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Challenges of the technical skills gap in South Africa's heating, ventilation and air conditioning sector

Marco Ferdinandi

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

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ABSTRACT

The topic of skilled labour is discussed in many fora across all types of industries locally and internationally. The main theme of this research was to seek confirmation that a shortage of skilled labour in the heating, ventilation and air conditioning HVAC industry in South Africa has consequences and challenges that need to be addressed

The study of skilled and unskilled labour is a large field with many different facets, some obvious and others not. The problem of where to start and stop is in itself a challenge. Skills requirements vary considerably from one industry to another, with only some skills being transferable. This study investigates a very specific area, the heating, ventilation and air conditioning HVAC sector in South Africa. The HVAC industry is specialised in that it requires a technically qualified individual to work on the equipment commissioned to deliver the desired air quality and temperature to make modern buildings habitable.

A qualitative approach was used to interpret the data collected during the research phase. A questionnaire was used to survey the sample selected. The findings were then extrapolated and interpreted into a set of results which supported or did not support the propositions made in this report.

The key finding was that the heating, ventilation and air conditioning HVAC industry in South Africa is facing a skilled labour supply problem, due to the lack of training. To address this problem, both industry and government training interventions were necessary.

The challenge of skilled labour seems to be an international problem. Developing countries must protect their skills base because vibrant first world economies will seek skilled labour abroad.

DECLARATION

I, Marco Ferdinandi, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Marco Ferdinandi

Signed at ……

On the …….. day of …… 2011

DEDICATION

To my mom and dad, for always believing in me.

ACKNOWLEDGEMENTS

I would like to thank all the contractors in the South African heating, ventilation and air conditioning industry who participated in this study. I very much appreciate the time and help you gave me to gather the information I required to complete this study. I hope the findings will in some small way help our industry improve.

To all my, work colleagues, friends and family members who kept asking me from time and time if I had finished my MBA, thank you!

Many thanks are also due to my two business partners, Chard Whitley and Derick Odendaal, for supporting me through this process and who willingly gave me the time and resources to obtain this qualification.

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1 INTRODUCTION

The challenge of sourcing skilled labour is a topic debated worldwide, in both first and third world economies (Barnow, 1998). The objective of this research was to first highlight the current status quo regarding the supply of skilled labour in the South African Heating, Ventilation and Air conditioning (HVAC) industry. The second thrust was to identify the reason for this lack of supply and the third, what the heating ventilation and air conditioning industry should be doing to realign itself with the industry demands.

The motivation for the research stemmed from 20 years of personal experience within the construction and building industry and ongoing formal discussions about the inherent lack of suitably skilled individuals within the heating ventilation and air conditioning industry.

Clean and healthy building spaces are essential workplace requirements for corporate, public service and industrial South Africa. It must be noted that the control of these working environments within building spaces is included in the Building Regulations Act (RSA, 1977). Therefore, the necessity for reliable air conditioning and ventilation installations is a legal requirement. The equipment commissioned to provide these artificial environments must be installed and maintained to specific standards. The standards are set by engineering firms accredited by the Engineering Council of South Africa (ECSA). These firms are tasked with the responsibility to design the systems in accordance with the aforementioned Building Regulations Act. The contracting firms appointed to do the installation and maintenance of the HVAC equipment will, in turn, require suitably skilled technicians to carry out the work in accordance with the initial specification. In a sense, a cycle of skills is required to design, build, commission and maintain a building for commercial use.

The mismatch between supply and demand of skilled labour was the basis of this research. The challenges faced by the HVAC contracting firms associated with this skills supply problem were further explored.

1.1 Purpose of the study

The purpose of this research was to identify the challenges related to sourcing skilled labour within the heating ventilation and air conditioning sector, from small and medium enterprises, through to large multinational firms. Furthermore, the question was asked, what are the reasons for this lack of skills supply and how can the heating, ventilation and air conditioning industry realign the sector from its current position to the required position of skills supply?

This report focused solely on the heating, ventilation and air conditioning (HVAC) sector within the building industry of South Africa.

1.2 Context of the study

The challenge of skilled labour is a reality in South Africa (Bhorat, 2002). The reason for this inherent lack of skills supply stems from skills migration of well-trained individuals to other countries faced with their own skills shortages (Bhorat, 2002). This is more evident when considering that South Africa's government administration does not have clear defining targets for uplifting skills in South Africa (Daniels, 2007a).

> "Nothing short of a Skills Revolution by a nation united will extricate us from the crisis we face. We are addressing logjams, some of which are systemic and therefore in some cases entrenched even in the post-apartheid South Africa. The systemic nature of some of our challenges undermine our excellent new policies, at least in the short term, hence the need for interventions such as JIPSA to enhance implementation of our policies." (Mlambo-Ngcuka, 2006b:1)

South Africa's significant skills shortage (Daniels, 2007a) is common in emerging economies and sustainability of their skills base is becoming even harder. Skills have no borders and migration to economies willing to employ skilled persons is too lucrative to ignore (Noorbakhsh, 2001).

Countries with a mature, well-developed skills base will have a significant advantage when attracting direct foreign investment (Noorbakhsh, 2001). Large

multinational corporations will look for a strong skills base within an economy as an essential decision tool to invest or not. Without skilled labour to protect and look after their invested interest from a fixed asset position, large international firms will be reluctant to invest in a country with a low skills base (Noorbakhsh, 2001). A stable third world economy requires a constant flow of highly skilled individuals to transform itself from a third world to a first world economy (William, 2001).

Intervention from national government level through to the private sector will be required to address the skills shortages faced in South Africa. However, many other developing and developed nations face a similar challenge, thereby stimulating the international demand for skilled labour and so adding pressure to South Africa to react (Campbell, 1999b).

The past five years have seen a significant mismatch between the supply of skilled labour and the demand for skilled labour within the building industry in South Africa (Dias, 2007). This gap has been growing at a steady rate and will only be amplified with the targeted growth of 6% to 8% in 2014 (Campbell, 1999a). Therefore, adding pressure to the demand side of the skills market will put more strain on an already stretched resource (Campbell, 2005).

The skills supply and demand gap and its related challenges is the basis of this research. The firms that formed part of the report were contractors and consulting firms associated to governing bodies, for example the South African Refrigeration and Air Conditioning Contractors Association (SARACCA) and the South African Institute of Refrigeration and Air conditioning (SAIRAC).

Briefly, all building disciplines - electrical, civil, structural and mechanical - work through professional teams made up of engineers, architects and building contractors, all of whom are tasked with a specific discipline ranging from design, to engineering services required to make buildings habitable. Contractors are appointed to execute the installation according to the specifications issued by the professional team. Consequently, each appointed contractor, either plumbing, electrical or air conditioning, will then have to

source suitably skilled labour to carry out the work in accordance to the specified designs.

There are legislative controls in place for various disciplines, for example, an electrical compliance certificate confirming the integrity of the electrical installation and safety certificates for the lift and escalator installations must be issued in accordance with the Occupational Health and Safety Act of South Africa (RSA, 1993). Clearly, not meeting these standards could lead to severe, even fatal, consequences such as a failed lift.

However, the legal constraints facing the HVAC sector are under review. Of particular concern is when HVAC firms work with dangerous gases housed in high pressure vessels which require a skilled artisan: this has not always been the case (Parker, 2008b).

The hazardous risk of this practice in itself should motivate the need for a specific type of skilled labourer. Unfortunately, the HVAC industry is not taking this risk seriously enough (Parker, 2008a). Parker notes that government intervention would be required to force HVAC contracting firms to take the practice of handling dangerous products more seriously. However, until there are stricter controls in place, HVAC firms will continue to hire under-skilled labourers to handle the dangerous gases used on refrigeration and air conditioning plants throughout South Africa (Parker, 2008b). Therefore the necessity of legislative enforcement within the HVAC industry needs to be encouraged (Parker, 2008a).

South Africa's economy was stimulated by the infrastructural demands of the 2010 Soccer World Cup tournament and the 2009 Confederations Cup (Crush, 2002). The pressure of delivery to meet the infrastructure required to host these events had a direct bearing on the ability to employ the appropriate skills to ensure a high level of quality service (Daniels, 2007b).

The data gathered from the contracting firms within the HVAC sector have been analysed in this report to further understand the nature of the skills supply problem.

1.3 Problem statement

1.3.1 Identify the challenges related to sourcing skilled labour within the heating, ventilation and air conditioning sector from small and medium enterprises through to large multinational firms.

1.3.2 Explore how the heating, ventilation and air conditioning industry can realign the sector from its current position to the required position of suitable skills supply.

1.4 Significance of the study

The study aims to provide guidance and information to heating, ventilation and air conditioning company owners with regard to the position of skilled labour supply within South Africa. These company owners are at the coal face as they understand the consequences of not having suitably skilled staff in the field representing their organisations. Their experience is hands-on and this study attempts to give these individuals a better understanding of how the South African HVAC industry has found itself in this critical situation, in order that they may take steps to alleviate the problems.

1.5 Delimitations of the study

- The research focused solely on the heating, ventilation and air conditioning (HVAC) sector within the South African building industry.
- There are many other areas within the building industry such as plumbing, electrical and fire safety. These disciplines have not been included in the sample although they too have their own associated skilled labour shortages.
- Geographically, only contractors within Gauteng, KwaZulu Natal and the Western Cape regions were surveyed.

