

Evaluating the impact of skills training on productivity in a printing and packaging plant

NP Zulu
23177594

Mini-dissertation submitted in partial fulfilment of the requirements for the degree *Magister in Business Administration* at the Potchefstroom Campus of the North-West University

Supervisor: Ms K Nell

May 2014

ACKNOWLEDGEMENTS

Writing this dissertation has been one of the most significant academic challenges that I've ever had to face. Without the support, patience and guidance of the following people, this study would not have been completed. I owe my deepest gratitude to each of them.

- Karolien Nell, who undertook to act as my supervisor despite her many other academic and professional commitments. Her patience guidance, knowledge and commitment to the highest standards have inspired me to finish this race.
- My sister and friend Busisiwe Zulu, for the support she has given me. I would not have made it this far without her. She is a blessing and may God bless her abundantly.
- To my son Thabo Nxumalo, my deepest thanks for all the sacrifices and hard times he had to endure. He is my constant strength.
- Ko Ndabezitha, for his/her constant support through times of absence on my part.

ABSTRACT

It is a well-known fact that skills development is central to improving productivity and that significant improvements in productivity as well as competitiveness can be obtained by improving the skills levels of employees through training or job rotation. Education, training and lifelong learning foster a virtuous circle of higher productivity, a higher employment rate and better quality jobs, income growth and development.

The nature of the work in the manufacturing sector specifically has changed dramatically during recent years. New technology and new work processes have changed the skills requirements of many jobs, and employees need access to regular training to provide them with the necessary skills, including advanced specialist skills, if they want to perform well in their jobs. Simultaneously, some workers need assistance with language, literacy and numeracy to cope with learning new processes and technology, or as a foundation to allow them to acquire new skills.

The aim of this study was to identify the essential skills and technical competencies critical to manufacturing performance. The researcher used firm-level data from a sample of manufacturing workers at a printing and packaging firm in Gauteng, West Rand District.

KEYWORDS

In this study the focus was on shop-floor workers (those who work on the factory floor), including machine minders, engineers, trade artisans, technicians, supervisors, forklift drivers and truck drivers.

The concept of education can generally be defined as the activities directed at providing the knowledge, skills, moral values and understanding required in the normal course of life. Education is the all-encompassing basis of these terms and includes elementary, middle and high school education, as well as college or tertiary education. It teaches one the basics of reading, writing, arithmetic, and then systematically goes on to teach an individual how to use his or her intellectual ability to its fullest. Having an education puts one on the road to a prosperous life as well as eventual success in any number of careers.

The concept of development refers to employee development rather than the development of an individual in general. Employee development is directed mainly at creating learning opportunities and making learning possible within an enterprise.

Training in contrast is much more specific than education. It is task-oriented and focuses on the work performed in an enterprise. Training teaches specific skills that will assist an individual to develop proficiency in a specific job or job category (Erasmus & Van Dyk, 1999:3).

KEY TERMS

Training; manufacturing; performance; skills; productivity; shop-floor workers; tasks; education; knowledge; jobs; requirements; firm; printing and packaging; improve productivity; competitiveness; industry; development; knowledge; decision; high performance; practices; maintenance; workplace; impact; managers; employment; labour; economy; competencies; high performing; production; essential skills.

TABLE OF CONTENTS

Acknowledgements	i
Abstract	ii
Keywords	iii
Table of Contents	iv
List of Tables	vii

Chapter 1: Nature and Scope off the Study

1.1	Introduction	1
1.2	Orientation and Background	2
1.3	Problem Statement	3
	1.3.1 Research Questions	3
1.4	Purpose and Objectives of the Study	4
	1.4.1 Primary Objective	4
	1.4.2 Secondary Objectives	4
1.5	Research Methodology	4
1.6	Literature Review	5
1.7	Empirical Study	5
	1.7.1 Study Population and Sampling	6
	1.7.2 Measuring Instrument	6
	1.7.3 Data Collection	7

1.7.4	Data Analysis	7
1.8	Limitations	7
1.9	Layout of the Study	8
 Chapter 2: Literature Review on Skills and Manufacturing Productivity		
2.1	Introduction	9
2.2	Description of Productivity	9
2.3	Productivity and Technological Innovation	11
2.4	Competencies Required to Improve Manufacturing Performance:	12
	The Four-Level Model Of Shop-Floor Worker Competencies	12
2.5	Productivity and Manufacturing Performance	19
2.6	Factors Affecting Productivity	20
2.7	Linking Training and Skills to Business	22
2.8	Impact of Training	23
2.8.1	Training and Productivity	24
2.8.2	Training Methods and Techniques	27
	2.8.2.1 On-the-Job Training Methods	27
	2.8.2.2 Off-the-Job Training Methods	29
2.8.3	Job Analysis	33
2.8.4	Job Design	33
2.9	High-Performance Work Practice (HPWS)	36
2.10	Training in the Printing and Packaging Industry	37
2.11	Summary	38
 Chapter 3: Results and Discussion of the Empirical Study		
3.1	Introduction	39

