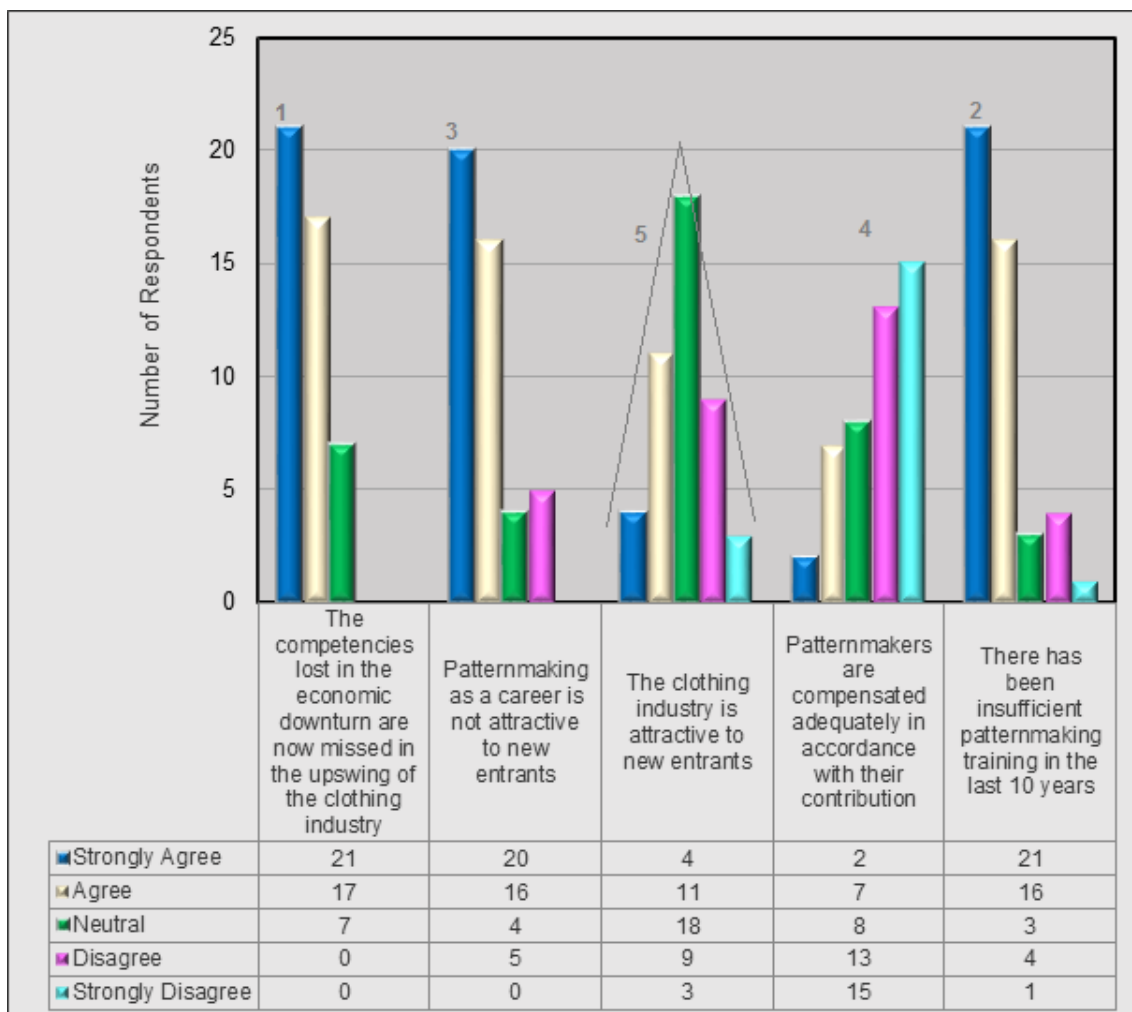


Figure 4.16 Factors contributing to the scarcity of patternmaking skills

- No.2 – There has been insufficient patternmaking training in the last 10 years – 21 (47%) respondents strongly agreed with the statement and a further 36% agreed. Although it may be the responsibility of educational institutions to train candidates, if there are no career prospects it would be reckless to do so. Educational institutions must strive to be in tune with the future needs of the industry but it is also the responsibility of the industry to be in communication with those institutions.
- No.3 – Patternmaking as a career is not attractive to new entrants – 20 out of 45 respondents strongly agreed with this statement. The marketing of this career has to fall within the scope of the industry. In addition, the mentorship of new entrants must be a priority to nurture and not neglect.
- No.4 – Switching to strong disagreement - 15 respondents strongly disagreed and 13 respondents disagreed with the statement that patternmakers are compensated adequately in accordance with their contribution in the industry. This statement correlates with the statements under Figure 4.13.
- No.5 – The last statement that the clothing industry is attractive to new entrants received an almost even response from the respondents as indicated by the normal curve in figure 4.16 above – with a very slight weighting towards the positive. This indicates the industry itself is a tough industry.

4.3.3.4 Patternmaking as a critical skill.

Figure 4.17 below was derived from Figure 4.11. An even higher 92% of the respondents reacted to the statement about patternmaking being critical. Again the two “Strongly Disagree” came from educators as in the previous discussion.

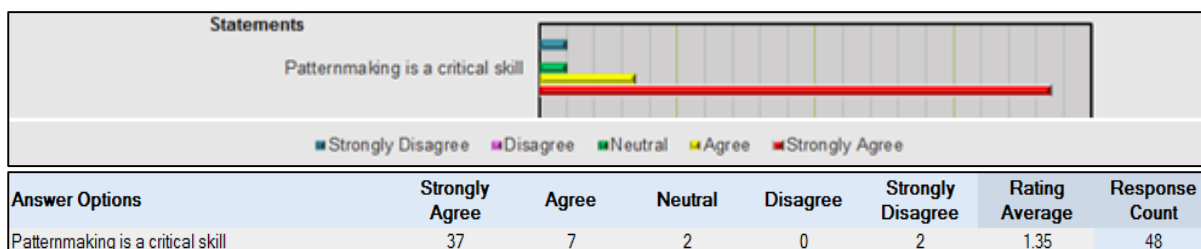


Figure 4.17 Respondents' reactions to the critical skill statement

Observing Figure 4.18 below the following conclusions were made:

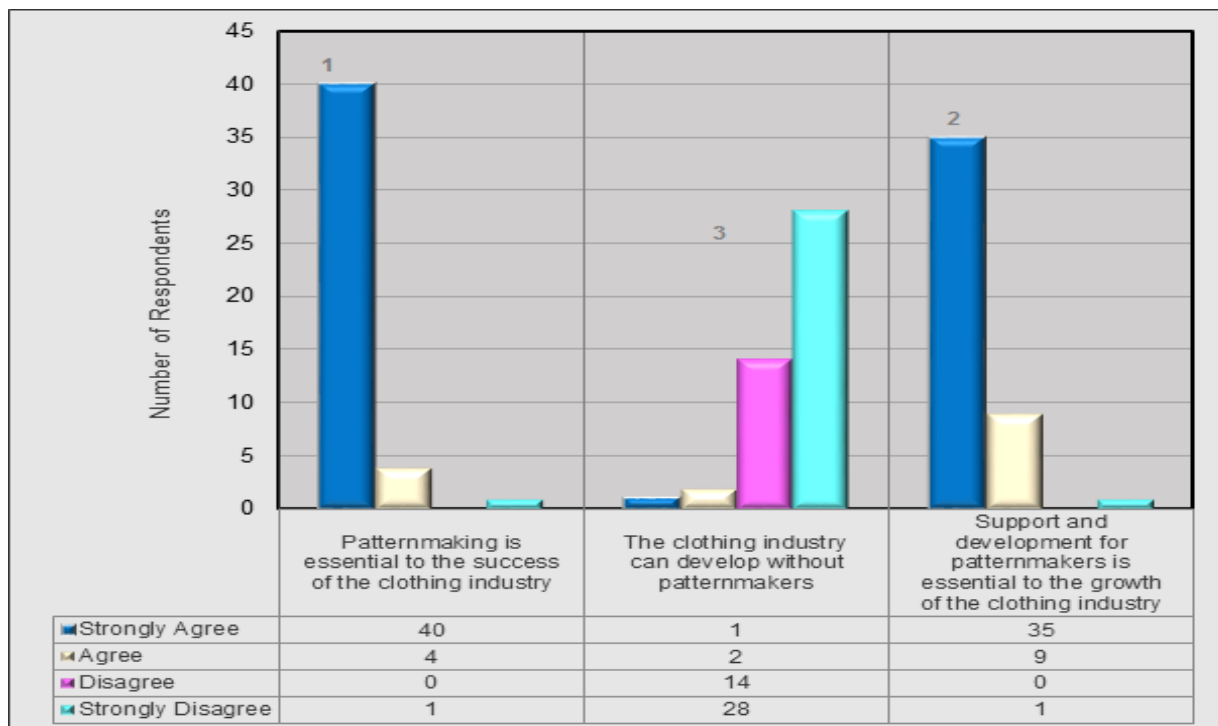


Figure 4.18 Patternmaking as a *critical* skill

No.1 – Patternmaking is essential to the success of the clothing industry – 98% of respondents strongly agreed or agreed with the statement.