1.6 Definition of terms

Term	Meaning
ACRICSA	Air conditioning and Refrigeration Council of South Africa
Building industry	The industry as a whole responsible for construction and refurbishment of new and existing buildings whether used for residential and/ or commercial use
Contractor	Independent company contracted to do the installation of HVAC plants
HVAC	Heating, Ventilation and Air conditioning
JIPSA	Joint Initiative for Priority Skills Acquisition
NQF	National Qualifications Framework
SAIRAC	South African Institute of Refrigeration and Air conditioning
SAQA	South African Qualifications Authority
SARACCA	South African Refrigeration and Air conditioning Contractors Association
Skilled labour	an individual with the appropriate NQF skills level
Under-skilled labour	an individual with limited formal training

1.7 Assumptions

The following assumptions were considered:

A. The perceived skills shortage in the HVAC industry affects all firms within the industry

B. The contractors sampled were open and truthful when rating their perception of the current skills position within the South African context.

2 LITERATURE REVIEW

2.1 Introduction

"Skills shortage" is defined as:

> "a market disequilibrium between supply and demand in which the quantity of workers demanded exceeds the supply available and willing to work at a particular wage and working conditions at a particular place and point in time" (Barnow, 1998:5).

The literature suggests that sustaining skilled labour is a common challenge worldwide (Bhorat, Meyer and Mlatsheni, 2002). However, and with reference to Barnow (1998), the difference in the South African context is rather on skills shortage than a labour shortage. For example, the South African labour market has an oversupply of under-skilled labour and an undersupply of skilled labour (Daniels, 2007b).

With reference to the literature, the gap between skilled job vacancies and the supply of skilled labour has indeed widened over the past decade (Daniels, 2007b). The challenge with this limited skills supply has a direct bearing on the ability of contractors to complete projects within specification. This challenge will be considered by multinational firms when deciding on their investments in a foreign country like South Africa.

2.2 Definition of topic

2.2.1 Significance of South Africa's history

South Africa's history has played a significant role with regard to the level of skilled labour available today (Bhorat et al., 2002; Daniels, 2007b). During the apartheid era, up-skilling of the then "Bantu" population was not considered an important need for South Africa (Daniels, 2007b).

This historical position has contributed to the significant skills gap within the South African labour market today (Lewis, 2002a). Addressing this skills supply gap has become an urgent task for South Africa.

The consequence of South Africa's history has exposed many challenges. The uncertainty of South Africa's future has resulted in many well educated, highly skilled South Africans choosing to emigrate to countries like Canada, New Zealand and Australia (Daniels, 2007b). The "brain drain" phenomenon has in itself added to the large exit of skilled labour from the South African work force (Momburg, 2008). Momburg adds that skilled South Africans have options and will be either approached by international recruitment agencies or look for lucrative opportunities aboard themselves. Migration of skills has been a challenge for all developing countries and South Africa is no exception (William, 2001).

2.2.2 Current position in South Africa

The problem of South Africa's skills shortage goes deeper than the active labour market. The 2008 Grant Thornton International Business Report (Thornton, 2008) confirms that South Africa's primary and secondary school results need to be addressed. Notably weak areas of maths and science are of concern. It is at this basic level of education on which South Africa needs to focus, before it can hope to make a significant difference in closing the skills gap within its labour force (Bamjee-Mayet, 2008). A key factor with regard to this weak base is the quality of teaching staff within South African schools (Daniels, 2007b).

The South African government, realising and acknowledging that a skills crisis has become a reality (Mlambo-Ngcuka, 2006a), promulgated the Skills Development Act in 1998 with the intention of uplifting all skills levels within South Africa. The Act delineates the responsibilities of the National Skills Authority, the National Qualifications Framework (NQF), the South African Qualifications Authority (SAQA) and the Sector Education and Training Authorities (SETAs).

The National Skills Authority is tasked with an advisory role to the Minister of Education, specifically in the areas of development, strategy, regulation and implementation of skills in South Africa.

The National Qualifications Framework (NQF) is tasked with the classification, registration, articulation and upgrading of all national qualifications (Daniels, 2007b). The objectives of the NQF are to accelerate, facilitate, enhance and integrate training and employment opportunities.

The South African Qualifications Authority (SAQA) has the responsibility to take a consultative role between the National Qualifications framework (NQF) and Parliament. Its objectives are to engage with and push through the objectives of the NQF (SAQA, 2000).

The feedback from government departments consulted on progress, amendments and recommendations are presented to the Minister of Labour and the Minister of Education. Finally, the 25 SETAs are tasked with coordinating and assisting industry to up-skill their specific skills levels from a broad perspective to a critical perspective.

However, the coordination between the Sector Education Training Authorities (SETAs), Department of Education, Department of Labour, National Qualifications Authority (NQF) and South African Qualifications Authority (SAQA) appears to be less than satisfactory (Daniels, 2007b).

The underperformance of these bodies to increase the skills levels within South Africa's labour market is of concern (Daniels, 2007b). This underperformance has led to the formulation of the National Skills Development Strategy (NSDS). The aim of the NSDS is to identify a strategy to find solutions to solve South Africa's skills supply challenge. The first step was to identify a critical scarce skills list.

The NSDS, together with the SETAs, has been given the responsibility to first identify a critical skills list in each sub-sector. Each list will then have a strategic plan assigned with the sole purpose to increase the supply of these critical skills.

Importantly, the National Qualifications Framework (NQF) requires co-ordination between the Department of Education (DOE), industry and the SETAs to ensure the up-skilling of South Africa's labour force to meet their objectives (Daniels, 2007b).

Table 1: Satisfaction with the services of SETAs rendered during 2002/03

Services	**1**	**2**	**3**	**4**	**5***	**Could not comment**
	%	%	%	%	%	%
Advice and Support (Leadership)	34.5	9.8	18.0	8.2	4.1	25.3
Easy Submission procedures	30.9	7.2	21.6	7.7	3.6	28.9
Internet site and web page	35.1	8.8	15.5	4.1	4.6	32.0
Promptness in paying grants	33.0	7.7	15.5	3.1	3.1	37.6
Providing information about courses, programmes and training	32.5	8.8	21.6	6.7	5.2	25.3
Providing information about grants	35.1	908	20.6	4.6	2.6	27.3
Provision of free training not funded by employers	40.2	8.8	12.4	5.2	3.1	30.4
Response to queries	32.5	6.2	17.0	5.2	3.6	32.5

Source: Reproduced from DOL (2005a)

A score of 1 indicates that the respondents do not think their SETA did a good job at all, while 5 indicates the respondent thinks their SETA did do a good job to a large extent. Thus we can see that the satisfaction scores for the SETAs are very low. On average one third of the scores indicate that the SETAs did not provide a satisfactory service

A concern voiced by Lewis (2002) and Daniels (2007) is that South Africa cannot afford government initiatives to become weighed down by bureaucratic procedures with regard to the urgent skills supply problem and therefore intervention is urgently required.

Furthermore, not just immediate resolution of the various bodies tasked with the up-skilling initiatives needs to be addressed, but long-term government intervention will be required to address the supply of skills (Altman and Mayer, 2003). In other words, by offering short-term employment projects for periods up to six months will not assist in up-skilling South Africa's work force. The only result of this short-term initiative is short-term employment rather than up-skilling.

Table 2: SETA Performance against the Growth and Development Summit (GDS) Learner Commitments (Learners below the age of 35 years)

SETA	GDS Commitments	Total by March 2004	Difference
FASSET	1,200	2,931	1,731
BANKSETA	1,505	1,115	65
CHIETA	1,466	1,945	479
CTFL	1, 080	1, 914	834
CETA	2, 174	1, 042	-1, 132
DIDTETA	8, 600	1, 423	-7, 177
ETDPSETA	5,000	4,145	-855
ESETA	782	849	67
FOODVEB	1,200	2,199	999
FIETA	825	871	46
HWSETA	2,000	4,131	,2131
ISETT	1,500	2,935	1,435

SETA	GDS Commitments	Total by March 2004	Difference
INSETA	350	350	0
LGWSETA	670	3,110	2,440
MAPPP	653	1,182	529
MQA	7,340	4,089	-3,251
MERSETA	8,831	9,671	840
POSLEC	300	100	-200
PAETA	1,000	722	-278
PSEATA	10,000	220	-9,780
SETASA	489	158	-331
SERVICES	4,148	8,212	4,064
THETA	8,000	7,011	-989
TETA	2,250	4,425	2,175
W&RSETA	2,000	4,556	2,556
TOTAL	72,908	69,306	-3602

Source: Reproduced from Kraak (2008b)

With reference to Table 2, the heating, ventilation and air conditioning industry falls under the MERSETA and the results look positive as opposed to the commitment made. However, it is important to note that the motor industry also falls into the MERSETA area and it has, with the help of the large motor manufacturers, undertaken extensive up-skilling campaigns to fall in line with international pressures.

The literature describes mismatching of skills (Barnow, 1998). For example, in North America the need for electricians is low due to an oversupply of certified electricians. Conversely, the demand for other skills, like plumbers, is high due

to the undersupply of certified plumbers. This oversupply and undersupply problem suggests a mismatch between two skills areas (Barnow, 1998).

Within the South African context this is not the case, as all skills are facing a short supply including technical, medical and management (Barnow, 1998).

In addition, this mismatching effect can also be economically driven (Dias, 2007). For example, if a country decides to embark on an up-skilling initiative and does not foresee what skills will be required into the future, this lack of strategic foresight could result in a mismatch of skills supplied and demanded, indirectly creating a shortage of certain skills even though the best intentions were considered (Barnow, 1998).

