

Addressing the skills shortage of computer-aided design pattern-making in the KwaZulu-Natal clothing industry

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**Addressing the skills shortage of computer-aided design
pattern-making in the KwaZulu-Natal clothing industry**

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DECLARATION

I, Minette Coetzee, 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 report has not been submitted for a degree at any other university or institution.

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ABSTRACT

Over the past 20 years, it has become necessary for South African clothing companies to raise their operational standards to keep up with international competitiveness. Consequently, it was necessary for companies to invest in technology to improve turnaround time, a case in point being computer-aided design (CAD) pattern-making technology. However, currently, a skills shortage exists in the area of trained CAD pattern-makers. Therefore, the intention of this study was to address the skills shortage of CAD pattern-makers in the KwaZulu-Natal (KZN) clothing industry. A concurrent-nested mixed-methods research method was carried out within a constructivist worldview. These methods were used to, firstly, establish what skills are necessary for CAD pattern-making, and, secondly, to identify the reasons for the skills shortage of CAD pattern-makers in the KZN clothing industry. Different role players from the clothing industry participated in the study. The participants indicated that CAD pattern-making requires a diverse set of skills, which they ranked in order of importance. These skills can now be used as a guide by lecturers, trainers and clothing companies to identify individuals with the required potential to be trained as CAD pattern-makers. The reasons identified by the industry participants for the skills shortage of CAD pattern-makers, needs to be addressed through education, training and remuneration. Since companies have purchased the necessary CAD software, without skilled pattern-makers, the system is underutilized, thereby affecting their profitability and costing the companies reduced profit margins.

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ACRONYMS

CAD	Computer-Aided Design
CEO	Chief Executive Officer
DTI	Department of Trade and Industry
FP&M SETA	Fibre-Processing and Manufacturing Sector Education and Training Authority
GCI	Global Competitiveness Index
KZN	KwaZulu-Natal
Lectra SA	Lectra South Africa
NBC	National Bargaining Council
SACTWU	South African clothing and textile workers' union

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

The process of interpreting an illustration of a garment design or a sample garment in order to create a two-dimensional pattern which is then used to construct a garment is referred to as pattern-making in the clothing industry. Pattern-makers must have a high level of skill in creating a pattern, as accuracy and speed of working are important to optimise lead times in the production cycle.

Pattern-making is seen as the link between design and production. Patterns have traditionally been drawn on paper, but nowadays, this method is fast being replaced by computer programmes. These programmes are referred to as computer-aided design (CAD) pattern-making systems, which use advanced software to create digital patterns. This method of pattern-making is quick and accurate and can be integrated into further production processes such as grading, marker-making and automated cutting, thus saving time and money.

There are many different CAD software programmes available in the market. This study focuses on a CAD pattern-making programme that was developed in France and is supplied by an international company named Lectra. Lectra software was chosen because their pattern-making programme is widely used in South Africa and is supported locally by Lectra South Africa (Lectra SA).

Lectra SA's head office is in Durban. The company provides training to their customers on-site as well as at their offices in Durban, Cape Town and Johannesburg. Lectra SA has formed partnerships with various educational institutions, including the Durban University of Technology, where they provide their software free of charge. They use this as a marketing strategy whereby they expect registered fashion students to be trained on the CAD

pattern-making software and to promote it once they qualify and join the clothing industry.

Globally, the clothing industry is highly competitive. In the last two decades, it has advanced from a manual operation to a technological one. This is due to the quick response system required to keep abreast with ever changing fashion trends and customer demands. The transition for first-world countries has been rapid, but for a developing country, such as South Africa, the pace has been slower.

The South African clothing industry has nevertheless made significant technological advances. This is evidenced by the implementation of the latest machinery such as automated cutters and CAD software, including CAD pattern-making. In general, CAD systems are used in the preproduction phase to integrate and automate processes. CAD pattern-making systems, in particular, guarantee accuracy and quick turnaround times depending on the skill level of the CAD pattern-maker. CAD software improves the productivity and efficiency of a company most significantly by shortening the cycle time of the manufacturing process. However, the investment in these operating systems by clothing manufacturers is hampered by a severe shortage of skilled operators.

1.2 AIM

The aim of this study is to investigate the reasons why a shortage of skilled CAD pattern-makers exists in KZN with the intention of making recommendations to address this challenge.

1.3 OBJECTIVES

The study objectives are to:

- establish what skills are necessary for CAD pattern-making;
- identify the reasons why a skills shortage of CAD pattern-makers exists in KZN; and
- make recommendations as to how the skills shortage of CAD pattern-makers in KZN may be addressed.

1.4 RATIONALE AND VALUE

Lectra SA provides in-house and on-site training as part of the purchase agreement of their product. They employ expert trainers who instruct manufacturers' pattern-making staff to be adept at using their software programmes. Employed as a CAD trainer for Lectra SA from 2005 to 2009, it became apparent that there were very few skilled CAD operators in the clothing industry. Lectra SA was inundated with requests from their customers for referrals to skilled CAD pattern-makers, to operate Lectra CAD software. In a report by Morris and Reed (2008: 44), it is documented that a shortage of skilled CAD pattern-makers exists in South Africa. To date, no further studies have been conducted to address the shortage of skilled CAD operators, hence the importance of focusing on this aspect of the study.

Over the past two decades, it has become necessary for clothing companies to raise operational standards to keep pace with international competition. This has necessitated their investment in technology to improve on quality, design and throughput times. Due to the on-going advancement of this technology, highly skilled workers are required to operate these machines and the skills shortage in this regard was identified as far back as 2008. Lack of investment in skilled labour has placed South Africa in a serious predicament which needs addressing.

There is limited literature relating to the shortage of skilled operators in CAD pattern-making. No literature relating to the skills required for CAD pattern-

making could be found, not even in company documentation and training manuals of Lectra SA. Therefore, this study explores and highlights the skills necessary for CAD pattern-making and the reasons for the shortage of skilled CAD pattern-makers in South Africa.

The value of this study lies in the formulation of recommendations to address the specific skills shortage of CAD pattern-makers in South Africa utilising KZN participants as the sample. Revealing the necessary skills required for CAD pattern-making will benefit the clothing industry and Lectra SA, as the skills required for employment as a CAD pattern-maker will be documented from the findings of this study. Having skilled CAD pattern-makers to operate Lectra CAD software could be an advantage to Lectra SA, as it might convince future customers to invest in their product, and therefore, increase their sales.

Furthermore, CAD pattern-making lecturers and Lectra SA trainers will be empowered with an understanding of developing their training material (courses) to equip CAD operators with the necessary skills required by the clothing industry. This will, in return, create a larger pool of CAD operators with the required employability skills. Finding the reasons for the skills shortage in CAD pattern-making will enable Lectra SA and the clothing industry to address this problem.

1.5 CRITICAL RESEARCH QUESTIONS

The objectives of the study were achieved by answering the following critical questions:

1. What skills does the clothing industry require for CAD pattern-making?
2. What are the reasons for the skills shortage in CAD pattern-making in KZN?
3. What recommendations can be formulated to address the skills shortage in CAD pattern-making?

1.6 ASSUMPTIONS

This research was based on the following assumptions:

- A shortage of skilled CAD pattern-makers currently exists in the South African clothing industry;
- The Lectra SA training programme is sufficient to improve the skills of CAD pattern-makers;
- Manual pattern-makers in the clothing industry will benefit from professional CAD pattern-making training offered by Lectra SA; and
- Companies that rely on the knowledge and skills of their staff should view any money spent on human-resources skills training as an investment in human capital.

1.7 THEORETICAL FRAMEWORK

This study encompasses elements of strategic human-resource management, and 'human capital theory', in particular. Masuku (2008: ii) defines human capital as the knowledge and skills which an individual obtains through education, self-teaching and work experience. Alpkhan, Bulut, Gunday, Ulusoy and Kilic (2010: 738) explain that human capital should be seen as one of the most valuable assets in a company. Companies that rely on the knowledge and skills of their staff should view any money spent on human-resource development as an investment. Training and retraining of employees improves efficiency and productivity (Liang, Chen and Lin 2013).

According to Simkins (2011: 2), over the past forty years, South Africa has invested a great deal in education and training, thus increasing human capital output. However, the quality of human capital delivered has often been poor. It is vital to shift from the quantity of human capital produced in South Africa to quality, as skilled workers are needed to increase competitiveness. In other words, the South African clothing industry requires a workforce equipped with the necessary skills in order to compete nationally and internationally. Alpkhan *et al.* (2010: 738) explain that the higher the quality

level of human capital in companies, the greater the innovative performance of companies to produce economic value.

1.8 RESEARCH METHODOLOGY

The methodology for this study consisted of a mixed methods research design where both quantitative and qualitative data were gathered using an online survey named Survey Monkey[®]. An on-line survey falls under the banner of descriptive survey research which Leedy and Ormrod (2010: 187) defines as obtaining information from a sample group, representative of the study population. The survey enquiry elicited responses from the sample population about their experiences and opinions on CAD pattern-making.

Non-probability purposive sampling was used to draw the sample which Leedy and Ormrod (2010: 212) explain applies when the sample is a group that the researcher has access to or has selected for a particular reason. Four groups of participants, namely, CAD pattern-makers, their managers, Lectra SA and DUT students, who are all related to the KZN clothing industry, participated in the online survey.

Quantitative and qualitative data was collected through structured online questionnaires, consisting of both closed and open-ended questions. The questionnaires were pre-tested through a pilot study to ensure instrument validity.

1.9 LIMITATIONS

All studies have limitations (Gallagher, Kaiser, Simon, Beath and Goles 2010: 35; Hofstee 2010: 87) and, therefore, it is important to identify the study's limitations. Due to the small sample size, the results of this study can only be representative of the groups of participants and cannot be generalised to CAD trainers or CAD pattern-makers across South Africa. However, findings can possibly become indicators of what the situation is in other parts of the country.

A second limitation is a lack of research information on the study topic. The only reference work on CAD pattern-making, found by the researcher, is by Morris and Reed (2008). In an e-mail communication on 23 January 2014, the Director of PRISM, Professor Morris confirmed that “I know of no other published work specifying CAD pattern-makers. It’s much too specific”. Furthermore, in a personal telephonic conversation with the Fibre Processing and Manufacturing Sector Education Training Authority (FP&M Seta) in KZN on 27 January 2014, Morris’s statement above was confirmed.

Thirdly, there are limitations to the mixed methods research approach which may result in unequal evidence being obtained from the study. This could prove to be a disadvantage when interpreting the results (Creswell 2003: 219).

1.10 SCOPE OF THE STUDY

This study has been confined to users of the Lectra CAD pattern-making software in the KZN province due to time and cost constraints. The participants in this study are limited to the KZN CAD pattern-makers utilizing Lectra CAD software, their managers, the 2013 third-year national diploma students in the Department of Fashion and Textiles at the Durban University of Technology (DUT) and the software manager of Lectra SA.

1.11 DEFINITION OF TERMS

The following definitions are relevant in this study.

Computer-aided design (CAD) is defined as creating and modifying garment patterns using a computer system which optimises the manufacturing of a garment, by streamlining the design and pattern-making process (Narayan, Rao and Sarcar 2008: 3).

Human capital is defined 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 (Schultz 1961: 8; Masuku 2008: ii; An, Davey and Eggleton: 2011: 572).

Skills shortage “A skills shortage occurs when any one of the following situations arises or a combination of them: shortage of workers in a particular occupation, labour demand exceeds availability of skills, or workers lack appropriate qualifications” (Rasool and Botha 2011: 6).

1.12 CHAPTER OVERVIEWS

Chapter 1: Provides the background to the study. The aims, objectives and rationale for investigating the necessary skills required for computer-aided design (CAD) pattern-making as well as the reasons for the current skills shortage of CAD pattern-makers in the KZN clothing industry, are outlined.

Chapter 2: Discusses the literature from published materials, pertinent to the study. This chapter commences with an overview of the South African clothing industry in relation to CAD technology and human capital and concludes with literature on education and skills training, in support of skills shortages.

Chapter 3: Offers an insight into the research methodology deemed most suitable for the study. In this chapter, the procedures used for mixed methods research, instrument and sample selection, data collection and analysis are described.

Chapter 4: Presents the findings from the data gathered by the researcher, using the appropriate statistical tests. The results are discussed in terms of the research objectives and human capital theory.

Chapter 5: Concludes with the salient findings of the empirical survey and makes recommendations including suggestions for future research.

CHAPTER 2

COMPUTER-AIDED DESIGN TECHNOLOGY, HUMAN CAPITAL AND SKILLS IN THE SOUTH AFRICAN CLOTHING INDUSTRY

2.1 INTRODUCTION

In this chapter, literature pertaining to the current state of the clothing industry in South Africa and the skills shortage related to CAD pattern-making are discussed. The literature examined four areas which provide the foundation for this study, namely the:

- South African clothing industry in perspective;
- Human capital and skills development;
- Skills required for using CAD technology; and
- Reasons for skills shortages.

2.2 THE SOUTH AFRICAN CLOTHING INDUSTRY IN PERSPECTIVE

The clothing industry forms part of the South African manufacturing sector; being labour intensive, it contributes to the country's economic growth by creating jobs (Ramdass 2007: 9; FP&M SETA 2012b: 53). The industry relies heavily on technology to improve its productivity levels. To operate the technology optimally requires a skilled labour force. This study investigates if there is a shortage of skilled CAD pattern-makers and how the problem can be overcome.

Morris and Reed (2008: 9) describe the South African clothing industry as being small, diverse and well established. A quote on the South Africa information website (South Africa.info 2013) alludes to the plans which this industry has for the future:

The South African textile and clothing industry has a powerful vision. It aims to use all the natural, human and technological resources at its disposal to make South Africa the preferred domestic and international supplier of South African manufactured textiles and clothing. Though the textile and apparel industry is small, it is well placed to make this vision a reality.

To ensure that these plans come to fruition, the use of technology and labour training must be optimised. Since the clothing industry, in general, is labour intensive (Yan and Fiorito 2002: 139), it stands to reason that the South African clothing industry plays a vital role in job creation (Vlok 2006: 229) and thus contributes to the South African economy. No official figures of those employed within the South African clothing industry specifically are available because they are combined with workers belonging to the textiles, footwear and leather industries. Furthermore, a large number of informal and small clothing companies exist and their employment numbers are not always included in the official statistics (Morris and Reed 2008: 21, 22, 39).

Most manufacturers in the South African clothing industry are small to medium sized, employing between approximately twenty to 200 people, respectively (Vlok 2006: 229). These companies are spread across the country, with the main clothing manufacturing provinces being the Western Cape and KZN. Each of these companies focuses on manufacturing for different market clusters.

The Western Cape produces clothing for high-income earning consumers who are prepared to pay more for high fashion garments (Nattrass and Seekings 2012a: 3). The majority of clothing manufacturers in this province are situated within the metropolitan area of Cape Town, attracting higher skilled workers who are concomitantly paid more. These higher costs are then passed on to the consumer.

The situation is different in KZN where the focus is on the manufacturing of price-specific clothing for the middle and lower income earning consumer. The reason for this is that the majority of clothing firms in KZN are situated in non-metropolitan areas, where lower wages are paid and fewer skilled

workers are attracted. KZN is, therefore, subjected to a lower cost structure (Barnes 2005: 5). Low wages have resulted in a lower skills level and lower productivity, necessitating the use of low-cost production methods to ease the tight profit margins (Nattrass and Seekings 2012a: 4). This has created a niche for KZN clothing manufacturers in the production of lower-priced garments.

Whilst each of the respective provinces contributes to the South African clothing industry by supplying to different target markets, they share similar weaknesses and strengths which contribute to the overall state of the industry.

2.2.1 Weaknesses and strengths of the South African clothing industry

The South African clothing industry has faced many and varied challenges or weaknesses over the years, as summarised in Table 2.1 by Morris and Reed (2008: 37). Morris and Reed compiled their report on ageing equipment, labour costs, a shortage of labour and management skills, insufficient government and retail sector support and certain restrictions when competing internationally.

These problems have resulted in an industry which is best described by Morris and Reed (2008: 36) as:

...an 'betwixt and between' market as it is neither a high value added, fashion orientated, adroit first world player that competes on the basis of its up to date technologies and capital, as well as highly skilled personnel and specialised market knowledge; nor is it a low cost, mass-based, third world player that competes on the back of scale economies, up to date technology, low cost labour and aggressive government policies tied to supporting their clothing and textile industries as socio-economic priorities.

WEAKNESSES	
Firms	<ul style="list-style-type: none"> • Capital investments and ageing equipment • Limited knowledge of export markets • Textile industry diminishing and unreliable • Management capabilities (younger generation) • Lack of world class manufacturing standards
Environment	<ul style="list-style-type: none"> • Labour costs • Insufficient government support for large clothing firms • Lack of private-sector partnerships • Rand strength and volatility • Inefficient ports and high shipping costs • Lack of partnership between clothing and textile industries • Access to technical and higher order management skills
Domestic Market	<ul style="list-style-type: none"> • Ineffective customs control • Concentration of domestic retailers with a tendency to import
International Market	<ul style="list-style-type: none"> • Lack of strategic partnerships between government and clothing industry • Distance to markets and lead times • Inability to supply required volumes

Table 2.1 Summary of the South African clothing industry's weaknesses

Source: Adapted from Morris and Reed (2008: 37)

The working environment of the South African clothing manufacturing workers is generally regarded as unattractive, particularly with factories being located within the industrial outskirts of towns and cities. Ramdass and Kruger (2011: 2565) describe working conditions as poor with most clothing companies being housed in steel structures, usually with artificial lighting and ventilation via industrial fans or air ducts resulting in poor performance and low productivity. Ramdass (2013: 340) mentions, in conference proceedings,

that “textiles and clothing” are considered to be “sunset industries” and unappealing to graduates. He notes that the situation is not unique to the South African clothing industry, as both the United States of America and the United Kingdom also face the challenge of fewer students enrolling for courses in the clothing field due to society’s pessimistic perception of this industry (Ramdass 2013: 338).

On the positive side, the South African clothing industry is also noted for many strengths, as outlined by Morris and Reed (2008: 37) in Table 2.2.

STRENGTHS	
Firms	<ul style="list-style-type: none"> • Flexible • Consistent quality • Longevity • Design capabilities in comparison to Asian competitors
Environment	<ul style="list-style-type: none"> • Stable macroeconomic environment • Established infrastructure of the country • Ports accessibility • Geographical firm clustering • Semi-skilled labour
Domestic Market	<ul style="list-style-type: none"> • Shorter lead times • Strong domestic retailer relationships • Growing market
International Market	<ul style="list-style-type: none"> • English language proficiency / dominant western culture • Compliance with social & labour standards • Proximity to EU / US market

Table 2.2 Summary of the South African clothing industry’s strengths

Source: Adapted from Morris and Reed (2008: 37)

When Morris and Reed compiled their report, clothing manufacturing firms had good design capabilities in comparison to Asian competitors; the country had an established infrastructure and plenty of semi-skilled labour; the

domestic market was strong and growing; the country benefitted from English language proficiency and a dominant Western culture; together with social and labour standards' compliance when trading internationally.

In 2011, the then and still current South African Trade and Industry Minister, Dr. Rob Davies, is quoted as having emphasised the crucial need for the clothing industry to “innovate and increase productivity” in order to survive the unstable world economy challenge (Sapa 2011) by focusing on the manufacturing of unique and quality garments which are calculated at the right price and delivered on time to satisfy customer needs.

In a Business Day online newspaper article in 2012, the Cape Chamber of Commerce president, Michael Bagraim, indicated that the clothing sector is confident that there will be an improvement in the industry as "Employers are now gearing up to employ more people and releasing some of their capital to buy machinery and plants to show their side of goodwill" after a wage deal was signed by employers and the South African Clothing & Textile Workers' Union (SACTWU) (Bekezela 2012). Furthermore, for the clothing manufacturing industry to be successful, the government would need to support the clothing industry (Ramdass and Kruger 2011: 2569; FP&M SETA 2012b: 53).

The South African Department of Trade and Industry (DTI) is responsible for commercial and industrial policies in the country (South Africa 2014). Together with subsidiary agencies, they promote economic development, and implement commercial law. They furthermore support and control international trade and consumer protection policies. In 2012, this department produced two incentive schemes to boost the local clothing industry, namely, the Clothing and Textile Competitiveness Improvement Programme (CTCIP) and the Manufacturing Competitiveness Enhancement Programme (MCEP) (South Africa 2012: 15-16).

The CTCIP's goal is to create clothing companies that can compete globally, not only to retain but also to increase employment levels in the clothing industry (The Department of Trade and Industry 2012: 15).

The MCEP focuses on the upgrading of manufacturing facilities, processes and products and the up-skilling of the workforce (South Africa 2012: 16). It also provides for the enhancement of sectors to capitalise on production and employment. Being part of the manufacturing sector, the clothing industry will thus benefit from the programme. Eligibility to benefit from this programme is dependent on a variety of factors, including:

- having been in operation for not less than one year;
- sustaining existing levels of employment;
- a B-BBEE status of level four or a submitted plan to the DTI of how this status will be achieved ; and
- not charging import equivalence prices (South Africa 2012: 16)

This programme also offers incentive and loans (South Africa 2012: 17).

Clothing manufacturers would benefit from any services and resources which would improve their production cycle methods. The clothing industry's role players need to persist in minimising the existent weaknesses, as described, and work towards a viable industry.

2.2.2 Role players in the South African clothing industry

The clothing industry comprises manufacturers and retailers. Manufacturers produce garments using various levels of skills. These garments are sold to retailers who market and sell them to customers. Customers have different needs (Potgieter, Wiese and Strasheim 2013: 30) in terms of what clothes they wear. These range from high-value added fashion and individually tailored garments to mass-produced basics, all of which cater to different target markets.

The South African clothing industry supplies a large retail sector with readymade garments to sell to customers. In a study of the South African

clothing industry by Ramdass (2013: 336), the manufacturers were found to focus on men's and ladies' fashion underwear and outerwear, children's wear, surf-wear and knitwear. These retailers include chain stores and independent stores. Within this sector, chain stores account for the majority of local sales.

Traditionally, the clothing industry operates as a buyer-driven value chain (Nattrass and Seekings 2012a: 20). This means that the buyer (in this case the retailer) has an upper hand and dictates to the manufacturers. Retailers negotiate for lower costs. If manufacturers cannot meet the expectations of quality, reliability and cost effectiveness, then retailers will find an alternative source (Ramdass and Pretorius 2011: 169). It stands to reason that mutual respect is required to work within the domestic market.

Figure 2.1 highlights the South African clothing value chain and domestic markets, where the complexity of value chains and links between the retailers and manufacturers are described. The powerful South African clothing retail sector, therefore, dictates to the South African clothing manufacturer by demanding lower manufacturing costs failing which they will outsource to other countries, for example, China or Lesotho, where large runs, quick turnaround times and lower costs are available. Edwards and Jenkins (2013: 24) confirm that Chinese competition has impacted on the clothing manufacturing industry in South Africa in the last decade.

Ideally, retailers and manufacturers should support each other. However, this does not always happen.

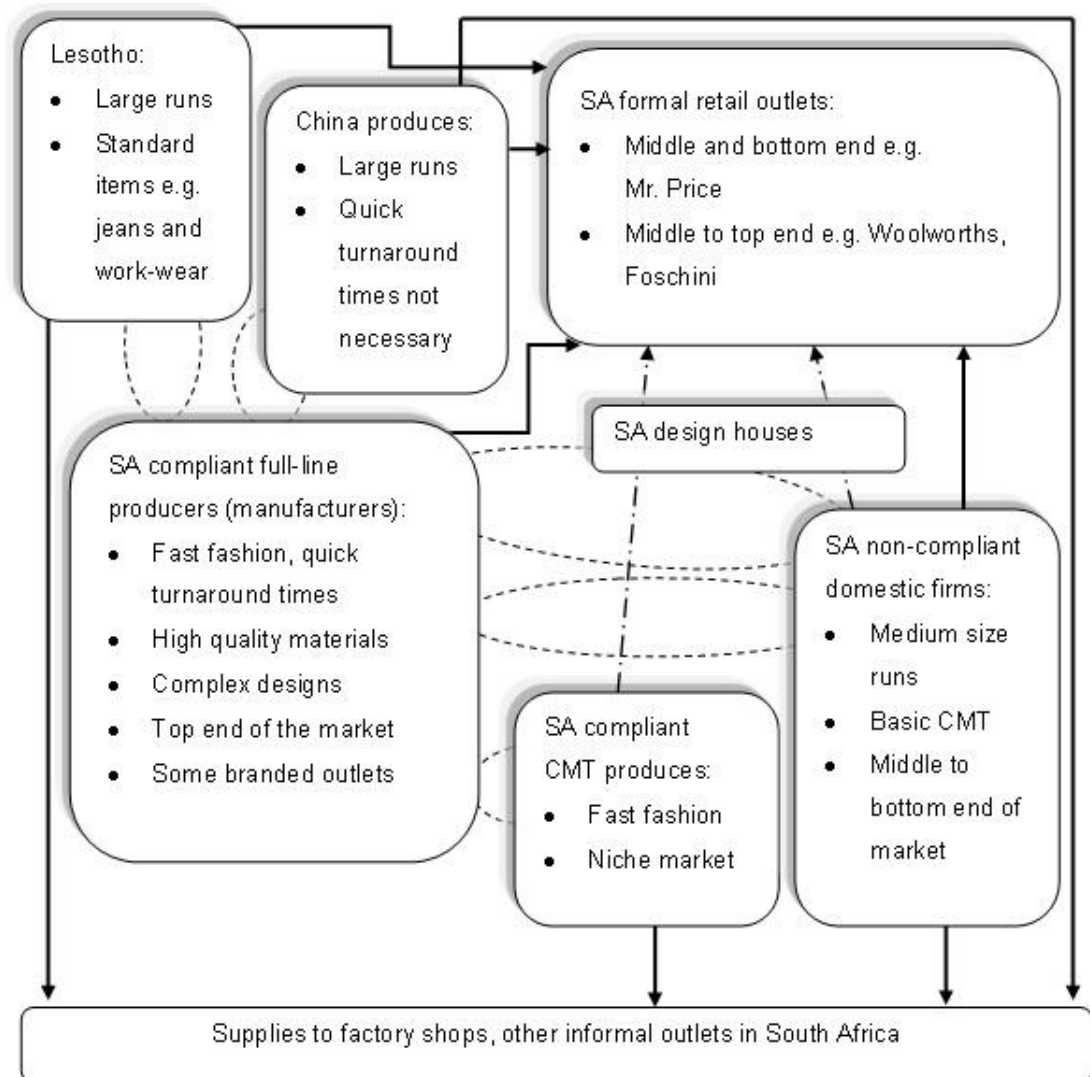


Figure 2.1 The South African clothing value chain and domestic markets

Source: Adapted from Nattrass and Seekings (2012a: 20)

2.2.3 The monetary exchange rate

The monetary exchange rate is a factor which influences the competitiveness and sustainability of the South African clothing manufacturing industry. When the rand depreciated against the US dollar from R6.94 in 2000 to R10.52 in 2002 (Morris and Einhorn 2008), the exporting of clothing from South Africa became more profitable. As a result, many local clothing manufacturers cancelled contracts with local retailers in favour of the more lucrative export market. The local retailers had to find alternative clothing suppliers. China became a good choice because of low production costs there at the time

(Liang, Chen and Lin 2013: 186). Once the rand strengthened, the export market plummeted. Clothing imports, however, increased significantly. Imports from China claimed 61% of the total South African clothing market in 2008 and 74% by 2010 (Nattrass and Seekings 2012b: 8). This was despite the temporary restrictions which were imposed on Chinese imports between 2007 and 2008 and a tariff of 45% which was levied on imports in an attempt by government to protect the local clothing manufacturing industry. This surge of imports caused the diminishing of the capacity of high value-added products being produced by local manufacturers. This caused a loss of jobs and had a negative influence on the local clothing industry with its ever increasing labour costs.

Over the past decade, there has been a growing trend by retailers to turn to overseas suppliers instead, because of the latter's lower costs than local suppliers. In support, a study by Morris and Einhorn (2008: 370), on "Globalisation, welfare and competitiveness: the impacts of Chinese imports on the South African clothing and textile industry", a local retailer pointed out:

Cheap imports put price pressure on local manufacturers to drop clothing prices. We use international prices as bench-marks when negotiating with local manufacturers which forces domestic suppliers to be competitive.

One cannot blame retailers for seeking the lowest priced garments. However, this has caused many problems for the South African clothing manufacturing industry as manufacturers have experienced cutbacks in, or cancellation of, orders from retailers (Local Product Supports Local Clothing Industry 2012). The resultant effect has been short time, retrenchments, company closures and job losses (FP&M SETA 2012b), despite an overall increase in retail sales.

On a positive note, recent reports indicate that a revived collaboration between major chain stores and the South African clothing manufacturing companies has begun (A silver lining for clothing industry 2014). For example, in their latest annual report, Woolworths commit to supporting the

local clothing industry (Woolworths Holdings Limited 2013: 43) by sourcing a minimum of 24% of their clothing from South African manufacturers and only resorting to overseas suppliers where local suppliers cannot provide the quality, value and innovation in garments that they require for their target market.

Furthermore, in a newspaper article in the Cape Times Business Report (A silver lining for clothing industry 2014), Minister Rob Davies indicated that, in recent years, the South African clothing manufacturing companies have become more competitive with the Far East as labour costs in China have doubled since 2007. According to the newspaper article, major chain stores in South Africa have reached a point where, at least, one third of their orders are placed locally.

This trend of using local clothing manufacturers again enables retailers to respond to consumer demands and trends quickly as lead times are shortened. Fast fashion, as it is called, has resulted in benefits to both retailers and manufacturers (Steyn 2014).