No.2 – The statement that the clothing industry can develop without patternmakers was strongly disagreed with. This was a check question to see the extent respondents were engaged with the questionnaire. A low “strongly disagree” here would raise questions of reliability. There are obviously many other variables that could also play a role here.

No.3 – Support and development for patternmakers is essential to the growth of the clothing industry – 98% of respondents strongly agreed or agreed with this statement.

4.3.4 EDUCATION AND TRAINING

This section speaks to *Critical Question 3 - What patternmaking training and education interventions could potentially meet the needs of industry?*

The following analysis looks at the respondent’s emphasis on education and training.

4.3.4.1 Workplace experience before embarking on a qualification in the clothing industry.

Almost 80% of respondents were in agreement that patternmakers need to gain workplace experience before embarking on a qualification in the clothing industry. This is, however, not always possible because the industry does not have the capacity to take on patternmakers that do not have any initial training.

The following six comments from respondents illustrate the value of experience gained. (It must, however, be noted that some of the comments might be contradictory in nature, but they are noted as respondents' comments):

#	Comment
1	<i>The learner needs to contextualise the learning. Workplace experience will assist with doing this.</i>
2	<i>Qualification curricula normally consist of beginner-level content. Industry background would definitely be an advantage but certainly not a definite necessity</i>
3	CRITICAL TO UNDERSTAND INDUSTRY PROCESSES
4	<i>There needs to be a strong interest in the technical processes of the industry. This would be improved by an internship in the industry prior to embarking on a qualification. A 'gap' year in the industry would help to understand the type of skills required and allow the prospective student to be able to select the correct syllabus for his/her chosen position.</i>
5	<i>Yes and no, but it's an advantage if they have been in industry, reason being: they are more familiar and it's easier for them to understand the technical part of the course.</i>
6	<i>You cannot fully understand patterns in a short course, it needs in-depth specific training for the average person who doesn't have the natural flair for it. Being in retail I see the lack of good patternmakers in manufacturing because most of them got training through short courses. I think learning the fundamentals from a book is a good start before actually going to industry experience. After grasping basics, only then would it make sense to me to go and gain basic workplace experience. This will help with understanding the skill in the work place. After that go back to study, this should ease your understanding of classroom training translated to actual industry work.</i>

Table 4.2 Comments about workplace experience

4.3.4.2 Discussion about academic qualifications

Twenty-four respondents agreed that NQF level 7: – 3 year Degree in Clothing Technology is important and twenty-three respondents agreed that NQF level 6: – 3 year Diploma (Clothing Management/ Fashion Design) is important. Twenty-two respondents strongly agreed that NQF level 5: – 1 year Higher Certificate (Patternmaking, Quality, Sewing skills, Work study) is important and twenty respondents strongly agreed that NQF level 7: – 1 year Advanced Diploma (patternmaking specific after level 6 Diploma) is important. This question could be helpful in the development of the curricula for Clothing Management, Fashion Design and other courses that include patternmaking as a subject.

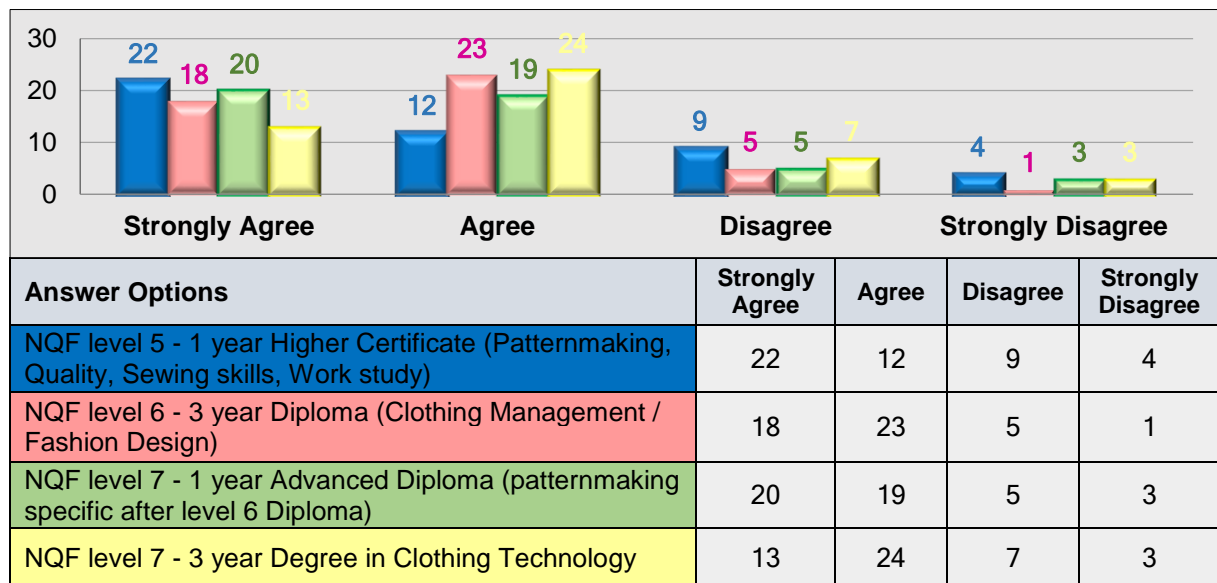


Figure 4.19 Academic qualifications assisting in the development of a patternmaker

4.3.4.3 Short courses that could assist in the development of a patternmaker.

The three fundamental short courses preferred by the respondents were: NQF level 5 – Short course in Patternmaking (90 hrs), NQF level 6 – Short course in Advanced Patternmaking (90 hrs) and NQF level 6 – Short course in Sizing & Grading – (90 hrs) where between 37 and 41 respondents either *strongly agreed or agreed* that these are the preferred short courses that should be offered. These are clearly the short courses that need to be developed to assist existing patternmakers to develop and upgrade their skills (Refer to Figure 4.20 below).