Barnow also suggests that this mismatch can create disequilibrium of skills. Disequilibrium would result in employers being unwilling to pay higher wages due to the oversupply of certain skills. The economic principles of demand and supply can be applied here. Economically skilled labour would be demanded as a service and will be affected by the same rules as finished goods.

South Africa, compared to other similar developing countries, needs to have the same intensity of in-house training. With reference to Table 3 below, about 45% of our under-skilled and skilled labour force is being trained compared to countries like Poland, which is training around 80 to 86% of its active work force (Daniels, 2007b). Individuals who are being trained and invested in feel motivated and inspired to make a difference (Coffield, 2004b).

Furthermore, Table 3 is an overall illustration of in-house training done by private companies internationally and is not specific to an air conditioning industry. The percentages shown are for a specific group, either skilled or under-skilled. For example, in South Africa 44.6% of the private companies offer in-house training aimed at the skilled labourer and 45.5% for the unskilled labourer.

Table 3: Comparison of South Africa's training levels

COUNTRY	% OF SKILLED WORKERS	% OF UNDERSKILLED WORKERS
BRAZIL	77.3	68.3
CHINA	69.1	63.0
INDIA	55.0	33.0
POLAND	79.9	86.2
SOUTH AFRICA	44.6	45.8

Source: Clark et al, 2005: 65 (as quoted in Daniels, 2007)

South African firms are well below other developing nations. Notably China, with its 1.5 billion inhabitants, scores a higher percentage than South Africa for employees being trained in-house. The concern raised by Daniels (2007) and Dias (2007), ie if the SETAs performed as intended, the low score as noted in Table 3 would be higher. The ideal situation would be 100% training for under-skilled and skilled workers.

Table 4: Employment and Unemployment by labour skill category, 2000

Category	Labour supply (Thousands)	Employment (Thousands)	Unemployment (Thousands)	Unemployment rate (Percent)
Highly skilled labour	1350	1350	0	0.0%
Skilled labour	3495	2928	567	16.2%
Semi-skilled and under skilled labour	7359	3669	3690	50.1%
Informal labour	2547	1494	1053	41.3%
Total	14751	9441	5310	36.0%

Source: South African CGE model based on statistics provided by Quantec Research.

Table 4 illustrates the unemployment rate for highly skilled labour at 0%. Unfortunately Table 4 does not indicate the actual demand figure for highly skilled labour. The table indicates that all highly skilled labour has found employment but not what the actual demand figure was.

2.2.3 Definition of skills shortage

The definition of skills is defined differently by economists and by government. Daniels (2007) illustrates that an economist regards a skilled person by his/her contribution to production and direct output. However, the South African government regards a skilled person in both absolute and relative terms referring to both qualification and experience without consideration to production (Daniels, 2007b). Therefore, an under-skilled person would be someone who has neither a qualification nor suitable experience to carry out a specific job (Daniels, 2007b).

With regards to Kraak (2008), the challenge of the skills shortage is far broader. For example, the challenge is not only the need for highly skilled individuals -

lower intermediary skills must also be considered. Developing countries such as South Africa must consider challenges across all skills levels with a strong emphasis on succession planning (Kraak, 2008a). In other words, developing countries must develop a skills base from school level upwards. This point was raised in the Grant Thornton Business report (Thornton, 2008). South Africa must start at the basic school level specifically in the areas of mathematics and science.

The challenge is the timing to meet the sudden demand of certain skills required (Owen, 2004). The indicator is when large multinational organisations, through to small enterprises, start doing their own in-house training (Owen, 2004). This in itself would indicate that the supply of skilled labour has not met the industry demand. Firms are therefore up-skilling internally to try and narrow this gap (Daniels, 2007b). According to Daniels (2007) South Africa is behind other developing nations when it comes to in-house training and up-skilling initiatives as noted in Table 3.

However, with reference to South Africa, a few unique reasons may be added to explain the lack of skilled labour supply. The discontinuation of the apprentice learning centres (Wocke, 2002) has added to the significant skills gap within South Africa. This was further noted during a MERSETA workshop on scarce skills which concluded that apprenticeship programmes would need to be revived (MERSETA, 2006). In addition, the literature suggests that the South African Department of Labour (DOL) has underperformed on their mandate to provide suitable skills programmes.

This is not good news for the mass unemployed, under-skilled work force present in South Africa (Daniels, 2007b). In addition, the shelving of the apprenticeship programs has proved to further widen the skills gap (Barnow, 1998). For example, India and Germany have increased their emphasis on the reintroduction of their apprenticeship programs with significant success (Persing, 1997).

In addition, there is the lure of international employment agencies offering lucrative contracts to many skilled South Africans. This in itself would suggest

that countries such as the United Kingdom, Canada, New Zealand and Australia are experiencing their own skilled labour supply problems (Bhorat et al., 2002). Therefore, the challenge South Africa faces is that if the country is unable to find a way to retain its skilled labour, the rest of the modern world will keep poaching qualified and skilled South Africans to meet their short supply. Furthermore, the constant threat of a prevalent high crime rate adds to the motivation for skilled South Africans to migrate to safer first world countries.

National government intervention is required (Wocke and Klein, 2002). South Africa needs to close the gap between the supply and demand for skills in the future. The motivator is sustainable economic growth. As South Africa's economy grows, the pressure on skilled labour has a direct relationship to this growth and serious intervention is required to meet this challenge (Lewis, 2002b).

The literature reviewed clearly illustrates that there is a large skills gap which has been amplified by South Africa's current economic growth, essentially widening the gap on a daily basis as the South African economy continues to grow (Campbell, 1999b).

At the Frigair conference 2010 held at NASREC, Dr Raymond Patel noted that South Africa is facing a significant lack of supply of skilled artisans within the HVAC sector (Patel, 2010). Furthermore, the growth trend in demand for skilled labour will be around 28% over the next eight years (Patel, 2010).

2.2.4 International skills situation

The development and retention of skills within first world countries has been under discussion for a long time. Highly skilled labour is required to sustain economic growth and activity (Skinner, Saunders and Beresford, 2004) in developing and developed countries. It is the competitive advantage that international investors seek when deciding to enter certain markets around the globe. Therefore, a robust and expanding skilled labour force is essential (Skinner et al., 2004).

Internationally, firms are not identifying their own skilled shortages within their own organisation. The reasons for this lack of understanding have been ascribed to the firms not actually knowing what skills they may need in the future (Ellis, 2003). This phenomenon highlights the notion that strategically deciding what skills will be required in the future has its own challenges (Ellis, 2003). The skills required today may not be needed in the future due to the fast changing economic environment. The information technology industry would be a case in point.

The literature also suggests that training and development improves the commitment of employees (Coffield, 2004b). This stands to reason, as people feel empowered and their self-belief increases, resulting in a motivated and committed work force. In addition, the on-going up-skilling of individuals will increase their chances of employability and increased earnings (Coffield, 2004a).

Internationally, the reality that employees are not notifying their employers of their desire to increase their personal skills also exists (Skinner et al., 2004). Interestingly employers with the financial means to invest in skills sometimes choose not to invest in programmes, due to market demands not allowing the back-up or time resources to send staff on up-skilling programs (Skinner et al., 2004).

The need to up-skill a work force is debated worldwide and parallel to this is the retention of skilled labour (Phillips, 2007a). Therefore, looking at up-skilling independently is not advised: considering it from the employees' point of view is equally important. There must be a two way relationship with regard to up-skilling an individual. The employer benefits by having access to skilled labour for a reasonable length of time to recover the cost of training and the employee gains a skill.

Globally, human resource managers have found themselves in the unfamiliar position as marketers (Phillips, 2007a). To attract highly skilled top performers, companies are now having to create a company image that will be attractive to such workers (Phillips, 2007a).

The set objectives between the human resources department and the marketing department within large multinational organisations have shown mismatches, highlighting the fact that most human resource departments are either not included in the strategic planning of these large multinational firms or are behind the times (Phillips, 2007a). Therefore, human resource departments will need to align themselves with their company's overall objectives and goals. They have the human capital know-how to make it happen through their recruitment and training strategies (Horwitz, 2005).

Importantly, the willingness of the young population wanting to gain skills has become a concern (Wright and Geroy, 2001): this phenomenon is clearly evident in Canada. With this lack of willingness, in-sourcing of skills initiatives from countries like South Africa have become common place (Wright and Geroy, 2001).

The literature suggests that when developed countries face a skills shortage within a specific sector, finding the desired skill internationally and, more specifically, from developing nations like India and South Africa, has its advantages (Daniels, 2007b). This strategy reduces training time for a person to become economically active and this quick turnaround time is a motivating factor for developed nations seeking a quick and easy solution to their skills shortage. In addition, the rate payable is often lower than hiring locally.

Cultural differences should also be considered (McIntosh, 2005b). Canada looked at the German model of apprenticeships and quickly rejected this route of up-skilling. Within their society, apprenticeships are looked down upon as manual labour. This posed a problem, as many young individuals would feel stigmatised by the apprenticeship program. The challenge here is how to make a technical qualification "cool" and attractive to young individuals (McIntosh, 2005a).

Conversely, Germany's apprenticeship programmes have motivated early school leavers (McIntosh, 2005a), noting that exposure to the classroom environment for these individuals is problematic. They are far more motivated by the on-the-job training format of apprenticeships. They see themselves as

contributors in society and develop a practical approach to their lives rather than an academic one. Apprenticeship programmes have been successful around the world for this reason (McIntosh, 2005a).

The speed of economic change within first world countries will result in a skills change lag time. North America's economic environment plays a role. Their business needs change quickly and companies want the flexibility to hire and fire as the environment dictates (Wright, 1997).