2.2.4 Labour and wage matters in the South African clothing manufacturing industry

The South African clothing manufacturing industry is labour intensive. Labour matters which challenge the clothing industry include the following:

- The South African clothing industry workforce is primarily female (Morris and Reed 2008: 31; FP&M SETA 2012b: 54, 90; Ramdass 2013: 335). Women workers have a higher rate of absenteeism than men due to their more direct role than men in fulfilling family responsibilities (Harrington 2000: 19; Van der Westhuizen 2006: 13; Mwamayi, Wood, Haines, Brookes and Mmbengwa 2013: 68).
- Most clothing production workers take their full quota of sick leave due to their attitude of entitlement rather than necessity (Morris and Reed 2008:

25). This has an impact on production levels. Absenteeism contributes to lower productivity. Companies in the clothing manufacturing industry, therefore, need to find innovative ways to reduce the rate of absenteeism such as measures introduced by an automotive company in East London. Their workers who achieve a 100 percent attendance record for a whole year are entered into a draw to win a luxury motor car. According to the company's CEO, Martin Zimmerman, this has resulted in annual attendance rising to an average of 99.3 percent (Hartley 2013: 3). This low absenteeism has created stability within the company as employees are working as a team. This has, in turn, improved the quality of the product and the company's level of productivity.

- Labour costs in South Africa have always been a crucial factor towards competitiveness of products. Wages in the South African clothing manufacturing industry are determined through negotiations in the National Bargaining Council (NBC) (South Africa: Labour Affairs Department 2013a). These rates differ according to the geographic location within the country, that is, metro, non-metro or rural areas, illustrated in Figure 2.2. For example, a qualified cutter in a:
 - KZN metro area earned, in 2012 to 2013, R1332.75 per week and, in 2013 to 2014, R1426.05 per week (South Africa: Labour Affairs Department 2013a: 6).
 - KZN non-metro area, earned R1137.50 per week in 2012 to 2013, and in 2013 to 2014, R1196.00 per week (South Africa: Labour Affairs Department 2013b: 11). According to the South African clothing industry representatives, high wage rates, in addition to total labour costs, fewer than a non-optimal use of weekly working hours and an inefficient workforce, lead to low levels of productivity and high unit labour costs (Morris and Reed 2008: 25). However, the South African clothing manufacturing industry is also known for its low rate of pay which, Ramdass and Pretorius (2011: 169) mention, is not conducive to recruiting or retaining workers. The authors go further in stating that the South African clothing industry workforce is exploited by some of

the manufacturers who pay lower wages than those prescribed by the NBC.

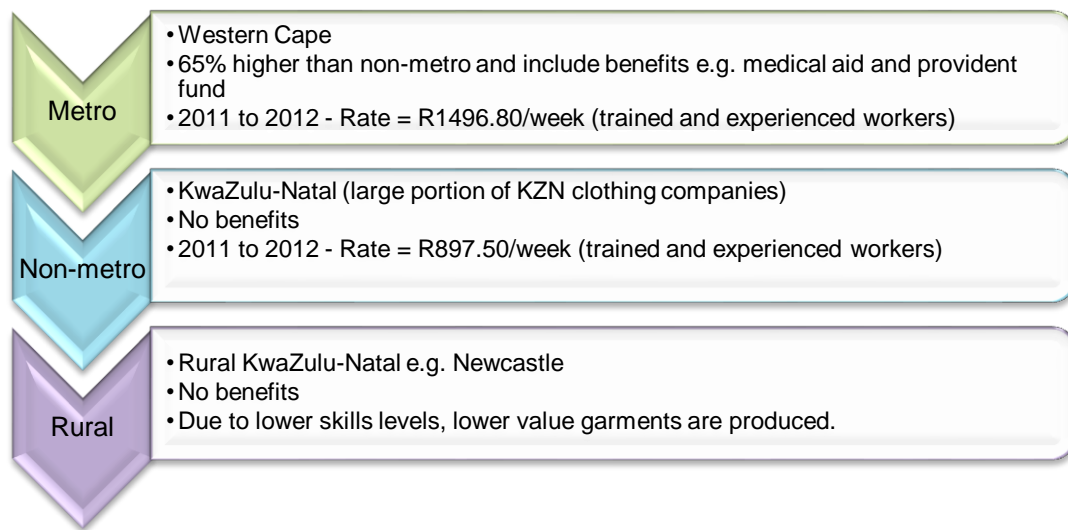


Figure 2.2 Wage rates in the South African clothing industry for 2011

Source: Adapted from Ramdass and Kruger (2011: 2565); South Africa: Labour Affairs Department (2013a)

- Employment in the South African clothing industry has almost halved since 2003 (Nattrass and Seekings 2013: 7). This is due to rising wages and competition from Chinese imports. The 2011 South African Minister of Finance, Pravin Gordhan, and the then head of the South Africa National Planning Council, Trevor Manuel, submitted, as far back as 2011, that changes need to be made to the South African labour law to prevent further job losses in the clothing manufacturing industry. The Cabinet of South Africa, however, did not support this stance (Staff reporter 2011).
- Labour strikes, as a result of a discontented workforce, resulting from low wages and poor working conditions, have become an almost yearly occurrence to the detriment of clothing manufacturing companies. Most recently, however, the current South African Minister of Labour (2014), Nelisiwe Mildred Oliphant, has published a new agreement which is affecting the whole South African clothing manufacturing industry. According to an online article (Fin24 2014a), “every single clothing worker

in the whole of South Africa now enjoys the protection of legislated minimum terms and conditions of employment". It also includes "compulsorily guaranteed minimum wage levels", as negotiated by the NBC for the clothing manufacturing industry.

One is encouraged by this latest development. The exact impact it will have and how long it will take remains uncertain though. In the meantime, wages and labour continue to pose a threat to the development and sustainability of the South African clothing industry as it struggles to compete globally.

2.2.5 The South African clothing manufacturing industry's position as a global competitor

Global competitiveness is defined as "the set of institutions, policies, and factors that determine the level of productivity of a country" (Schwab 2012: 4; 2013: 4).

The Global Competitiveness Index (GCI) has been developed, by the World Economic Forum, to rank participating countries' economies, in terms of their sustainability and competitiveness. For 2010 to 2011, the South African economy was ranked 54 out of the 144 countries listed in the GCI. By 2012 to 2013, South Africa had moved up two places to 52. Currently, 2013 to 2014, South Africa has moved down one place to 53 out of the 148 countries currently listed in the GCI. Although South Africa is maintaining its position near the top one third of the GCI, the country is far from being a major global competitor.

Figure 2.3 explains twelve pillars of competitiveness for the GCI. These are different components which influence a country's effectiveness and growth. Pillars one to four are fundamental for factor-driven economies. Pillars five to ten are the key factors for efficiency-driven economies. Lastly, pillars eleven to twelve are key factors for innovation-driven economies.

A country may not be affected by each and every pillar, but the more pillars a country is positively influenced by, the more likely it is to be globally competitive. Each pillar measures a different aspect of competitiveness. These pillars are dependent on each other and have a predisposition to strengthen or weaken one another.

According to the GCI, South Africa is currently at the stage of an efficiency-driven economy. This means that, as the country becomes more competitive, productivity will increase and wages will rise with advancing development. Competitiveness is increasingly driven by higher education and training (pillar 5), efficient goods' markets (pillar 6), well-functioning labour markets (pillar 7), developed financial markets (pillar 8), advantages of existing technologies (pillar 9) and a large domestic market (pillar 10) (Schwab 2012: 8).



Figure 2.3 Pillars of competitiveness for the Global Competitiveness Index

Source: Adapted from Schwab (2012: 4-8)

The South African clothing industry's main competitors are Mauritius (ranked 45) and the Eastern countries of Taiwan (ranked 12), India (ranked 60) and mainly China (ranked 29) (Schwab 2013: 15).

According to Brooks and Simon (2012), international competition has been a key factor in driving structural change in the clothing manufacturing industry globally. This is evident in companies that use the latest technology and equipment which gives them a competitive advantage.

Globalisation is defined as the process by which businesses or other organizations develop international influence or start operating on an international scale (Soanes and Stevenson 2006). Currently, globalisation is adversely affecting the South African clothing industry due to the industry's lack of implementation of enhanced strategic processes, such as sound clothing industry principles which, alone, would improve productivity by approximately 30% (Harrison 1997). The South African clothing industry needs a comprehensive competitive strategy to compete globally. This has been widely debated since currently each company prioritises according to its own specific needs. Focusing on unique, highly-valued quality products, at the right price with timely delivery and appropriate labour skills would be one way of ensuring that the South African clothing industry becomes more competitive and of securing the future of this industry (Ramdass and Kruger 2011: 2562; Natrass and Seekings 2013: 18).

World-class manufacturing means being the best in all aspects: customer service, optimising lead time, providing quality, being flexible, competitively priced, and always innovating (Seven Keys to World Class Manufacturing 2007). Skilled labour is vitally important to achieving the quality and flexibility required for world-class manufacturing. Having a skilled workforce will improve lead times as fewer mistakes are made and operators are more productive, leading to reduced product cost and customer satisfaction.

Human capital and technology are factors that can help to optimise time frames to accommodate more requests from customers and, thus, positively impact the clothing industry. For the South African clothing industry to successfully participate in the global value chain, it is required that labour skills (human capital) be upgraded with the advancement of technology in order to demonstrate world-class manufacturing capabilities. Therefore, in the following section, the importance of human capital and skills required in the clothing industry will be analysed and discussed.

2.3 HUMAN CAPITAL

The clothing industry relies on the interplay of human capital and technology, as appropriately qualified staff is required to operate machinery. A study by Gereffi, Fernandez-Stark, Bamber, Psilos and DeStefano (2011) states that developing countries need a skilled workforce to participate in the global value chain. To achieve the required skilled workforce, it is important to identify the human attributes and skills essential to drive productivity.

This study revolves around the concept of strategic human resource management, in particular, the development of human capital. It is important for the clothing industry to invest in human capital to compete globally, due to the major role that a skilled workforce plays in the industry.

2.3.1 Definition of human capital

Human capital has, inter alia, been defined as follows:

- The skill, knowledge and similar attributes that affect particular human capabilities to do productive work (Schultz 1961: 8);
- The individual's knowledge, experiences, capabilities, skills, creativity and innovativeness (Edvinsson and Malone 1997);
- The knowledge and skills which an individual obtains through education, self-teaching and work experience (Masuku 2008: ii); and

- An individual's knowledge, consisting of qualifications, skills, values and experiences, which belong to the individual and not to the company (An, Davey and Eggleton 2011: 572).

Based on the above definitions, human capital is defined 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.

2.3.2 Overview of human capital

The idea of human capital originated in 1954 when A. W. Lewis interrogated the field of Economic Development and wrote the "Economic Development with Unlimited Supplies of Labour". The negative connotation of the term human capital was not used until it was first discussed by an English economist named Arthur Cecil Pigou, but, unfortunately, a neglected aspect of his work is the analysis of human capital which has not been documented (Aslanbeigui 2008). For this reason, most literature refers to the term 'Human Capital' in the modern neoclassical economic literature to an article "Investment in human capital and personal income distribution" by Jacob Mincer in *The Journal of Political Economy* (Mincer 1958). In 1960, a Nobel Prize winner and an economist, Theodore Schultz, contributed to the invention of the term 'Human Capital'. He wanted to expose the value of the human capability. He believed human capital could be invested in through education, training and improved benefits and that the investment would lead to an improvement in the quality and level of production (Schultz 1961).

Wright and McMahan's (1992: 299) conceptual model of theoretical frameworks (Figure 2.4) for studying strategic human resource management highlights that a firm's human capital pool consists of the employees with appropriate skills and abilities. The authors, in Figure 2.4, indicate that the human resource capital pool impacts on human resource behaviours and finally on firm-level outcomes, which are measured in terms of employee performance, satisfaction and absenteeism. Human capital also has an

influence on a firm's strategic planning. The company needs to utilise all the available resources to generate a strategic plan in order to move forward and remain/become competitive.

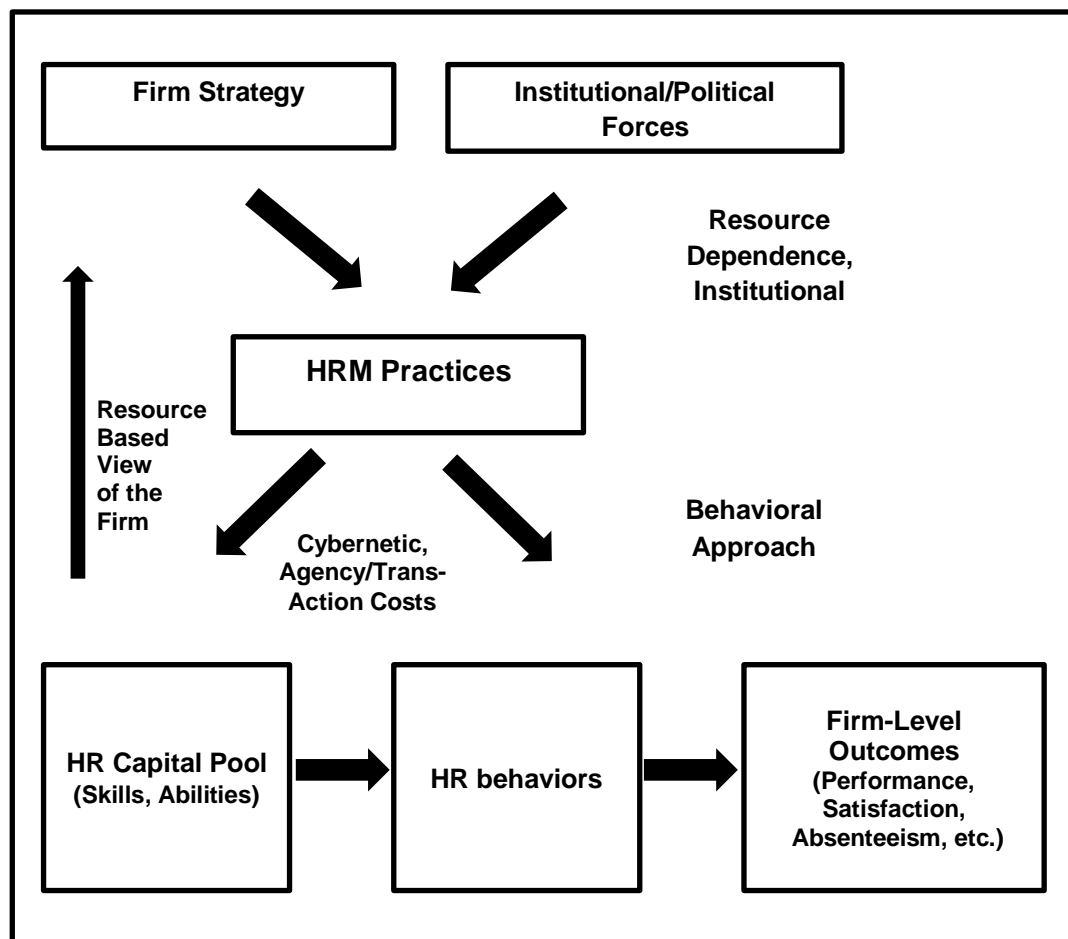


Figure 2.4 A Conceptual Model of Theoretical Frameworks for Studying Strategic Human Resource Management

Source: Wright and McMahan (1992: 299)

Table 2.3, developed by Michele, Livio and Francesco (2013: 510), indicates that human capital is a component of intellectual capital, namely, knowledge that is of value to an organization (Bassi 1997) and contributes to its competitive edge (An, Davey and Eggleton 2011: 571).

According to Michele, Livio and Francesco (2013: 510), the key value drivers of human capital consist of knowledge skills, management skills, creativity and innovativeness which an employee brings to a company and form part of

a company's intangible assets. The authors list the following as intangible asset of human capital:

- For knowledge skills: Skills, know-how, competencies, experience, expertise, education, training and learning;
- For management skills: Entrepreneurial spirit, leadership, commitment, motivation, loyalty and vocational qualification; and
- For creativity and innovativeness: Flexibility, creativity, changeability, proactive abilities and emotional intelligence.

Intellectual capital components	Value drivers	Intangible asset elements
Human capital	<p>Knowledge skills</p> <p>Management skills</p> <p>Creativity and innovativeness</p>	<p>Skills, know-how, competencies, experience, expertise, education , training, learning</p> <p>Entrepreneurial spirit, leadership, commitment, motivation, loyalty, vocational qualification</p> <p>Flexibility, creativity, changeability, proactive abilities, emotional intelligence</p>
Structural capital	<p>Innovation</p> <p>Intangible infrastructural assets</p> <p>Information technology</p> <p>Intellectual property</p>	<p>Codified knowledge, organizational know-how, R&D, technology transfer, new technology</p> <p>Management processes, organizational structure, corporate culture, procedures, strategy, vision, internal collaboration</p> <p>Information systems, DB, communication, technology, systems, documentation service</p> <p>Patents, copyright, trademarks, trade secrets</p>
Relational capital	<p>Customer relations</p> <p>Inter-firm relations</p> <p>Supplier relations</p> <p>Financial relations</p> <p>Institution relations</p> <p>Brand and image</p>	<p>Customer satisfaction, retention and loyalty</p> <p>Collaborations, partnerships, alliances, licensing, franchising</p> <p>Distribution channels</p> <p>Investor relationships, Investor capital, shareholders</p> <p>Regulatory relationships</p> <p>Trust, reputation, perception</p>

Table 2.3 Reclassification of key value drivers

Source: Michele, Livio and Francesco (2013: 510)

2.3.3 Importance of the development of human capital

Companies rely profoundly on the knowledge and skills of their staff. Employees, however, are an asset only if they are willing to share their knowledge and skills for the upliftment of the company. This means that employees might have skills which the company is not aware of, and if the employee is unwilling to show/share them, the company will not benefit. This highlights the importance of companies having insight/knowledge of the skills required for each and every job, to ensure an employee works to his/her full potential. Furthermore, it assists companies to invest in and develop the required skills to increase the company's human capital.

Alpkan *et al.* (2010: 738) explain that the higher the level of human capital in companies, the greater the innovative performance, that is, the development and implementation of original ideas.

The level of capital investment has a direct influence not only on the productivity but also on the flexibility of the workforce (Masuku 2008: 4). Human capital is important to the growth of individuals, companies and the economic growth of a country (Liang, Chen and Lin 2013: 180). The findings in the study by Liang, Chen and Lin (2013) indicated that training develops skills which, in turn, improve a company's productivity. Therefore, trained staff should be viewed as contributors to the success of any company.

Similarly, the importance of human capital to the South African manufacturing sector was studied by Masuku (2008: 1). The findings of the study highlighted a co-dependency between human capital and the economic growth of South Africa. Investments in human capital will promote economic growth. Finding new methods to attract and sustain human capital is needed for the "transitional political economy" of South Africa (Horwitz, Heng, Quazi, Nonkwelo, Roditi and van Eck 2006: abstract). Horwitz (2013: 2447) concurs that the continuous investment in human capital contributes to the countries sustainability of economic growth.

Whilst it is important to increase the number of skilled workers employed, it is also important to work towards an increase in the quality of human capital. This means that skills must be developed by training or re-training. Human capital, therefore, needs to be developed effectively in the South African clothing industry to create a workforce equipped with the necessary skills, capable of adapting to technological changes to improve productivity. Masuku (2008: ii) states that “according to human capital theories, education and training enhances a person’s stock of human capital, increasing productive potential and leading to higher earnings”. Consequently, higher wages usually leads to a more motivated workforce willing to share their human capital.

2.3.4 Factors influencing human capital

According to Masuku (2008: 5), human capital in the manufacturing sector is influenced by:

- **Technology** - A company which uses advanced technology should pay higher wages to ensure it attracts the necessary skilled workers to give it the competitive edge;
- **Wages** - All employees want to ensure they are getting the appropriate return for their human capital investment through wages, bonuses and benefits;
- **Competitiveness** - Companies with workforces (the human capital asset) which have the right profile and capabilities have an advantage which is not easily replicated by their competitors. Any company interested in its performance will manage their human capital asset to ensure maximum return on investment; and
- **Labour productivity** - It is important for a company to understand how its human capital contributes to its business success. Through a highly-skilled workforce, labour productivity is guaranteed. Ramdass and Pretorius (2011:180) report that labour performance is improved if the

manager of the team focuses on encouraging the workforce to use their skills to their full potential.

Researchers have identified skills as being part of human capital (Schultz 1961; Wright and McMahan 1992; Edvinsson and Malone 1997; De Pablos 2002; Alpan *et al.* 2010; Esposto, Garing, Langworthy and Feldmann 2012; Michele, Livio and Francesco 2013). It is, therefore, important to define and give an overview of the term 'skills' to understand the contribution that skills make towards human capital in a company.

2.4 SKILLS

Skills are defined as the ability to carry out activities or job functions, usually acquired through training or experience (Soanes and Stevenson 2006).

2.4.1 Types of skills

The classification of skills differs between theorists. There is no one accepted categorization of skills that is comprehensive enough to be applicable to all industries (Blom and Saeki 2011: 9).

Surveys are usually conducted to determine what skills are required by industries in general (Saunders and Zuzel 2010: 2; Shury 2010: 2; Blom and Saeki 2011: 2; Davies, Gore, Shury, Vivian, Winterbotham and Constable 2012: 1). The following are skills applicable to industries in general:

- **Soft (or social) skills** - Pauw, Oosthuizen and Van der Westhuizen (2008: 54) refer to soft (or social) skills as communication, presentations, financial management, time management and creative thinking. Soft skills or general social skills assist in adapting to the professional work place. This is especially important for young people as they lack experience (Pauw, Oosthuizen and Van der Westhuizen 2008: 55);

- **Social (or core) skills** - A study conducted in Sweden (Gibbons-Wood and Lange 2000: 29) identified the informal definition of social (or core) skills as team player (an ability to work in a team), co-operation, job flexibility (willingness to move between jobs and positions within a company) and being a peoples' person (getting along with people); and
- **Core skills** - According to Hiedack and Schulz (1997), core skills are defined as organisation, communication, application, independence and resilience. The authors further describe the attributes of each skill. Organisational skills include self-management, logical approach, accuracy and care. Communication skills consist of oral and written communication as well as the ability to collaborate and amalgamate. Application skills entail theoretical principles to be applied to practical problems, problem solving through centred and focussed reasoning and the ability to draw analogies and comparisons. Independence, on the other hand, refers to the ability to self-reflect, recognise one's own limitations and to be a decision maker. Under resilience the authors include motivation, endurance and flexibility (ability to adjust).

From the above, it is clear that the types of skills and a common classification of the different skills pose a problem from a comparability and interpretation point of view. Some of the skills are overlapping in the categorising of different types of skills, e.g., communication. However, there is no generally accepted single categorisation of skills that is non-overlapping and comprehensive (Blom and Saeki 2011: 9), leaving one with the view that an overlap of skills is unavoidable.

In Table 2.4 Blom and Saeki (2011: 12) refer to *core employability skills* as an individual's characteristics, namely, integrity, self-discipline, reliability, self-motivation, entrepreneurship skills, teamwork, understanding and taking directions for work assignments, willingness to learn, flexibility and empathy, some of which are applicable to CAD operators. The professional skills, which the authors refer to, pertain mainly to engineering graduates. However,

use of appropriate tools, equipment and technology are applicable to CAD pattern-making.

The communication skills, included in the study by Blom and Saeki (2011), comprise of a mixture of different skill types, namely, written, verbal, reading and communicating in English. Furthermore, computer and technical skills are grouped as part of their communication skills.

The study by Blom and Saeki (2011: 16), in India, refers to core employability and communication skills as *soft skills*. The results from their study prove that employers of engineering graduates preferred graduates with stronger soft skills above the ones that have professional skills. According to the authors, one of the reasons for this might be that an employee with stronger soft skills, for example, willingness to learn, could lead to the improvement of that individual's professional skills (Blom and Saeki 2011: 17).

Factor 1 (Core Employability Skills)	Factor 2 (Professional Skills)	Factor 3 (Communication Skills)
Integrity	Identify, formulate, and solve technical / engineering problems	Written communication
Self-discipline		Communication in English
Reliability	Design a system, component, or process to meet desired needs	Verbal communication
Self-motivated		Reading
Entrepreneurship skills	Use appropriate / modern tools equipment, technologies	Basic computer
Teamwork		Advanced computer
Understands and takes directions for work assignments	Apply knowledge of mathematics, science, engineering	Design and conduct experiments, and analyse and interpret data Technical Skills
Willingness to learn	Customer service skills	
Flexibility	Knowledge of contemporary issues	
Empathy	Creativity	

Table 2.4 Skills grouped into three factors

Source: Adapted from Blom and Saeki (2011: 12)

In support, according to an analysis of skills development in the South African labour market by Horwitz (2013: 2441), companies require

employees to possess several skills and attributes. These are life skills, adaptability to change, team work and leadership, social, technical and functional skills. The author suggests that critical and independent thinking are essential attributes and the curriculum of all higher learning institutions must include courses which provide sound education to prepare new graduates for the world of work.

Similarly, Taylor (2005: 206) used an employability skills framework summary which consisted of a list of skills as well as attributes. In Table 2.5, the list of skills is explained to understand the contribution that each of the skills will make to an individual/employee and/or the company.

Employability skills framework summary	
Attributes	
<ul style="list-style-type: none"> • Loyalty • Commitment • Honesty and integrity • Enthusiasm • Reliability • Personal presentation • Common sense 	<ul style="list-style-type: none"> • Positive self-esteem • A sense of humour • A balanced attitude to work and home life • An ability to deal with pressure • Motivation • Adaptability
Skills	
<ul style="list-style-type: none"> • <i>Communication</i> that contributes to productive and harmonious relations across employees and customers • <i>Teamwork</i> that contributes to productive working relationships and outcomes • <i>Problem-solving skills</i> that contribute to productive outcomes • <i>Self-management skills</i> that contribute to employee satisfaction and growth • <i>Planning and organising</i> that contribute to long- and short-term strategic planning • <i>Technology skills</i> that contribute to effective execution of tasks • <i>Learning skills</i> that contribute to on-going improvement and expansion in employee and company operations and outcomes • <i>Initiative and enterprise skills</i> that contribute to innovative outcomes 	

Table 2.5 Employability skills framework summary

Source: Adapted from Taylor (2005: 206)

It is beneficial to all role players in an industry to understand the impact that skills have and ensure the skills are applied appropriately and efficiently.

2.4.2 Application of skills

From the above discussed literature, it can be seen that a mix of skills is essential for workers to enhance their employability. Hence, Gallagher *et al.* (2010: 147) state that companies value employees with diverse skills. Therefore, most workers need a broad enough range of knowledge and skills to meet the demands of the ever-changing work environment, especially in occupations where technology is used (Gallagher *et al.* 2010: 144). It is clear that employers find employability skills important (Rasul, Rauf, Mansor, Yasin and Mahamod 2013: 249). The authors concluded that employees who utilise technology in the manufacturing industry play a crucial role to simplify work.

It stands to reason that, in today's world of work, companies in the industry, at large, prefer employees with better 'general' skills together with 'upgradable' potential. The focus has shifted to 'general' skills, as companies prefer to employ a person/worker, with a great attitude which includes a willingness to learn, who can cope with new information and is quick to follow instructions (Gereffi *et al.* 2011: 10).

The researcher views the categorisation of skills by the different authors (soft, core, social skills) as 'non-technical' or 'general' skills which are the foundation of a person's character ability. These 'general' skills are taught to individuals by parents and teachers through pre-primary, primary and secondary school. 'General' skills are used in daily life and applied (not taught) at university as lecturers assume that students come already equipped with them, whilst a broad set of 'specific' skills are taught to a student at university as part of their tertiary education towards qualifying and taking up employment. The 'specific' skills will differ from one occupation to the next. In a study conducted in Malaysia in the manufacturing industry, it was found that technical graduates were lacking in employability skills (Rasul

et al. 2013: 43). To overcome this problem, an assessment tool was developed by these authors to analyse skills amongst students, graduates and employees. The tool makes it easier for employers to select a new employee. Rasul *et al.* (2013: 249) established that trainers (lecturers) play an important role in transferring the necessary employability skills to students. Other factors that are influential in developing and retaining skills are the culture within a company, which refers to principles, values and beliefs, motivation of employees and job satisfaction/fulfilment (Horwitz 2013: 2449).

Identifying the skills needed for each and every industry is crucial, as it is the first step to develop and retain the required skills.

2.4.3 Skills in the clothing manufacturing industry

An adequate skills base is an important factor to achieve high productivity within the manufacturing environment in order to attract investors. More and more companies are demanding highly-skilled workers as production processes are rapidly becoming more technologically advanced (Bhorat and Oosthuizen 2005; Pauw, Oosthuizen and Van der Westhuizen 2008: 45).

Skill requirements for each individual within the production process vary. The main role players in the manufacturing pre-production phase, which refers to the process prior to the actual bulk manufacturing of the garment, are designers, CAD/manual pattern-makers, sample cutters, sample machinists, costing clerks, work study officers, quality assurers and garment technologists.

Clothing industry employees require a variety of skills to perform their specific tasks optimally. The skills range from creativity, technical, practical, communication, literacy and social skills. For example, in one manufacturing company, a designer is only responsible for the designs and costing of the garments, while, in another company, the designer is responsible for the designs, initial pattern as well as the costing of the garment. This might be

causing a mismatch of the types of skilled workers supplied and those demanded by the industry as there is not a set standard.

The majority of clothing manufacturers in South Africa focus on garments that require “shorter runs, quicker response and higher fashion content. For these products, besides costs, production flexibility and higher, more versatile skills are important” (Staritz and Morris 2013: 16).