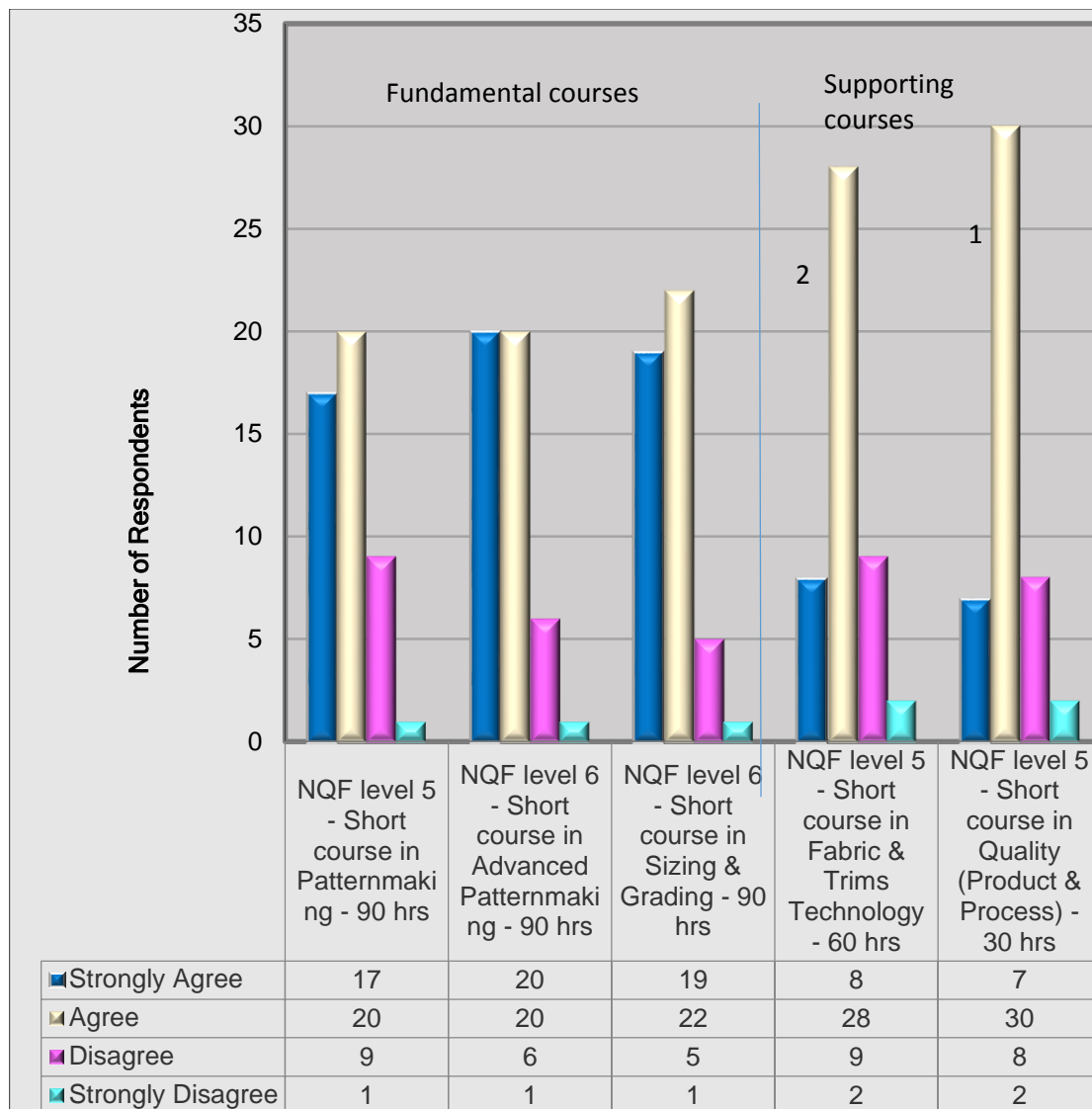


Figure 4.20 Short courses that will assist in the development of a patternmaker.

The results from the questionnaire indicated clearly what the respondents preferred or saw as relevant. One hundred percent of the respondents felt that fit and sizing was absolutely necessary as supporting knowledge, and patternmakers need experience in these areas (Refer to figure 4.8). Although size and fit was not a separate focus of this study, it is incorporated into patternmaking skill and knowledge as a given. However, subsequent to this research it may be important to make it more visible in the patternmaking curriculum.

As for supporting knowledge, 98% of the respondents indicated that fabrication and 96% of the respondents indicated that quality is critical knowledge requirements. Quality here can be seen as an inclusive term spanning both product (fabric, trim,

outwork, pattern, construction etc.) and processes (marker making, laying, cutting, assembly finishing etc.).

From the above information seen in Figure 4.20, the two short courses that need to be developed as supporting short courses are NQF level 5 – Short course in Fabric & Trims Technology (60 hrs) and NQF level 5 – short course in Quality (Product & Process) (30 hrs). Both of these can be integrated with patternmaking knowledge and offered to both patternmakers and non-patternmakers (e.g. quality, work-study, design personnel). This is because all technical knowledge is interrelated and a problem in one area can easily cause a problem in another area.

4.4 CONCLUSION

This chapter interpreted and analysed the results of the study. The focus group and online questionnaire were used to illustrate which patternmaking knowledge and skills were required by the clothing industry in the eThekweni Metropolitan region in KwaZulu-Natal. The result revealed substantial and relevant information which needs to be addressed to develop and improve the clothing industry.

The next chapter will discuss the recommendations and final conclusion of the study.

CHAPTER 5 - CONCLUSION AND RECOMMENDATIONS

5.1 INTRODUCTION

This research investigated patternmaking and the factors contributing to making it a scarce and critical skill. The results of the study provide a record of the skills and knowledge required, with a deeper insight into the factors which could be implemented to address the scarce and critical patternmaking skills.

This chapter summarises the findings in answer to the critical questions discussed and outlined in chapter four.

5.2 SUMMARY OF THE FINDINGS ADDRESSED

The main aim of this study was to find out what the clothing industry's requirements for patternmaking are and ascertain their perspective of the current situation. The study provided insight into the patternmaking skills required by the clothing industry and recommending potential ways of developing these skills to address their scarcity.

A background was given about the industry and the skill of patternmaking and the importance of the project were outlined. Factors were looked at which make patternmaking a scarce and critical skill within the South African clothing industry.

In chapter two the literature outlined the areas that supported the study. This provided the foundation on which the results pivot and future recommendations can be built. The different factors that affect the training of patternmakers and the additional factors that contribute to the development of patternmakers were discussed. There was also an in-depth review of the competencies, skills and knowledge relating to patternmaking.

Chapter three defined the research methodology used, rationalising the sampling method and procedure used in designing the most suitable instruments to collect data. The requirements of ethics, validity and reliability are paramount at all times.

In chapter four the data gathered from the contributions of the focus group/ interview sessions and the online survey questionnaire was presented. The data was qualitative and interpreted with descriptive statistics, comprising of graphs and spreadsheets to encapsulate the information.

The most important findings and factors of the study came from the data in chapter four and are outlined below:

5.2.1 Patternmaking skills

Critical Question 1: - What are the contributing factors and specialised professional skills that relate to patternmaking?

- These skills are critical and in short supply. Doing pattern adaptations, master patterns and alteration for fit are rated as extremely important activities for which skill is required. Drafting basic blocks and style analysis are equally rated as being very important by the respondents. There was consensus that the patternmaker needs to have mastered a wide range of cognitive/ psychomotor abilities. Furthermore it is felt far more attention should be given to the importance of drafting as this is where the fundamentals of size and fit are introduced into a pattern, and where many problems originate.
- There were prerequisites for patternmaking that were seen as being crucial. These requirements relate to two- and three-dimensional perception, and an understanding of body and garment proportion. Patternmakers make two-dimensional patterns for garments that have to fit the three-dimensional human body. A strong numerical aptitude is also needed. Supporting knowledge required by patternmakers included garment construction, fit concepts and sizing standards, fabrication and quality.
- The importance of soft skills such as accuracy, attention to detail, and passion for clothing were rated as extremely important. Good listening and

communication skills with integrity and creative flare were also regarded as being vitally necessary.

In support of these findings Pritchard (2013) stated that teaching patternmaking requires an instructor who is knowledgeable and familiar with traditional pattern-cutting principles and understanding. He also noted that patternmaking takes time and requires practice and supervision. It is a practical skill that develops through the use of the upper psychomotor area.

All of the above need to be incorporated into the new curriculum for the various programmes as discussed in 5.3 below. In addition, further work needs to be done in industry to share these findings and encourage wider discussion to find creative solutions to these challenges.

5.2.2 Industry perceptions

Critical Question 2 - What do industry personnel think about these factors and skills?

- The time to develop a competent patternmaker needs to be further explored and discussed with industry. There was no consensus of whether this should be less than three years, 4 to 5 years or 6 to 8 years. Through this exploratory research and with further studies it could be possible to determine a scale of competency.
- 98% of respondents agreed that patternmaking is more than just doing pattern alterations, and that a good patternmaker is fundamental to increasing sales at retail level. This implies that patternmaking includes a wide range of abilities, and certainly this skill is appreciated amongst the respondents to this survey.
- The factors contributing to making patternmaking a scarce skill include the perception that the competencies lost in the economic downturn are now missed in the upswing of the clothing industry, and that there has been insufficient patternmaking training in the last 10 years. This was true of our own programme where our focus moved to entrepreneurship due to limited

opportunities for our graduates in the formal clothing industry. With the market swinging back to South Africa, patternmaking has been made a priority subject area in the curriculum.

- Over 85% of respondents strongly agreed/ agreed that patternmaking is a scarce skill and 92% of respondents strongly agreed / agreed that it is a critical skill -essential to the success and development of the clothing industry.

5.2.3 Education and Training

Critical Question 3 - What patternmaking training and education interventions could potentially meet the needs of industry?

A survey was conducted with people in senior positions in the wider clothing industry to obtain a perception on possible education and training interventions to support development of patternmaking. The following findings are deemed important:

While 72% of the respondents strongly agreed that the one year certificate programme may assist in the development of patternmaking, 87% of the respondents support a three year Diploma, which is the preferred formal qualification for patternmaking. Coetzee (2014) in her study recommended that students from the National Diploma Clothing Management could become pattern-makers, as this course is more technically orientated. The three year Degree in Clothing Technology had a 79% interest rate from the respondents, this being a potential future development in education. An Advanced Diploma was supported by 83% of respondents.

Respondents were supportive of the introduction of industry specific training courses where industry staff can be upskilled and trained in a reasonably short period. The following short courses and specific NQF levels were supported.

- NQF level 6 - Advanced Patternmaking (90hrs).
- NQF level 6 - Sizing & Grading (90hrs).
- NQF level 5 - Fabric & Trims Technology (60hrs).
- NQF level 5 - Product Quality (Product & Process) (30hrs).

These short courses could be the catalyst to address the crisis around this critical and scarce patternmaking skills dilemma.