Furthermore, when a country is faced with a skills supply challenge, what actual skills will be required in the near future? This is a crucial point, as it would be pointless to promote the up-skilling of electricians when the country has an oversupply of electricians. The challenge then arises: what skills are needed right now and what skills will South Africa need in the future?

2.2.5 South African economic pressures

South Africa has over the past five years experienced significant economic growth (Mlambo-Ngcuka, 2006b). Associated with this growth has been the pressure to provide basic infrastructure, from roads and food, to health and security. This is all too evident when driving through any major city in South Africa today. The development and sustainability of this increased pressure requires skilled personnel, from engineers to skilled labourers, to mention a few. Therefore the vacuum caused by this energetic economic environment must be anticipated in the future (Chandra, Moorty, Rajaratnam and Schaefer, 2001).

Conversely, if a country like South Africa had sufficient skilled labour to meet the production needs, this in turn would have a positive effect on direct foreign investment opportunities (Lewis, 2002a). The more skills per capita, the more productivity can be expected (Giles and Campbell, 2003). Internationally a competitive South Africa would stimulate the country's foreign reserves as a whole (Lewis, 2002a)

During 2002, Bhorat and Lundall conducted a survey to conclude what firms felt was one of their biggest economic challenges in South Africa. The shortage of

skilled labour ranked the highest, particularly among firms with 200 and more employees (Bhorat et al., 2002). A year before Bhorat and Lundall's report, Chandra et al. (2001) wanted to verify what one of the biggest contributing factors was for small firms not being able to grow – the lack of skilled labour was a significant contributor.

2.2.6 Skills required

The National Qualifications Framework level required for the installation, maintenance, servicing and replacement of air conditioning systems is NQF level 4 (RSA, 2007). Importantly, the need for the lower skilled worker from NQF level 1 to 5 must be considered to ensure suitable succession.

The need for continuous improvement in respect of artisans wanting to qualify up to NQF level 5 competency is key (Kraak, 2008a). Kraak (2008) mentions that the under-skilled person must have a clear path from entry into the specific skills base, through to senior status. The uncertainty of not having a clear path to becoming a qualified skilled person leaves individuals disheartened and they will more than likely leave the industry to look for other opportunities. With reference to Table 5 each industry needs to have a clear route to higher skills attainment.

Table 5: Skills on the National Qualifications Framework (NQF)

NQF Level	Skill Band
1	Low Skill
2	(Pre-Matric)
3	
4	Intermediate Skill
5	(Equivalent to Matric and Matric plus Diploma)
6	High Skill
7	
8	(Equivalent to a higher education degree and postgraduate courses)

Source: Reproduced from Kraak (2005: 69)

The underperformance of Sector Education Training Authorities (SETAs) has not helped in the retention of these individuals within specific industries (Chandra et al., 2001). With reference to Appendix B, there is a clear illustration of what routes can be considered to becoming a fully qualified artisan, namely: Apprenticeship Route, Learnership Route, Internship/Skills Programme Route and Recognition of Prior Learning Route. However, if the support from the industry specific SETA is not performing as mentioned by Chandra et al (2001), the motivation from both employee and employer will be lost.

There is another area of concern, that of wage imbalance directly associated to gender discrimination, which has added to the skills gap (Campbell, McKay and Thomson, 2005). Females are reluctant to enter the technical field for fear of discrimination by their male counterparts.

The Department of Home Affairs has a “scarce and critical skills” list, illustrating the number of individuals required in each occupation: however, it is unable to indicate how many local South Africans will be employed, as opposed to foreign nationals, to satisfy the need for these skills to be prevalent in South Africa.

Daniels (2007) noted that critical skills are listed into two groups: (1) generic skills made up of literacy, numeracy, language and problem solving; (2) occupational skills referring to performance within an occupation. The latter group suggests that firms looking to employ skilled artisans within a specific sector will be faced with a supply shortfall.

2.2.7 Research propositions

The research propositions will enlighten contracting firms within the South African HVAC market of the challenges related to sourcing skilled labour within the heating ventilation and air conditioning sector, from small to medium enterprises, through to large multinational firms.

Proposition 1 The challenges for contracting firms in South Africa are a shortage of skilled labour available and a lack of motivated youth entering the technical field as a career choice.

Proposition 2 The heating, ventilation and air conditioning industry can realign themselves through adequate training facilities, committed employers understanding the long term benefits of training and government intervention to enforce education and training at all levels.

2.2.8 Conclusion of Literature Review

The literature concludes that South Africa and the rest of the developing world face the common challenge of the skills gap. More than identifying this problem, a proactive stance needs to be put into place by the custodians appointed by government together with corporate and industrial South Africa, further ensuring that South Africa's skills base grows and is maintained.

Economically, the demand for skills is evident, from the 2010 Soccer World Cup tournament and the Gautrain project, to the upgrading of the roads network in and around all major cities in South Africa.

With reference to the critical skills list, the need for specific skills is high. The time lag, from school leaver to skilled person, must be considered. In addition, forward planning must be carefully considered. As noted, the skills we may think we need today may not be required in five years' time.

The importance of the 2010 Soccer World Cup showcasing South Africa as a stable country with a strong economy must not be underestimated. The tournament drew potential investors to the country and emphasised the importance for South Africa to display that it is able to handle this investment.

3 RESEARCH METHODOLOGY

A qualitative approach was taken in this research, since the data to be collected were in the form of words, descriptions, thoughts and perceptions of players in the HVAC industry (Miles and Huberman 1994), rather than aiming for numerical generalisation of the results. Qualitative data can be obtained via a number of mechanisms, including observation, interviews and open-ended questionnaires. Documentary archival evidence may also be sought where relevant, although this was not done in this study. As it turned out in this research, 45 usable responses were obtained (greater than the 30 required by the central limit theorem) (Lind, Mason and Marchal 2000), so it was possible to analyse the data to a certain extent with descriptive statistics (Leedy and Ormrod 2001). However, qualitative research is not without its drawbacks, often being time-consuming and labour-intensive. In addition, interpretation of the answers is subjective and dependent to a degree on the perspective of the researcher – although qualitative research does recognise this.

An important way of maintaining the integrity of the research is to apply appropriate, tested analysis methods, which was done here (Miles and Huberman 1994).

3.1 Research design

The research design was a simple qualitative approach. Words rather than numbers illustrate a chronological flow, leading events into consequences (Miles and Huberman 1994).

The objective of this approach was to try and gain a better understanding of the challenges the heating, ventilation and air-conditioning firms are facing within the local skilled labour market. The advantage with this approach was the simplicity of the research questions remaining as direct as possible limiting confusion as much as possible. The disadvantages were the confidentiality of the answers due to the sensitive nature of the topic and the researcher's impact on the answers whereby careful attention was made not to lead the respondents in anyway.

3.2 Population and sample

Population

The population for this research was the HVAC industry within South Africa. There is no formally published figure on the total number of contracting firms operating in South Africa's HVAC industry. This is due to the very low barriers to entry into the industry. Small informal concerns are easily started with very little capital input and they either grow to become large companies or just fade away unnoticed.

The population was companies responsible for the installation of air conditioning systems that have become popular in South Africa. The installations range from small domestic applications to large multi-story commercial and industrial applications. In addition, the maintenance of these large central plant systems common to large multi-story buildings are essential. Therefore, qualified labour is required to carry out the work in accordance to specific standards as mandated.

Sample and sampling method

A total of forty five (45) convenience samples were taken from various points of contact. Initially, contractors were e-mailed the questionnaires. Alternatively, several contractors daily visiting the researcher's offices in Johannesburg Crown X5 to purchase various components required to do air conditioning installations, were asked to complete the questionnaire in the presence of the writer. In addition to ensuring that a suitable sample was achieved, various appointments were made for one- on-one completion of the questionnaires; finally, to complete the sample, telephone interviews were conducted.

The advantage with the interviewing approach was consistency and the ability to get company owners and senior managers to focus and answer the questions asked in the questionnaire.

3.3 The research instrument

The methodological approach used was open questions addressing three areas, namely: is there a skilled labour shortage?; what are the reasons for this shortage?; and what needs to be done the fix the problem?.

Contractors were asked if they would like to remain anonymous. Interestingly, only one contractor decided to remain anonymous.

Using the qualitative approach in conjunction with the three themes as illustrated by Miles and Huberman (1994) the data were further understood.

The research instrument used was an open ended questionnaire followed with one-on-one interviews, either in person or telephonically, to gain additional information. The questionnaire covered three questions.

1. What are the main challenges you are facing when you are sourcing technical skills in your organisation?

2. What caused these challenges to arise?

3. How can the HVAC sector re-align these skills challenges?

3.4 Procedure for data collection

The procedure adopted for data collection was through e-mailed questionnaires. To ensure the questionnaire was completed, one-on-one interviews were conducted either at my offices or my client's offices or via the telephone. The structured approach seemed to be the most successful option as the respondents made the time to complete the questionnaires in the presence of the writer.

3.5 Data analysis and interpretation

Content analysis was used to interpret the data received. Common patterns and themes within the data were identified and interpreted within the context of the literature base. This approach to data analysis can produce clear, verifiable and

replicable meanings from the set of data if conducted systematically and thoroughly (Miles and Humberman 1994). The qualitative paradigm requires a focus on substance, depth and transferability rather than generalising the results. Every effort was made to use this approach in the interpretation phase of the study.