Due to the fact that technology is playing a crucial role in clothing manufacturing, the skill requirements needs to be identified and kept up to date with advancing technology. In support, Sabourin (2001: 1) and McDowell (2013: 4) state that technological changes are a determining factor for the skills required by industry, in general. They assert that the reason is that, during periods of rapid technological advancements, skill shortages of particular types of skilled workers tend to appear.

Therefore, technological advancements, together with the quality of skills developed from a company’s human capital investments, affect the clothing industry globally.

2.5 TECHNOLOGY IN THE CLOTHING INDUSTRY

The clothing industry works on a quick response principle, the intention being to supply the right quantity of the product at the right time and at the right price. Consumers demand well-fitted garments, designed according to the latest fashion trends and offered at a reasonable price (Momborg, Jacobs and Sonnenberg 2012: 408). An amalgamation of the retailers and manufacturers is necessary to meet these consumer demands (Yan and Fiorito 2002: 132).

In addition, the clothing industry, as with all industries, relies on technology to reduce production time, improve productivity and maximise profit. Much of the machinery in the industry is automated and displays advanced levels of

technology. Being profit driven, any technological innovation, which can diminish costs, will benefit the clothing industry.

Technology has transformed the way the clothing industry perform their daily tasks. According to Oppong, Biney-Aidoo and Antiaye (2013: 73), technology available in the clothing industry includes a variety of software programmes utilised for fashion and textile design, fashion illustration, pattern-making, grading, marker making, product lifecycle management, marketing and sales. These software programmes enable the clothing industry's role players to work faster, reduce costs and, most importantly, increase productivity. Other technologies in the clothing industry include computer-aided manufacturing (CAM), which refers to standalone computerized equipment, namely, sewing machines, spreading machines (laying bulk fabric plies), and cutting machines, which are all automated. In support Oppong, Antiaye and Biney-Aidoo (2014: 25) found that technology streamlines the clothing production process which makes it more efficient.

However, according to Ramdass and Kruger (2011: 2566), the South African clothing industry operates with a low level of technological sophistication because of:

- A lack of capital investment in technology (Ramdass 2013: 340). Technology is expensive and many companies are unwilling or unable to invest in expensive equipment. Most technological systems must be imported and, because of the general weakness of the South African rand, such purchases are made additionally expensive; and
- Time constraints, as manufacturers often limit the time allocated for training employees and experimenting with new technology.

A significant advanced technology method that benefits the clothing industry is CAD (Dunlop and Weil 1996; Phi uses CAD to make fashion faster 2006; Vinodh, Sundararaj, Devadasan, Kuttalingam, Jayaprakasam and Rajanayagam 2009). According to Yan and Fiorito (2002: 140), CAD

technology assists clothing companies to have a competitive approach to handling internal and external pressures of the industry.

Technological innovations are, therefore, imperative to transform the South African clothing industry. The technologies used in the South African clothing industry are CAD software programmes which are used for pattern-making, grading, and marker making. Some of the larger manufacturing companies have invested in CAM, specifically automated spreading machines and cutters. However, they are in the minority due to cost implications.

One significant result of specifically CAD technology in the South African clothing industry has been improved communication with suppliers. For example, CAD patterns can now be emailed to local and abroad CMT factories. This is a time saving factor. Not only can it be received instantly, but also time difference no longer affects turnaround times.

2.5.1 Definition of computer-aided design

Computer-aided design, better known as CAD, is the use of computer systems for the purpose of creation, modification, analysis, or optimization of a design which streamlines the design process (Narayan, Rao and Sarcar 2008: 3).

2.5.2 Utilization of CAD technology in the clothing industry

CAD developed in the clothing industry in the 1970's (Shin and Downing 2011: 1) and started as a tool for pattern-making, grading and marker-making in the clothing industry. The computers then were huge and extremely costly. In those days, the large production runs of the same garment justified the great cost to acquire such expensive equipment, but only by large clothing manufacturers. Over the years as CAD technology evolved, computers became smaller, more affordable and the CAD programmes easier to operate. CAD, therefore, became more accessible to medium- and some smaller-size clothing companies. According to Aldrich (1997: 6), clothing

companies invested in CAD due to cost reduction in the garment manufacturing process.

In 1997, as many as eleven groups of CAD systems were being utilised in the clothing industry (Shin and Downing 2011: 2), which included textile design, illustration, texture mapping, embroidery, specification and costing, digitizing, pattern-making, measurement taking, grading, marker-making, garment-moving and commercial software. Therefore, CAD can be used throughout the garment development process in the clothing industry. CAD technology has drastically increased the pace at which a garment is manufactured. A change in consumer demand has resulted as consumers have become accustomed to having a variety of garments available in a short period of time. The change in consumer demand caused manufacturers to keep finding methods to shorten product cycle time, which refers to the time it takes from start of garment development to the finished garment sold in stores.

Expert use of CAD technology is described as implementing a CAD system which fully utilizes the systems functions to satisfy a given business's needs. Therefore, an expert CAD user is an operator who pushes the boundaries of the available technology to improve personal productivity and the company's profitability (Weldon 1999: 38).

Lectra, supplier of CAD software to the clothing industry, has established partnerships with more than 850 schools and universities in 60 countries (Lectra 2014) to provide educators and learners with the latest CAD technologies, in order to give students the opportunity to become skilled in the effective use of the latest software as it has become a basic tool of the industry.

In order to understand the crucial role that CAD technology plays in the clothing industry, it is important to note its advantages and disadvantages.

2.5.3 Advantages of utilising CAD software

CAD systems are extensively used in the clothing industry worldwide, especially in the preproduction phase. They integrate and automate processes and indirectly improve the productivity and efficiency of companies. Therefore, the biggest advantage of CAD technology is the improved cycle time of the manufacturing process. Ramdass and Kruger (2011: 2568) note that clothing companies in Norway who have developed technological advancement strategies have a clear competitive edge over their competitors because they maximize efficiency and lower costs.

Listed below are the benefits of CAD for the clothing industry:

- Quality of design and finished products are improved;
- Ability to meet retail standards on product delivery;
- Quicker response times to make alterations;
- No paper patterns required;
- Cost saving factors due to less samples being made;
- Productivity is improved, due to reduced throughput time of product assembly;
- Creation and storage of patterns on a computer hard drive;
- Practically an unlimited number of patterns for mass customization;
- Increases the productivity of the operators (pattern-maker, grader, marker maker and designer); and
- Improves communication through documentation as it reduces human errors and is more legible (Weldon 1999: 38, 40, 42; Yan and Fiorito 2002: 136; Phi uses CAD to make fashion faster 2006; Oppong, Antiaye and Biney-Aidoo 2014: 28)

It is clear from the above that CAD is utilised to meet deadlines for mass production, and improves quality in shortened product cycle times which all add up to make the company more profitable.

2.5.4 Disadvantages of utilising CAD software

The disadvantages to using CAD software, according to Yan and Fiorito (2002: 136), are the following:

- Implementation cost of the CAD system is high;
- Training time is quite extensive and costly;
- Lack of information as decision makers do not always know enough about the CAD systems;
- Most CAD software is licensed and not freely available to individuals to practise on after hours; and
- Shortage of skilled operators on CAD systems.

It is evident that the advantages of utilising the CAD software far outweigh the disadvantages and that the latter arise mainly due to costs and lack of knowledge of the systems. This study addresses the shortage of skilled CAD operators, specifically CAD pattern-makers.

2.5.5 Pattern-making utilising computer-aided design

According to Cooklin (1994: 15), “Pattern-making is the creative process of manipulating and shaping a flat piece of fabric to conform to one or more curves of the human figure”. The pattern creation process involves folding, cutting, modifying and experimenting with the relevant basic block to create a master pattern. A master pattern is the first set of pattern pieces that depicts a sample garment or fashion design illustration. These pattern pieces are then finalised for the manufacture of a garment and referred to as pattern-making/drafting (Koh, Lee and Lee 1995: 56). Therefore, in the clothing industry, pattern-making is seen as a bridge function between design and production. A sketch can be turned into a garment via a pattern which interprets the design in the form of the garment components (Cooklin 1991: 34-35).

Manual pattern-making can, therefore, be described as creating a paper template to specific measurements for all the components, such as cloth,

lining and fusible to manufacture a garment using tools such as pens, pencils, rulers, scissors and notchers.

CAD pattern-making can be described as creating and modifying garment patterns using a computer system which optimises the manufacturing of a garment, by streamlining the design and pattern-making process. For CAD pattern-making, a company needs the expertise of a skilled CAD operator. The importance of an expert (skilled) operator is not only to keep pace with the current capacity of CAD technology, but also to advance the capabilities of the systems in line with the world's technology revolution.

2.5.6 Skills required for CAD pattern-making

In a report by Morris and Reed (2008: 44, 47), CAD pattern-makers are classified as being in a very high skill demand category, while there is, in fact, a very low skills supply. This means that there is a skills shortage of CAD pattern-makers. According to Skinner, Saunders and Beresford (2004: 183), it is important to investigate wherever skills shortages arise because these impede economic performance. A study by Haskel and Martin (1993: 389) indicates that the effect of a skills shortage is significant and reduces productivity growth and inhibits the successful implementation of new technologies.

Hence, the significance of this study is namely, to address the skills shortage of CAD pattern-makers in the KZN clothing industry, is supported.

With regard to skills required for CAD pattern-making, Jack de Raismes, vice president and general manager of Gerber Technology, has stated that the factors which contribute to the competency of an expert CAD user are education and training (Weldon 1999: 42). An article by Oppong, Antiaye and Biney-Aidoo (2014: 74) states that CAD operators are required to think differently about how to use CAD to design virtual components in a different manner. Significantly, no literature which lists specific skills required for CAD pattern-making in the clothing industry could be found. When, as an

alternative, a search was conducted for information on manual pattern-making, only a single article was found relating to skills required.

The article by Ahn and Workman (2010: 31) mentions the skills needed to change a three-dimensional (3D) object into a two-dimensional (2D) form. This study was conducted amongst designers, pattern-makers and apparel professionals and required participants to interpret how a 3D object could become a 2D form (Ahn and Workman 2010: 33). This is the basis of pattern-making whereby a garment (3D) is depicted as a pattern (2D). The findings of this study show that spatial visualisation skills are required and defined these skills as “those abilities used in the production and interpretation of drawings in which three-dimensional objects are represented in two-dimensional form” (Ahn and Workman 2010: 33). Therefore, a pattern-maker needs to understand garment-construction (3D) in order to make a pattern (2D).

Due to the lack of academic literature, which identifies the skills required for CAD pattern-making in the clothing industry, an objective of this study is to fill this gap by identifying the skills required for CAD pattern-making.

2.6 SKILLS SHORTAGES

A skills shortage can arise from a lack of qualified workers in a specific occupation (Shah and Burke 2003: 6), or when posts for jobs which require specific skills cannot be filled because no one has the skills (Frogner 2002: 20).

Skills shortages have been explained as follows:

- When there are more vacancies with certain skills needed than there are people available with those skills (Frogner 2002: 20);
- A situation where there is a scarcity in the accessible external labour market of the type of skill being sought, which results in recruitment difficulties (Wallis 2002: 4);

- Associated with the lack of professional qualifications of workers in a particular occupation (Shah and Burke 2003: 6);
- When the quantity demanded of skills in particular work-related categories, exceeds the supply of these skills (Trendle 2008: 9); and
- “A skills shortage occurs when any one of the following situations arises or a combination of them: shortage of workers in a particular occupation, labour demand exceeds availability of skills, or workers lack appropriate qualifications” (Rasool and Botha 2011: 6).

The above definition by Rasool and Botha is the most recent, comprehensive and appropriate for this study as it relates to the focus of the study on the causes of the skills shortage of CAD pattern-makers in the KZN clothing industry.

2.6.1 Reasons for skills shortages

A skills shortage can occur in any industry. The reasons for such shortages are generic to any industry and include the following:

- The content and quality of courses offered at tertiary institutions do not meet industry needs (Morris and Reed 2009: 214);
- Service providers, who offer training courses, deliver poor quality training (Morris and Reed 2009: 214) and/or the training is too theoretical (Ramdass 2007: 85);
- Employers do not communicate the skills needed to either potential employees or education and training institutions. This results in employees lacking the required skills for a specific job (Skinner, Saunders and Beresford 2004: 184), contributing to inadequate quality of qualified people resulting in a mismatch between qualification and the ability to do the job (Rasool and Botha 2011: 49). “The remainder (10%

with a tertiary qualification in South Africa) fail to find employment, because their qualifications do not match those sought by employers” (Fin24 2014c);

- Retraining of staff requires time, which costs money and could strain resources of the company (Deloitte & Touche 2009: 21, 26). Training institutions often charge inflated prices for courses, especially if they are the sole service provider. This results in companies choosing not to up-skill staff (Skinner, Saunders and Beresford 2004: 184);
- New graduates do not have adequate work experience. Many companies insist on work experience before they employ an individual (Skinner, Saunders and Beresford 2004: 191). Not only do they look at the years of experience but also at the quality of experience and personal attributes (Morris and Reed 2009: 206); and
- Retiring staff, with many years of experience, are lost to the economy (Horwitz 2013: 2443) and cannot be replaced by adequately qualified people (Morris and Reed 2009: 204). This is not only creating a culture of ‘poaching’ staff for more lucrative opportunities, but also one of uncompetitive labour conditions (Coffield 2002: 285; Morris and Reed 2009: 205) as employees with the necessary skills may ask for inflated salaries as they have the upper hand. Since many companies are unable or unwilling to pay high salaries, skilled workers tend to job hop. However, according to Horwitz (2013: 2442), “precarious labour conditions” are linked to job insecurity, which creates the trend of job hopping to secure better salaries.

According to Frogner (2002), occupations associated with skills shortages are those where relatively long periods of education and on-the-job training are needed to gain the required skills and knowledge. A skills shortage may also exist only within a particular specialisation area of an occupation.

As the focus of this study is to address skills shortages of CAD pattern-makers in KZN, a general understanding of the skills shortages in South Africa is required.

2.6.2 Skills shortages in South Africa

The South African economy is becoming increasingly skills-intensive (Fin24 2014b). The country lacks the necessary skills for various industries (Tshilongamulenzhe 2012: 30). More jobs are now available to skilled workers and this has created a higher wage bill and fewer opportunities for unskilled labour (Altbeker and Storme 2013: 3), which is negatively impacting the country's economic prospects, development and socio-economic growth (Johnson, Altbeker and Bernstein 2010: 9). The South African government and private sectors are attempting to address the issue.

2.6.3 Addressing skills shortages in South Africa

South Africa, as a country, is addressing skills shortages in various ways. The following are a few interventions:

2.6.3.1 Government interventions

As skills shortages are major obstacles to economic growth and job creation in South Africa, the South African government seems committed to addressing skills shortages.

According to Daniels (2007), government describe skills shortages as the lack of qualifications and experience within the workforce. He points out that there is a difference in the way that economists and the South African government describe skills shortages. Economists see the relationship between lack of qualifications, experience as well as productivity of the workforce as the most important aspects of skills shortages. This has caused a difference of opinion over the precise numbers of occupational skills shortages in South Africa. In the researcher's view, and as previously stated in 2.1, for the manufacturing sector, it is vitally important to take skills

shortages and their relationship to productivity into account as it will impact on the manufacturing output of companies.

There are, at least, four important policy documents with regard to skills development, namely, the Skills Development Act (1998), the Skills Development Levies Act (1999), the National Skills Development Strategy (2001), and the Human Resources Development Strategy (2001). However, the impact the above mentioned policies have had on the development of skills in South Africa is dubious.

In 2006, the then Deputy President, Ms Phumzile Mlambo-Ngcuka, launched two ambitious programmes, namely, the Accelerated and Shared Growth Initiative for South Africa (AsgiSA) together with its sister programme, the Joint Initiative on Priority Skills Acquisition (Jipsa) to address the “scarce and critical skills South Africa needed” (Rasool and Botha 2011: 1, 2). However, the success of these programmes to identify the latest scarce skills is questionable. There have been no recent reports on the two initiatives from which the nature, scale, severity of or reasons for scarce skills shortages can be detected, let alone how these shortages have been addressed since then or will be addressed in future. Tshilongamulenzhe (2012: 30) states that the South African government is still dedicated to addressing scarce skills shortages and recommends that accurate labour data be gathered to further develop government action plans. It is, however, a known fact that labour force data in South Africa is generally poor, making the reliability and validity of data a cause for concern for purposes of effective response.

2.6.3.2 Education

Education is a fundamental driver of human development, as it is expected to increase an individual's skills (abilities) year after year. Over the past forty years, South Africa increased its human capital (skills) by investing a great deal in education and training (Simkins 2011: 2). Skills are obtained through different methods of education and training. Since 1994, the pace has been picked up and broadened to all sectors of the population in South Africa

(Badat 2009: 460). Unfortunately, the quality of education in South Africa has not yet produced the skilled workforce required.

Poor student performance at higher education (tertiary) level is often blamed on the poor quality output of basic education (primary and secondary schooling) in South Africa. Fryer and Vencatachellum (2004: 20) highlighted in a study that the South African government needs to focus on getting all people to complete their education, reduce the drop-out rate, and place more emphasis on the quality of primary and secondary education.

A tertiary qualification, however, remains the most successful route to finding employment, as approximately 90% of graduates in South Africa are employed (Fin24 2014c). Unfortunately, various restructurings of the school curriculum have not impacted on the skills shortages in the country (Rasool and Botha 2011: 49). More particularly, the practical needs of industry are not being adequately catered for in the South African educational system. According to a study by Ramdass (2013: 338), students enrolled in the National Diploma: Clothing Management programme at the University of Johannesburg and alumni emphasised the need for the focus of the curriculum to remain on technology and computer applications to meet the requirements of industry.

The South African clothing industry itself must also take responsibility for training, retraining and educating their workforce to increase labour productivity and raise employment levels. Education enhances a “person’s stock of human capital” and, through training, their productive potential is increased which, in return, leads to higher earnings (Masuku 2008: ii).

Morris and Reed (2008: 47, 111; 2009: 216) state that the reasons for the shortage of graduates in the South African clothing industry are due to the low number of new enrolments at universities in the courses related to this industry. The authors also report that companies in the clothing industry experienced a mismatch of graduates’ qualifications and the requirements of

the industry. For these reasons, firms have decided to use their own resources to conduct in-house training and to participate in the formal training programmes regulated by the relevant Sector Education and Training Authority (SETA).

2.6.3.3 SETAs

The Sector Education and Training Authorities (SETAs) were established in 2002, by the then Minister of Labour, Membathisi Mdladlana. The 23 SETAs were established to oversee skills development for the different labour sectors and sub-sectors within South Africa. Due to negative perceptions in 2009 about the SETAs, Mr Thabo Mashongoane, director secretariat, Department of Higher Education and Training, assumed responsibility for skills development that had previously been controlled by the Department of Labour. In 2011, the SETAs were reduced from twenty three to twenty one, through amalgamation, to improve the proficiencies of the SETAs in order to address the skills shortage in South Africa.

The Clothing Textiles Footwear and Leather (CTFL) SETA amalgamated with three other SETAs in 2011 and is now known as the Fibre-Processing and Manufacturing (FP&M) SETA. This SETA is responsible for thirteen industries of which the clothing industry is one. FP&M SETA is responsible for the skills development within these industries and its aim is to improve productivity within the manufacturing sector (FP&M SETA 2012b: 32) through training. Coffield (2002: 487) reports that training improves the commitment of employees, which, in return, encourages a common culture within a company which helps to attract a higher quality work force.

Before the aforesaid amalgamation, an amount of R825 000.00 was earmarked for technical training, to address the critical shortage of technical skills, amongst, mechanics, patternmakers and work study officers in the industry, according to the final CTFL SETA (2011: 8) Annual Report. This allocation was not utilised properly (FP&M SETA 2012a: 79). Possible reasons could be a lack of awareness by companies related to these SETA

funded programmes and/or insufficient funding to meet the training needs (Morris and Reed 2009: 211, 212). The regrettable outcome, however, is that companies have been deprived of much needed training resources (Morris and Reed 2008: 112).

One specific objective of the FP&M SETA was to “encourage improved use of workplace-based skills development”. The outcome was “Training of employed workers addresses critical skills, enabling improved productivity, economic growth and the ability of the work force to adapt to change in the labour market” (FP&M SETA 2012a: 18). This object was achieved, as stated in the 2011/2012 Annual Report of the FP&M SETA.

However, due to the FP&M SETA receiving only modest levy income, it faces the challenge of adequately allocating funding towards education and training initiatives (FP&M SETA 2012a: 7). This has resulted in limited support to its beneficiaries, of which the clothing industry is one.

Changes to the SETA funding grant regulations were published in the Regulation Gazette Volume 570 no. 9867 on 3 December 2012 and came into effect on 1 April 2013 (Gazette 2012). Changes were made to the funding regulations to ensure that discretionary funding application forms accommodated the needs of a wide range of beneficiaries nationally, including small and micro enterprises, co-operatives and Non-Government Organisations (NGOs) (Gazette 2012). The new regulation also required SETA's to spend or commit to at least 95% of their discretionary funds in any financial year. Only a maximum of 5% of uncommitted funds could be carried over to the next financial year. This was an attempt to ensure that funds were used to improve the skills base of the workforce.

Morris and Reed (2008: 113) noted, however, that clothing companies require specific skills and that a ‘one size fits all’ supply of skills is not likely to succeed. In a further study conducted in 2009, these authors state that companies reported that the former CTFL SETA was not adequately

addressing the diverse needs of the clothing sector (Morris and Reed 2009: 207). The success of the FP&M SETA's up-skilling of the CTFL sector is largely dependent on the satisfaction rate of the companies which make use of the SETA's training and skills development programmes. For companies to make use of the SETA programmes, the content of the programmes has to provide adequately for the diverse and specific needs of the clothing industry. SETAs, therefore, must provide on-going training to develop skills in the workplace (Tshilongamulenzhe 2012: 34).

There is a definite need for a strong link between government, education and skills development in the workplace in an attempt to address what Rasool and Botha (2011: 3) describe as "the chronic skills shortages in the country and the inability of the education and training system to meet the demand-driven needs of the economy."

2.6.3.4 Workplace learning

Workplace learning refers to the learning that takes place when students are exposed to the actual working environment under close supervision of a person representing the company (workplace) (Taylor 2012: 11). Workplace learning is also referred to as work-integrated learning (WIL), in-service or experiential training.

Partnership development and marketing of a cooperative educational approach in which workplace learning should be an integral part of educational and skills development programmes seems to be a viable strategy forward (Taylor 2012: 7). To achieve this specific aim, the National Skills Development strategy III (2011 – 2016), was put in place. The aim of the strategy is, amongst others, to ensure that skills development can take place as part of supervised practical learning in a workplace (South Africa 2011: 20). Also important to this strategy is the advocating of partnerships between all role players, namely, public and private education institutions and training providers, SETAs and employers, in order to address the role players' specific needs (Taylor 2012: 7). Workplace learning for students is,

therefore, required to be an integrated part of occupationally-directed programmes to address the critical skills shortage and high unemployment in South Africa.

From the above, it is evident that workplace learning has to remain a key part in the overall strategy to develop the necessary skills in people to expertly apply themselves in a particular context for a defined purpose, of which a CAD pattern-maker for the clothing industry is such an example.

2.6.3.5 Short-courses

Short courses refer to an educational initiative, in which an instructor/trainer introduces the functions of a specific application or practice in a short period of time (if possible, not more than 1 day). These courses are offered at external facilities of service providers or on-site at the factory.

In a study by Ramdass (2007: 86), more than half of the clothing organisations (55%) were involved with CTFL SETA initiatives for learnerships and short courses. Due to the time constraints within the clothing industry, it is understandable that clothing companies would prefer short courses as they cannot afford employees/operators to be absent, as it impacts on the production processes.

2.6.3.6 In-house training

In-house training refers to workshops being conducted on-site, utilizing the company's own staff or resources, rather than sending employees to external facilities for training.

According to Ramdass (2007: 85), "Many organisations (87%) utilise in-house training especially the larger organisations" in KZN. Larger organisations sustain their competitiveness through regular training initiatives. Horwitz (2013: 2441) concurs with Ramdass and states that "private enterprise training" is crucial not only to support but also to sustain

the required skills and economic growth of “large infrastructure projects”. Therefore, companies must not only focus on skills development but also on retaining the fundamental skills within the company.

2.6.3.7 Life-long learning

According to Skinner, Saunders and Beresford (2004: 184), ‘lifelong learning’ develops an individual’s skills and will increase his/her employability and earning power. Training, either through formal education, short courses or in-house training plays a vital role in the development of clothing industry employees. However, an individual’s determination impacts on the effectiveness of the training, which, in return, affects the productivity of a company (Ramdass 2007: 87). Ramdass and Pretorius (2011: 179) reiterate that continuous training within the company is important.

Horwitz (2013: 2443) suggests that retired “highly skilled and experienced people” could be “re-employed on a contract basis in training, mentoring or coaching roles to help develop and better utilise younger talent”. Encouraging retired staff to continue their contribution to the labour pool, in this way, could lead to improving and enlarging the human capital pool. Their work and life experiences in the field could add value by developing the skills required within their specific industry/field. Setting an example for the younger generation would contribute to the much needed life-long learning mentality, through continuous training undertaken by experts in their field.

2.6.4 Skills shortages in the South African clothing industry

Ramdass (2013: 340) states that the South African clothing industry has been very slow to invest in the development of skills. This is contributing to the industry’s skills shortages. Ramdass and Pretorius (2011: 169) report that the education level of employees in the clothing industry is poor. No recent evidence could be found to suggest any improvement to the current situation. Occupations in the clothing industry where skills shortages are most common

are sample machinists, pressers, markers, machine mechanics, garment technologists and pattern-makers (Morris and Reed 2009: 206-207).

Of particular relevance to this study, a report by Morris and Reed (2008: 44, 82) indicates that the supply of skilled CAD pattern-makers is very low. The skills shortage of CAD pattern-makers is one of the major concerns of the clothing industry, as indicated in the reports by Morris and Reed (2008: 36), CTFL SETA (2011: 9) and FP&M SETA (2012b: 39). Not only does the clothing industry need more CAD pattern-makers to operate the software, but, more importantly, CAD pattern-makers who are meeting the skill requirements of the clothing industry. Hence, it is important to establish what skills are necessary for CAD pattern-making according to the clothing industry.

Morris and Reed (2008: 75) state that there is a high demand for skilled CAD pattern-makers, but a very low skills supply. Skilled pattern-makers in the South African clothing industry are difficult to find and employ, especially those who are able to utilise the CAD pattern-making software. As previously mentioned, pattern-making demands a high level of aptitude and skill, both of which are in short supply in South Africa, as very few young people find CAD pattern-making an attractive career option due to unattractive working conditions and remuneration packages.

Thus, one finds that CAD pattern-makers' positions are mainly filled by older staff with a great number of years of experience and this limited labour pool remains difficult to replace. Furthermore, this has partially created a 'poaching' culture in the clothing industry, where skilled workers are lured with more lucrative employment opportunities (Morris and Reed 2008: 75).

2.7 Conclusion

This chapter has reviewed the South African clothing industry's position as a global competitor in terms of its strengths and weaknesses. The importance of human capital and skills development for industry employees was

highlighted. According to human capital theory, training employees to attain the necessary skills required for a specific occupation should be seen as an investment rather than a cost. Furthermore, the influence that technological advancement has had on skill requirements by the clothing industry was emphasized, with specific reference to CAD. The purpose of this study was to address the skills shortage of CAD pattern-makers in the KZN clothing industry. The literature review outlined reasons for the skills shortage and current methods utilised to address South African skills shortages in general.

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

CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

In chapter two, CAD technology and skills in the clothing industry were discussed. The purpose of the study was to investigate the reasons why a shortage of skilled CAD pattern-makers exists in KZN. To obtain the necessary data on skills shortage, a mixed methods approach, using both quantitative and qualitative enquiries, was applied within a social constructivist perspective. Constructivism is characterised by finding, describing and interpreting the data based on the principle that individuals create their own knowledge through life experiences (Creswell 2003: 8-9; Maree 2012: 81). The following objectives were framed to guide the inquiry:

- To establish what skills are necessary for CAD pattern-making;
- To identify the reasons why a skills shortage of CAD pattern-makers exists in KZN; and
- To make recommendations as to how the skills shortage of CAD pattern-makers in KZN might be addressed.

This chapter commences with a description of the mixed methods research applied to this study.

3.2 RESEARCH DESIGN

Research design is a plan of how the study was conducted and how the research problem was solved (Leedy and Ormrod 2010: 85). A descriptive survey research design is applied in this study. According to Leedy and Ormrod (2010: 187), “survey research involves acquiring information from about one or more groups of people – perhaps about their characteristics, opinions, attitudes, or previous experiences – by asking them questions and tabulating their answers. The ultimate goal is to learn about a large population by surveying a sample of that population”. In the subsection that follows, the choice of methodology and the study perspective are explained.

3.2.1 Research Methodology

The mixed methods research approach chosen for this study is defined by Maree (2012: 269) as the utilization of both quantitative and qualitative enquiries. A quantitative approach refers to data presented as numbers while a qualitative approach refers to data mainly presented as text (Zikmund, Babin, Carr and Griffin 2013: 135). Applying a combination of both methods can present the most comprehensive analysis of the research problems (Creswell and Plano Clark 2007: 7, 13) as the strengths of one method support the weaknesses of the other.

The strength of using mixed methods for this study was for descriptive text to give meaning to numerical representations (Esposito *et al.* 2012: 21). The qualitative data enriched the quantitative data collected on various questions regarding CAD pattern-making skills and reasons for the skills shortage.

Both methods of data collection can take time, if gathered separately. To save time, a mixed methods concurrent-nested design was applied (Creswell 2003: 218). This shortened the data collection time period as both sets of data were collected at the same time with the aid of one questionnaire.