5.3 FURTHER RESEARCH POSSIBILITIES

Although this study has produced findings which can be immediately incorporated into the Clothing Management curriculum, there is a great need for further discussion and research at a wider level. As patternmaking is such an important research area for the Clothing Industry, this research should be undertaken by as many parties as are interested and able. A wider pool of knowledge will stimulate conversation and bring life to this subject. The specialists interviewed in the focus group concluded that without the reinforcement of patternmaking skills the entire value chain will likely collapse.

The sustainable growth of the industry is dependent on finding solutions through further research including but not limited to the following topics as outlined below:

- Further in-depth research into how skills can be developed in the ongoing training of patternmaking students. How could the 21st century technological environment facilitate the development of two-dimensional (2D) and three-dimensional (3D depth perception) skills?
- Investigate the learning processes used by other institutions, both nationally and internationally (as a benchmarking exercise), in the context of patternmaking as a form of creative development.
- Determining through analysis what success has been achieved through the Fibre-Processing and Manufacturing Sector Education and Training Authority (FP&M SETA) with regard to alleviating the scarce and critical patternmaking skills situation.

- Explore patternmaking skills in greater depth by carrying out a broader practical study in South Africa in demographic areas other than KwaZulu-Natal to further investigate the skills required by patternmakers nationally.

5.4 CONCLUSION

Through this research, it is clear that patternmaking is a multifaceted, high level cognitive and psychomotor skill. A patternmaker needs to be fully trained and educated over a period of several years to develop an integrated knowledge and skill that far surpasses that of simply adapting patterns.

There is an urgency to alleviate the '*scarce and critical*' skills situation of patternmaking in South Africa, and the importance of manual patternmaking is paramount for the future growth and sustainability of the industry.

It is vital that future patternmakers entering the workplace are well trained and educated in an environment of continual development. We as educators need to preserve the crucial skills and knowledge base of manual patternmaking, whilst also inspiring technological exploration and further development through the use of CAD applications.

Patternmaking is like the proverbial elephant in the story of 'The Elephant and the Blind Men' (Chircop 2012). This study attempts to remove the blindfolds from those observing the patternmaking 'phenomenon' in order that all may see patternmaking in its entirety and not just as part of an end result – the garment.

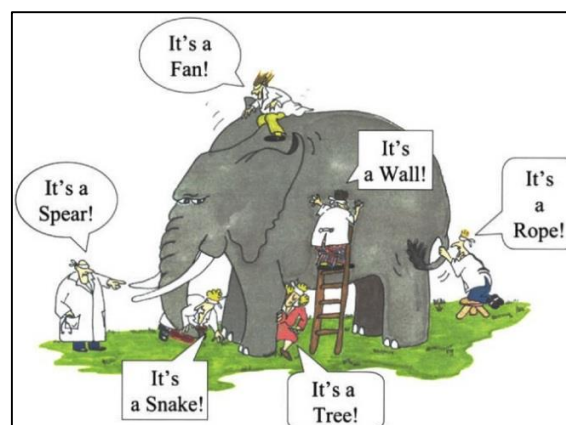


Illustration from (Chircop 2012)

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APPENDICES

APPENDIX Ai – email to a Superior requesting patternmakers' participation in a focus group interview.

Dear Superior,

I am registered for my Master of Applied Arts: Fashion at the DUT, within the Department of Fashion & Textiles.

My research topic is:

'A study of patternmaking and the contributing factors making it a scarce and critical skill.'

The purpose of this study is to investigate the needs (nature and importance) of the patternmaking knowledge and skills required by industry, which will ultimately be used to guide and inform the teaching practices of patternmaking in the Clothing Management Programme (CM) at Durban University of Technology (DUT).

I would like to ask for your help to identify a senior patternmaker (a person with at least 7-10 years' experience) within your company. I would like to invite them to be part of a focus group interview, together with 5 other patternmaking experts, to discuss the challenges faced by industry with regard to these scarce and critical skills.

Also could you please inform me as to who their supervisor is to ask for permission for their participation in the focus group?

Following the focus group there will be an online questionnaire to a wider audience.

You can contact me on 083 44 55 211 or email williamsonk@dut.ac.za to confirm if you have anybody in your company who would be able to participate in this study.

Please note that the information gathered from the focus group interview will be used exclusively for research purposes. All information will be treated with great confidentiality.

If you have any queries regarding the study you can contact my supervisors:-

Dr Aliakbar Fassihi
031 373 2148
afassihi@dut.ac.za

or

Mrs Sunthra Moodley
031 373 3711
sunthram@dut.ac.za

Yours sincerely

Karin Williamson (Student No: 18800010)
Cell: 0834455211
Tel: 031-3732617
Email: williamsonk@dut.ac.za



APPENDIX Aii - Gatekeeper consent for participation in an academic research project.

Dear Supervisor / Manager,

You are herewith requested to allow to participate in an academic research study conducted by Karin Williamson towards a Master's in Applied Arts: Fashion, in the Faculty of Arts and Design, at the Durban University of Technology (DUT).

The research topic is: *A study of patternmaking and the contributing factors making it a scarce and critical skill.*

The purpose of this study is to investigate the needs (nature and importance) of the type of patternmaking knowledge and skills required by industry, which will ultimately be used to guide and inform the teaching practices of patternmaking in the Clothing Management programme at Durban University of Technology (DUT).

Please be advised that the information gathered from the **Focus Group** will be used exclusively for research purposes. All answers will be treated as confidential, and neither the company nor the participant's details will be disclosed. The participant may however choose not to participate and may withdraw from the study at any time without any negative consequences.

I will provide you with a summary of my findings on request.

If you have any queries regarding the study you may contact my supervisors:-

Dr Aliakbar Fassihi
031 373 2148
afassihi@dut.ac.za

or

Mrs Sunthra Moodley
031 373 3711
sunthram@dut.ac.za

Yours sincerely

Karin Williamson (Student No: 18800010)
Cell: 0834455211
Tel: 031-3732617
Email: williamsonk@dut.ac.za

.....
Indicating your consent please sign below:

(Please return the letter with candidate)

Name: Signature:Date:.....

APPENDIX Aiii - Consent form - Subject matter experts in focus group

Dear Respondent,

I would like to thank you for being part of this focus group, together we are discussing the challenges faced by the clothing industry with regard to scarce, critical patternmaking skills. Your participation is greatly appreciated.

The data collected from this focus group discussion will be recorded and captured electronically. The information will guide the development of a *patternmaking process flowchart* and a *patternmaking competency matrix*. The flowchart and matrix will then assist and give input into the appropriate construction of questions for the online SurveyMonkey questionnaire. This process will be used to obtain information about the clothing industry expectations.

Please note that the information gathered from the focus group meeting will be used exclusively for research purposes. All information will be treated with great confidentiality.

Kindly indicate your consent by signing at the bottom of this letter.

Yours sincerely

Karin Williamson (Student No: 18800010)
Cell: 0834455211
Tel: 031-3732617
Email: williamsonk@dut.ac.za

.....
Indicating your consent please sign below:

Name: Signature:Date:

APPENDIX Aiv - Consent form - Subject matter experts being interviewed - (due to not being able to attend the Focus Group).

Dear Respondent,

I would like to thank you for being part of this interview. Together we are discussing the challenges faced by the clothing industry with regard to scarce, critical patternmaking skills. Your participation is greatly appreciated.

The data collected from this discussion will be recorded and captured electronically. The information will guide the development of a *patternmaking process flowchart* and a *patternmaking competency matrix*. The flowchart and matrix will then assist and give input into the appropriate construction of questions for the online SurveyMonkey questionnaire. This process will be used to obtain information about the clothing industry expectations.

Please note that the information gathered from the interview will be used exclusively for research purposes. All information will be treated with great confidentiality.

Kindly indicate your consent by signing at the bottom of this letter.

Yours sincerely

Karin Williamson (Student No: 18800010)
Cell: 0834455211
Tel: 031-3732617
Email: williamsonk@dut.ac.za

.....
Indicating your consent please sign below:

Name: Signature: Date:

APPENDIX Av - Focus group information and thank you letter:-

Focus Group – Subject Matter Experts.

I would like to thank you for being part of this focus group, together we are discussing the challenges faced by the clothing industry with regard to these scarce skills. Your participation is greatly appreciated.

The data collected from this focus group discussion, will be recorded and captured electronically. The information will guide the development of a *patternmaking process flowchart* and a *patternmaking competency matrix*. The flowchart and matrix will then assist and give input into the appropriate construction of questions for the online SurveyMonkey questionnaire. This process will be used/followed to obtain information about the clothing industry expectations. Please note that the information gathered from the focus group meeting will be used exclusively for research purposes. All information will be treated with great confidentiality.

Referring to the *patternmaking process flowchart* attached.

- What other competencies do you feel are critical and need mentioning / building into this flowchart?
- Do you have any comments / input about the sequence of patternmaking processes in this flowchart?

Referring to the *patternmaking competencies matrix* attached.