The analysis consisted of three activities as interpreted by Miles and Huberman (1994)

- Data reduction
- Data display
- Conclusion drawing / verification

Data reduction refers to the process of selecting, focusing, simplifying, abstracting and transforming the data from the raw responses received during the capturing process (Miles and Huberman 1994).

Data display is the organised assembly of information. The display activity will help further understanding of the data at a glance (Miles and Huberman 1994)

Conclusion drawing / verification is the description of what the data means from patterns, explanations, possible configurations and positions (Miles and Huberman 1994).

The difficulty of qualitative studies is attaining a reasonable sample of the population being studied. What are the influences that may be determining the responses within the study? What is the transferability of the derived findings?

A further difficulty with qualitative research is maintaining confidentiality of the answers to the questions. The respondents who contributed to this report were given the choice to write their details on the questionnaire or to remain anonymous. 98% decided against anonymity.

3.6 Limitations of the study

- In addition, there is a large informal or sub-contracting sector, made up of small companies mostly trading as sole proprietors. Estimating what this figure would be is very difficult to calculate, as the number of sub-contracting firms changes frequently. The reason for this high frequency is due to the easy entry into the air conditioning market.

- Furthermore, this research aimed to identify the risky practice of employing under-skilled labour to do a skilled job. The consequence of this dangerous behaviour to staff and customers is a sensitive issue. Therefore, getting contractors to be open during the data capturing was potentially a challenge, and why confidentiality was ensured, where it was asked for.

3.7 Validity and reliability

3.1.1 External validity

External validity relates to the generalising of the findings. Can the results be easily reproduced if done by another researcher or at a different time, in other words can the results be replicated? (Miles and Huberman 1994). Qualitative research results are not expected to be generalised as the number of respondents is usually quite small and they are not selected randomly.

3.1.2 Internal validity

The research questionnaire had to have a specific question asking the contracting companies if they had direct experience of this problem, how severe it was, and how did they see possibilities for resolution. The survey remained true to the intention of the research, namely to understand the challenges HVAC companies face with the skills shortage in South Africa.

3.1.3 Reliability

The reliability of the results was a key concern. To ensure reliability, the same question format was used for all respondents. The questions were kept simple and specific to the topic, ie the lack of skills in the South African HVAC industry. The intention of reliability is to yield the same results if repeated using a different set of samples within the same population (Neuendorf, 2002).

4 PRESENTATION OF RESULTS

4.1 Introduction

This chapter presents the results achieved during the research. The chapter has three dimensions in order of the question asked during the data capturing phase. Each section illustrates what themes have been identified and the support and frequency achieved for each theme.

4.2 Demographic profile of respondents

The demographic profiles of the respondents were typical heating ventilation and air conditioning contracting firms. The respondents were either the company owners or senior individuals responsible for the direct employment of technical staff. Careful attention was also given to the respondents' experience in the field of employment.

The overall willingness of the interviewees was good. Out of 45 individual companies that took part in the research, only one HVAC contracting company asked for their questionnaire to be kept confidential.

4.3 Question 1

> *What are the main challenges you are facing when sourcing technical skills in your organisation?*

The results from question 1 are illustrated in Figure 1. The intention of the question was to be as direct as possible. The overall response to the question supports proposition 1, that the HVAC industry in South Africa is facing a lack of skilled labour.

Four (4) themes were identified during the analysis of the data.

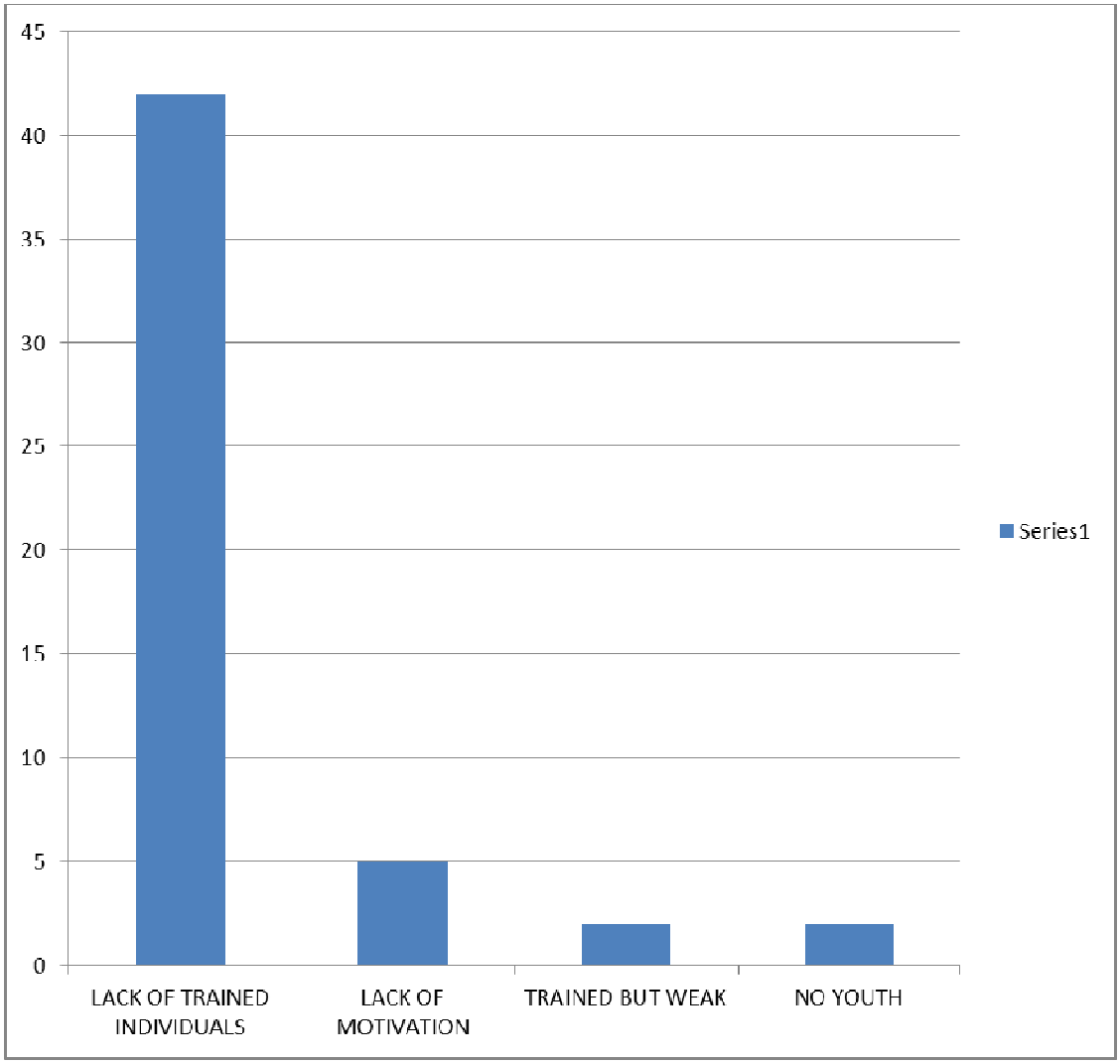


Figure 1: Results from question 1 (what are the main challenges you are facing when you are sourcing technical skills in your organisation?)

Lack of trained individuals:

The lack of trained individuals is the main challenge that contracting companies face when sourcing skilled labour within the South African HVAC market: 93% of the interviewees mentioned this as their biggest challenge. Interestingly, of the forty two (42) responses, only twenty three (23) mentioned that suitable training will be required to re-align the industry. However, more support for training was anticipated here.

Trained but weak:

The trained but weak finding received 4.4% support from the research. Neither of the contractors who mentioned the labour available is trained but weak noted that there were too many short courses. Various contractors elaborated that the short courses were not in-depth enough to be of any value.

Lack of motivation:

Lack of motivation was mentioned by 11% of the interviewees. Clarity would have been ideal here as it was unclear at what stage this lack of motivation was noticed. Was it noticed during the interview process or during the employment of the individual? However, out of the five (5) responses only one (1) noted that the youth require a clear career path.

No youth:

The point of no youth contributed 4% to the results. This is a concern to the industry. Only one interviewee mentioned that the industry must promote the HVAC industry to the youth as a way to re-align the HVAC industry with its skilled labour demand.

Summary of frequency responses to question 1:

The results attained during the data capturing phase clearly illustrate that the heating, ventilation and air conditioning industry within South Africa is facing a challenge when it comes to employing skilled labour. Furthermore, the trained but weak theme also supports the notion that there is a lack of skilled labour.

TABLE 6: FREQUENCY OF RESPONSES TO Q 1	
LACK OF TRAINED INDIVIDUALS	42
LACK OF MOTIVATION	5
TRAINED BUT WEAK	2
NO YOUTH	2

4.4 Question 2

Why?

The intention of question 2 was to find out from the sample what they think the reasons are for the lack of skilled labour. With reference to Figure 2 the reason for the lack of skilled labour supply was illustrated in various ways. During the analysis of the second question nine (9) themes were identified.