Transforming the two sets of data in the analysis phase can become a challenge if unequal amounts of quantitative and qualitative data are gathered (see Creswell 2003: 219 on "unequal evidence"), leading to problems when attempting to generalise results. Since more quantitative than qualitative data was collected in this study, the results cannot be generalised to the KZN target population and limited conclusions were drawn. However, the statistical results, gained through the principal quantitative method of enquiry, are supported, to some extent, by the embedded data from the qualitative enquiry.

Figure 3.1 depicts the nested approach used for the study where quantitative data collection was the principal method while the qualitative data was embedded and had less emphasis placed on it (Creswell 2003: 218).

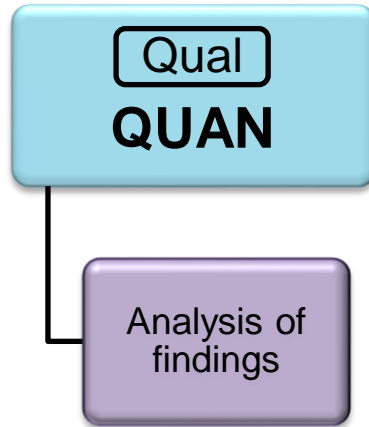


Figure 3.1 Concurrent-nested design diagram

Source: Creswell (2003: 214)

The concurrent-nested approach was used to gain a comprehensive perspective from the different groups of participants on CAD pattern-making skills, and to identify the reasons for the skills shortage of CAD pattern-makers in the KZN clothing industry. Responses to the two critical questions of this study were measured quantitatively. The third critical question, concerning recommendations to address the skills shortage of CAD pattern-making, was extracted qualitatively from responses to the online questionnaires.

3.2.2 Constructivist perspective

The qualitative part of this study was aligned with a constructivist perspective, also known as constructivism, which is based on the principle that individuals construct their own knowledge through life experience (Creswell 2003: 8). Thus, each person in the clothing industry will have their own perspective of the skills necessary for CAD pattern-making, as well as reasons for the skills shortage of CAD pattern-makers, arising from their own

work experience in the field. From varying perspectives, the study intends to build new knowledge on the research topic.

Constructivism provides a subjective opinion (Creswell 2003: 8). The results from the participants of this study were compared to give a comprehensive overview of their opinions.

3.3 HYPOTHESES

The results of the study will be assessed against the following hypotheses:

- There is no significant difference in the perceptions of the CAD pattern-makers and their managers in the clothing industry on the overall importance of the required skills for CAD pattern-making; and
- There is no significant difference in the perceptions of CAD pattern-makers and managers in the clothing industry for overall reasons of the skills shortage in CAD pattern-making.

3.4 SAMPLING

The participants in the sample were chosen because they have defining characteristics, which are useful to the study (Maree 2012: 79). The sample was chosen using a non-probability purposive sampling method whereby participants are chosen according to pre-selected criteria which show relevance and relatedness to the research questions (Neuman 2000: 198; Creswell 2003: 185; Leedy and Ormrod 2010: 212-213).

The study sample was chosen as they represent different levels of CAD pattern-makers in the KZN clothing industry.

The sample comprised the following participants:

- CAD pattern-makers in the KZN clothing industry who utilise Lectra CAD pattern-making software;
- Managers overseeing the above mentioned CAD pattern-makers;

- 2013 Fashion students at the Durban University of Technology training in CAD pattern-making; and
- Lectra SA software manager/trainer.

The above sample was chosen because all the groups know how to operate the Lectra CAD pattern-making software. The researcher was employed as a software application specialist for Lectra SA from 2005 to 2009 which led to an understanding of the skills required for Lectra CAD pattern-making.

The KZN clothing companies used in this study were selected by the Lectra SA software manager from their database of customers using the system on a daily basis. Access to the participants was readily available because:

- Lectra SA and their clients were former colleagues and customers of the researcher; and
- Fashion students in the Department of Fashion and Textiles were trained by the researcher.

The criteria used to choose the three groups of samples were as follows:

- Each group represents a different level of experience and knowledge of CAD pattern-making;
- The CAD pattern-makers and their managers in the KZN clothing industry were chosen because they utilise the Lectra CAD pattern-making software and thus have knowledge of the necessary skills required for CAD pattern-making. Hence, they should be in a position to shed light on the reasons for the skills shortage of CAD pattern-makers in the KZN clothing industry. The choice of the managers, in particular, is important to this study, because Ramdass and Pretorius (2011: 180) reported in the findings of their study that managers need to understand the skills of their workforce;
- The 2013 students registered for the subject Computer Pattern in the Fashion and Textiles Department at the Durban University of Technology. The students were chosen because they are conversant with Lectra CAD pattern-making software as a result of recent training; and

- Since there is only one Lectra software manager in South Africa, this group comprised of a single member who provides software training to CAD pattern-makers in the clothing industry.

3.5 SAMPLE SIZE

The sample size (N = 70) comprised of the following:

- 26 CAD pattern-makers and 10 managers of the CAD pattern-makers, from 11 KZN clothing companies;
- 33 students registered in 2013 for the subject Computer Patterns in the Department Fashion and Textiles, at the Durban University of Technology; and
- 1 Lectra SA software manager/trainer.

3.6 DATA COLLECTION INSTRUMENT

Questionnaires are useful for collecting data from participants (Hofstee 2010: 132). A questionnaire is a collection of predetermined questions which will capture data from participants of the sample groups (Kumar 2011: 145). According to Maree (2012: 157) and Kumar (2011: 148), the following are advantages of data collection through a questionnaire:

- it is an inexpensive method;
- it is a quick method of gathering data;
- participants can be reached even if they are far away; and
- anonymity can be ensured.

Three questionnaires were used, one for each of the three participating groups. The questionnaires were created online using the Survey Monkey[®] website. The questionnaires consisted of closed-ended and open-ended questions. The majority of the questions were closed-ended which could be readily answered by the click of a mouse. Four of the questions were open-ended, requiring the participants to explain their answers.

The questionnaires were structured as follows:

- All three questionnaires commenced with biographical questions, which were tailored to suit the respective groups. The following appendices were allocated to the different participants:
E – Clothing industry questionnaire;
F – Student questionnaire; and
G – Lectra SA questionnaire.
- All three questionnaires included questions pertaining to skills required for CAD pattern-making and the reasons for skills shortages in KZN
- Students were requested to indicate whether they would be interested in being employed as CAD pattern-makers in the clothing industry in KZN.
- The CAD pattern-makers, managers and the Lectra SA software manager were requested to comment on aspects of training and staff turnover.
- Recommendations to increase the stock of CAD pattern-makers in the future were requested from industry participants and Lectra SA.

All questions were compulsory. The questions on skills required for CAD pattern-making and reasons for skills shortages in CAD pattern-making were compiled from the researcher's four years' work experience as a Lectra CAD software trainer and from a study conducted in India by Blom and Saeki (2011). This study was reviewed in the literature in Chapter 2.

A Likert scale was used for the questions pertaining to the necessary skill requirements and the reasons for the skills shortage of CAD pattern-makers in KZN. According to Bell (2010: 225), scales are intended to discover the participants' strength of feeling or attitude and the variables measured can be expressed as numerical scores.

The Likert scale used in the students' questionnaire differed from those used for the clothing industry participants; with the addition of an extra category titled "Uncertain", because the researcher anticipated that students may not have the knowledge to respond. The 'Uncertain' category was coded with a

zero value and was not taken into account when overall mean values and scores were calculated for data analysis.

The questionnaire for the CAD pattern-makers, clothing industry managers and the Lectra SA software manager did not contain the extra response category because these participants have sufficient knowledge of clothing industry requirements. This technique forced participants to respond with their opinion (Maree 2012: 167).

3.7 PRE-TEST AND PILOT STUDY

Pre-test is a “screening procedure that involves a trial run with a group of respondents to iron out fundamental problems in the survey design” (Zikmund *et al.* 2013: 231). It is carried out prior to any pilot study and/or commencement of the actual study. The aim was to check the user friendliness of the data collection instrument, which included clarity of questions and instructions, to avoid bias in questions and length of questionnaire to avoid participant fatigue (Leedy and Ormrod 2010: 196).

In this study, the three questionnaires were pre-tested by DUT research professionals, colleagues and BTech graduates in the Department of Fashion and Textiles. Questionnaires were refined according to responses received.

Thereafter, a pilot study of the updated questionnaires was conducted prior to commencement of the actual study. It had a similar aim to that of a pre-test, but used a group of participants who are representative of the sample population of the study (Zikmund *et al.* 2013: 63).

Clothing industry employees in Cape Town and students registered at the time (2013) in the Department of Fashion and Textiles at the Durban University of Technology were selected to participate in the pilot study. They were representative because they met the criteria of the sample population by having the necessary knowledge and experience of the Lectra CAD

software. Cape Town participants were used for the pilot study, in an endeavor to retain the number of KZN participants for the study.

The pilot study was conducted as follows:

- For the clothing companies' questionnaire, CAD operators and managers of a well-established retail clothing company in Cape Town were used. Prior to the pilot study, an email (Appendix C) was sent to the manager of the company which explained the study and requested participation by the company's CAD pattern-makers and CAD managers. The company agreed to provide six participants. The participants' email addresses were captured and a letter of consent explaining the study was emailed to each participant (Appendix D). The email included a link, which connected them to the online questionnaire. All the participants completed the questionnaire without encountering any problems.
- Five BTech Fashion students completed the pilot study of the student questionnaire. All these students had passed the Lectra pattern-making course in either 2011 or 2012. Two of the students experienced technical problems when they tried to complete the questionnaire using cellular smart phones. No changes to the questionnaire were required, but, in order to avoid technical problems in the actual study, the researcher arranged to have a DUT computer laboratory available for the completion of the online student questionnaire.
- The Lectra SA trainer based in Cape Town participated in the pilot study to pre-test the Lectra SA questionnaire, because Lectra SA has only one software manager/trainer based in Durban, KZN to participate in the actual study.

The data collected from the three pilot studies was checked by a statistician and validity was verified. No changes to the questionnaires were required.

3.8 DATA COLLECTION PROCEDURE

An online survey was used to collect the data for this study. The benefits of this method are that:

- the collection time is shorter as it is a quick method of responding; and
- it is a low-cost method with no travel, postage or telephone costs (Jansen, Corley and Jansen 2007; Zikmund *et al.* 2013: 224).

The on-line survey was chosen because the researcher did not want to impose too heavily on production time in the work environment or on learning time of students.

The online survey offered anonymity to the participants as there was no face-to-face contact with the researcher. Accurate information is obtained when confidentiality is ensured (Kumar 2011: 148).

According to Zikmund *et al.* (2013: 230), the only disadvantage of an online survey is the high possibility of misunderstanding by participants. Pre-testing and conducting a pilot study of the research instrument minimised this problem. Questionnaires were distributed in the following manner to:

Industry participants - The researcher obtained a list of twelve (12) companies which use Lectra CAD pattern-making software in KZN. The chosen companies were each contacted via telephone and/or emailed by the researcher to request a contact person within their respective companies to liaise with, on their behalf. These contact persons were approached for permission to conduct the study in each of their respective companies. Once this was forthcoming, the contact persons provided the researcher with the relevant email addresses of the CAD pattern-makers and managers. Eleven (11) companies were willing to participate. One company was not willing to participate due to the questions concerning salaries. Within these eleven companies, 26 of the participants were CAD pattern-makers and 10 were managers of CAD pattern-makers. The contact person helped to schedule suitable dates and times for each company to receive the online

questionnaires via email. This ensured that all the participants had access to the internet.

A covering letter explaining the study was emailed to the participants (Appendix D and E). CAD pattern-makers and managers could complete the questionnaire at their convenience.

Follow up reminders were emailed to participants who had not as yet completed the questionnaire. All thirty six (36) participants from the KZN clothing companies completed the questionnaire, achieving a 100% response rate.

Student participants - The 2013 third-year national diploma students in the Department of Fashion and Textiles Department at the Durban University of Technology were verbally informed by the researcher on the content and nature of the study. They were requested to indicate on a class register if they were willing to participate in the study by providing their signature and an email address. All 33 students completed the class register accordingly. The student questionnaire was then emailed to each student to complete at their convenience. A computer laboratory with internet access was made available to those students who did not have internet access at home, thus increasing the chances of a good response rate. A covering letter explained the study to the students and by clicking on the link to the questionnaire, the student was giving consent to participate (Appendix D and F). All 33 students completed the questionnaire, achieving a 100% response rate.

Lectra SA - Prior to the commencement of the study's proposal, Lectra SA confirmed participation in the study, including the use of their trade name and their list of customers (Appendices A and B). The covering explanatory letter, with the link to the questionnaire (Appendix D and G), was emailed to the Lectra SA software manager/trainer. The questionnaire was returned completed.

Data collected from the three online questionnaires was captured, saved and stored on the Survey Monkey[®] database. Once all the data was collected, it was exported to a Microsoft[®] Excel 2010 CSV format. The data was coded and imported into IBM[®] SPSS[®] Statistics V21 in preparation for data analysis.

3.9 DATA ANALYSIS

Data analysis is defined as “the application of reasoning to understand the data that has been gathered” (Zikmund *et al.* 2013: 68). This process involves the identification of patterns which are then interpreted and summarized to reveal the results of the study.

In a concurrent-nested strategy, data is analysed on multiple levels (Creswell 2003: 221) to gain diverse perspectives from the different types of data sets within the study (Creswell 2003: 218). In this study, the types of data sets were quantitative (mainly numbers) and qualitative (mainly words). Multiple levels of participants, used in this study, were experienced CAD pattern-makers and their managers, the service provider and fashion students. The data sets from these participants were analysed to explore the skills shortage phenomenon.

Data analysis comprise of no less than three steps (Vithal and Jansen 1997: 27 - 28). The stages followed in this study were:

1. Reading and checking data for incomplete answers;
2. Combining and consolidating data from the different level of participants;
and
3. Presenting the data in the form of tables, graphs, statistical summaries (means and standard deviations) and selected quotations.

3.9.1 Quantitative data analysis

The quantitative data was analysed through descriptive and inferential statistics.

3.9.1.1 Descriptive statistics

Descriptive statistics, such as percentages, distribution and frequencies were used to summarise responses obtained from the questionnaire (Maree 2012: 19). These measures illustrated the following:

- the demographic statistics of the participants;
- the necessary skills for CAD pattern-making; and
- the reasons for a skills shortage of CAD pattern-makers.

3.9.1.2 Inferential statistics

Inferential statistics enable a researcher to draw conclusions about the relationships that exist between the variables that constitute the research. In this study, a t-test was conducted to establish via inferential statistics to determine whether a significant difference existed between the CAD pattern-makers and their manager's perceptions regarding:

- the overall importance of necessary skills required for CAD pattern-making; and
- the overall reasons for the skills shortage of CAD pattern-makers in the KZN region of South Africa.

3.9.2 Qualitative data analysis

The qualitative data was analysed through an inductive content analysis. This is the process whereby qualitative data is categorised into similar responses to generate themes or trends that emerge from the data (Maree 2012: 108, 109). Microsoft® Excel 2010 software was used to categorise similar responses obtained from the open-ended questions. These trends or patterns were analysed and discussed.

3.9.3 Reliability

Reliability refers to the consistency of an instrument used (Maree 2012: 147). For this study, it refers to the consistency of all three questionnaires.

Cronbach's alpha was used as a measure of reliability for the two scales in the questionnaire, namely the:

- importance of required skills for CAD pattern-making; and
- reasons for the skills shortage of CAD pattern-makers.

This method is based on inter-item consistency in each category. If the items are closely correlated, the alpha coefficient will be close to one and if the items are badly correlated, the alpha will be close to zero. An alpha coefficient close to one indicates high reliability (Zikmund *et al.* 2013: 302). The reliability results for this study are discussed in chapter four.

3.9.4 Validity

Validity of an instrument indicates whether it measures what is intended to measure (Kumar 2011: 179). According to Maree (2012: 216), 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.

In this study:

- "Face validity refers to the subjective agreement among professionals that a scale logically reflects the concept being measured" (Zikmund *et al.* 2013: 303) and was, therefore, used to check the validity of the questionnaires; and
- a pre-test as well as a pilot study were conducted prior to the commencement of the actual study to exclude any threats to the validity of the questionnaires.

The validity of this study is discussed in chapter four.

3.10 ETHICS

A researcher must be concerned with ethical considerations during the entire research process, that is, recruiting respondents for the study, data collection methods and publishing phases of a study (Kumar 2011: 241 - 248).

Prior to commencement of this study, ethical clearance from Durban University of Technology was obtained at the proposal review stage.

Data collection was preceded by the researcher having obtained permission from Lectra SA through a letter (Appendix A and B) outlining the research topic and purpose, and requesting consent to the use of their trade name and their list of customers.

Principles of ethics, such as anonymity, were addressed in the letter to ensure that participants were comfortable to partake in the study. “Confidentiality means that information involved in the research will not be shared with others” (Zikmund *et al.* 2013: 89).

Cover letters explaining the study (Appendix D) were emailed to each participant to ensure they understood the study and gave informed consent to participate. According to Zikmund *et al.* (2013: 89), “Informed consent means that the individual understands what the researcher wants him or her to do and consents to the research study”. Once necessary permission and consent was obtained, questionnaire distribution and data collection followed.

The data was collected, analysed and presented accurately.

3.11 CONCLUSION

This chapter covered the research methodology used to establish both the necessary skills required for CAD pattern-making and the reasons for the skills shortage of CAD pattern-makers in KZN. The findings of the research study are discussed in chapter four.

CHAPTER 4

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

In the previous chapter, the research methodology and design of the study were discussed. The findings derived from the data analysis of the questionnaires from four groups of participants are presented in this chapter. The results are both quantitative and qualitative in nature. The quantitative data collected from the responses was analysed using the IBM® SPSS® Statistics V21 software. The qualitative data was analysed using inductive content analysis. The results are presented in the form of graphs, tables and descriptive text.

4.2 RELIABILITY AND VALIDITY

“Research projects that use measures with high reliability and validity are more likely to yield statistically significant results” (Leedy and Ormrod 2010: 281).

4.2.1 Reliability analysis of the questionnaires

Cronbach's coefficient alpha was used to establish inter-item consistency and reliability for the two scales used in the questionnaire, namely, the importance of skills required for CAD pattern-making and the reasons for the skills shortages of CAD pattern-makers in KZN. Results for the importance of the necessary skills required for CAD pattern-making are shown in Table 4.1.

Group	Cronbach's alpha	Number of items in questionnaire
CAD pattern-makers	.943	34
Managers	.904	34
Students	.942	34

**The Lectra group was excluded as there was only one respondent.*

Table 4.1 Reliability results for the importance of skills required for CAD pattern-making

According to Nunnally and Bernstein (1994), Cronbach's coefficient should be 0.70 or higher to be considered acceptable. The alpha coefficients in Table 4.1 range from .904 to .943, which are higher than .70 and, thus, considered highly acceptable. Therefore, the answer to critical question 1, skills required by the clothing industry for CAD pattern-making, was reliable.

Results for reasons for skills shortages in CAD pattern-making are shown in Table 4.2.

Group	Cronbach's alpha	Number of items in questionnaire
CAD pattern-makers	.876	23
Managers	.933	23
Students	.902	21**

**The Lectra group was excluded as there was only one respondent.*

***The number of items in the student questionnaire differs from the clothing industry questionnaire. Items of which they have no knowledge were omitted.*

Table 4.2 Reliability results for reasons of the skills shortages in CAD pattern-making in KZN

The alpha coefficients in Table 4.2 range from .876 to .933 and are considered acceptable because the results are higher than .70 (Nunnally and Bernstein 1994). Therefore, the answer to critical question 2, reasons for skills shortages in CAD pattern-making in KZN, was reliable.

4.2.2 Validity analysis of the questionnaires

Prior to the commencement of the study, and as part of a pre-test, senior researchers completed the questionnaires to check for face and content validity. They were satisfied with the content and the validity of the questionnaires. Furthermore, the questionnaires were pre-tested in a pilot study by:

- Clothing industry employees in Cape Town;
- 2013 students registered at the time in the Department of Fashion and Textiles at the Durban University of Technology; and
- The Lectra SA trainer in Cape Town.

All the participants gave positive feedback and none of the threats mentioned in 3.9.4 were found to exist. The data was checked and verified by a statistician. For this reason, the questionnaires have a high degree of face validity (Maree 2012: 217). The researcher, however, does not generalize findings to the target population. Therefore, conclusions drawn are limited to face validity and cannot be quantified or tested, as it is a subjective agreement among professionals that the instrument measures what is intended to be measured (Kumar 2011: 179 - 180).

The following sections present the descriptive statistics based on the demographic information of the four different groups of participants.

4.3 DEMOGRAPHIC STATISTICS OF THE KZN CLOTHING COMPANIES' PARTICIPANTS

The demographical statistics for the KZN clothing companies' are presented with the use of graphs according to the CAD pattern-makers' and managers' responses to the questionnaire.

4.3.1 Gender distribution of KZN clothing companies' participants

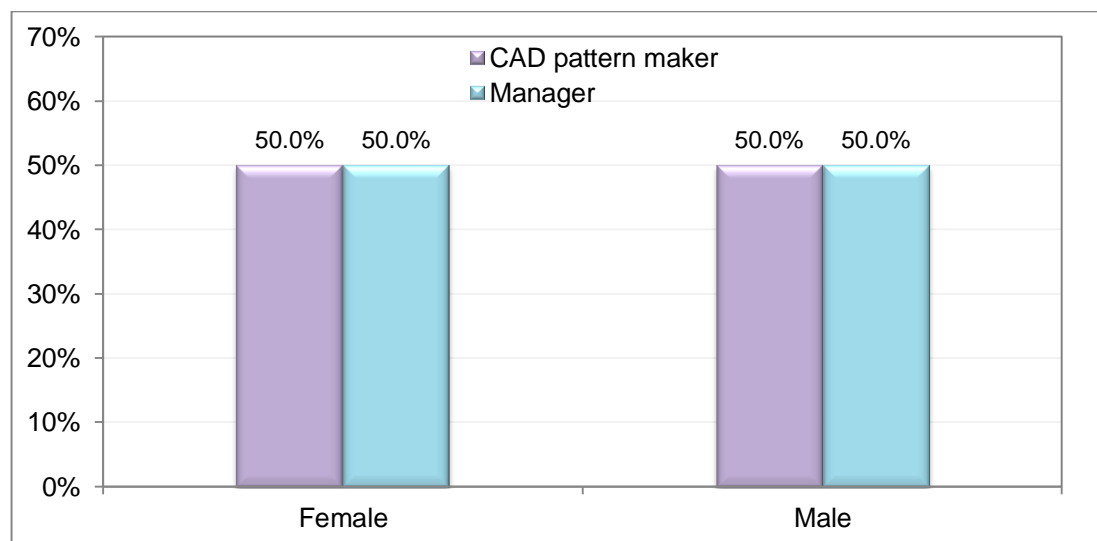


Figure 4.1 Gender distribution of KZN clothing companies' participants

According to Figure 4.1, there was an equal number of male to female participants represented, with 50% being male and 50% being female. This is in contrast to the literature discussed in 2.2.4 where the gender majority in the South African clothing industry was shown to be female. However, only CAD pattern-makers and their managers in the KZN clothing industry are represented in this study.

4.3.2 Age distribution of KZN clothing companies participants

Figure 4.2 represents the age group of the KZN clothing companies' participants.

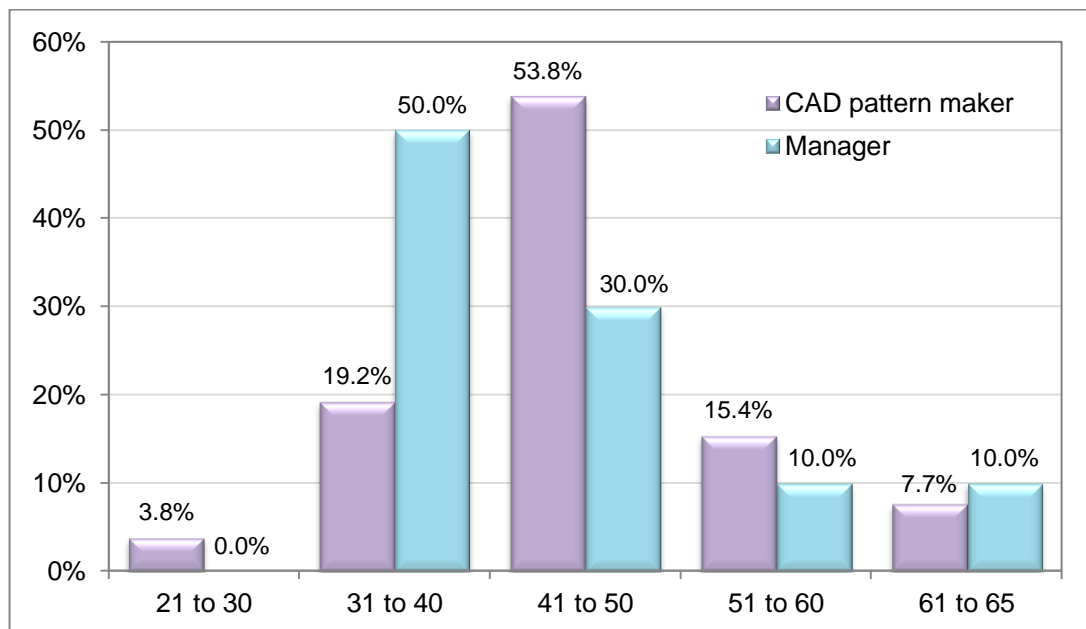


Figure 4.2 Age distribution of KZN clothing companies' participants

The majority of CAD pattern-makers (53.8%) were between the ages of 41 to 50, while 50% of the managers were between the ages of 31 to 40. The balance of the clothing companies' participants' age distribution consisted of the following breakdown:

- CAD pattern-makers: 19.2% were between the ages of 31 to 40, 15.4% between the ages of 51 to 60, and 7.7% were between the ages of 61 to 65.

- Managers: 30% were between the ages of 41 to 50, and the rest (10%) were between the ages of 51 to 60 and 61 to 65, respectively.

4.3.3 Retirement age for CAD pattern-makers in KZN clothing industry

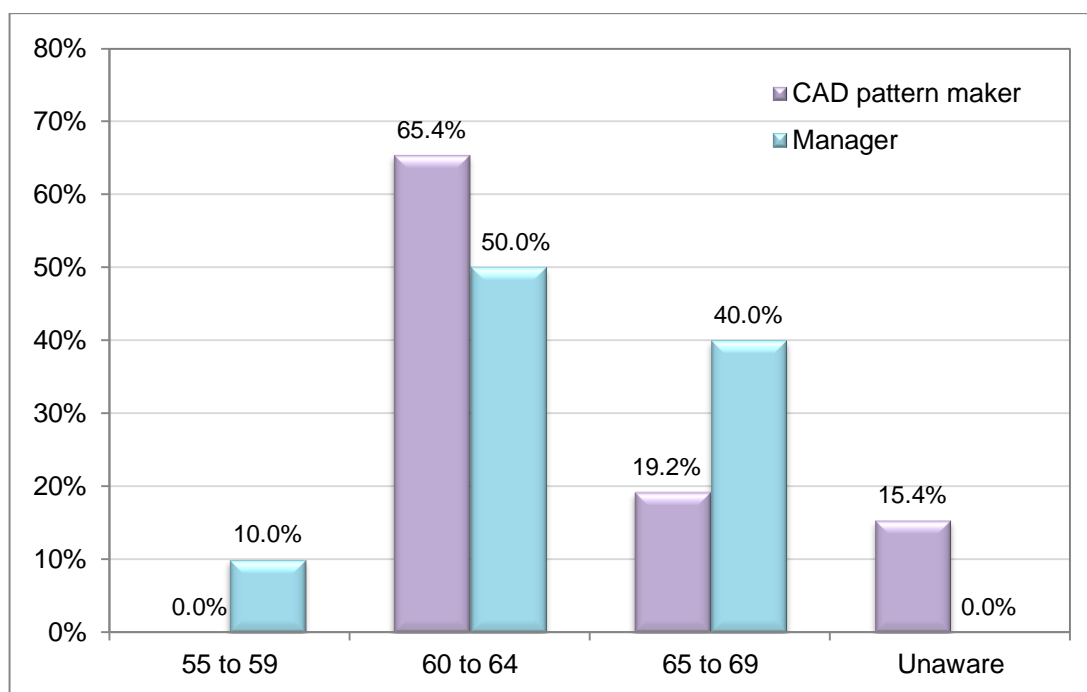


Figure 4.3 Retirement age for CAD pattern-makers in KZN clothing industry

Figure 4.3 indicates that the majority of the CAD pattern-makers (65.4%) and managers (50%) stated that the retirement age for CAD pattern-makers is between the ages of 60 to 64. The remainder of the clothing companies' participants indicated the retirement age as follows:

- CAD pattern-makers: 19.2% selected the age group 65 to 69 and the rest (15.4%) were unaware of the retirement age specified for CAD pattern-makers; and
- Managers: 40% selected the age group 65 to 69 and the remainder (10%) indicated that the retirement age specified for CAD pattern-makers is between the ages of 55 to 59.

The results in Figure 4.3 indicate that varying retirement ages are specified by different companies. The earlier the retirement age, the sooner the experienced CAD pattern-makers have to be replaced. From Figures 4.2 and

4.3, it is suggested that 23.1% (15.4% and 7.7%) of the CAD pattern-makers are nearing, or are already at the age of retirement. In a maximum of twenty years' time, 53.8% of the CAD pattern-makers will be retired. These results confirm that many staff are close to retirement and will create a major skills shortage unless a solution is sought.