The patternmaking competencies referred to in the matrix are informed by the Organising Framework for Occupations (OFO) published by the Department of Higher Education and Training (DHET). DHET included the OFO for skills, planning to establish a common language for discussing occupations. This was an attempt to create a standardized framework aligning to an international framework and to reflect the important changes that have taken place in the world of work (South African Department: Higher Education and Training 2013). The development of this common language will add significant value for further discussion and development.

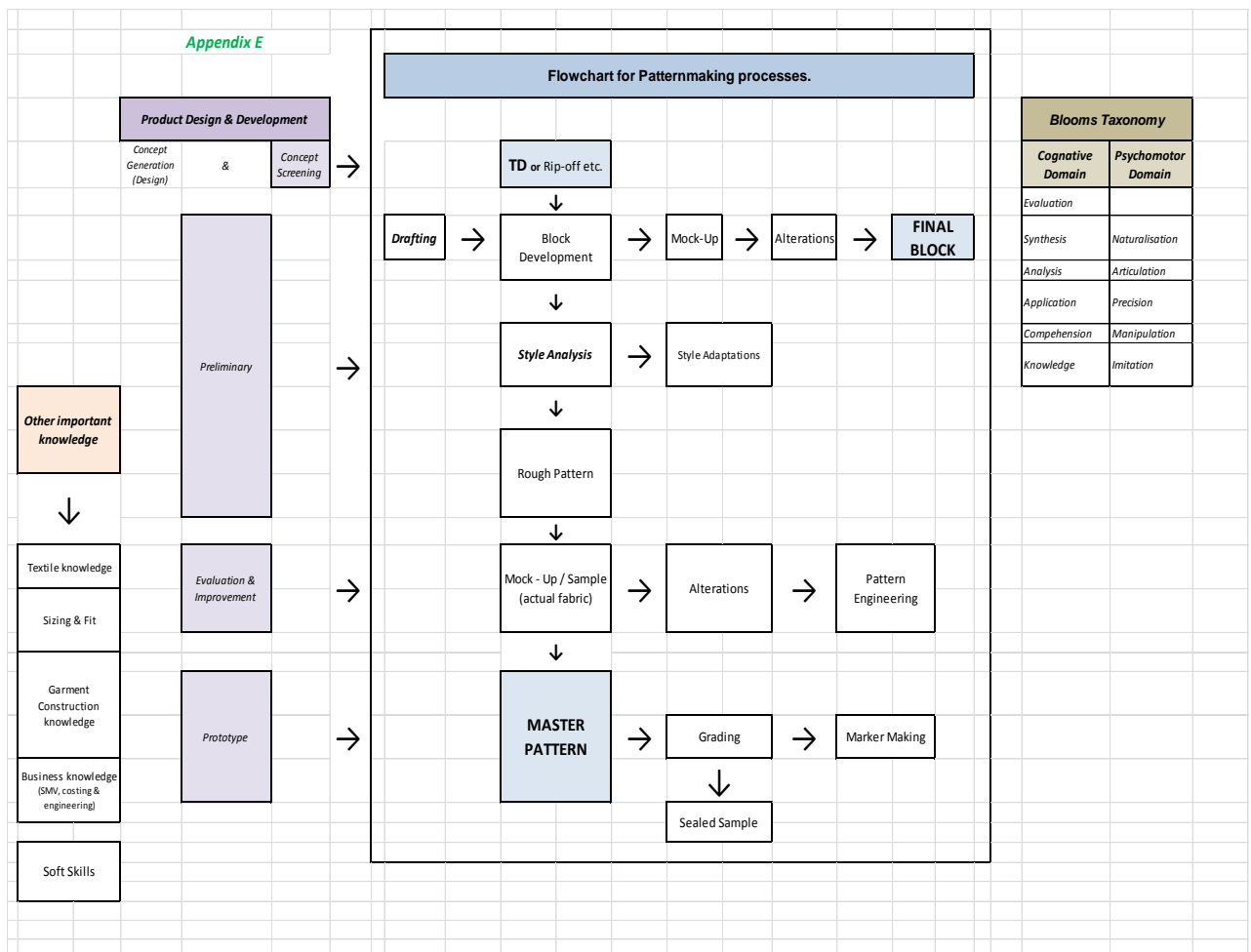
- Referring to the column that have all the different job types, are there any other job types or profiles that you can suggest?
- Are all the competencies listed appropriate?
- Are there any additional competencies that need to be included?
- Populate the matrix. (This will be explained to the focus group).

I would like to thank you for being part of this focus group, together we are discussing the challenges faced by industry with regard to these scarce skills.

Yours sincerely

Karin Williamson (Student No: 18800010)
Cell: 0834455211
Tel: 031-3732617
Email: williamsonk@dut.ac.za

APPENDIX B – Flowchart for patternmaking processes.



Developed using South African Department: Higher Education and Training (2013) Guidelines: Organising Framework of Occupations(OFO)

APPENDIX C – Competency Matrix

APPENDIX BII		COMPETENCY MATRIX													
		JOB PROFILES													
		OFO Job Profiles						Other Additional Job Profiles							
		Pattern Maker	Grader	Marker Maker	Sample Cutter	Bulk Production Cutter	Designer	Garment Technologist	Quality Controller	Quality Manager	Workstudy Officer	Production Supervisor	Retail Buyer		
Competencies (Skills) to be developed	Schooling - Base Education														
	Pre-Training														
	Pattern Education & Training														
	Advanced NQF7														
	Intermediate NQF5														
	Basic NQF2														
	Patternmaking Interest + Aptitude														
	Design Interest + Aptitude														
	Spatial Conceptualisation (+ understanding Proportion)														
	Numerical Aptitude														
TD's															
Drafting															
Style Analysis + Adaptation															
Master Pattern + Alterations															
Grading															
Marker Making															
Textile knowledge															
Sizing & Fit															
Garment construction knowledge															
Business knowledge (SMV, costing & engineering)															
Soft Skills															
"Time on the Job"															

1	Competence	Analysis
2	Awareness	Knowledge

NOF Level	10	9	8	7	6	5	4	3	2	1	ABET 4	ABET 3	ABET 2	ABET 1
	HET - Higher Education										GET - General Education			
							Grade 12	Grade 11	Grade 10	Grade 9	TVET's & School			
							FET - Further Education							

Developed using South African Department: Higher Education and Training (2013) Guidelines: Organising Framework of Occupations(OFO)

APPENDIX Di - Focus Group Session

Focus Group Plan – Subject Matter Experts.

16 August 2016

1. Introduction to my Masters

I am registered for my 'Master of Applied Arts: Fashion' at the DUT, within the Department of Fashion & Textiles.

My research topic is:

'A study of patternmaking and the contributing factors making it a scarce and critical skill.'

The purpose of this study is to investigate the needs (nature and importance) of the patternmaking knowledge and skills required by industry, which will ultimately be used to guide and inform the teaching practices of patternmaking in the Clothing Management Programme (CM) at Durban University of Technology (DUT).

I would like to thank you for being part of this focus group, together we are discussing the challenges faced by the clothing industry with regard to these scarce and critical skills. Your participation is greatly appreciated.

2. Request permission to record (signed consent APPENDIX Aiii & APPENDIX Aiv).

The data collected from this focus group discussion, will be recorded and captured electronically. Please note that the information gathered from the focus group interview will be used exclusively for research purposes. All information will be treated with great confidentiality.

3. Introduction of members to each other.

- Name
- Company
- Position held at company
- Years' experience as a patternmaker.

Introduction to the process and hand-out pack to respondents:-

- Permission sheet to sign
- Flowchart
- Matrix
- NQF Sub-Frameworks and Qualification Types.

4. Flowchart & Matrix.

The information gathered here will guide the development of a *patternmaking process flowchart* and a *patternmaking competency matrix*.

The flowchart and matrix will then assist and give input into the appropriate construction of questions for the online SurveyMonkey questionnaire. This process will be used to obtain information about the clothing industry expectations.

4.1 Introduction of the flowchart for patternmaking process.

Referring to the *patternmaking process flowchart* attached. (APPENDIX B)

- Are there any processes that should be left out?
- Are there any processes that are missing that you feel are critical to be built into this flowchart?
- Is it necessary to change the ranking/order of the patternmaking processes in this flowchart?

4.2 Introduction of the patternmaking competency matrix.

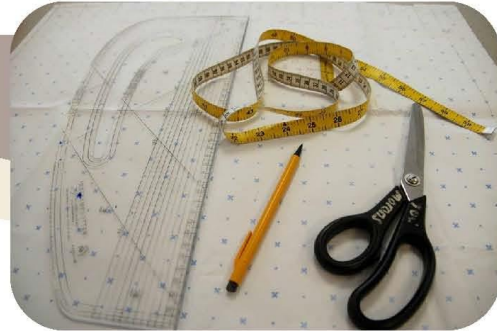
The patternmaking competencies in the matrix are informed by the Organising Framework for Occupations (OFO) published by the Department of Higher Education and Training (DHET). DHET included the OFO for skills, planning to establish a common language for discussing occupations. This was an attempt to create a standardized framework aligning to an international framework and to reflect the important changes that have taken place in the world of work (South African Department: Higher Education and Training 2013). The development of this common language will add significant value for further discussion and development.