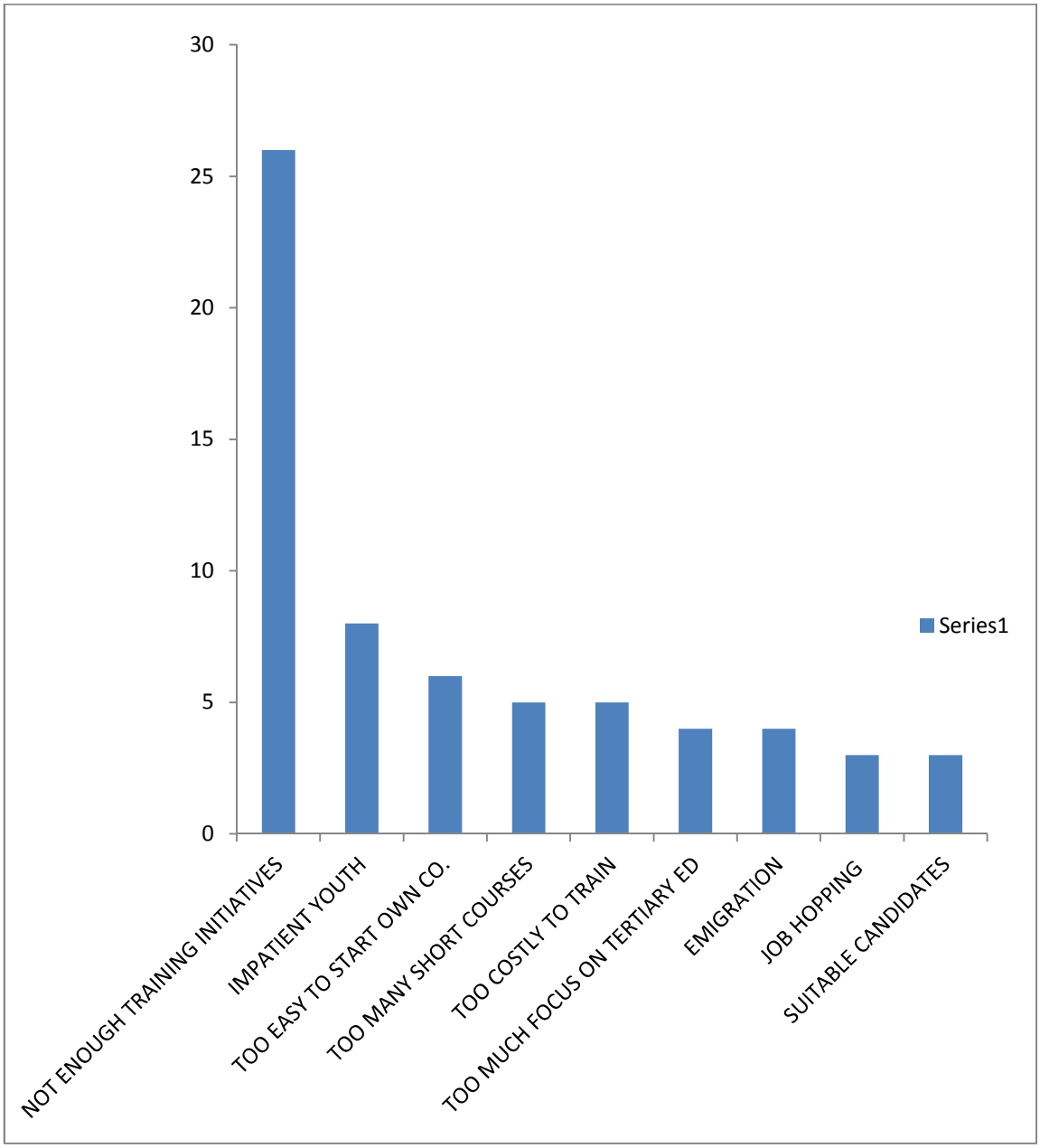


Figure 2: Results from question 2 (Why do the company owners and employers think that we have these challenges with regard to skill supply?)

Not enough training:

The results showed that 57% of the companies surveyed felt that there was not enough training available in the South African HVAC industry. Only one (1) contractor mentioned both the lack of training and that there are too many short courses on offer. The contracting company owners experience with short courses is that they don't offer an in-depth technical experience for their staff.

Although too many short courses did get 5% support from the contractors surveyed, a large majority supported the need for more training and the emphasis was on "suitable" training.

Impatient youth:

The response of impatient youth was an interesting finding as 17% of the sample noted that this was a problem. Furthermore, of the eight (8) companies mentioning that the youth are impatient, only one (1) company highlighted that there is too much focus on "tertiary education".

Too easy to start own company:

The point that it is too easy to start a business due to the low barriers of entry into the HVAC industry contributed 13% to the results. This issue is of concern and adds to the fact that legislation for companies handling refrigerant gasses is limited within the HVAC industry.

However, of the six (6) contractors who mentioned that it is too easy to start a company within the South African HVAC industry, only one (1) of the six (6) companies highlighted that government intervention would be required to re-align the skilled labour supply to the industry's demands.

Too many short courses:

There seems to be an oversupply of short courses within the South African HVAC industry. 11% of the responses noted this as a reason for the lack of skilled labour, commenting that the short courses did not offer an in-depth

technical learning experience. Three (3) out of the five (5) interviewees wanted the old trade test programme to return.

Too costly to train:

The lack of training was mentioned as the main reason for the lack of skilled labour in the South African HVAC industry. However, the response that it is too costly to train was not anticipated and was mentioned by 11% of the interviewees. Of the five (5) companies mentioning that it is too costly to train, three (3) highlighted that there were not enough training initiatives.

Focus on tertiary education:

Tertiary education was highlighted as a problem contributing 9% to the results. The contractors felt that the technical industry was not attractive enough for the youth. Interestingly, none of the interviewees who highlighted this point mentioned promoting the HVAC industry to the youth.

Emigration:

Emigration accounted for 9% of the responses. Keeping young skilled talent in South Africa and any developing country will be a challenge.

Job hopping:

6% of the interviewees mentioned that there is a lot of job hopping within the industry. Individuals move from one contracting firm to the next seeking better wages and positions. None of the interviewees who mentioned that job hopping was a challenge mentioned the point about impatient youth.

Suitable candidates:

Further adding to the lack of skills is the lack of suitable candidates mentioned by 6% of the interviewees. The response that there is not enough skilled labour within the South African HVAC market mentioned in the first question and illustrated in Figure 1 further supports this result, ie that there are not enough suitable candidates available for employment.

Summary of frequency responses to question 2:

The theme “not enough training initiatives” received significant support. In addition, the theme of “too many short courses” directly supports the notion that the heating, ventilation and air conditioning industry within South Africa needs appropriate training programmes.

TABLE 7: FREQUENCY OF RESPONSES TO Q 2	
NOT ENOUGH TRAINING INITIATIVES	26
IMPATIENT YOUTH	8
TOO EASY TO START OWN CO.	6
TOO MANY SHORT COURSES	5
TOO COSTLY TO TRAIN	5
TOO MUCH FOCUS ON TERTIARY ED	4
EMIGRATION	4
JOB HOPPING	3
SUITABLE CANDIDATES	3

4.5 Question 3

How can the HVAC sector re-align these skills challenges?

The intention of the third question was to further understand what the HVAC industry in South Africa could do to address this skilled labour supply problem. The question was open, allowing for all possible opinions to be noted.

During the analysis of the data received from question three (3), six (6) themes were identified.

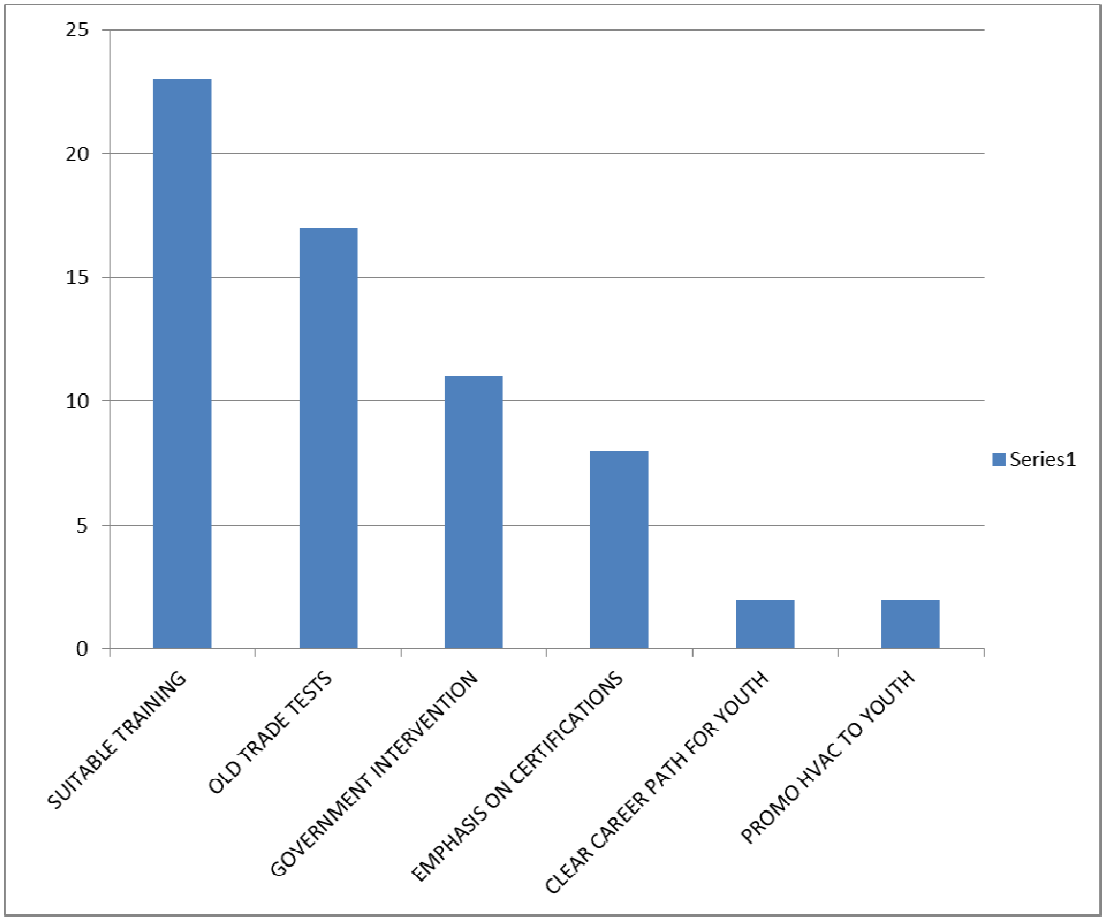


Figure 3: How can the HVAC sector re-align these skills challenges?