4.3.4 Educational levels of KZN clothing companies' participants

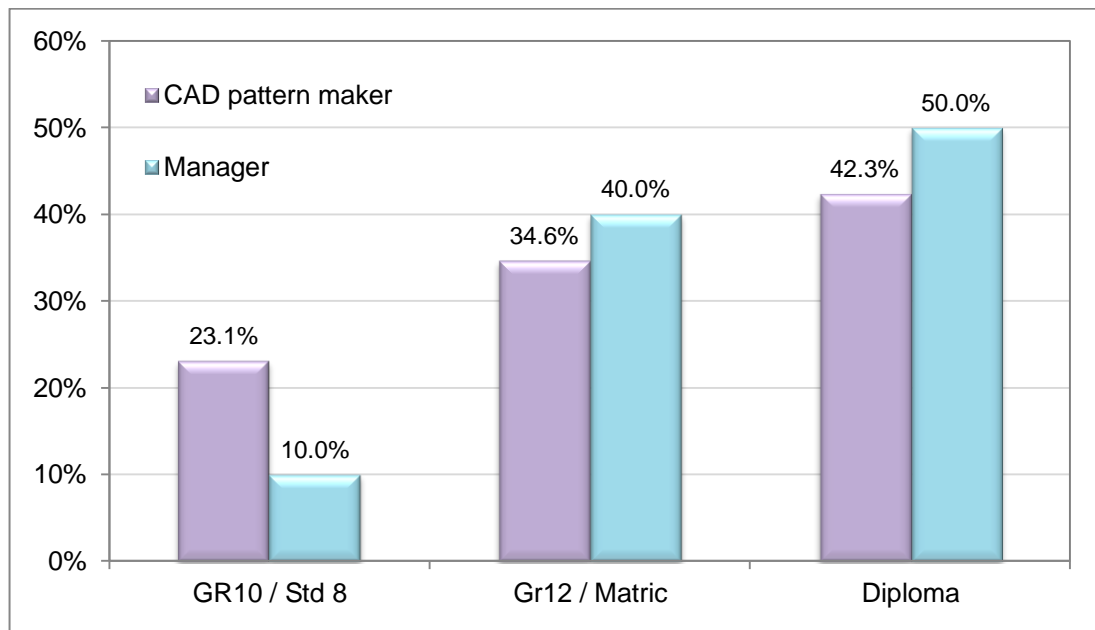


Figure 4.4 Highest level of education of participants

Figure 4.4 indicates that 42.3% of CAD pattern-makers and 50% of managers have a National Diploma as their highest qualification level while 34.6% of the CAD pattern-makers and 40% of the managers have a National Senior Certificate (GR12) or equivalent as their highest qualification. The remaining participants (23.1% CAD pattern-makers and 10% managers) have a Grade 10 school education as their highest qualification.

Over three quarters (77.9%) of CAD pattern-makers and 90% of the managers have either a National Senior Certificate (Grade 12) or a National Diploma as their highest educational achievement level. These results concur with the literature in 2.6.3.2, that formal education minimally at National

Senior Certificate level and preferably at tertiary level is a necessity to operate CAD pattern-making software.

4.3.5 Starting and current monthly salary of CAD pattern-makers

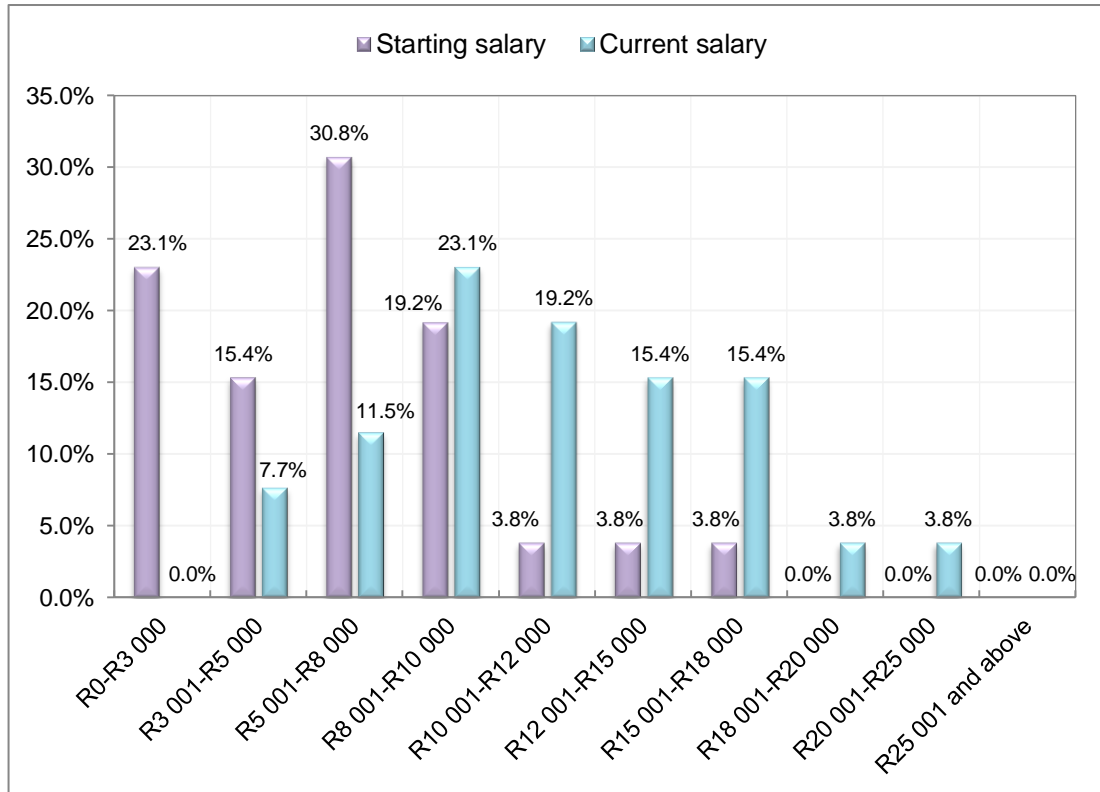


Figure 4.5 Starting and current monthly salary of CAD pattern-makers

The majority of CAD pattern-makers (30.8%), as shown in Figure 4.5, indicated that their starting salary as a pattern-maker was between R5 001 to R8 000, while 23.1% of the CAD pattern-makers indicated that their current salary as a CAD pattern-maker is between R8 001 to R10 000. The breakdown of the remainder is as follows:

- **Starting salaries** - 23% of CAD pattern-makers earned between R0 to R3 000, 19.2% earned between R8 001 to R10 000, 15.4% earned between R3 001 to R5 000. 3.8% earned between R12 001 to R15 000 and R15 001 to R18 000, respectively. None of the CAD pattern-makers' starting salaries were above R18 001; and
- **Current salaries** - 19.2% of the CAD pattern-makers earn between R10 001 to R12 000, followed by 15.4% earning between R15 001 to

R18 000 and R12 001 to R15 000, respectively. A total of 11.5% earn between R5 001 to R8 000, and 7.7% earn between R3 001 to R5 000 as current salary. The rest (3.8%) earns R18 001 to R20 000 and R20 001 to R25 000, respectively. None of the CAD pattern-makers currently earn less than R3 001 or more than R25 001.

The literature in 2.6.3.2 supports these findings that experience, training and skills acquired through the use of advanced technology (CAD) leads to higher earnings (Masuku 2008) which contribute to more productive human capital.

4.3.6 Previous experience in manual pattern-making

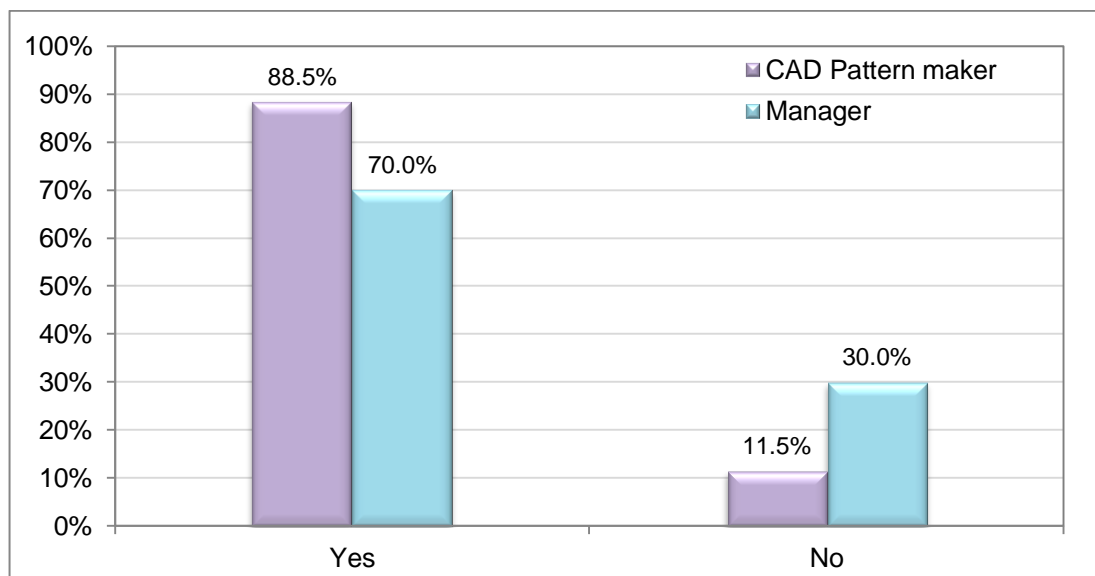


Figure 4.6 Experience in manual pattern-making prior to working as a CAD pattern-Maker

The results from Figure 4.6 show that the majority of CAD pattern-makers (88.5%) and managers (70%) had manual pattern-making experience prior to working as CAD pattern-makers or as managers. However 11.5% of CAD pattern-makers and 30% of the managers had no manual pattern-making experience prior to working with CAD patterns.

4.3.7 Years of experience in manual and CAD pattern-making

Figure 4.7 reflects the percentage value of participants' years of experience in both manual and CAD pattern-making. The figure below only displays managers' manual pattern-making experience as they were requested to select not applicable (N/A) to the CAD pattern-making experience question. The reason for doing this was because not all managers are active CAD pattern-makers since they only oversee the entire process.

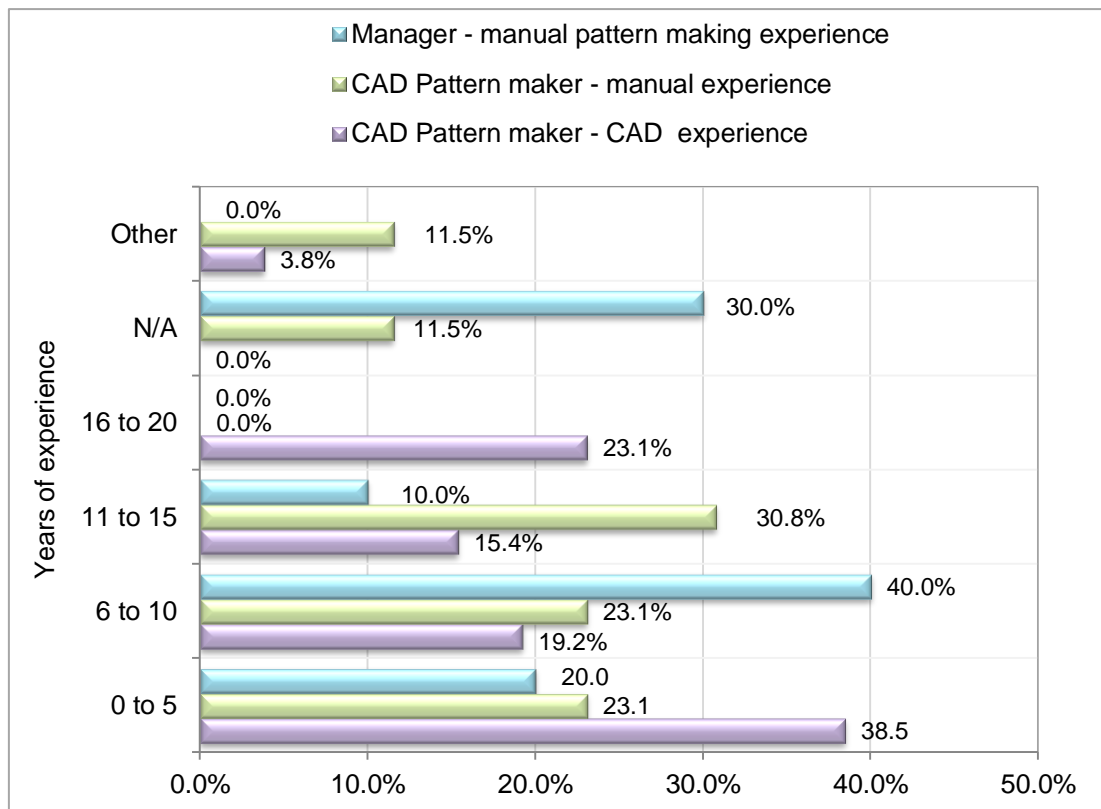


Figure 4.7 Years of experience in manual and CAD pattern-making

Almost one third (30.8%) of CAD pattern-makers had between 11 to 15 years' experience in manual pattern-making while 38.5% had 0 to 5 years' experience. The majority (40%) of the managers have between 6 to 10 years of experience in manual pattern-making. The breakdown of the rest is as follows:

- **Managers' manual pattern-making experience** - Almost a third (30%) of the managers did not have any experience in manual pattern-making, 20% had between 0 to 5 years' experience and the rest (10%) have

between 11 to 15 years of experience. None of the managers had more than 16 to 20 years' experience in manual pattern-making. A total of 70% of managers had experience in manual pattern-making;

- **CAD pattern-makers' manual pattern-making experience** - 23.1% had between 6 to 10 years' and 0 to 5 years' experience, respectively, in manual pattern-making. The rest (11.5%) indicated that they have more than 21 years' experience or no experience at all (see N/A column). None of the CAD pattern-makers had 16 to 20 years' experience in manual pattern-making; and
- **CAD pattern-makers' experience in use of technology** - 23.1% of the participants had between 16 to 20 years CAD pattern-making experience, 19.2% had 6 to 10 years, 15.4% had between 11 to 15 years and 3.8% have more than 20 years' experience in CAD pattern-making.

The results above reflect that the sample group had many years of experience in pattern-making, suggesting that they would know what the required skills are for CAD pattern-making in the clothing industry.

4.3.8 Comparison of current salary and years of CAD pattern-making experience

The frequency comparison of CAD pattern-makers' current salary and years of CAD pattern-making experience is shown in Table 4.3.

The majority (23.1% blue) of CAD pattern-makers earned, including company benefits, between R8 001 to R10 000 per month. The majority (38.5% highlighted in lilac) of CAD pattern-makers had between 0 to 5 years' experience in CAD pattern-making. The minority of 3.8% (highlighted in blue) of CAD pattern-makers earned above R18 001 per month. Unexpectedly, the highest earning (above R20 001 per month) CAD pattern-makers (3.8% highlighted in blue) had only between 0 to 5 years' experience in CAD pattern-making. The CAD pattern-makers with the highest number of years of experience (3.8% highlighted in lilac) earn only between R12 001 to R15 000.

Current salary	Current years of experience as a CAD pattern-maker										Total	
	0 to 5		6 to 10		11 to 15		16 to 20		21 +			
	n	%	n	%	n	%	n	%	n	%	n	%
R3 001-R5 000	2	7.7%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	2	7.7%
R5 001-R8 000	3	11.5%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	3	11.5%
R8 001-R10 000	3	11.5%	0	0.0%	1	3.8%	2	7.7%	0	0.0%	6	23.1%
R10 001-R12 000	0	0.0%	2	7.7%	1	3.8%	2	7.7%	0	0.0%	5	19.2%
R12 001-R15 000	1	3.8%	1	3.8%	0	0.0%	1	3.8%	1	3.8%	4	15.4%
R15 001-R18 000	0	0.0%	2	7.7%	1	3.8%	1	3.8%	0	0.0%	4	15.4%
R18 001-R20 000	0	0.0%	0	0.0%	1	3.8%	0	0.0%	0	0.0%	1	3.8%
R20 001-R25 000	1	3.8%	0	0.0%	0	0.0%	0	0.0%	0	0.0%	1	3.8%
Total	10	38.5%	5	19.2%	4	15.4%	6	23.1%	1	3.8%	26	100.0%

Table 4.3 Cross tabulation of current salary and CAD pattern-making experience

The literature in 2.6.1 supports the findings that employees with the necessary skills may seek inflated salaries. The minority (3.8%) of CAD pattern-makers had more than 21 years' of experience and earned slightly more (between R12 001 and R15 000) than the majority (23.1%) of CAD pattern-makers.

The following is a breakdown of Table 4.3:

- In the salary range R3 001 to R5 000, there were only 2 participants with 0 to 5 years' experience;
- In the R5 001 to R8 000 salary range, there were 3 participants with 0 to 5 years' experience and, in the other experience categories none of the participants earned in this salary range;
- The majority of participants earned in the salary range R8 001 to R10 000 (n = 6) with work experience as follows:
 - 3 participants had 0 to 5 years' experience;
 - 1 participant had 11 to 15 years' experience;
 - 2 participants had 16 to 20 years' experience; and
 - None of the participants in this salary range had 6 to 10 years' experience;

- In the salary range R10 001 to R12 000, there were 2 participants with 6 to 10 years' experience, 1 participant with 11 to 15 years' experience, 2 participants with 16 to 20 years' experience. None of the participants in this salary range had less than 6 years' experience;
- In the salary range R12 001 to R15 000, 1 participant had 0 to 5 years' experience, 1 participants had 6 to 10 years' experience, 1 participant had 16 to 20 years' experience and 1 participant had more than 20 years' experience;
- In the salary range R15 001 to R18 000, the participants' breakdown of their years' of experience were as follows:
 - 2 participants had 6 to 10 years' experience;
 - 1 participant had 11 to 15 years' experience; and
 - 1 participant had 16 to 20 years' experience;
- In the salary range R18 001 to R20 000, there was only 1 participant with 11 to 15 years' experience. None of the participants in the other experience categories earned in this salary range; and
- In the salary range R20 001 to R25 000, there was just 1 participant with 0 to 5 years of experience. In the more experienced categories, none of the participants earned in this salary range.

These results are an indicator that earning a better salary seems to be dictated by experience. The findings indicate that clothing companies are paying according to years of experience. Therefore, newly qualified employees (graduates) will have to settle for a low wage if employed as a CAD pattern-maker without previous work experience. This finding concurs with comments by students in 4.4.3.

4.3.9 Percentage values for types of patterns produced

The results from Table 4.4 show that the majority (55.6%) of CAD pattern-makers created men's wear patterns, closely followed by 52.8% producing ladies' patterns. A total of 41.7% of the CAD pattern-makers created boys' wear patterns, while 36.1% produced girls' patterns.

Gender and types of patterns produced	CAD Pattern-maker	
	Count	% of Total
Girls	13	36.1%
Ladies	19	52.8%
Boys	15	41.7%
Men's	20	55.6%
Blouses / Shirts	19	52.8%
Dresses	11	30.6%
Jackets	14	38.9%
Skirts	14	38.9%
Trousers	17	47.2%
T-shirts	14	38.9%
Sleepwear	9	25.0%
Underwear	8	22.2%
Swimwear	3	8.3%
Other	1	2.8%

Table 4.4 Percentage values for type of pattern produced

The types of garments produced by CAD pattern-makers were mainly (52.8%) blouses and/or shirts, followed by trousers (47.2%). A breakdown of the rest of the garments is as follows:

- CAD pattern-makers created an equal number (38.9%) of jackets, skirts and t-shirts' patterns. 30.6% produced dress patterns, 25% created sleepwear patterns, 22.2% underwear patterns while 8.3% produced swimwear patterns. Only 1 CAD pattern-maker (2.8%) indicated that their company produced other garments. The 'other' was explained as work wear which, more specifically, referred to boiler suits and overalls.

From the above results, it is evident that CAD pattern-making is used to create a wide variety of garments for different age groups and genders. Therefore, CAD pattern-makers need to be versatile.

4.3.10 Percentage values of customer base

A significant result in Table 4.5 indicates that the majority (97.1%) of clothing companies' customer base consisted of 'Retailers'. 22.9% firms manufactured for smaller stores and only 11.4% for schools.

Customer base of clothing companies	Total	
	Count	% of Total
Schools	4	11.4%
Retailers	34	97.1%
Smaller Stores	8	22.9%

Table 4.5 Percentage values of customer base

The literature from 2.2.2 supports the findings that the South African clothing industry primarily supplies a large retail sector. This finding highlights the concomitant relationship necessary between manufacturers and retailers of clothing.

4.4 DEMOGRAPHIC STATISTICS OF THE 2013 FASHION STUDENTS

The demographical statistics for the students are presented in charts according to their responses to the questionnaire. This is followed by the students' qualitative responses in pursuing CAD pattern-making as a career.

4.4.1 Gender distribution of student participants

The gender distribution of the 2013, third-year national diploma student participants, in the Department of Fashion and Textiles at the Durban University of Technology is displayed in Figure 4.8.

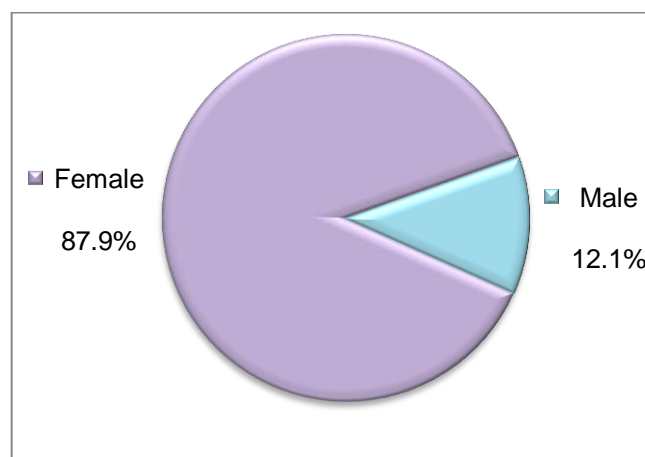


Figure 4.8 Gender distribution of student participants

According to the results, the majority (87.9%) of the student participants were female and only 12.1% were male. These results are in contrast to the clothing companies results in 4.3.1.1 where the genders were reported as being equal. The literature discussed in 2.2.4 supports the findings that the gender majority in the clothing industry is female.

4.4.2 Age distribution of student participants

The age distribution of the student participants is represented in Figure 4.9.

The results of the study show that the majority of the student participants (72.7%) were in the age group 17 to 21 followed by 27.3% in the age group 22 to 31.

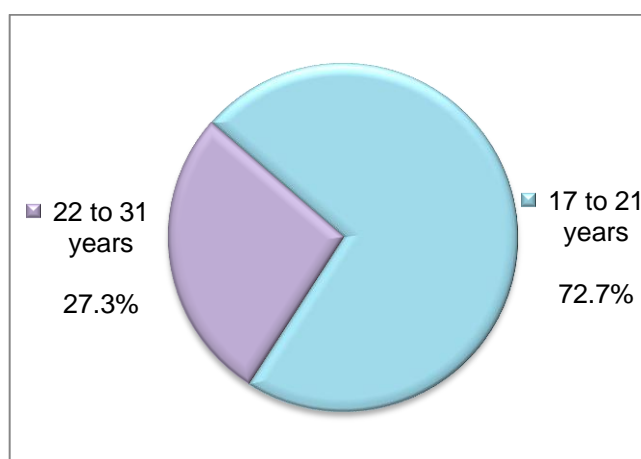


Figure 4.9 Age distribution of student participants

4.4.3 Students interested in CAD pattern-making careers

The 2013 third-year national diploma students in the Department of Fashion and Textiles at the Durban University of Technology were questioned about their interest in being employed as CAD pattern-makers in the clothing industry.

The results in Figure 4.10 revealed that a large majority (81.8%) of the students were not interested in being employed as CAD pattern-makers despite their training in CAD pattern-making software. Only 18.2% of the

students responded that they would be interested in pursuing CAD pattern-making as a career.

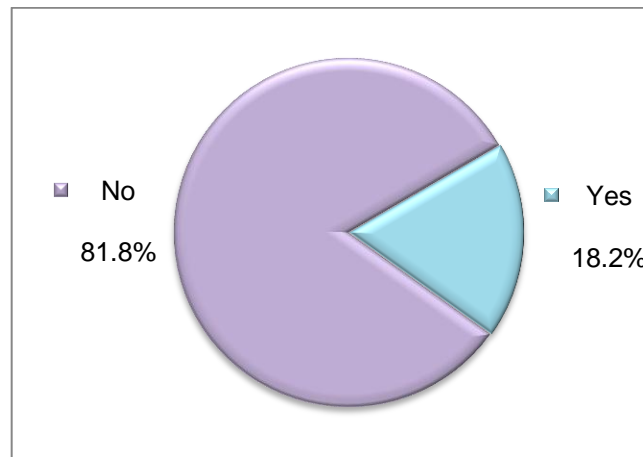


Figure 4.10 Percentage values of fashion students interested in employment as CAD pattern-makers

The participants were requested to explain the reason for their answers. A variety of qualitative responses to 'Please explain your answer' were obtained in the open-ended question. Some of the negative responses are reported as follows:

- "I would rather make [construct] the garments [than to create the patterns]"; and
- "It is not an interest or passion of mine".

The following comments from participants were noted with regard to creativity:

- "I would be more interested to lend myself towards a more creative position in the clothing industry as opposed to pattern technology";
- "I prefer the creative side of fashion design";
- "I am too creative as an individual to sit behind a computer as a daily job. The job does not excite me";
- "I choose no because I would not want to be a CAD pattern-maker as it is not my interest. I am a creative person and battle with technological stuff such as CAD [pattern-making]";
- "I wouldn't be able to sit behind a computer from day to day. I would like to be actively involved in every creative process that takes place. Although I agree that CAD pattern-makers play a vital role in the clothing industry";

- “My passion lies within the more creative side of the fashion industry”;
- “Not interested in working on a computer all day, every day. I want to be creative”; and
- “I enjoy the more practical side of fashion - don't enjoy sitting behind a computer all day”.

The following comments from participants were noted with regard to expectations of remuneration:

- “Pressure seems too high and don't get much recognition for the work you do and you don't get paid a lot, unless you have a lot of experience”;
- “The salary is insufficient. The duty or job of being a pattern-maker is too confining to one area, might end up being tiring and boring as I am a creative person”; and
- “This position doesn't interest me. There is only so much experience and knowledge you can gain from this position. I think it would be a lot harder to be promoted if you are employed as a CAD pattern-maker. Your salary will remain the same unless you work for many years in the same position”.

The following comments from participants were noted with regard to computer literacy and CAD pattern-making:

- “Computer patterns are not my strong point”;
- “I do not enjoy it as a subject and when I am in industry I want to enjoy my job”;
- “I do not feel that I have had enough training as a CAD pattern-maker. This particular subject is not offered until second year and then, you only have time to learn the basics [functions] in one year and there is not [always] enough time to practice all functions in a practical way. There isn't a lot of practice during work experience where companies can show how they use CAD making in production”;
- “I do not have a natural passion for either computers or patterns and would thus be unhappy working at a computer doing patterns all day, every day”;
- “I don't see myself behind a computer for nine hours of my day, that being said, CAD is not one of my strongest subjects”;

- “I wouldn’t be able to sit behind a computer from day to day. I prefer being actively involved in the creative design process that takes place in industry. I recognise however, that CAD pattern-making plays a vital role in the clothing industry”; and
- “It wouldn’t be my dream job, but you can learn new skills [in CAD pattern-making] in the industry”.

The following comments from participants were noted as the only positive comments with regard to interest in being employed as a CAD pattern-maker:

- “I really enjoy anything that has to do with patterns”;
- “It’s mentally challenging, requires creativity which I have and it would give me experience in that department as well as at problem solving”;
- “In order to fulfil the gap in the CAD pattern-making industry with my CAD experiences gathered from the university.”; and
- “Yes and no, it isn’t my first few choices of a job but because I have the knowledge of CAD pattern-making it would be my last option to apply for such a job”.

Many students arrive at the Department of Fashion and Textiles to pursue a career in the creative field of design. From their responses, it is evident that the majority (27%) of Fashion students are not interested in CAD pattern-making as it is not ‘creative’ enough for them. The working environment of a CAD pattern-maker seems to be unappealing to them as 21% commented that they do not want to work on a computer all day.

The literature in 2.6.1 supports these findings that younger inexperienced graduates are not easily employed as CAD pattern-makers. Furthermore, these results concur with the conclusion in 4.3.3 that CAD pattern-makers are nearing retirement and will not be replaced timeously, if currently qualifying students are not interested in being employed as CAD pattern-makers.

4.5 DEMOGRAPHIC STATISTICS OF LECTRA SA

The demographical statistics for Lectra SA is presented in a table as there was only one participant.