Referring to the *patternmaking competencies matrix* attached. (APPENDIX C)

- Are all the competencies listed appropriate, and are there any that should be left out?
- Are there any additional competencies that you feel need to be included?
- Referring to the job profile column are there any other job types that you can suggest?

Please populate the matrix.

Department
of
Clothing & Textile Studies



Your attendance will be appreciated at the following meeting

Patternmaking Focus Group


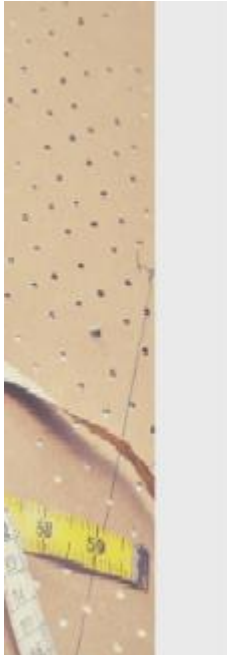
- Purpose:** Determining the skills requirements for industry patternmakers.
- Host:** Karin Williamson
- Date:** Tuesday - 16 August 2016
- Time:** 08h00 to 10h00
- Venue:** Steve Biko Campus - DUT
Steve Biko Road
Department of Clothing & Textile Studies - Block S6 Level 4

Parking at Gate 2 off Steve Biko Road.



APPENDIX Diii Focus Group PowerPoint Presentation:-

Slide 1



Department
of
Clothing & Textile Studies

Your attendance will be appreciated at the following meeting

Patternmaking Focus Group

Purpose: Determining the skills requirements for industry patternmakers.

Host: Karin Williamson

Date: Tuesday - 18 August 2016

Time: 09h00 to 10h00

Venue: Steve Biko Campus - DUT
Steve Biko Road
Department of Clothing & Textile Studies - Block 56 Level 4

Parking at Gate 2 of Steve Biko Road

DUT DURBAN
UNIVERSITY OF
TECHNOLOGY

Slide 2



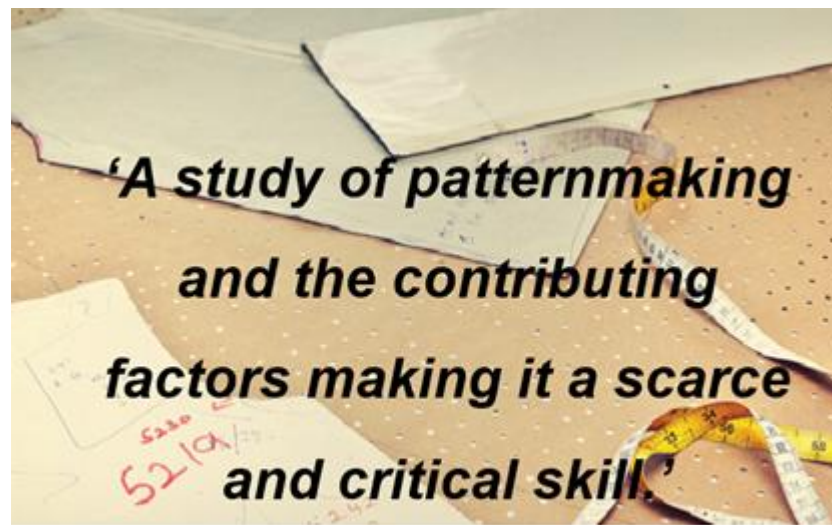
Introduction to my Masters

'Master of Applied Arts: Fashion'
in
Department of Fashion & Textiles.

*(Lecturer in Clothing Management Programme in
Department of Clothing & Textile Studies)*

My research topic is:

Slide 3



by Karin Williamson

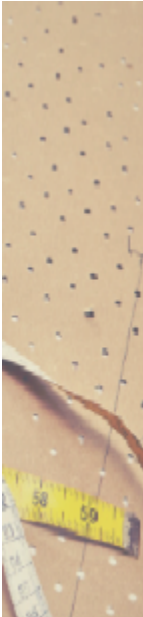
Slide 4

Request permission

Data collected from this focus group discussion, will be

- Recorded and captured electronically.
- Information gathered from the focus group interview will be used exclusively for research purposes.
- All information will be treated with great confidentiality.

Slide 5



Introduction of members to each other.

- Name
- Company
- Position held at company
- Years' experience as a patternmaker.

Slide 6



The Purpose of this study

Investigate the needs (nature and importance) of patternmaking

- ***knowledge and skills*** required by industry, used to guide and inform the
- ***teaching practices*** of patternmaking in the Clothing Management Programme

Slide 7




“scarce and critical” skills in patternmaking (FP&MSETA)

We are discussing the challenges faced by the clothing industry with regard to these findings by FP&MSETA

- **What do you think?**
- **In your experience how scarce?**

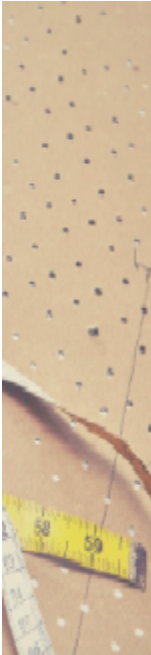
Slide 8



Flowchart & Matrix

- Information gathered - guide the development of a
*patternmaking process **flowchart** & patternmaking competency **matrix**.*
- They will give input, into construction of questions for
online **SurveyMonkey** questionnaire.
(Aim: Obtain information about the clothing industry expectations).

Slide 9




FLOWCHART

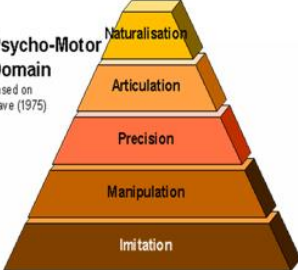
Referring to the *patternmaking process flowchart* (APPENDIX E)

- Are there any items that should be left out?
- Are there any items that are missing that you feel are critical to be built into this flowchart?
- Is it necessary to change the ranking/order of any of the items in this flowchart?

Slide 10




Psycho-Motor Domain
based on Dave (1975)



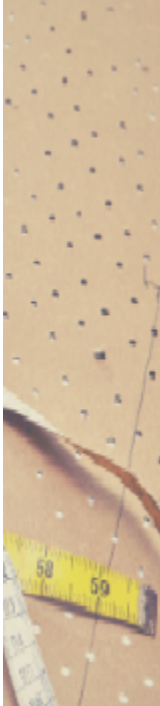
- Naturalisation
- Articulation
- Precision
- Manipulation
- Imitation

Cognitive domain



- Evaluation
- Synthesis
- Analysis
- Application
- Knowledge

Slide 11




Intro to MATRIX.

- The patternmaking competencies in the matrix are informed by the Organising Framework for Occupations (OFO) published by the Department of Higher Education and Training (DHET).
- DHET included the OFO for skills, planning to establish a common language for discussing occupations.
- Development of this common language will add significant value for further discussion and development.

Attempt to create - standardized framework aligning to an international framework and to reflect the important changes that have taken place in the world of work' ([South Africa Department: Higher Education and Training 2013](#)).

Slide 12

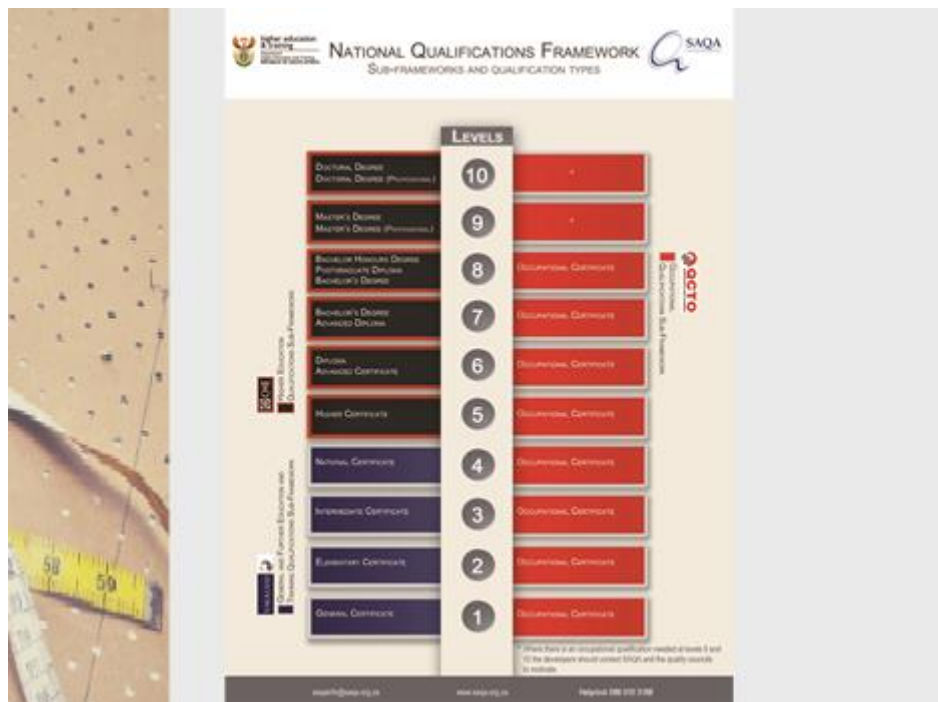


MATRIX

Referring to the ***patternmaking competencies matrix*** (APPENDIX C)

- Are all the competencies listed appropriate, are there any that should be left out?
- Are there any additional competencies that you feel need to be included?
- Referring to the job profile column are there any other job types that you can suggest?