Suitable training:

Suitable training contributed 51% to the answers. The need for training has been highlighted several times in various forms during the research. The second biggest re-alignment initiative was the introduction of the trade test and apprenticeship programme.

Trade tests (apprenticeships):

Re-introduction of the old trade tests was supported by 37% of the interviewees, further supporting the need for adequate training. Out of the forty five (45) companies surveyed, seventeen (17) mentioned that the old trade test system must be reintroduced. The individuals surveyed felt technicians who passed the trade test of old were of a higher quality than in recent years.

Of the seventeen (17) companies supporting the reintroduction of the trade tests, six (6) also supported the finding that suitable training will be required.

Government intervention:

24% of the interviewees believed that government intervention would be required to get the industry back on track. This score was lower than anticipated and lightly supports the proposition that "*Government intervention would be required to meet the demand for skilled labour within the heating, ventilation and air conditioning industry".* The results were surprising as more support toward government involvement was anticipated.

Emphasis on certification:

The point that certification of skilled labour needs to be taken more seriously was highlighted by 17% of the individuals interviewed. Of the eight (8) firms that mentioned that certification is essential, only three (3) out of the same eight mentioned that government intervention is required.

Clear path for youth:

This response was interesting as there seemed to be a feeling that when a young individual enters the HVAC industry, there seems to be a lack of direction. This point was raised by 4% of the companies surveyed.

Promote HVAC to the youth:

Promoting the HVAC industry to the youth received 4% of the support from the interviewees. Interestingly, the companies that mentioned this in their questionnaire did not mention that the youth needed a clear path to grow their careers.

Summary of frequency responses to question 3:

Proposition 3 '*Government intervention will be required to meet the demand for skilled labour within the South African heating, ventilation and air conditioning industry.'* The frequency achieved for government intervention was lower than anticipated. An assumption may be made that government intervention will be required to ensure that the correct training standards are enforced via the unit standards and mentioned in the literature reviewed by Daniels (2007).

TABLE 8: FREQUENCY OF RESPONSES TO Q 3	
SUITABLE TRAINING	23
OLD TRADE TESTS	17
GOVERNMENT INTERVENTION	11
EMPHASIS ON CERTIFICATIONS	8
CLEAR CAREER PATH FOR YOUTH	2
PROMO HVAC TO YOUTH	2

4.6 Summary of the results

The results that were achieved during the research in many cases seem predictable. Responses to the question "does South Africa have a skills shortage?" indicate at a surface level that there is indeed a lack of skilled labour available. What is the reason for this lack of supply? Training was highlighted as the biggest reason and that is not surprising. How can the HVAC industry re-align itself with the supply of skilled labour? Suitable training was the overall consideration closely followed by the old trade test programme which in a sense supports the notion that training is urgently needed.

However, the results of impatient youth, lack of motivation, no youth, job hopping and too easy to start a company were unpredictable results.

5 DISCUSSION OF THE RESULTS

5.1 Introduction

This chapter discusses the results as presented in chapter 4 with reference to the literature reviewed in chapter 2.

The results received from the research confirmed that the heating, ventilation and air conditioning industry does experience challenges when sourcing skilled individuals. The first question asked the firms surveyed, 'what are the challenges they face when sourcing skilled staff?' The results here overwhelmingly indicated that there is a significant lack of skilled individuals within the South African HVAC industry. The results remained true to the literature reviewed (Daniels 2007; Kraak 2008; Chandra, Moorty, Rajaratnam & Schaefer 2001).

5.2 Demographic profile of respondents

The demographic profiles of the respondents were typical heating ventilation and air conditioning contracting firms. The respondents were either the company owners or the individuals responsible for the direct employment of technical staff.

Many of the individuals who participated in the research had themselves been employed to work as artisans and/or journeymen. Many of them obtained their technical qualification through the apprenticeship process.

All the companies, owners and senior staff interviewed met the demographic profile required for this study

5.3 Proposition 1

The challenge for contracting firms in South Africa is a shortage of skilled labour available and a lack of motivated youth entering the technical field as a career choice.

Lack of trained individuals:

The results as illustrated in Figure 1 indicate that there is a lack of skilled labour within the South African HVAC industry and the literature reviewed supports this notion. Daniels (2007) mentioned that South Africa is facing a skilled labour supply crisis. Various reasons were given, namely apartheid, the lack of government intervention and the sector education training initiatives, all of which are contributing to the crises we as South Africans are experiencing today.

This result was predictable when referring to the literature reviewed. This point was noted by forty three (43) of the forty five (45) contractors surveyed. The remaining two (2) contractors mentioned that the labour available has not been trained properly; this would suggest that they too have problems sourcing skilled labour.

Lack of motivation:

The interesting finding from 11% of the respondents - that staff in the HVAC industry lack motivation - is of concern. During the literature review Coffield (2004) mentioned that staff members supported by their employers are inherently more motivated. Typically, contracting companies in South Africa have this hardnosed “get the job done” mentality and this may contribute to the fact that staff are not mentored enough to stimulate a sense of personal growth.

The lack of motivation needs further research as this point came up sufficiently often to be considered for further investigation. The question that needs to be asked is, do South Africans see a technical career below the social acceptance line? One of the points raised during the survey (in question 3 - how the HVAC industry can re-align itself to meet the demand of skilled labour) was promotion of the industry to the youth.

Interestingly the issue with regard to the lack of motivation and not enough youth during the research seem to complement each other, further backing the notion that technical careers must be presented as a viable option for young technically minded individuals. South Africa seems to suffer the same stigma attached to a technical apprenticeship programme as Canada does, that technical careers are not attractive to the youth (McIntosh, 2005b).

Trained but weak:

The answer of trained but weak may indicate that training institutions generally recognised by the industry are not offering the quality of training essential to the HVAC firms employing skilled labour.

No youth:

The heating ventilation and air conditioning industry in South Africa cannot afford to have a lack of young artisans entering the industry. 4.4% of the responses noted this as a challenge in their organisation. Furthermore, Kraak (2008) adds that succession planning of skills needs to be taken very seriously. Developing countries must hold onto their skills base by ensuring continuity through their youth.

Conclusion:

The dominant theme, that there is a lack of skilled labour, came through clearly. The theme supports proposition 1 that air conditioning contractors in South Africa face a skilled labour supply problem. Indirectly, the point that the labour available is not trained well enough, also supports the fact that there is a challenge with sourcing skills. The unpredictable results from the data analysed were first, there is a perception of no youth entering the HVAC industry and second, the lack of motivation.

5.4 Proposition 2

The heating, ventilation and air conditioning industry can realign themselves through adequate training facilities, committed employers understanding the long term benefits of training and government intervention to enforce education and training at all levels.

Not enough training:

The results showed that there seems to be a lack of training institutions available within the South African HVAC sector. The response was small but highlighted this problem. Patel (2010) mentioned specifically to the HVAC industry that the apprenticeship programmes were crucial to close the growing gap between skilled and unskilled labour.

The issue with regard to trained but not of sufficient quality, has a direct relationship with the apprenticeship programs being removed from the technical qualification process. The apprenticeships of the past had structure to them and importantly, specific time frames before individuals were allowed to do their trade tests. The mention of motivation should be considered here. Employees feel motivated when they are invested in and trained by the their employers (Coffield, 2004a).

The apprenticeships programmes are well received in several first world economies, namely Germany (McIntosh, 2005b). The reintroduction of this technical process has stimulated and motivated young school leavers, giving them a sense of worth and so motivating them to increase their skills level substantially.

Too costly to train:

The point highlighted, that training is too costly, is a concern. When asked to explain, the key reason given was that not just the cost of the technical courses offered should be accounted for, but also the labour time that a company forgoes due to the individual sitting in a class room rather than working the

chargeable labour hours; the employer thus loses on two counts - the cost of the courses and the unrecoverable labour time. This fact needs consideration.

Emigration:

With reference to Figure 2, well trained artisans are leaving South Africa for better opportunities within first world economies. The brain drain is a real problem and challenge for South Africa (Momberg, 2008). Emigration was mentioned by 9% of the interviewees.

First world economies are also experiencing their own skills shortage and are looking abroad for their technical talent: with their strong, secure and growing economic environments, hardworking skilled South Africans are a target (Gordon, 2009). In addition, the safety issue and black empowerment all play a role for qualified individuals to seek new lives abroad. As was noted by Momberg (2008) the brain drain is a significant problem for South Africa's skills supply.

Too many short courses:

There seemed to be a concern that there were too many short courses on offer. This was borne out by the results achieved in the first question, ie of the staff that available for employment, many are trained but weak.

The quality of the courses was questionable and several respondents commented that some courses offered are merely a marketing initiative, in particular by suppliers of air-conditioning equipment, offering very little in-depth technical training. The emphasis would appear to be on highlighting features and benefits of their product line-up.