4.5.1 Qualifications and experience of the Lectra SA participant

Profile of Lectra SA participant	Qualifications and experience
Highest level of education	Honours Degree
Experience in pattern-making prior to working for Lectra SA	0 – 5 years
Years of experience as CAD trainer	16 – 20 years

Table 4.6 Profile of qualifications and experience of the Lectra SA participant

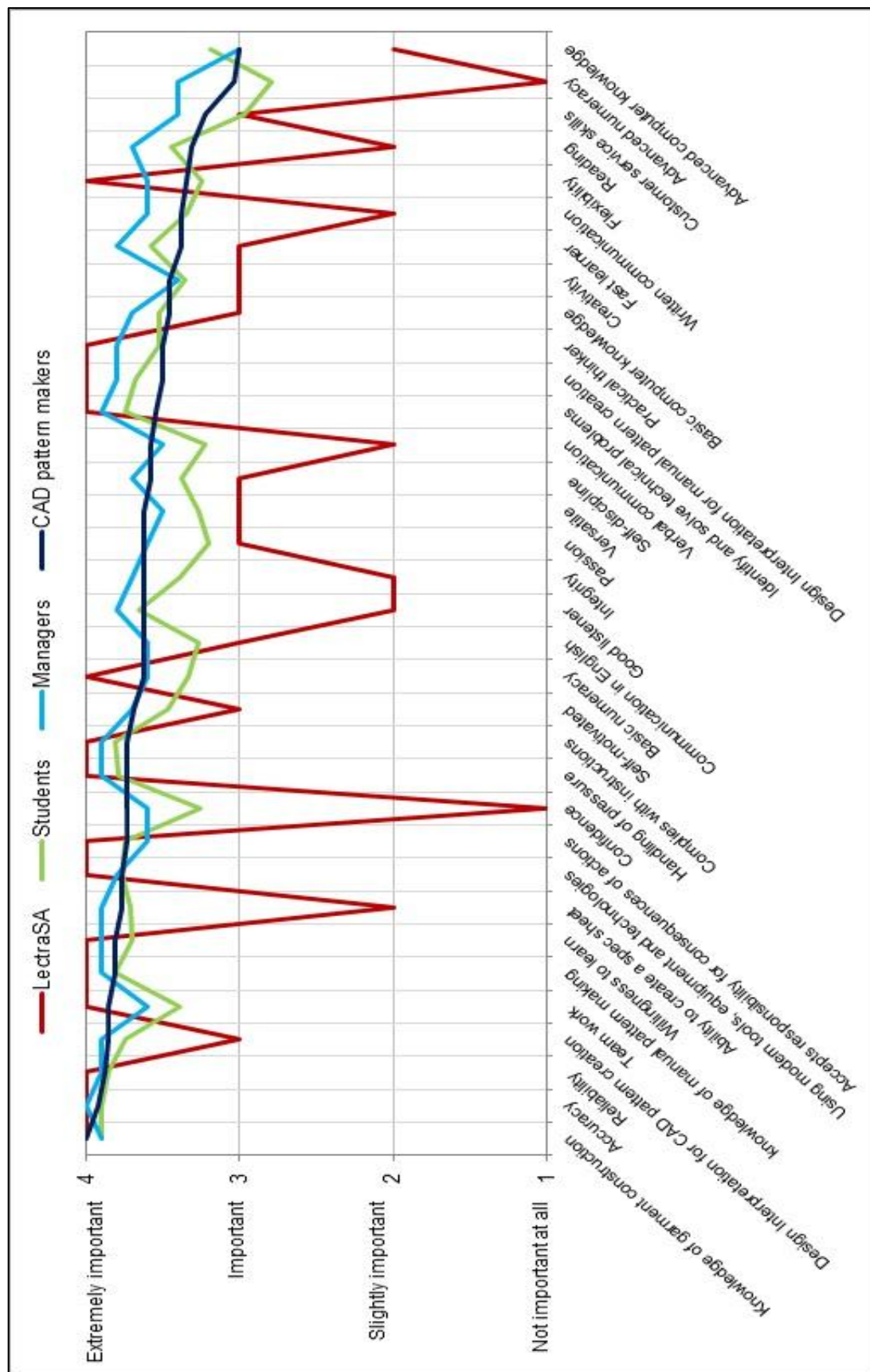
Table 4.6 shows that the Lectra participant has an Honours Degree with 0 to 5 years' experience in pattern-making prior to working for Lectra and 16 to 20 years' experience as a CAD trainer.

The above profile of the Lectra SA participant shows that a minimal amount of pattern-making experience was required for her to become a CAD trainer. However, the participant has since worked with CAD pattern-makers for many years. For this reason, the participant would know the skill requirements for CAD pattern-making and the reasons for the skills shortage of CAD pattern-makers in the clothing industry.

4.6 NECESSARY SKILLS FOR CAD PATTERN-MAKING IN ORDER OF IMPORTANCE ACCORDING TO PARTICIPANTS

This section discusses the importance of the necessary skills required for CAD pattern-making as perceived by the participants, with reference to Figure 4.11, which was drawn up as follows. Firstly, CAD pattern-makers' mean scores were used to rank the skills in order of importance. This was because they had the work experience of having to apply the skills themselves, and therefore, their perceptions could be expected to match the

actual work. Their rankings are displayed as the navy (dark blue) line in Figure 4.11, which provides a kind of “benchmark” ranking against which the rankings of other groups are set. In particular, it provides the ranking of what this group perceived as being most important to least important. The list of skills at the horizontal axis follows the order of extremely important to not important at all. The other participants’ rankings were then displayed with reference to the same horizontal axis, so that any similarities or divergences could be seen more clearly. Since there was only one (1) participant of Lectra SA, the actual recorded count was used to interpret the level of agreement.



The results from Figure 4.11 indicate that the CAD pattern-makers and their managers perceived all 34 skills to be important to extremely important. Students agreed with the participants from the clothing industry on 33 of the 34 skills, with advanced numeracy being only slightly important according to the students. However, Lectra SA shared a varied perspective regarding the importance of the skills. More specifically, Lectra SA indicated that the following skills were only slightly important ($m = 2$), while the CAD pattern-makers and their managers perceived them as important ($3.49 \leq m \leq 3$) to extremely important ($4 \leq m \leq 3.5$).

- **Ability to create a spec sheet** - A spec sheet consists of the required measurements and information in detail to manufacture a garment. The spec sheet consists of different calculations, for example, half waist to give accurate measurements used by machinist and quality auditors to ensure the garment produced will fit the required size/body measurements. Due to the versatile functionality of the CAD software, it can be used to create a spec sheet; however, a CAD pattern-maker is required to operate the software. Therefore, a CAD pattern-maker needs to know what a spec sheet consists of and adapt it for each customer's needs/requirements. Lectra SA perceived it as slightly important. However, in the clothing industry, spec sheet creation is part of a CAD pattern-maker's daily task. Therefore, the CAD pattern-makers and their managers indicated this function as being extremely important ($m = 3.77$).
- **Good listener** - CAD pattern-makers work with different departments within the company and receive many verbal instructions. These instructions need to be accurately executed in order to ensure a good quality garment is being produced. Not executing instructions correctly can cost the company money, as it wastes time and resources, e.g. paper, fabric and trims. Thus, CAD operators need to be good listeners and indicated listening skills as being extremely important ($m = 3.62$).

- **Integrity** - Employers need their workforce to have integrity, which indicates they are honest and reliable, as these attributes contribute to the dynamics of the work environment. CAD pattern-makers ($m = 3.62$) and their managers ($m = 3.7$) indicated integrity as extremely important.
- **Verbal and written communication** - CAD pattern-makers need good verbal and written communication skills as they liaise with designers on the style, cut and fit of a garment. They also give instructions to sample cutters, sample machinists and the production set on the construction of a garment. Even though the majority of the instructions will be written down, not all sample cutters and sample machinists understand the written communication due to low literacy levels. Another reason might be that not all employees will have access to a computer to receive written communication. Verbal communication is faster and more direct. Thus, it is easier to know if a colleague received and understood the instructions. Written communication is used as proof/record that instructions were given at a certain time and date. Lectra SA does not see or understand the relevance of these specific skills as the trainer only interacts with CAD pattern-makers during training sessions. Thus, it might be the reason why communication is indicated as slightly important. However, CAD pattern-makers rated written communication with $m = 3.38$, and verbal communication with $m = 3.58$, indicating that it is important to extremely important to communicate effectively in the industry. The managers ($m = 3.6$ for written communication, $m = 3.5$ for verbal communication) perceived both to be extremely important skills required for CAD pattern-makers.
- **Reading** - Instructions from designers are usually given to pattern-makers in the form of annotations attached to a sketch. Therefore, it is important for CAD pattern-makers to read the annotations carefully as they contain the relevant information to draft a pattern according to certain specifications. The CAD pattern-makers ($m = 3.31$) perceived this skill as important, while their managers perceived it as extremely important

($m = 3.7$). Lectra SA does not perceive this skill as important, as it may be only slightly important during a training session with the CAD pattern-makers.

- **Advanced computer knowledge** - The perception of Lectra SA is that CAD pattern-makers do not need advanced computer knowledge as they are of the opinion that their CAD software is easy to use and only requires basic computer knowledge. However, the participants from the clothing industry indicated ($m = 3$) that advanced computer knowledge is a required skill to be a CAD pattern-maker, but it was the least important of the 34 skills listed.

Lectra SA indicated the following two skills as 'not important at all' for CAD pattern-making:

- **Confidence** - CAD pattern-makers ($m = 3.73$) and their managers ($m = 3.6$) perceived confidence to be an extremely important attribute. Lectra SA's diverse perception may be due to the fact that operators develop confidence once they have been trained on operating the CAD software. Therefore, Lectra SA's opinion is that CAD pattern-makers do not need this attribute as a prerequisite; and
- **Advanced numeracy** - The CAD pattern-makers ($m = 3.04$) and their managers ($m = 3.4$) indicated that having advanced numeracy skills is important. However, it is important to keep in mind that each participant would have their own understanding of the term 'advanced numeracy'. Clothing industry participants may consider it necessary when they work on calculations to accommodate fabric shrinkage and different elastics while constructing a pattern. The accuracy of these calculations is important as it will impact on fabric and trim ratings. The amount of fabric or trims required to construct a garment could have a cost implication if not calculated accurately. Lectra SA train CAD pattern-makers to use the software as a tool to construct a pattern and, therefore, it would not be

part of their training to use advanced numeracy skills. Thus, in the trainer's opinion, it is not considered an important requirement.

The 34 skills listed in Figure 4.11 consist of 'soft' skills and 'job specific' skills. 'Soft' skills refer to inherent skills, while 'job specific' skills refer to skills that can be taught. In Table 4.7, these skills are recorded, respectively, in order of importance.

'Job specific' skills	'Soft' skills
Knowledge of garment-construction	Reliability
Accuracy	Willingness to learn (life-long learning)
Design interpretation for CAD pattern-creation	Accepts responsibility for consequences of actions
Team work	Confidence
Knowledge of manual pattern-making	Handling of pressure
Ability to create a spec sheet	Self-motivated
Using modern tools, equipment and technologies	Good listener
Complies with instructions	Integrity
Basic numeracy	Passion
Communication in English	Self-discipline
Versatile	Practical thinker
Verbal communication	Creativity
Identify and solve technical problems	Fast learner
Design interpretation for manual pattern-creation	Flexibility
Basic computer knowledge	
Written communication	
Reading	
Customer service skills	
Advanced numeracy	
Advanced computer knowledge	

Table 4.7 Job specific and soft skills

The 'job specific' and 'soft' skills identified as being important for effective CAD pattern-making employees are key issues in human capital theory. This is because it is not just the availability of personnel, but their potential for

contributing to productivity, which adds to a company's core competence or competitive advantage.

4.7 REASONS FOR THE SKILLS SHORTAGE OF CAD PATTERN-MAKERS ACCORDING TO PARTICIPANTS

This section discusses the reasons for the skills shortage of CAD pattern-makers as perceived by the participants, with reference to Figure 4.12, which was drawn up as follows. Firstly, CAD managers' mean scores were used to rank the reasons in order of agreement. This was because they had the work experience of having to manage/deal with the skills shortages, and therefore, their perceptions could be expected to match the actual reasons. Their rankings are displayed as the turquoise (light blue) line in Figure 4.12, which provides a kind of "benchmark" ranking against which the rankings of other groups could be set. In particular, it provided the ranking of what this group perceived as being most agreed to least agreed upon. The list of reasons at the horizontal axis follows the order of strongly agree to strongly disagree. The other participants' rankings were then displayed with reference to the same horizontal axis, so that any similarities or divergences could be seen more clearly. Since there was only one (1) participant of Lectra SA, the actual recorded count was used to interpret the level of agreement.

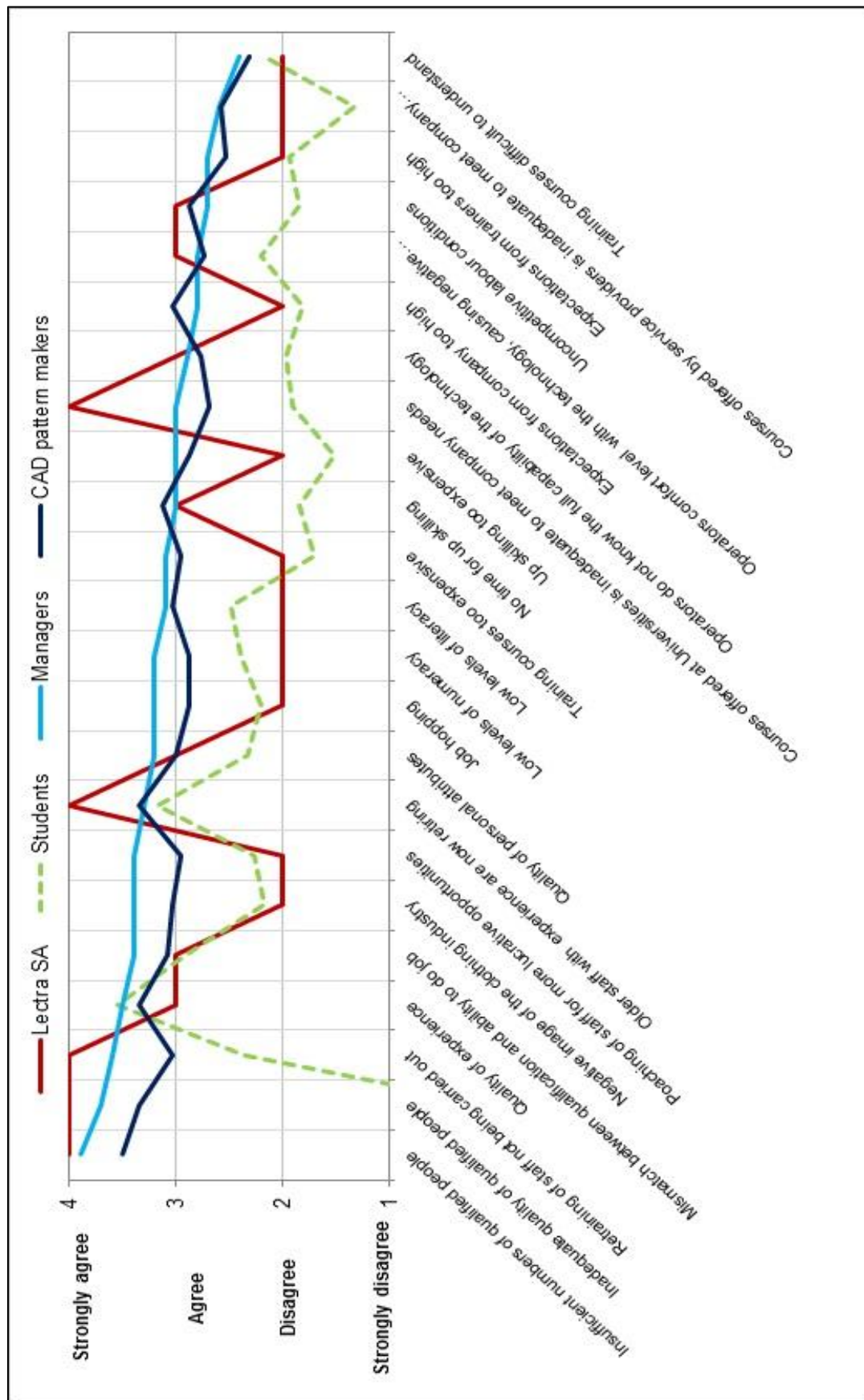


Figure 4.12 Participants' perceptions of the reasons for the skills shortage of CAD pattern-makers

The results from Figure 4.12 indicate that CAD pattern-makers, their managers and Lectra SA unanimously agreed with eight of the listed reasons for the skills shortage of CAD pattern-makers in the KZN clothing industry. More specifically, their agreement is based on the following reasons:

- **Insufficient numbers of qualified people** – The literature in 2.6.3.2 by Morris and Reed (2008), that the shortage of graduates in the South Africa clothing industry is due to the low number of new enrolments at universities in the courses related to this industry, concurs with the result obtained in this study. Furthermore, the findings in 4.4.3 highlight that fashion students are not interested in being employed as CAD pattern-makers. This emphasises the need for the clothing industry to change the view of CAD pattern-making as an occupation, by making it more attractive and lucrative to graduates. It is equally important for universities and private colleges that offer courses related to the clothing industry to not only include CAD pattern-making as a subject, but also teach it according to the standard required by the industry. The current number of universities offering CAD pattern-making as a subject are inadequate and departments can facilitate only a limited number of students due to restricted resources.
- **Inadequate quality of qualified people** – The literature in 2.6.1 by Morris and Reed (2008), that content and quality of courses offered at tertiary institutions do not meet industry needs, and the literature in 2.6.3.2 by the same authors, highlight that clothing companies experienced a mismatch of graduates' qualifications and the industry's requirements. A reason for the inadequate quality of qualified people might be that the clothing industry needs are not adequately communicated to the tertiary institutions. Furthermore, the industry must realise/accept that universities are only able to provide foundation knowledge to students. Students enrolled for a fashion course needs to be taught not only to become designers, but also merchandisers, buyers, pattern-makers and more. Due to the duration of the course, the students

will have a basic understanding of the different aspects, but not an in-depth knowledge of each occupation. Therefore, companies need to up-skill and retrain junior staff according to their specific needs. The importance of work place learning must be further investigated to determine the time period needed by the undergraduate to gain experience to benefit the company.

- **Retraining of staff not being carried out** – The literature by Deloitte & Touche (2009) in 2.6.1 state that retraining staff requires time, which costs money and could strain resources of the company. According to Skinner, Saunders and Beresford (2004), these cost implications result in companies choosing not to up-skill staff, which supports the finding that retraining is seldom carried out. Not retraining staff impacts negatively on the productivity of the company.
- **Quality of experience** – The literature in 2.6.1 from Skinner, Saunders and Beresford (2004) noted that companies insist on work experience. A report by Morris and Reed (2009) states that companies look at the years and quality of experience, which coincides with this finding.
- **Mismatch between qualification and ability to do the job** – According to the literature in 2.6.1 by Skinner, Saunders and Beresford (2004), employers do not communicate the skills needed to potential employees or to education and training institutions. This communication gap might be a reason why employees lack the required skills for a specific job. Rasool and Botha (2011) concur with this result that an employee with the necessary qualification does not guarantee that he/she has the required skills to do the job.
- **Older staff members with experience are now retiring** – The literature in 2.6.1 by Horwitz (2013) states that retiring staff, with many years of experience, are lost to the economy. Morris and Reed (2009) highlight that there are insufficient adequately qualified people to replace retiring

staff. Furthermore, the findings in 4.3.3 indicate that many staff members are close to retirement, which will impact on the human capital pool of CAD pattern-makers, unless more CAD pattern-makers are employed and the experienced staff share their knowledge with new employees before they retire.

- **Quality of personal attributes** – The literature in 2.6.1 by Morris and Reed (2009) with reference to the requirements by the clothing industry as years of experience, quality of experience and personal attributes concurs with this finding. Personal attributes, such as respect, loyalty, passion, kindness, values and ethics, are embedded within an individual and determine the type of employee an individual will be. For this reason, having an employee with a good set of personal attributes contributes to the human capital an individual brings to a company. The company would, therefore, not hesitate investing in the employees' development and skills, either by providing employment and/or offer further training.
- **No time for up-skilling** - The literature by Deloitte & Touche (2009) in 2.6.1 that retraining staff requires time, supports this finding. The clothing industry is fast paced with strict deadlines, and each employee plays a crucial role in the garment production process. Clothing companies are, therefore, seldom willing to send CAD operators for training, due to the impact it would have on the production cycle if an operator is not available to perform their specialised tasks. Although the CAD pattern-makers and their managers indicate that their companies do provide first-time training and up-skilling of staff (section 4.10), it does not occur frequently enough to address the skills shortage of CAD pattern-makers.

The following are reasons with which only one or two of the participants agreed.

The CAD pattern-makers and managers indicated that training courses are too expensive, while Lectra SA disagreed. Lectra SA provides the training

and generates income for them as a service provider, hence, their disagreement with the CAD pattern-makers and managers.

The managers and Lectra SA perceived courses offered at universities are inadequate to meet company needs. This finding and the reason 'mismatch between qualification and ability to do the job' discussed above, supports one another. However, CAD pattern-makers, who work with the software, disagreed that courses offered at universities are insufficient. This is a cause for concern as the actual CAD operators, of which 42.3% have obtained a National Diploma as their highest qualification, feel that the courses offered are sufficient. However, the managers who interview and make the decision to employ undergraduates feel the courses are of an unsatisfactory quality/standard.

Being a CAD pattern-making lecturer in the Department of Fashion and Textiles at the Durban University of Technology, with previous experience as a Lectra SA software trainer, the following might be contributing factors for not meeting the companies' requirements:

- Time constraints – students are introduced to CAD pattern-making only from second year, as they need to gain basic knowledge of manual pattern-making in their first year; and
- Retaining information – students have a three-hour lecture (mainly practical) once a week for CAD pattern-making. They find it challenging to remember work covered in the previous lecture and many find it difficult to apply their manual pattern-making knowledge. Due to their lack of information retention, a great deal of valuable time is spent on revision which could rather be used to gain new knowledge and experience utilising the CAD software.

Clothing manufacturing companies need to communicate to lecturers/tertiary institutions through the university's advisory board meetings what they specifically require a graduate to be capable of, in order to be employed in the clothing industry as a CAD pattern maker. Although invitations are sent to various companies, these meetings are poorly attended and, therefore, not

much feedback is received. This information will assist lecturers and trainers to focus on the specific areas. Companies, however, still need to invest in up-skilling newly employed graduates in order to be productive according to the company's expectations.

CAD pattern-makers agreed with the managers that a negative image of the clothing industry is also a reason for the skills shortage of CAD pattern-making. The literature in section 2.2.1 (Ramdass 2013) states that society has a pessimistic perception of the clothing industry which concurs with the findings of this study. In order to change the image of the clothing industry, further research is required to address this concern.

Interesting to note is that only the CAD pattern-makers indicated that 'expectations from companies are too high'. This shows that CAD pattern-makers work under pressure which is not acknowledged by their managers.

Only managers perceived 'poaching of staff for more lucrative opportunities' and 'job hopping' to be contributing factors for the skills shortage of CAD pattern-making. Managers perceive CAD pattern-makers to 'job hop' for reasons of higher salaries and better working conditions, while CAD pattern-makers indicated that work pressure associated with CAD pattern-making is immense but not recognised by managers.

These results highlight the diverse views of the various role players in the clothing industry.

4.8 T-TEST OVERALL IMPORTANCE OF SKILLS FOR CAD PATTERN-MAKING

The t-test was used to test the following hypothesis:

There is no significant difference in the perceptions of the CAD pattern-makers and their managers in the clothing industry on the overall importance of the required skills for CAD pattern-making.

The results are shown in Table 4.8 below.

Group		N	Mean	Std. Deviation	t	df	p
Overall Skill score	CAD Pattern-maker	26	3.5962	.35210	-.793	34	.433
	Manager	10	3.6930	.25034			

Table 4.8 T-test overall importance of skills for CAD pattern-makers

The above results show that there is statistically no significant difference in the perception of the overall importance of skills for CAD pattern-making between CAD pattern-makers and managers ($t = -.793$; $df = 34$; $p > 0.05$).

Accordingly, this hypothesis is supported.

These results support the findings of Ramdass and Pretorius (2011: 180) that managers understand the skills of their workforce.

4.9 T-TEST OVERALL REASONS FOR THE SKILLS SHORTAGE IN CAD PATTERN-MAKING

The t-test was used to test the following hypothesis:

There is no significant difference in the perceptions of CAD pattern-makers and managers in the clothing industry for overall reasons of the skills shortage in CAD pattern-making.

The results are shown in Table 4.9 below.

Group		N	Mean	Std. Deviation	t	df	p
Overall Reason score	CAD Pattern-maker	26	2.9549	.37901	-1.125	34	.268
	Manager	10	3.1260	.48123			

Table 4.9 T-test for overall reasons of the skills shortages in CAD pattern-making

There is statistically no significant difference in the perception of the overall reasons for the skills shortage of CAD pattern-making between CAD pattern-makers and managers ($t = - 1.125$; $df = 34$; $p > 0.05$).

Accordingly, this hypothesis is supported.

The inferential statistics in Tables 4.8 and 4.9 indicate that CAD pattern-makers and their managers are in agreement on the necessary skills required for CAD pattern-making as well as on the reasons for the skills shortage of CAD pattern-makers in the KZN clothing industry.

4.10 TRAINING

Clothing company participants were asked to indicate the frequency of first-time training of CAD pattern-makers on CAD pattern-making software by the clothing companies. The results are displayed in Figure 4.13.

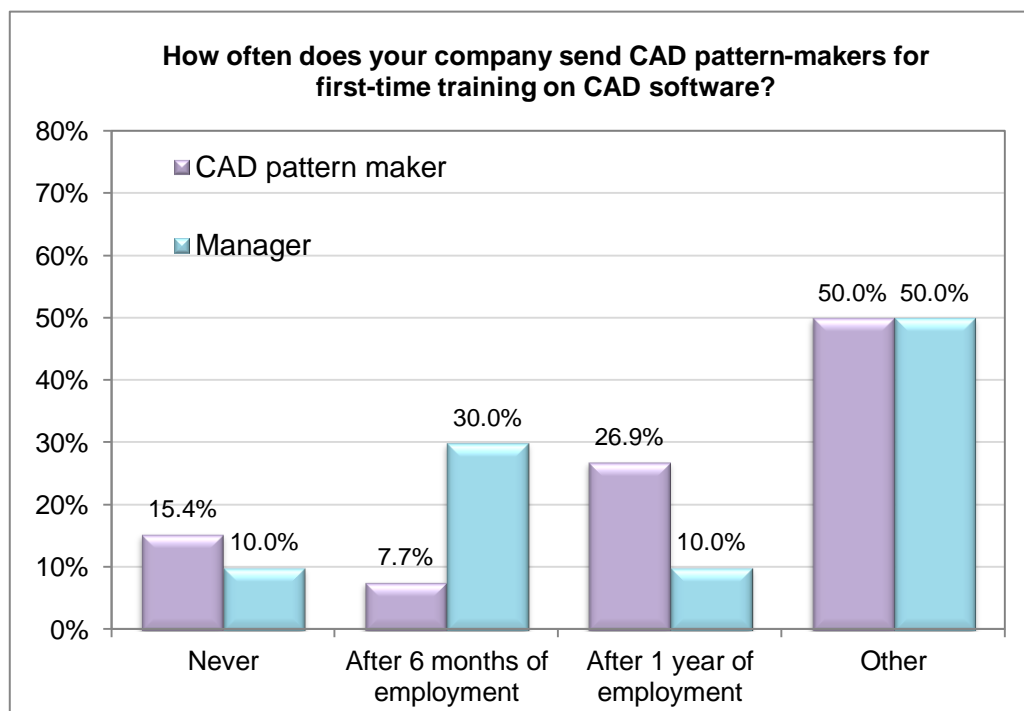


Figure 4.13 Frequency of first-time training for CAD pattern-makers on CAD pattern-making software

The results from Figure 4.13 indicate that the majority (50%) of the CAD pattern-makers and managers selected 'Other'. The following are the explanations to some of the managers' answers followed by responses from CAD pattern-makers:

- "Since we are 100% into CAD pattern-making it would mean the minute an employee joins the company. That is if the worker is not well vested in the system [he/she will be sent for training]";
- "Initially if their skill level is not developed fully";
- "Employees are sent for training as soon as they are employed. Training is planned in advance so training days are booked in advance";
- "If required, staff will be sent for training"; and
- "It depends on the operators themselves. If he or she requires added training, it is obviously requested";

CAD pattern-makers responses:

- "Prior to commencement of work";
- "I was sent immediately";
- "Within first month of employment";
- "Within 3 months of employment";
- "As soon as possible";
- "Only when there is a need";
- "Depends on the need"; and
- "When required".

From the above explanations, it is clear that many of the clothing companies send their CAD pattern-makers for first-time training immediately upon employment or as soon as the need arises thereafter. The reason for this might be that the companies require their CAD pattern-makers to be fully operational as soon as possible to ensure that they contribute to the company's productivity. However, the Lectra SA participant disagreed, as, according to her experience, CAD pattern-makers are only sent for first-time training after one year of employment. Figure 4.13 indicates that 26.9% of CAD pattern-makers, compared to 10% of managers, agreed with Lectra

SA's observation as they stated that their companies also send their CAD pattern-makers for first-time training only after one year of employment. This might be due to managers ensuring that they have seen the employee's potential and commitment to the company, before they invest/spend money on a new employee. 30% of managers, compared to 7.7% of CAD pattern-makers indicated that their companies send CAD pattern-makers for first-time training only after six months of employment. 15.4% of CAD pattern-makers and 10% of managers stated that their companies never send the CAD pattern-makers for first-time training. This might be due to these companies employing only skilled (experienced) CAD pattern-makers or testing manual ability and competence before committing to CAD pattern-making training, as the training is a costly exercise for companies.

From the above results, it is noted that the majority of the clothing companies do send their CAD pattern-makers for first-time training.

Figure 4.14 depicts the results of the frequency of up-skilling CAD pattern-makers.