Slide 13



Slide 14

SurveyMonkey ?

(Aim: Obtain information about the clothing industry expectations)

- What type of Questions should I ask?
 - Biographical Profile (job? How long? How did you get into patternmaking?)
 - Personal Profile (qualifications? Make clothing from domestic patterns?)
- Why do graduates not take up patternmaking positions?
- What are some of the enablers and dis-enablers in patternmaking?

Thank You

I would like to thank you for being part of this focus group.

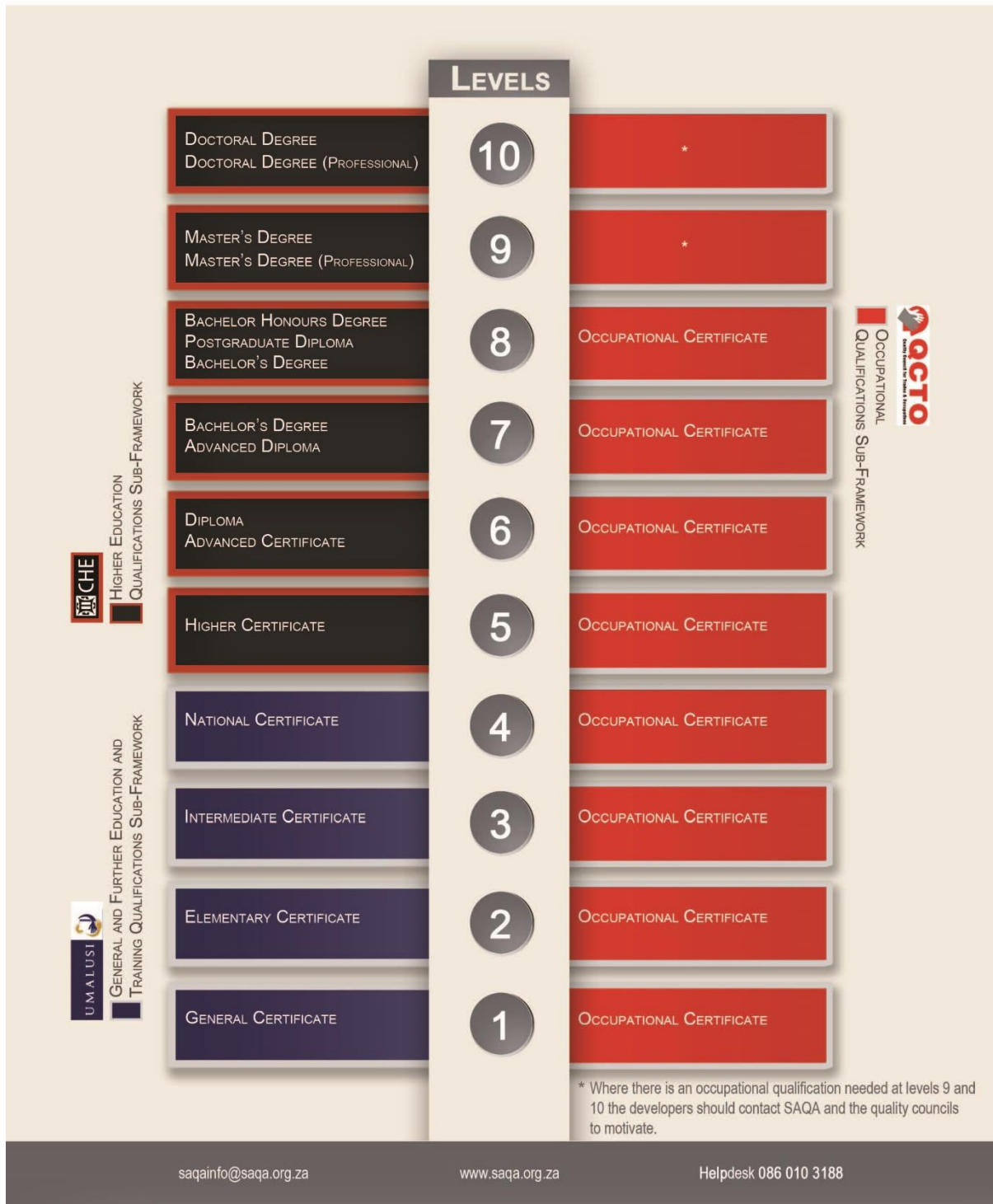
Your participation is greatly appreciated.





NATIONAL QUALIFICATIONS FRAMEWORK

SUB-FRAMEWORKS AND QUALIFICATION TYPES



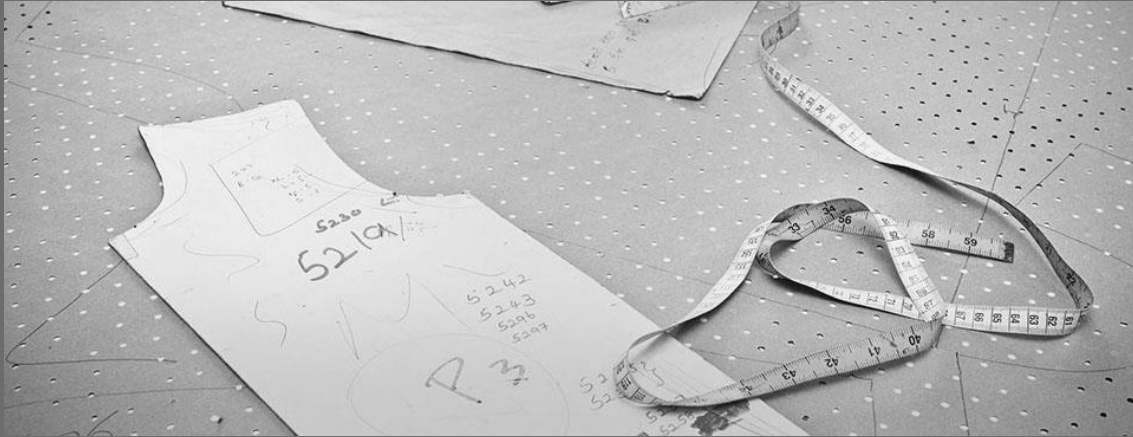
saqainfo@saqa.org.za

www.saqa.org.za

Helpdesk 086 010 3188

APPENDIX E SurveyMonkey: On-line questionnaire to industry stakeholders with patternmaking knowledge:-

The multifaceted nature of



Purpose of this Survey:

Patternmaking is a multifaceted and complex activity.

This survey attempts to determine some of the contributing factors which make patternmaking a scarce and critical skill in the clothing industry.

Thank you for participating in my survey. Your feedback is important.