Too easy to start own company:

There are very low barriers to entry within the South African HVAC industry, supported by the fact that it is too easy to start up a contracting firm in South Africa's HVAC industry. The lure of profitable earnings is what attracts young motivated entrepreneurial individuals. 17% of the respondents mentioned this point in their answers.

Focus on tertiary education:

Tertiary education received 9% of the support. The technical field does not seem to be an attractive career path for young individuals in South Africa. The contractor who mentioned that there was too much focus on tertiary education also mentioned that there were not enough training initiatives available in the industry. The need for further education is evident from both the employers' and employees' perspective.

From the results it seemed that the younger generation sees a tertiary level education as more attractive than a technical one. There needs to be a programme put in place to introduce the technical field as a viable option for young school leavers. A case in point is the German model of apprenticeship programmes. Youth in Germany see technical skills in a positive light and quickly understand the value it adds to their lives as societal contributors (McIntosh, 2005b).

Job hopping:

The restlessness of staff is a challenge for business owners across all industries. Respondents alluded to the insecurity of employing an individual, then investing in training and hoping that once trained, the newly skilled staff member would stay to repay the investment.

Suitable candidates:

The lack of suitable candidates was an interesting result and further study may be considered here. Are the candidates physically or intellectually unsuitable to undertake the job specification?

The points raised in the literature review whereby the basic level of education, namely in the areas of maths and science as raised in the Grant Thornton Business review (Thornton, 2008), has significance here: without good basic education at early school level the future path of adult learning will suffer.

Impatient youth:

The younger generation, on completing their training, want to move away from working on sites to a more office type environment. There seemed to be a strong inclination by young artisans to move from blue collar to white collar jobs as quickly as possible - this point was made very clear during the interviewing phase.

Because the youth do not want to wait around too long and are restless, this is a challenge for HVAC contracting firms. This restlessness results in the young staff member leaving, thereby putting pressure on the contractors to have to re-enter the labour market and face the lack of skilled labour supply all over again.

A very important point rose during the questionnaire and survey phase: the comment “you train them up and then they leave” was noted and this in turn demotivates company owners to invest in training young individuals entering the heating, ventilation and air conditioning market.

Suitable training:

The findings clearly illustrated that suitable training was required. Interestingly, the call for the old apprenticeship style programmes was also raised. There may be various reasons for this as many current company owners qualified through the old apprenticeship system; obviously further research would be required to validate this.

The reasonsas to how the HVAC industry can re-align itself to meet the demands of skilled labour supply clearly indicates that more training is required. However, the emphasis is on *suitable* training. The issue of suitable training was highlighted in question 2 and reflected in Figure 2 where the issue of too many short courses was highlighted and combined with question 1 (and illustrated in Figure 1), that an individual may be trained but weak. All supported the fact that high quality technical training schools were essential to close the gap between skilled labour and unskilled labour.

Old trade tests:

There seemed to be very strong support for the re-introduction of the old trade test supported by the apprenticeship program, as was done in Germany (McIntosh, 2005b). McIntosh noted that within the German artisan realm, individuals who did not feel comfortable with the traditional classroom environment felt far more motivated to be in the field working with their hands. The trade test system supported by apprenticeships motivated these individuals and they felt that they were valuable contributors to their society.

Government intervention:

Government intervention will be required to re-align the HVAC industry. Strong regulation - specifically with regard to the safe handling of refrigerants, a point noted by Parker (2008) - must be taken seriously. Without government intervention the industry will fall prey to many small rogue type firms that have very small barriers to enter the market. Conversely, these same rogue contracting companies leave the market in tough times and re-enter the market when the economy lifts.

Emphasis on certification:

The HVAC industry embarked on a safe handling of refrigerant programme. The intention of this initiative was to ensure that any individual handling refrigerant gases used for refrigeration and air conditioning systems must be certified to handle these refrigerants housed in pressure vessels (Parker, 2008b). Parker noted that the HVAC industry in South Africa was not taking this seriously enough. A non-certified technician and/or individual can still buy refrigerant without having to prove that they are competent to handle these gasses.

The emphasis on certification would motivate individuals and company owners to be trained and train. If the government sets the bench mark, the industry will have to meet this requirement. However, strong measures would have to be adhered to for this ideal to be realised.[1]

A contractor can employ an individual to undertake certain technical skilled roles and will not be required to ensure that the individual has the correct qualifications. 17% of the respondents highlighted this as an area that needs to be addressed in order to realign the HVAC industry.

Clear career path for the youth:

The HVAC industry employs technical staff to get a job done and as long as that job specification has been met, the daily routine of work done and chargeable hours will continue as normal. The challenge comes when a young artisan wants to grow and learn. This initiative puts pressure on the company owners and therefore training is not always encouraged as freely as it should because of the consequences of productive labour time. This demotivates young artisans as they would like to see a plan for their future. This may also add to the lack of motivation as mentioned in the study by various contractors. The HVAC industry in South Africa needs structure.

Promote the HVAC industry to the youth:

The interviewees acknowledged that there would be long term consequences for the HVAC industry without the introduction of young successors. Promoting the HVAC industry to the youth is thus essential to any industry.

This indicated that there is a perceived lack of interest from the youth in South Africa to enter the technical field of air conditioning and refrigeration. The point that there is too much focus on tertiary education may play a role here. Do South Africans see a technical career less favourably than a tertiary one?

5.6 Conclusion

The results from the research supported the literature reviewed. The key factor was a definitive lack of skills within the South African heating, ventilation and air conditioning sector. Therefore, in order to re-align the HVAC sector the key finding was that good quality training is required. Various other points were mentioned adding value to the results.

Within the literature reviewed, company owners highlighted that their biggest concern during a growth phase was being able to employ suitably skilled labour (Chandra, 2001). South Africa - and in fact any country with a growing vibrant economy - cannot afford not to have skilled labour. Countries that face this crisis seek labour elsewhere, the United Kingdom being a case in point (Phillips, 2007b).

We cannot blame a young skilled person for deciding to take up an opportunity in a first world country. The world has become a small place and skills have no borders.

> “Companies should get together and pool funding for training in similar fields. As industry leaders, large corporations have in the past seen it as their responsibility to grow industry resources. The time is ripe for them to do so again.” (Burmeister, 2008:77)

The above quotation was published in the Civil Engineering magazine in 2008 and offers an additional insight to government intervention. Is there a place for corporate South Africa to take up the responsibility of lifting the skills level in South Africa? The important consideration here is that corporate South Africa is a large employer directly and indirectly and has the power to set standards for itself.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

The research undertaken in this report highlighted that South Africa's heating; ventilation and air conditioning industry is facing a skilled labour supply problem. The reasons for this situation have been illustrated in various forms, all of which have a role to play. The suggestions to correct the imbalance between supply and demand of skilled labour have been discussed. However, the time for action has arrived and South Africa as a nation needs to accept the challenges and make decisions now to close this growing gap.

6.2 Conclusions of the study

Proposition 1

The challenge for contracting firms in South Africa is a shortage of skilled labour available and a lack of motivated youth entering the technical field as a career choice.

The results presented within this report clearly illustrated that the South African HVAC industry was facing a skills shortage: this point was supported by the majority of contracting firms who completed the questionnaire.

Proposition 2

The heating, ventilation and air conditioning industry can realign themselves through adequate training facilities, committed employers understanding the long term benefits of training and government intervention to enforce education and training at all levels.

The findings in the report supported the proposition that there was a need for adequate training within the industry to meet the demand for skilled labour.

Interestingly, the results indicated that more training and more focus on apprenticeship programmes would be the best options to re-align the industry

with the demand and supply of skilled labour. Unpredictably, government intervention was supported by only a small number of interviewees as a percentage of the sample.

6.3 Recommendations

The significance of this study was to better understand the reasons why the South African heating, ventilation and air conditioning industry finds itself in a position of undersupply of skilled labour. It noted that there was an historical aspect to this problem as highlighted by Daniels (2007a).In his report “Skills Shortage in South Africa” he noted that South Africa was suffering the consequences of our past whereby the pre-1994 government did not at the time see as essential the need to uplift skills within the black population. Furthermore, the shortcoming of our post-1994 government by not putting enough emphasis on technical skills has also added to the frustration experienced by company owners wanting to hire skilled labour.

There is a combination of reasons why today we have this skilled labour problem. However, it is never too late to take action, but action must be taken in the best interest of all South Africans.

Corporate South Africa has a fundamental role to play in uplifting the skills base within the South African HVAC industry. The buildings businesses occupy have services such as air conditioning and ventilation which are an integral part of the building infrastructure required in order to provide a healthy clean working environment. The systems and machinery installed need to be looked after by competent, technically skilled labour.

Therefore more pressure should be applied to companies - and indirectly on their staff - to have the correct qualifications before they are allowed to do any work on heating, ventilation and air conditioning equipment.

Government too has a role to play. It needs to enforce the requirement that any building spaces occupied by humans must have the correct certification in place to ensure their health and safety. There is the Occupation, Health and Safety

Act of (1993). However, more enforcement is required. This would in turn force company owners to train their staff, adding some impetus for the unskilled labourer to make more effort to be trained.

6.4 Suggestions for further research

Various points were raised during the research. Two areas of concern were the lack of youth wanting to enter the technical field as a career and that succession planning must be a high priority within any technical field, whether white or blue collar industries. The introduction of young individuals is essential. Why does the HVAC industry have this problem? What are the core reasons for this lack of willingness by the youth to enter the technical field as a potential career path?

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