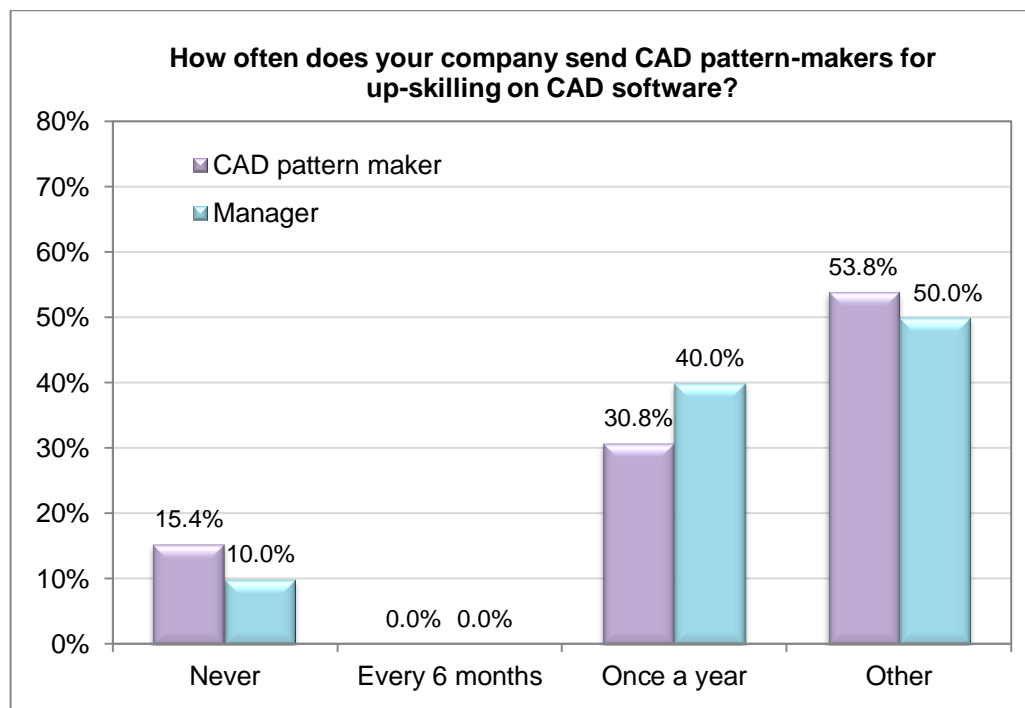


Figure 4.14 Frequency of up-skilling CAD pattern-makers

The results in Figure 4.14 indicate that the majority of the CAD pattern-makers (53.8%) as well as the majority of the managers (50%) selected 'Other'. Not all of the participants explained their answers. The following are the explanations to some of their answers:

- "When new software is being introduced or being sold to the company";
- "Every time we get a new module on the software once in 2 years";
- "Whenever the software company has an upgrade";
- "With a software upgrade";
- "When a software upgrade is available";
- "Only when new software [becomes] available and [the company] intends purchasing";
- "Only if there is an upgrade version on the software, not regularly";
- "When a new programme is launched";
- "Whenever up-skilling is available";
- "When courses are offered"; and
- "When required by the CAD software developer [Lectra SA]".

The qualitative explanations from the participants give an insight into reasons for up-skilling. It can be concluded that the majority of the clothing companies do up-skill their CAD pattern-makers, albeit at varying times. This result, however, differs from the findings in 4.7 as 'no time for up-skilling' by the clothing industry, is seen as a reason for the skills shortage of CAD pattern-making.

4.11 CLOTHING COMPANIES TURNOVER OF CAD PATTERN-MAKERS

The CAD pattern-makers and their managers were asked if their companies have a high turnover of CAD pattern-makers. The results are displayed in Figure 4.15.

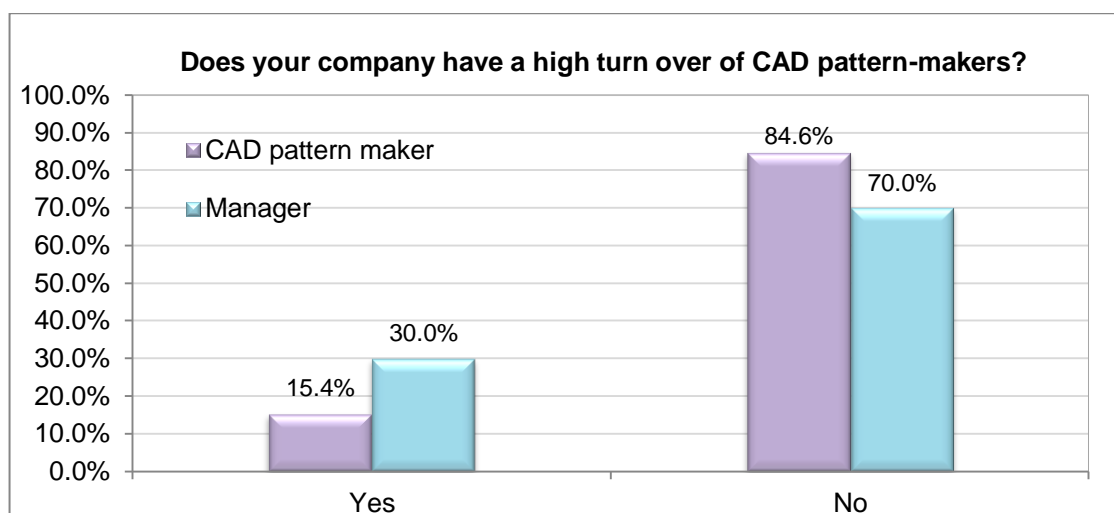


Figure 4.15 Clothing companies turnover of CAD pattern-makers

The results from Figure 4.15 are an indicator that the majority of CAD pattern-makers (84.6%) and their managers (70%) agree that their companies did not have a high turnover of CAD pattern-makers. The Lectra SA software manager was asked a similar question. Through her work experience, she indicated that she agreed with the minority of the CAD pattern-makers (15.4%) and their managers (30%) that clothing companies had a high turnover of CAD pattern-makers.

The following comments from CAD pattern-makers, their managers and Lectra SA were noted with regard to 'skills and experience':

- "Due to clothing imports, technical skill in garment manufacture is far and few [limited]. There used to be a high volume of manual pattern-makers in the 80's due to the boom in the clothing trade. Due to imported clothing many skilled technical people have been retrenched and left without jobs. Job markets have been low and currently the new generation of students are focusing on CAD [design or graphic programmes]. At our company, pattern-makers need to have experience as this company produce corporate wear, which is unlike fashion. No room for error!";
- "Battle to find experienced staff that will stay with the company";

- “Reason being that people who come in are not skilled/qualified to perform what’s required for this specialised job”; and
- “Underwear pattern-making and grading is a much specialised job. This is also a highly pressurised position. It can take up to 2 to 3 years to fully understand and execute [CAD pattern-making] correctly. Many graduates don’t have any knowledge or experience of underwear pattern-making and or grading. People with experience in this field are few and far between. An underwear pattern-maker needs to have a technical background and MUST enjoy pattern-making and grading. Many don’t have the patience to learn this area, as it takes a long time to fully grasp the concepts in this area. This type of position requires out of the box thinking and unfortunately employees don’t understand the job until they are experiencing it, and realise later that they are not equipped for the job. The high turn-over of CAD operators in my area is due to the actual job of underwear pattern-making and grading NOT the CAD system. We all have been here for many years.”

The following comments from participants were noted with regard to salary:

- “Staff is usually not happy with the salary that they earn after gaining the experience”;
- “Not sure, pattern-makers always tend to be leaving for more money”;
- “Many leave for better salaries. Being in the Inland, the salary is not as good as being in an urban area”;
- “We are currently looking for more [CAD pattern-makers] as we have a shortage of CAD pattern-makers. However, there are very few that are willing to stay for a long period in one company unless the working condition and salary is great”; and
- “Good pattern-makers will move for more money”.

The majority of the CAD pattern-makers and their managers didn’t give insightful reasons for their companies not having a high turnover of CAD pattern-makers. They only justified their answers by writing that the majority of the CAD pattern-makers in their company had been employed by the company for many years.

The literature in 2.6.1 aligns with the explanations for turnover of CAD pattern-makers that often employees leave a company for more lucrative opportunities. However, the findings revealed that only a minority of companies have experienced this problem.

The majority of the companies may be paying a reasonable salary and are, therefore, not losing their experienced CAD pattern-makers to other firms.

4.12 EMPLOYMENT PREFERENCES OF MANAGERS

The participating managers were asked to indicate their employment preference when a new CAD pattern-maker is required. The results are displayed in Figure 4.16.

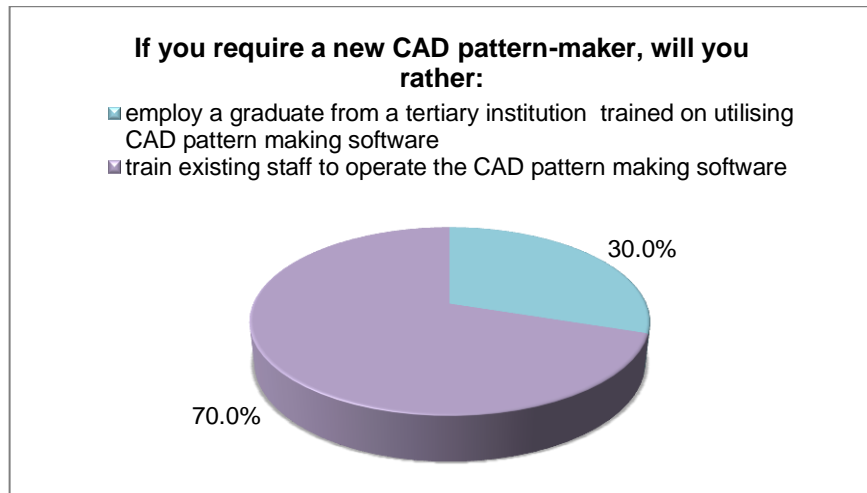


Figure 4.16 Employment preferences of managers

Figure 4.16 shows that the majority (70%) of managers indicated that they will rather train existing staff to operate the CAD pattern-making software. The rest (30%) of the managers will employ a graduate from a tertiary institution trained on utilising CAD pattern-making software. Not all companies want to invest or do not have the capital to invest time or money in training a graduate, but would rather up-skill existing staff and promote staff to a higher skills level. This will lead to higher earnings for the employee and, in return, create loyalty towards the company. In this way, the company invests in human capital that is readily available to them.

The reason that 30% of managers might have selected a graduate is that younger people are more flexible in their thinking and grasp computer technology concepts quite easily. Therefore, the company can train them to follow their procedures and maintain standards.

The Lectra SA participant indicated that employing a graduate from a tertiary institution trained on utilising CAD pattern-making software would be her

recommendation to the clothing industry. However, this answer from the Lectra SA participant is contradicting the result from Figure 4.12, that the participant strongly agrees that *'the content and quality of courses offered at Universities is inadequate to meet company needs'* is a reason for the skills shortage.

4.13 GRADUATES EMPLOYED AS CAD PATTERN-MAKERS

The managers were asked whether, in the past, they have employed a graduate from a tertiary institution as a CAD pattern-maker. Figure 4.16 displays the results.

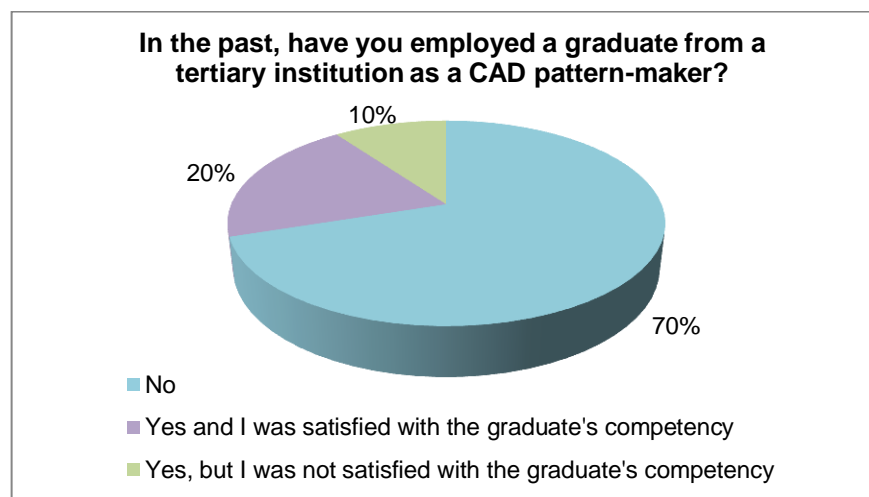


Figure 4.17 Graduates employed as CAD pattern-makers

The results from Figure 4.17 indicates that the majority (70%) of managers have not employed graduates from tertiary institutions as CAD pattern-makers. 30% of the managers have employed graduates from tertiary institutions as CAD pattern-makers, of which 20% were satisfied and the rest (10%) were not satisfied with the graduates' competency. Only four of the managers explained their answers as follows:

"Graduates do not have work experience";

"I have not yet had any suitable candidates [applying] for the positions in my department";

"They have the tertiary qualifications but do not have the practical experience to do the job";
and

“We have older pattern-makers that only learned CAD years after qualifying”.

The explanations suggest that managers prefer employees who have many years of experience.

The Lectra SA manager has previously trained a graduate from a tertiary institution as a CAD pattern-maker and was satisfied with the graduate's competency. Her answer was explained as follows:

“If the graduate stays in the company for a while, they improve and grow, becoming more competent. However, many design graduates do not want jobs as pattern-makers”.

4.14 THE DEPARTMENT OF TRADE AND INDUSTRY'S INCENTIVES

The managerial participants were asked whether their company benefits from the DTI's incentive programmes. The results are displayed in Figure 4.18.

The results from Figure 4.18 indicate that 40% of the participating managers' companies do benefit from the DTI's incentive programmes and an equal amount of managers (40%) 'do not know' whether their company benefits from the DTI's incentive programmes. The minority (20%) of managers indicated that their company do not benefit from the DTI's incentive programmes.

The results from above concurs that only a few KZN clothing companies are taking advantage of the DTI's incentive programmes, as stated in section 2.2.1.

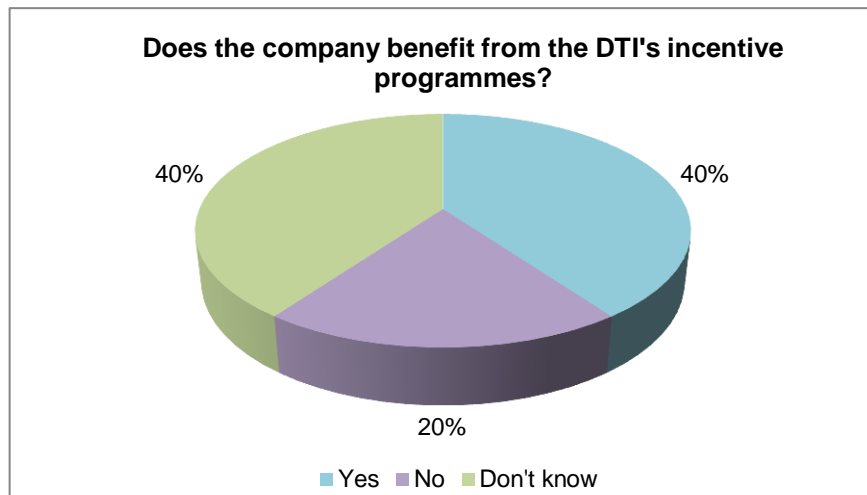


Figure 4.18 Percentage values of participating managers whose companies benefit from the DTI's incentive programmes

4.15 IMPACT OF UP-SKILLING CAD PATTERN-MAKERS

The CAD pattern-makers and their managers were also questioned on the impact that up-skilling will have on their company's productivity. The results are displayed in Figure 4.19.

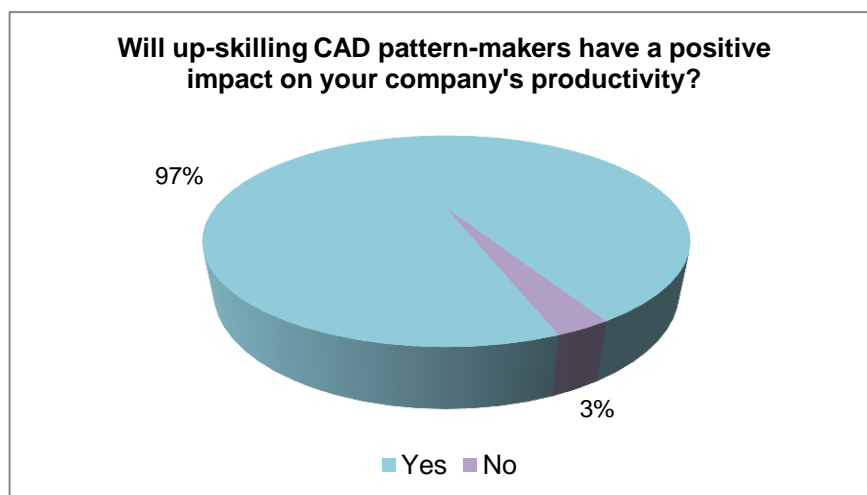


Figure 4.19 Impact of up-skilling CAD pattern-makers on companies' productivity

The results in Figure 4.19 revealed that a large majority (97.2%) of the clothing companies' participants (CAD pattern-makers and their managers) indicated that the up-skilling of CAD pattern-makers will have a positive impact on their companies' productivity. Only 2.80% of these participants indicated that up-skilling CAD pattern-makers will not have a positive impact

on their company's productivity. Lectra SA agreed with the large majority of clothing companies' participants.

A variety of qualitative responses to 'Please explain your answer' were obtained in the open-ended question. Some of the responses by the managers are reported as follows:

"Quick turnaround time is possible with CAD [therefore upskilling CAD operators will improve productivity]";

"We need to have [retrain] more pattern-makers on pc for efficient and quick patterns";

"They become versatile and will be able to sort out problems if they arise";

"They will be able to work faster";

"There will be a better understanding of patterns";

"Currently, not all of our CAD pattern-makers are skilled in patterns specifically. They are however trained in the specific programmes we use to make patterns. A vast majority of them started out in our factories performing other jobs, and were then trained up in-house to their current positions. While this means that their knowledge of construction/cutting/etc. is generally better than a formally-trained patternmaker, it does mean that bad habits and short-cuts are generally employed in their pattern-making.";

"If CAD operators' skills are continuously advancing, this would make their task of doing their jobs, as pattern-makers and graders more efficient. Speed and accuracy levels would be elevated, thereby creating less production problems and increased productivity"; and

"Most companies are also computer driven. In order to be competitive in the business CAD pattern-making should be a must in order to be efficient and productive".

The following comments from CAD pattern-makers were noted:

"Companies need to send their employees for advance training. Technology advances, pattern-makers need to upskill so as to be able to compete with the outside world. Our company are even using Automatic Cutting machines; this requires the pattern-makers to up their game. The demand for fine-tuned patterns and an understanding of the system calls for training";

"Efficiency = productivity";

"Even though the styles are derived from existing styles they are complicated designs and have intricate details, such as back pleats or vents, underarm vents etc.";

"For sure. CAD pattern-makers will be able to think wider with the newly acclaimed knowledge";

"Increase productivity due to time saving";

“It has been proven to be the most efficient method of pattern-making, grading and marker-marking”;

“It is much quicker than manual pattern-making”;

“It is the most efficient method to work with, but there is also room for improvement”;

“It will help us to work smarter and faster”;

“There is always more to learn to improve one’s own productivity”;

“They will improve their skills/knowledge to work faster and be more productive”;

“They will work quicker”;

“We want to be more knowledgeable”;

“Will help to work quicker methods”;

“You can always learn more”; and

“You can never stop learning; it always improves your productivity”.

From the qualitative responses, it is evident that the majority (97.2%) of CAD pattern-makers, their managers and Lectra SA agree with the findings of the study by Liang, Chen and Lin (2013), as discussed in 2.3.3. of the literature that training (up-skilling) improves skills which, in turn, improves a company’s productivity.

4.16 RECOMMENDATIONS TO PREVENT LACK OF SKILLS IN FUTURE CAD PATTERN-MAKERS

The CAD pattern-makers, their managers and Lectra SA were questioned regarding their recommendations to prevent lack of skills in future CAD pattern-makers. The overall answers from the participants were similar and, therefore, grouped into the six categories, as displayed in Figure 4.20.

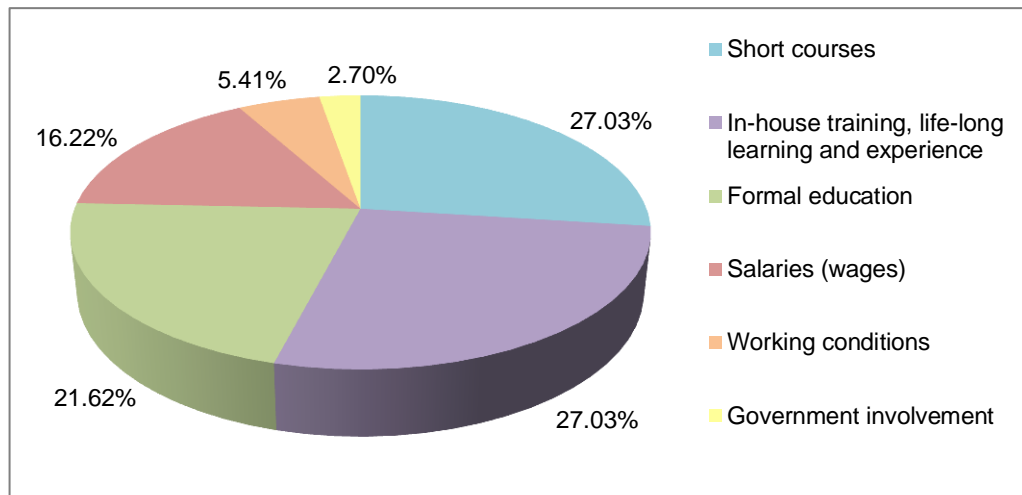


Figure 4.20 Recommendations to prevent lack of skills in future CAD pattern-makers

The results from figure 4.20 indicates that the majority (27.03%) of participants recommend that short courses and in-house training, life-long learning and work experience need to be implemented and/or sustained to prevent lack of skills in future CAD pattern-makers. 21.62% of the participants advised that CAD pattern-making needs to be integrated into formal education at tertiary level. 16.22% of the participants commended the role salaries (wages) play. 5.41% suggested that the working conditions need to be improved and only 2.70% mentioned government involvement.

The following comments from participants were noted with regard to:

- Short courses (27.03%)

“They need to be trained once new systems are implemented continuously to keep up with the market”;

“In order to be competitive in your business, continuous up-skilling is necessary to keep up with new upgrades on CAD systems”;

“To send them 2 times a year to upgrade their skills”;

“Newcastle and surrounding areas has many clothing factories in the area, I would like to suggest that a CAD course is offered in the area, as this will give a skill to people in the area. Many people cannot afford to go to bigger centres to gain this skill”;

“Courses at Lectra are too expensive”;

“More regular training courses and short courses [are needed]”;

“More skills training”;

“Refresher courses”;

“Send current pattern-makers for training on a regular basis”; and

“To offer part time courses that workers may attend that will not interfere with their current jobs. Make it affordable if they wish to pay for it themselves if the companies are not willing to expand their knowledge”.

- In-house training, life-long learning and experience (27.03%)

“Specialists in the field of different garment types from industry should be utilised to impart their rare skills to new pattern-makers starting out in the field”;

“Continue to train staff; managers are too scared to train for fear that staff will leave for better prospects”;

“In my opinion, one would have to have manual knowledge and experience first before being a fully-fledged cad operator. One has to understand the skill of patternmaking. I've had 20 years of experience in design and patternmaking before going digital. I personally have a better understanding of the system”;

“Management to strongly look into [the value/importance] of [CAD] pattern-making and study [CAD operators] individuals skills [in order to know who to] push to extreme limits to know more [about the full capability of the CAD software. This need to be done to ensure the CAD programme is used to its full potential]”;

“They must have at least 3 to 5 years pattern-making experience, and knowledge of reading a spec [measurement specification sheet]”;

“To choose suitably qualified staff who are interested in choosing a career in pattern-making, offer them in house training, and choose from them as to who would make it in the technical field. There is a big difference in wanting to be a patternmaker and succeeding to be one. The person would have to not only make patterns, but also know how the pieces should be sewn together. Many patterns and garments have to be made to gain experience”;

“To motivate people in advancing themselves and companies to continue upgrading CAD software [keep up with new versions of the CAD software]”;

“Training courses to be held at the workplace, to have hands on training”;

“Training manual pattern-makers on the software”; and

“Training should be provided by the more experienced staff within a company rather than external institutions that is not familiar with the realistic requirement of the industry”.

- Formal education (21.62%)

“Practice in service training within companies that have CAD systems. Make this part of the requirement to pass the course. Companies need to agree to do this programme in conjunction with the University to aid skills development. Students should be evaluated by the company (whomever they worked under). Training programmes should be more

readily available (in terms of price) so they can be purchased and loaded on laptops to help practice any time in conjunction with formal lectures. Module and tests can be set up for student to maybe go onto the internet and practice”;

“CAD training must be done at university level”;

“More involved pattern-making training at a tertiary education level for those who can afford it”;

“Training to be done on a full time basis at the Universities. Universities’ to use modern and up to date CAD software to teach”;

“CAD pattern-making courses/training should be offered at more colleges”;

“Short courses at Universities/Technikons”;

“The current CAD Systems that are being used in the industry should be introduced in training centres and universities. In the similar way that manual pattern-making and grading courses, so should the course for CAD systems be introduced”; and

“Youngsters have to learn from experts in the industry. Experts to teach at colleges to give experience across to learners”.

- **Salaries (16.22%)**

“Better pay”;

“Higher salaries. More training”;

“Pay a salary that is worth the skill”;

“Pattern-makers should be paid a qualified rate, so more students would want to go into this field of training”;

“Honestly, pattern-making skills are decreasing because companies will not pay. Look at my earnings and I am here for 2 years”;

“Paying the CAD pattern-makers a decent salary”.

- **Working conditions (5.41%)**

“At the moment I don't see the future in this field. Our local industry does not recognise this skill as the heart of the clothing industry. To be straight, I would not advise my child/family member to take up this job. Recognition is the key factor here, if that is increased from the employer side. The working conditions and workers’ rights to be upheld, and the remuneration to be well looked at. A guy who leaves college with Engineering Diploma does very well in a few years, than his counterpart who studied Clothing Design.”; and

“Make pattern-making more accessible, enjoyable and affordable”.

- Government involvement (2.7%)

“Government has to reduce [garment] imports to make the clothing industry survive and more attractive to youngsters”.

4.17 LIMITATIONS IN RESULTS

Due to Lectra SA having only one software manager, questionnaire results from this participant were not used in the reliability test or in the calculation of mean scores and standard deviations.

4.18 CONCLUSION

This chapter presented the analysis of the data collected for the study. The necessary skills required for CAD pattern-making were presented and ranked according to the importance of skills. The reasons for CAD pattern-making skills shortages were displayed and discussed according to the different perceptions of the participants’ ‘agreement’. The graphs displayed the different opinions of CAD pattern-makers, their managers, students and Lectra SA regarding the importance of the skills and reasons for CAD pattern-making skills shortages. Relevant comparisons were obtained from the different experience levels of participants.

The next chapter highlights the conclusions of the study and makes practical recommendations, including directions for future research.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The purpose of this study was to address the skills shortage of CAD pattern-making in the KZN clothing industry. To alleviate the problem, the study provided a list of required skills for the clothing industry to identify and train potential candidates for CAD pattern-making.

This chapter presents the final insights discovered within the study. The results obtained from the empirical study were compared against key findings within the literature reviewed and discussed. This chapter concludes with future research recommendations for similar studies.

5.2 CONCLUSIONS

It was evident from the empirical investigation that CAD pattern-makers and their managers' perceptions were significantly similar regarding the question on the skills necessary for CAD pattern-making. According to the clothing companies' participants, all 34 skills listed in the questionnaire were perceived as important to extremely important skills for CAD pattern-making. The necessary skills required by the clothing industry for CAD pattern-making are listed in order of importance in Table 5.1. The 'soft' skills, which refer to inherent skills, are highlighted in white. The 'job specific' skills that can be taught are highlighted in blue.

5.2.1 Skills necessary for CAD pattern-making

1. Knowledge of garment construction	18. Integrity
2. Accuracy	19. Passion
3. Reliability	20. Versatile
4. Design interpretation for CAD pattern creation	21. Self-discipline
5. Team work	22. Verbal communication
6. Knowledge of manual pattern-making	23. Identify and solve technical problems
7. Willingness to learn (life- long learning)	24. Design interpretation for manual pattern creation
8. Ability to create a spec sheet	25. Practical thinker
9. Using modern tools, equipment and technologies	26. Basic computer knowledge
10. Accepts responsibility for consequences of actions	27. Creativity
11. Confidence	28. Fast learner
12. Handling of pressure	29. Written communication
13. Complies with instructions	30. Flexibility
14. Self-motivated	31. Reading
15. Basic numeracy	32. Customer service skills
16. Communication in English	33. Advanced numeracy
17. Good listener	34. Advanced computer knowledge

Table 5.1 Necessary skills for CAD pattern-making

The majority of skills in Table 5.1 can be taught and, therefore, are seen as 'job specific' skills which are attained through basic and tertiary education as well as on-the-job training. An employee with a basic education should have the attributes such as complying with instructions, basic numeracy, communication in English (verbal and written) and reading skills. The rest of the skills are taught at tertiary level, with specific reference to courses for the clothing industry. Furthermore, team work and customer service skills can be encouraged through workshops offered at training institutions or in-house at the clothing firms.

In Table 5.1, the 'soft' skills, such as reliability, confidence, handling of pressure, self-motivation and good listening skills, depend largely on an individual's character and lessons which one has learnt through life experiences. Managers, therefore, need to identify employees within the company who have these 'soft' skills and are willing to progress with technological advancement. These employees must then be trained and regularly retrained to retain the company's human capital pool. Continuous

development of the workforce, in return, improves the overall productivity of the company.