The multifaceted nature of



Section1: - About You

1. Into which age category do you fall?

- 21-30 years
- 31-40 years
- 41-50 years
- > 50 years

2. What is the highest level of education that you have completed?

- GR10 / Std 8
- GR12 / Std 10
- Diploma
- BTech / Degree

Other (please specify)

3. What is your current job position?

- Patternmaker
- Grader
- Designer
- Garment Technologist
- Merchandiser
- Quality Personnel
- Workstudy Personnel
- Production Supervisor
- Educator (Patternmaking)

Other (please specify)

4. How many years of experience do you have in the clothing industry?

- < 1 year
- 1-5 years
- 6-10 years
- 11-15 years
- >16 years

5. You consider your personal understanding of patternmaking to be...

- Limited
- Moderate
- Extensive knowledge but not practitioner
- Expert practitioner
- Patternmaking Educator
- n/a

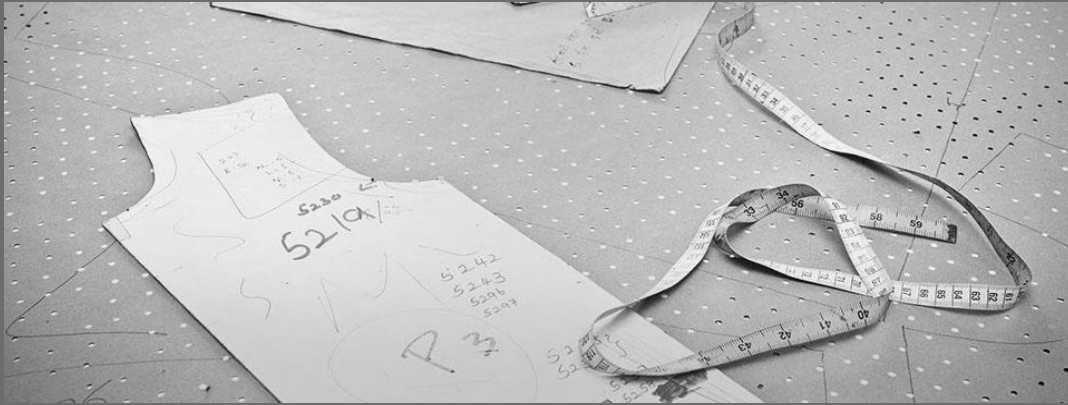
6. If you are a patternmaker, how many years of experience do you have as a patternmaker?

- 1-5 years
- 6-15 years
- 16-20 years
- > 20 years
- not applicable to me

7. If you are a patternmaker, what is your gender?

- Not a Patternmaker
- Male
- Female

The multifaceted nature of



Section 2: - About your Company

8. Which of the following would best describe the company for which you work.

- Full-line Manufacturer
- Design House
- CMT
- Retail
- Education

Other (please specify)

9. How many employees are there in your company?

- < 20
- 21-50
- 51-200
- 201-500
- >501

10. Does your company employ patternmakers?

- Yes
- No

11. Does your company use a Computer Aided Design (CAD) system in the making of patterns and markers?

- Yes
- No

12. Which of the following CAD systems does your company use?

- Gerber
- Lectra
- Assist
- other

13. How many patternmakers in total do you have in your company?

- 1
- 2
- 3
- 4
- 5 and more

14. How many of these patternmakers are manual patternmakers?

- none
- 1
- 2
- 3
- 4
- >5

15. How many of these patternmakers work only on CAD programmes?

- 0
- 1
- 2
- 3
- 4
- >5

16. Does your company battle to find new patternmakers if a position is available?

- Yes
- No
- Do not know

17. What do you think is the reason for this high turnover?

- Remuneration was too low
- Pressure and stress was too high

Other (please specify)

The multifaceted nature of patternmaking



Section 3: - Patternmaking: Skills and related areas

18. In your opinion, rate the importance of the following patternmaking skills required for a patternmaker.

	Extremely Important	Important	Not Important	Not applicable
Drawing Technical drawings (TD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Drafting basic blocks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Style Analysis	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pattern Adaptations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Doing master patterns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fit alterations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grading	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Marker making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. In your opinion, rate the importance of the following prerequisites for patternmaking.

	Extremely Important	Important	Not Important	n/a
Patternmaking interest	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creative aptitude	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Design aptitude	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2 and 3 dimensional perception	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understanding of proportion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Numerical aptitude	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual dexterity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

20. In your opinion, rate the importance of the following supporting **knowledge / experience** required by a patternmaker.

	Extremely Important	Important	Not Important	n/a
Fabrication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sizing standards	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fit concepts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Garment construction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic business	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Costing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Workstudy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Computer competence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
"Time on the Job"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

21. In your opinion, rate the importance of the **soft skills** - traits / emotions / values - required of a pattern maker.

	Extremely Important	Important	Not Important	n/a
Integrity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good listener	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accuracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attention to detail	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Good verbal communicator	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creative flare	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Passion for clothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. In your opinion, how many years' experience should a patternmaker have in order to be deemed competent?

- > 3 years
- 4-5 years
- 6-8 years
- Other (please specify)

23. In your opinion, the basic salary of an *experienced* patternmaker should be...

- < R5000 p/m
- R5001 - R8000 p/m
- R8001 - R12 000 p/m
- R12 001 - R20 000 p/m
- > R20 001 p/m

The multifaceted nature of

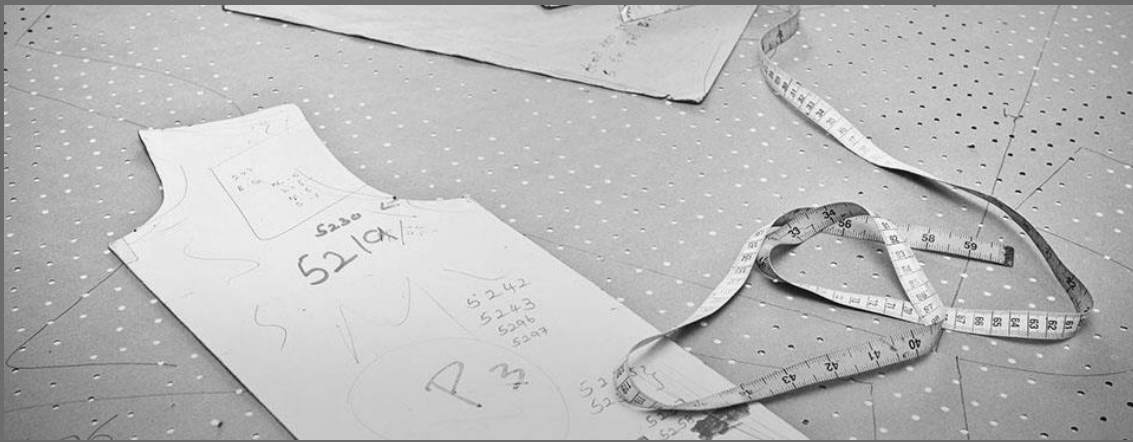


Section 4: - General statements

24. Indicate your level of agreement with the following statements:-

	Strongly Agree	Agree	Disagree	Strongly Disagree
Only pattern makers need to know how to make patterns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patternmaking is more than just doing pattern adaptations	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
CAD patternmakers do not need manual patternmaking skills and knowledge.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Manual patternmaking knowledge and skills are fundamental to obtaining a profitable garment.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Grading knowledge and skills are part of patternmaking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The fit provided by the pattern is less important than the style and price of a garment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
A good pattern is fundamental to increasing sales at retail level	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Most consumers are happy with the fit of their purchased clothing.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The up-skilling of pattern makers will have a positive impact on our company's productivity	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patternmaking knowledge is replaced by computer technology (CAD patternmaking)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patternmaking is a scarce skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patternmaking is a critical skill	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

The multifaceted nature of patternmaking



Section 5: - Patternmaker qualifications & short courses

25. Indicate your level of agreement as to which of the following *academic qualifications* would assist in the development of a patternmaker?

	Strongly Agree	Agree	Disagree	Strongly Disagree
NQF level 5 - 1 year Higher Certificate (Patternmaking, Quality, Sewing skills, Workstudy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 6 - 3 year Diploma (Clothing Management / Fashion Design)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 7 - 1 year Advanced Diploma (patternmaking specific after level 6 Diploma)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 7 - 3 year Degree in Clothing Technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

26. Indicate your level of agreement as to which of the following *short courses* would assist in the development of a patternmaker?

	Strongly Agree	Agree	Disagree	Strongly Disagree
NQF level 5 - Short course in Patternmaking - 90 hrs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 6 - Short course in Advanced Patternmaking - 90 hrs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 6 - Short course in Sizing & Grading - 90 hrs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 5 - Short course in Fabric & Trims Technology - 60 hrs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
NQF level 5 - Short course in Quality (Product & Process) - 30 hrs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

27. In your opinion, should a potential patternmaker gain workplace experience before embarking on a qualification?

Yes

No

Other comment:

The multifaceted nature of



Section 6: - Factors contributing to the current status of patternmaking skills.

For the following statements please indicate the degree to which you agree or disagree.

28. The following factors contribute to the *Scarcity* of patternmaking skills.

	Strongly Agree	Agree	Disagree	Strongly Disagree
The competencies lost in the downturn are now missed in the upswing of the clothing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patternmaking as a career is not attractive to new entrants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The clothing industry is attractive to new entrants	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Patternmakers are compensated adequately in accordance with their contribution	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There has been insufficient patternmaking training in the last 10 years	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other factors regarding scarcity (please specify)

29. Patternmaking as a *Critical* skill:-

	Strongly Agree	Agree	Disagree	Strongly Disagree
Patternmaking is essential to the success of the clothing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The clothing industry can develop without patternmakers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Support and development for patternmakers is essential to the growth of the clothing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>