Table 5.1 highlights that the KZN clothing industry requires CAD pattern-makers with diverse skills for CAD pattern-making, who develop this expertise over many years.

To acquire all the required skills listed above, a tertiary qualification pertaining to the clothing industry and through work-integrated learning is considered a necessity. The list of skills ranked in importance should be used as a guide by lecturers to plan what emphasis should be placed on each skill to be acquired by graduates before working in the clothing industry.

CAD pattern-makers are required to have a broad range of pattern-creation and garment-construction knowledge as well as skills to meet the ever changing demands of the fashion/clothing industry. CAD operators, with the required knowledge, are an asset to a clothing company as they are able to work with precision and speed, which are important to optimise lead times.

Quick response is a priority in the clothing industry and CAD pattern-making provides the tools to create well-fitted garments with fast turnaround times which result in company growth and profitability, due to improved productivity and efficiency.

CAD software providers or trainers need to inform clothing companies prior to training on the specific 'soft' skill requirements for CAD pattern-making to ensure that potential CAD pattern-makers fulfil these requirements and that resources are used sensibly. Furthermore, an outline of the 'job specific' skills, which need to be taught, either through workshops or short courses, prior to commencement of training, must be provided to the clothing firms.

The findings can be useful to graduates or job seekers interested in CAD pattern-making to be prepared for the expectations of clothing industry

employers. The development of each skill must be seen by the prospective or current CAD pattern-maker as an investment in their personal human capital and an enhancement of their employability.

Clothing manufacturing employers should be aware of the vast amount of human capital a CAD pattern-maker contributes to a company and acknowledges it through incentives or bonuses. Clothing companies must value CAD pattern-makers for their diverse skills and focus on the creation of a work environment where employees' skills are developed and retained.

5.2.2 Reasons for the skills shortage of CAD pattern-makers

The empirical study indicates that there is still a skills shortage of CAD pattern-makers, and this challenge needs to be addressed. Three groups of participants, namely, the CAD pattern-makers, their managers and Lectra SA, agreed upon 8 reasons for the shortage of skilled CAD pattern-makers in KZN. The reasons are listed in Table 5.2.

1. Insufficient number of qualified people
2. Inadequate quality of qualified people
3. Retraining of staff not being carried out
4. Quality of experience
5. Mismatch between qualification and ability to do the job
6. Negative image of the clothing industry
7. Poaching of staff for more lucrative opportunities
8. Older staff with experience are now retiring

Table 5.2 Reasons for the skills shortage of CAD pattern-makers in KZN

Loane Sharp (Fin24 2014c), labour market economist at Adcorp, states that South Africa's dysfunctional education system has contributed to the critical skills shortage in sectors where a highly skilled workforce is required. The reasons in Table 5.2 imply that the schooling system is impacting negatively on the clothing industry's needs for a skilled workforce such as CAD pattern-makers.

Clothing manufacturers place great emphasis on the quality of experience that potential employees bring to a firm, and are hesitant to employ individuals without previous experience. However, this becomes a problem as the human capital pool of CAD pattern-makers is diminishing. To address this challenge clothing companies need to start investing in younger, less experienced CAD operators to increase their human capital pool. Younger graduates or employees with the inherent 'soft' skills will be quicker at grasping and utilising the technology, and willing to advance with it, thereby increasing the firm's productivity levels. However, their pattern-making skills, in terms of style and fit, may need to be further developed by experienced pattern-makers. Clothing firms, therefore, should view any money spent on skills training as an investment in human capital, which will have a positive effect on company profits.

Furthermore, the negative image of the clothing industry needs to be addressed urgently as it does not encourage potential employees to enter this work environment. The beliefs, values and principles within a company influences employees' personal development/growth and retaining of staff. Therefore, clothing companies need to strive for a working environment where current and prospective employees are motivated and job satisfaction is guaranteed.

5.3 RECOMMENDATIONS TO ADDRESS THE SKILLS SHORTAGE IN CAD PATTERN-MAKING

The following recommendations are submitted:

Education - According to the findings of this study, DUT Fashion students, who participated in the study, are not interested at this stage of their career in being employed as CAD pattern-makers. To them, the CAD pattern-making process is not 'creative' enough. This will further exacerbate the skills shortage and could cause the depletion of the CAD pattern-making human capital pool. However, students from the Clothing Management course might be ideal to acquire CAD pattern-making skills. Students from the Clothing Management course are studying towards a diploma qualification and will

enter the clothing industry as either garment technologists, work study officers and/or pattern-makers, to name a few. The Clothing Management course is more technically orientated and would, therefore, target a different kind of student than those enrolled in the Fashion and Textiles Department, who are more interested in design as a career.

Availability of CAD pattern-making software - CAD pattern-making software should be made freely available to students to be loaded on laptops for the purpose of practice to enable students to become well-versed in using the technology. The practice software should be a prototype which does not allow the user to print/plot; therefore, it cannot be used for commercial clothing manufacturing purposes. Furthermore, users must be registered with the software provider to be granted access, only to users that qualify (new trainee CAD pattern-makers and students). Modules and tests can be set up for students to go onto the internet and practice.

Training - Tuition is known to be effective in furnishing individuals with knowledge and skills, if provided by an expert. Pattern-making specialists in different garment types should be utilised to impart their skills to new CAD pattern-makers starting out in the field. Services of retired CAD pattern-makers must be utilised for in-house training as and when more training is required.

Salary/wage - The clothing industry must strive to increase the remuneration package of CAD pattern-makers to attract more qualified recruits.

The South African clothing industry must aim to produce innovative, value added, quality garments for their target market. CAD pattern-makers are integral to the South African clothing manufacturing industry. The industry, therefore, needs to address the skills shortage of CAD pattern-makers to ensure that these highly skilled people are timeously replaced by younger staff to increase the invaluable human capital pool. Clothing manufacturing companies may have the necessary CAD equipment, but without the CAD

pattern-makers' expert knowledge, the CAD system will be underutilized. This will result in a low return on investment for the manufacturer, having a negative impact on the South African clothing industry.

The South African clothing industry needs to use technology to its full potential and increase productivity levels to become more competitive. In return, wages will rise with advancing development.

5.4 FURTHER RESEARCH

The following recommendations are submitted for future research. These will assist in addressing the skills shortage of CAD pattern-makers in the South African clothing industry:

- Participation of clothing manufacturing companies in advisory board meetings at Universities of Technology to investigate the willingness of clothing manufacturing companies to provide work place learning for undergraduates as hands-on experience in the field of manual/CAD pattern-making;
- Developing the curriculum of the Clothing Management and Fashion courses at Universities of Technology to place more emphasis on technology advancement as required by the clothing manufacturing industry; and
- Determining the degree of success achieved by the Fibre-Processing and Manufacturing Sector Education and Training Authority (FP&M SETA) with regard to CAD pattern-making training programmes in the clothing industry.

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APPENDIX A – Information letter to Lectra SA

Ms. M. Coetzee
Department: Fashion & Textiles
Durban University of Technology
196 Brickfield Road
Overport
Durban
4091

LECTRA SOUTH AFRICA
197 North Ridge Road
Morningside
Durban
4001

30 March 2012

Dear Mr. Michael Stoter and Ms. Pamela Laurent

RE: LETTER OF CONSENT REQUEST

I, Minette Coetzee, am currently studying towards my Master's degree in Fashion and Textiles at the Durban University of Technology (DUT).

My research topic is as follow:

Understanding the skill shortages of CAD pattern makers in the KwaZulu Natal Clothing industry.

The study requires me to examine:

- The KwaZulu Natal Clothing industries CAD pattern makers skill requirements.
- The shortages of such skills as experienced in the clothing industry.

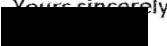
DUT is one of the many higher education institutions of learning that are fortunate to have been sponsored with your Lectra Modaris software. As a specialist instructor I am teaching students to become potential operators on the Lectra system. Therefore I believe that this study will give the necessary insight to ensure that we are giving effective tuition on the software to address the skill shortages being experienced in KZN.

It would be greatly appreciated if you would give me permission to approach the KwaZulu Natal Lectra customer base for participation in the study and if Lectra South Africa will also participate as the service provider of the Lectra software. The company will benefit from the findings obtained from the study. Training needs and strategies devised in the study may prove to be a useful resource for Lectra South Africa.

The information received will be treated as confidential and will only be used for the purpose of analytical comparison.

Thank you in advance for your kind assistance. Should you require any further information or clarification, please contact me on the details provided below.

Yours sincerely


Minette Coetzee

Tel: 031 3733739 / 0764719787

Email: minettec@dut.ac.za

APPENDIX B – Lectra SA letter of consent

LETTER OF CONSENT

I, Michael Stöter, hereby confirm that I understand that Minette Coetzee is conducting research for a Master of Technology study entitled: *Understanding the skill shortages of CAD pattern makers in the KwaZulu-Natal clothing industry.*

I hereby give Minette Coetzee permission to approach the KwaZulu-Natal Lectra customers' to participate in the study and to please refer to our company as Lectra SA in the study.

Signed: _____

Michael Stöter

Date: _____

30 July 2012

APPENDIX C – Pilot study participation request letter (emailed)

From: Minette Coetzee [<mailto:minettec@dut.ac.za>]
Sent: 05 June 2013 12:34 PM
To: [contact person's email address]
Subject: CAD pattern-making pilot study questionnaire

Good afternoon [contact person's name],

Pam Laurent from Lectra SA gave me your email address. I am a former colleague of Pam, as I was a Lectra trainer for four years in Durban :).

I trained at [company's name] while they were still using Investronica.

Currently I am working at Durban University of Technology (DUT) as a lecturer teaching Lectra CAD pattern-making/grading/marker-making as well as Kaledo Style.

I am registered for the Master's degree, with the Department of Fashion & Textiles at DUT. My research topic is as follows:

Addressing the skills shortage in computer aided design (CAD) pattern-making in the KwaZulu-Natal clothing industry.

I need to conduct a pilot study to test my questionnaire - for validity and if questions are clear prior to the actual study. Please may I ask you and your CAD pattern makers to participate in the pilot study?

The questionnaire consists of 21 questions and will be online (SurveyMonkey website). A link will be emailed to each participant and it should take +- 8 minutes to complete.

Please will you be so kind to forward me the email addresses of the Lectra CAD pattern makers that are willing to participate?

Your participation in the pilot study will be greatly appreciated. Please note that any information gathered from the questionnaire will be exclusively for research purposes and all information obtained will be treated with strict confidentiality. There is no risk involved and your identity will be kept confidential.

Thanks and regards
Minette Coetzee - 21240225
Tel. no: 0764719787 / 0313733750
Email: minettec@dut.ac.za

APPENDIX D – Explanatory and consent cover letter (emailed)

Dear Participant

I am registered for the Master's degree in Technology: Fashion at the Durban University of Technology, with the Department of Fashion & Textiles. My research topic is as follows:

Addressing the skills shortage in computer aided design (CAD) pattern-making in the KwaZulu-Natal clothing industry.

Your participation in the study by completing the attached questionnaire will be greatly appreciated.

Please note that any information gathered from the questionnaire will be exclusively for research purposes and all information obtained will be treated with strict confidentiality. There is no risk involved and your identity will be kept confidential.

Thank you once again.

Click on the link below for the questionnaire.

<http://www.surveymonkey.com/s.aspx>

Yours sincerely,

Minette Coetzee - 21240225
Tel. no: 0764719787 / 0313733750
Email: minettec@dut.ac.za

APPENDIX E – Clothing company questionnaire

Questionnaire - Clothing Companies

***1. Please select your current position**

☐ CAD pattern maker

☐ Manager

***2. What is your gender?**

☐ Female

☐ Male

***3. What is your age?**

☐ 21 to 30

☐ 31 to 40

☐ 41 to 50

☐ 51 to 60

☐ 61 to 65

***4. What is the retirement age specified by your company for CAD pattern makers?**

☐ 50 - 54

☐ 55 - 59

☐ 60 - 64

☐ 65 - 69

☐ Unaware

***5. Did you have any experience in pattern making prior to working as a CAD pattern maker?**

☐ Yes

☐ No

Questionnaire - Clothing Companies

***6. If you answered 'Yes' to the previous question, please indicate how many years of experience you had in pattern making?**

If you answered 'No' to the previous question please select N/A.

- ☐ 0 to 5
- ☐ 6 to 10
- ☐ 11 to 15
- ☐ N/A
- ☐ Other (please specify)

***7. Currently how many years of experience do you have as a CAD pattern maker?**

Managers, please select N/A.

- ☐ 0 to 5
- ☐ 6 to 10
- ☐ 11 to 15
- ☐ 16 to 20
- ☐ N/A
- ☐ Other (please specify)

***8. What is the highest level of education you have completed?**

- ☐ GR10 / Std 8
- ☐ Gr12 / Matric
- ☐ Diploma
- ☐ Degree
- ☐ Other (please specify)

Questionnaire - Clothing Companies

***9. What patterns are you required to produce? Please select all applicable.**

Managers, please select N/A.

- ☐ Girls
- ☐ Ladies
- ☐ Boys
- ☐ Mens
- ☐ Blouses / Shirts
- ☐ Dresses
- ☐ Jackets
- ☐ Skirts
- ☐ Trousers
- ☐ T-shirts
- ☐ Sleepwear
- ☐ Underwear
- ☐ Swimwear
- ☐ N/A
- ☐ Other (please specify)

***10. Who are your company's customers?**

- ☐ Schools
- ☐ Retailers
- ☐ Smaller Stores
- ☐ Other (please specify)

Questionnaire - Clothing Companies

*** 11. Please select your starting and current salary bracket as CAD pattern maker (including company benefits).**

Managers, please select N/A.

	Starting	Current
R0 - R3 000	<input type="checkbox"/>	<input type="checkbox"/>
R3 001 - R5 000	<input type="checkbox"/>	<input type="checkbox"/>
R5 001 - R8 000	<input type="checkbox"/>	<input type="checkbox"/>
R8 001 - R10 000	<input type="checkbox"/>	<input type="checkbox"/>
R10 001 - R12 000	<input type="checkbox"/>	<input type="checkbox"/>
R12 001 - R15 000	<input type="checkbox"/>	<input type="checkbox"/>
R15 001 - R18 000	<input type="checkbox"/>	<input type="checkbox"/>
R18 001 - R20 000	<input type="checkbox"/>	<input type="checkbox"/>
R20 001 - R25 000	<input type="checkbox"/>	<input type="checkbox"/>
R25 001 and above	<input type="checkbox"/>	<input type="checkbox"/>
N/A	<input type="checkbox"/>	<input type="checkbox"/>

*** 12. Does your company have a high turnover of CAD pattern makers?**

☐ Yes

☐ No

Please explain your answer.

*** 13. Will the up skilling of CAD pattern makers have a positive impact on your company's productivity?**

☐ Yes

☐ No

Please explain your answer.

Questionnaire - Clothing Companies

***14. In your opinion, please rate the importance of the necessary skills required for CAD pattern making.**

(1 = Not important at all and 4 = Extremely important)

	Not important at all	Slightly important	Important	Extremely important
Flexibility (responds well to change)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creativity (identifies new approaches to problems)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability (can be depended on to complete work to meet deadlines, punctuality)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrity (understands/applies professional and ethical principals to decisions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-discipline (exhibits control of personal behaviour)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self motivated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team work (interpersonal relationships)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Willingness to learn (life-long learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understands and takes directions for work instructions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accepts responsibility for consequences of actions	<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"/>
Confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Passion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to apply knowledge of manual pattern making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use appropriate and modern tools, equipment and technologies specific to the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to identify and solve technical problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interpret designs and create a pattern MANUALLY to meet production needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interpret designs and create a COMPUTER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questionnaire - Clothing Companies

pattern to meet production
needs

Ability to create a spec sheet (garment and pattern measurements)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verbal communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication in English	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic computer knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced computer knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accuracy (attention to detail)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Versatile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handling of pressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fast learner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge of garment construction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Practical thinker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer service skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other: please specify.

Questionnaire - Clothing Companies

***15. The following have been stated as reasons for skills shortage.**

Please indicate if it is applicable to CAD pattern makers in the clothing industry.

(1 = Strongly disagree and 4 = Strongly agree)

	Strongly disagree	Disagree	Agree	Strongly agree
Uncompetitive labour conditions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient numbers of qualified people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inadequate quality of qualified people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of personal attributes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low levels of literacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low levels of numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Older staff with many years of experience are now retiring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negative image of the clothing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poaching of staff for more lucrative opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Job hopping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mismatch between qualification and ability to do the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retraining of staff not being carried out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training courses too expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No time for up skilling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Up skilling too expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectations from company too high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectations from trainers too high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content and quality of courses offered at Universities is inadequate to meet company needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content and quality of courses offered by service providers is inadequate to meet company needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training courses difficult to understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questionnaire - Clothing Companies

***16. How often does your company send the CAD pattern makers for first time training on CAD software?**

- ☐ Never
- ☐ After six months of employment
- ☐ After one year of employment
- ☐ Other (please specify)

***17. How often does your company send the CAD pattern makers for upskilling on CAD software?**

- ☐ Never
- ☐ Every six months
- ☐ Once a year
- ☐ Other (please specify)

***18. What would your recommendations be to prevent lack of skills in future CAD pattern makers?**

***19. Only Managers to answer question number 19, therefore CAD pattern makers please select N/A.**

Does the company benefit from the DTI's incentive programs?

- ☐ Yes
- ☐ No
- ☐ Do not know.
- ☐ N/A

Questionnaire - Clothing Companies

***20. Only Managers to answer question number 20, therefore CAD pattern makers please select N/A.**

If you require a new CAD pattern maker, will you rather:

- ☐ employ a graduate from a tertiary institution trained on utilising CAD pattern making software.
- ☐ train existing staff to operate the CAD pattern making software.
- ☐ N/A

Please explain your answer.

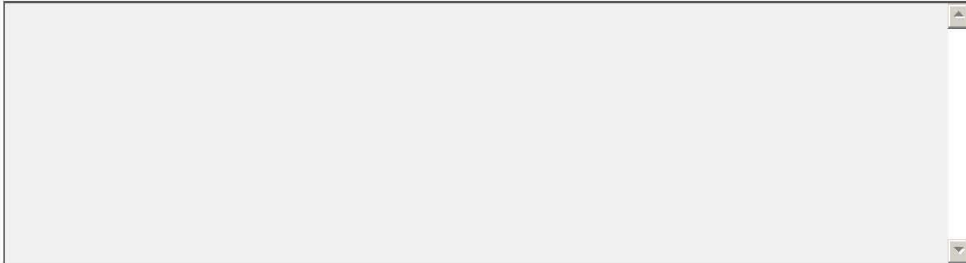


***21. Only Managers to answer question number 21, therefore CAD pattern makers please select N/A.**

In the past, have you employed a graduate from a tertiary institution as a CAD pattern maker?

- ☐ No.
- ☐ Yes and I was satisfied with the graduate's competency.
- ☐ Yes, but I was not satisfied with the graduate's competency.
- ☐ N/A

Please explain your answer.



APPENDIX F – Student questionnaire

Questionnaire - Students
<p>*1. What is your gender?</p> <p><input type="radio"/> Female</p> <p><input type="radio"/> Male</p> <p>*2. What is your age?</p> <p><input type="radio"/> 17 to 21</p> <p><input type="radio"/> 22 to 31</p> <p><input type="radio"/> 32 to 41</p> <p><input type="radio"/> 42 and above</p>

Page 1

* Document has been condensed to fit the page. Hence the text appears reduced in size.

Questionnaire - Students

***3. In your opinion, please rate the importance of the necessary skills required for CAD pattern making.**

(1 = Not important at all and 4 = Extremely Important)

	Not important at all	Slightly important	Important	Extremely important	Uncertain
Flexibility (responds well to change)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creativity (identifies new approaches to problems)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability (can be depended on to complete work to meet deadlines, punctuality)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrity (understands/applies professional and ethical principals to decisions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-discipline (exhibits control of personal behaviour)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self motivated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team work (interpersonal relationships)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Willingness to learn (life-long learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understands and takes directions for work instructions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accepts responsibility for consequences of actions	<input type="radio"/>	<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"/>	<input type="radio"/>
Confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Passion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to apply knowledge of manual pattern making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use appropriate and modern tools, equipment and technologies specific to the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to identify and solve technical problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interpret designs and create a pattern MANUALLY to meet production needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interpret designs and create a COMPUTER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questionnaire - Students

pattern to meet production needs

Ability to create a spec sheet (garment and pattern measurements)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verbal communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication in English	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic computer knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced computer knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accuracy (attention to detail)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Versatile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handling of pressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fast learner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge of garment construction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Practical thinker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer service skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other: please specify.

Questionnaire - Students

***4. The following have been stated as reasons for Skills shortage.**

Please indicate if it is applicable to CAD pattern makers in the clothing industry.

(1 = Strongly disagree and 4 = Strongly agree)

	Strongly disagree	Disagree	Agree	Strongly agree	Uncertain
Uncompetitive labour conditions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of personal attributes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low levels of literacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low levels of numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Older staff with many years of experience are now retiring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negative image of the clothing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poaching of staff for more lucrative opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Job hopping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mismatch between qualification and ability to do the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retraining of staff not being carried out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training courses too expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No time for retraining	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Up skilling too expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectations from company too high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectations from trainers too high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content and quality of courses offered at Universities is inadequate to meet company needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content and quality of courses offered by service providers is inadequate to meet company needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training courses difficult to understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operators do not know the full capability of the technology	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Operators battle to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questionnaire - Students

achieve a comfort level
with the technology,
resulting in job insecurities
and causing a negative
attitude towards
technological
advancements.

Other: please specify.

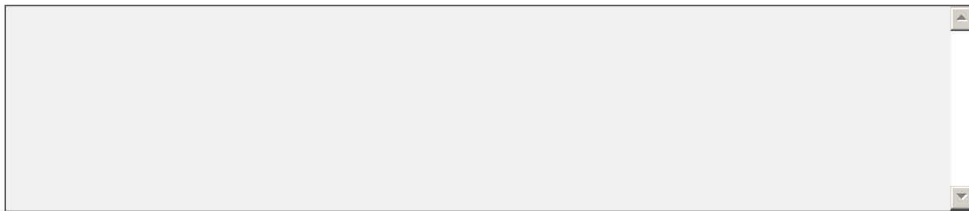


***5. Would you be interested in being employed as a CAD pattern maker in the clothing industry?**

☐ Yes

☐ No

Please explain your answer.



APPENDIX G – Lectra SA questionnaire

Questionnaire - Lectra SA

***1. Did you have any experience in pattern making prior to working for Lectra SA?**

- ☐ Yes
☐ No

***2. If you answered 'Yes' to question no. 1, please indicate how many years of experience you had in pattern making.**

If you answered 'No' to question no. 1, please select N/A.

- ☐ N/A
☐ 0 - 5
☐ 6 - 10
☐ 11-15
☐ Other: please specify.

***3. How many years have you been a Lectra CAD trainer?**

- ☐ 0 - 5
☐ 6 - 10
☐ 11 - 15
☐ 16 - 20
☐ Other: please specify.

***4. What is the highest level of education you have completed?**

- ☐ GR10 / Std 8
☐ Gr12 / Matric
☐ Diploma
☐ Degree
☐ Other: please specify.

Questionnaire - Lectra SA

***5. In your opinion, please rate the importance of the necessary skills required for CAD pattern making.**

(1 = Not important at all and 4 = Extremely important)

	Not important at all	Slightly important	Important	Extremely important
Flexibility (responds well to change)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Creativity (identifies new approaches to problems)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliability (can be depended on to complete work to meet deadlines, punctuality)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Integrity (understands/applies professional and ethical principals to decisions)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self-discipline (exhibits control of personal behaviour)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Self motivated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Team work (interpersonal relationships)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Willingness to learn (life-long learning)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Understands and takes directions for work instructions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accepts responsibility for consequences of actions	<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"/>
Confidence	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Passion	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to apply knowledge of manual pattern making	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to use appropriate and modern tools, equipment and technologies specific to the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to identify and solve technical problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interpret designs and create a pattern MANUALLY to meet production needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ability to interpret designs and create a COMPUTER	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page 2

Questionnaire - Lectra SA

pattern to meet production needs

Ability to create a spec sheet (garment and pattern measurements)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Written communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Verbal communication	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication in English	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reading	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic computer knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced computer knowledge	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Basic numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advanced numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Accuracy (attention to detail)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Versatile	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Handling of pressure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Fast learner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Knowledge of garment construction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Practical thinker	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Customer service skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Other: please specify and rate importance.

Questionnaire - Lectra SA

***6. The following have been stated as reasons for skills shortage.**

Please indicate if it is applicable to CAD pattern makers in the clothing industry.

(1 = Strongly disagree and 4 = Strongly agree)

	Strongly disagree	Disagree	Agree	Strongly agree
Uncompetitive labour conditions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Insufficient numbers of qualified people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inadequate quality of qualified people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of personal attributes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Quality of experience	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low levels of literacy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Low levels of numeracy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Older staff with many years of experience are now retiring	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Negative image of the clothing industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Poaching of staff for more lucrative opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Job hopping	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mismatch between qualification and ability to do the job	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Retraining of staff not being carried out	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training courses too expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
No time for up skilling	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Up skilling too expensive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectations from company too high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Expectations from trainers too high	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content and quality of courses offered at Universities is inadequate to meet company needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Content and quality of courses offered by service providers are inadequate to meet company needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training courses difficult to understand	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Questionnaire - Lectra SA

Operators do not know the full capability of the technology

☐☐☐☐

Operators battle to achieve a comfort level with the technology, resulting in job insecurities and causing a negative attitude towards technological advancements.

☐☐☐☐

Other: please specify and rate accordingly

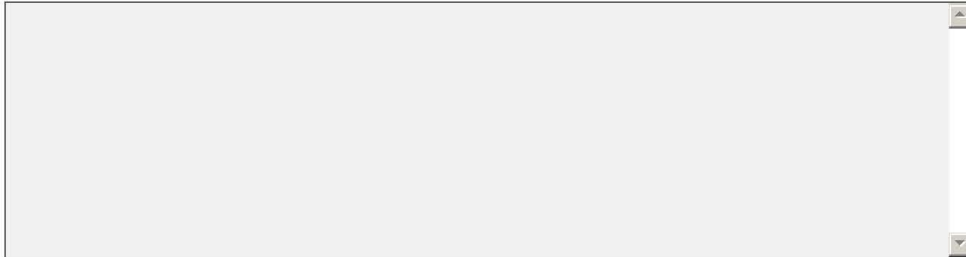
Questionnaire - Lectra SA

***7. In your experience do clothing companies have a high turnover of CAD pattern makers?**

☐ Yes

☐ No

If 'Yes', please explain the reasons for it.

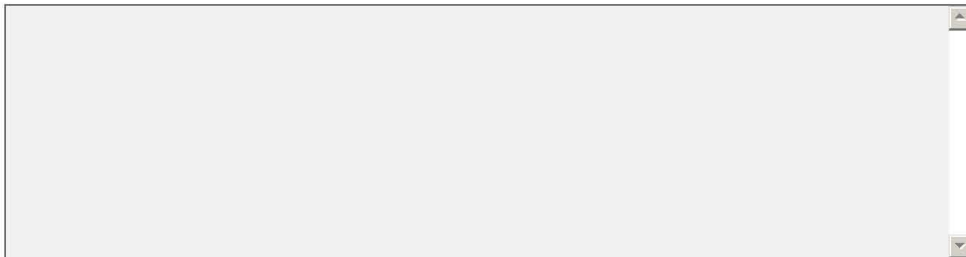


***8. Will the up skilling of CAD pattern makers have a positive impact on companies' productivity?**

☐ Yes

☐ No

Please explain your answer.



***9. How often do clothing companies send CAD pattern makers to Lectra SA for first time training on CAD software?**

☐ Never

☐ After six months of employment

☐ After they have been employed for one year

☐ If 'Other', please specify.



Questionnaire - Lectra SA

***10. How often do clothing companies send CAD pattern makers to Lectra SA for upskilling on CAD software?**

- ☐ Never
- ☐ Every six months
- ☐ Once a year
- ☐ If 'Other', please specify.

***11. Do you advise your customers on how often they need to send their CAD pattern makers for training ?**

- ☐ Yes
- ☐ No

***12. If a clothing company were to contact Lectra SA for advice on who to employ as a CAD pattern maker would you recommend:**

- ☐ a graduate from a tertiary institution trained on utilising the Lectra CAD software.
- ☐ training existing staff to operate the CAD pattern making software

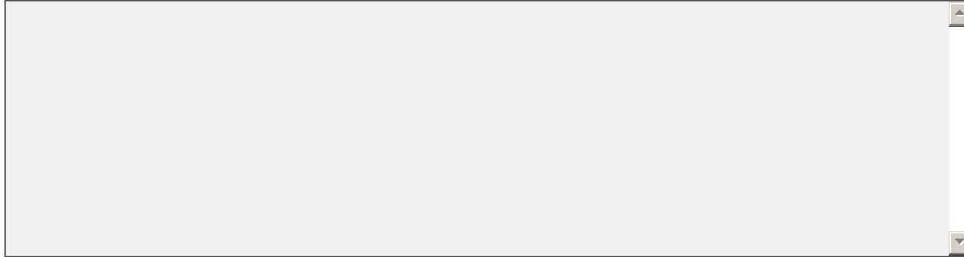
Please explain your answer.

Questionnaire - Lectra SA

***13. In the past, have you trained a graduate from a tertiary institution as a CAD pattern maker?**

- ☐ Yes and I was satisfied with the graduate's competency.
- ☐ Yes, but I was not satisfied with the graduate's competency.
- ☐ No.

Please explain your answer.

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***14. What would your recommendations be to prevent lack of skills in future CAD pattern makers?**

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