3.2	Gathering of Data	39
3.2.1	Development and Construction of Questionnaire	39
3.2.2	Data Collection	40
3.2.3	Measurement Instrument	43
3.3	Demographic Information of Respondents	45
3.3.1	Gender Distribution	46
3.3.2	Age Group	47
3.4	Human Capital Characteristics of Respondents	48
3.4.1	Highest Academic Qualification of Respondents	48
3.5	Structural Labour Characteristics of Respondents	49
3.5.1	Job Tenure of Respondents	49
3.5.2	Hours Worked by Respondents in a Week	50
3.5.3	Job Positions of Workers Compared with those of Five Years Prior	51
3.5.4	Promotion	52
3.5.5	Union Status of Respondents	53
3.5.6	Additional Results of Interest	54
3.6	Essential and Industry-Related Skills Requirements for Manufacturing Jobs	55
3.7	Skills Change in Manufacturing Jobs	57
3.8	Essential Skills Levels and Utilisation in Manufacturing Jobs	59
3.9	Technical Skill Levels and Utilisation in Manufacturing Jobs	61
3.10	Human Capital Skills	62
	3.10.1 Skills Levels and Productivity	64
Chapter 4: Conclusions and Recommendations		
4.1	Introduction	66
4.2	Conclusions Regarding the Empirical Study	66
4.3	Recommendations	68

4.4	Suggestion for Future Research	69
	References	70
	Appendix A – Questionnaire	79
	Appendix B – Skills Pyramid For High Performance Manufacturing	80

List Of Tables

Table 3.1	Gender Distribution of Respondents
Table 3.2	Age Group Category of Respondents
Table 3.3	Highest Academic Qualifications of Respondents
Table 3.4	Job Tenure of Respondents
Table 3.5	Hours Worked Per Week by Respondents
Table 3.6	Current Job Title of Respondents (Occupation)
Table 3.7	Job Positions of Workers Compared to the Situation Five Years Prior
Table 3.8	Promotion
Table 3.9	Union Status of Respondents
Table 3.10	Essential and Technical Skills Requirements for Manufacturing Workers
Table 3.11	Skills Change Percentage on Ten Essential Skills Measurement
Table 3.12	Skills Change in Measurement of Technical Skills
Table 3.13	Means and Standard Deviations of Skills Levels and Utilisation
Table 3.14	Means and Standard Deviations for Skills Levels and Utilisation
Table 3.15	Mean Comparison of Skills Levels and Utilisation by Respondents' Highest Level of Education
Table 3.16	Primary Processing Employment and Occupation

Chapter 1

Nature and Scope of the Study

1.1 Introduction

Organisations have to constantly align themselves with economic and technical changes in order to remain competitive in the market place. Training and retraining are paramount for both employers and employees alike. Organisations engage employees to execute certain activities in order to achieve their goals and objectives. It has been emphasised a number of times that irrespective of the nature of these goals and objectives, organisations need competent employees to perform and accomplish the tasks. Although well-thought-out strategies and efficient human resource planning and recruitment and selection initially provide an organisation with the required employees, additional training is necessary to provide employees with job specific skills that will enable them to survive over time (Swanepoel *et al.*, 2000:493).

Erasmus & Van Dyk (1999:2) define training as a systematic and planned process to change the knowledge, skills and behaviour of employees in such a way that organisational objectives are achieved. A major purpose of training and development is to remove performance deficiencies, whether current or anticipated, that may cause employees to perform at less than desired levels. The investment in new equipment or the introduction of new systems to adapt to new product manufacturing methods often requires training needs analysis. The pressure on organisations to remain competitive sometimes necessitates new procedures and systems that require employers to upgrade the skills of their workforce. Training, therefore, is directed at improving the employees' job performance (measured in terms of productivity) and is fundamental for organisations wanting to adapt and remain competitive. Substantial evidence indicates that investing in people is one way in which organisations can make positive gains in productivity and other business outcomes (Tamkin, 2005:3).

1.2 Orientation and Background

A large percentage of South Africa's population is unskilled. The task of providing training, whether career oriented or not, cannot be borne by the formal education system alone as it is simply not possible in practical terms to deal with such vast numbers.

Enterprises, therefore, also have a responsibility to contribute towards the effective training of employees, and in so doing, to counter the national literacy problem. A major challenge faced by organisations is to train their employees in such a way that they have the necessary knowledge, skills and attitudes to do their work successfully (Erasmus & Van Dyk, 1999:1).

South African manufacturing companies are faced with critical problems arising from the extended global economic recession, rising input costs (particularly administered prices) and low and falling levels of investment arising from institutional and private sector market failures. The global printing and packaging industry has unfortunately not escaped the consequences of the global financial crisis. The general economy has affected the printing industry in many ways. The economic meltdown has had a significant impact on investment and has affected new investments in equipment and business expansion. The global landscape is becoming more competitive, with technology driving product innovation. The volatility of the South African rand towards the dollar has increased costs of raw materials. It is becoming difficult for firms in the printing and packaging industry to price their products competitively in the market. The rising costs of raw material have also led to European and North American paper mills reducing capacity in order to increase prices.

1.3 Problem Statement

The advancement in digital and electronic solutions is driving the sector's competitiveness, and the sector is also in need of technical skills. Technical skills have been identified as having the greatest scope for development across occupational categories (Tamkin *et al.*, 2004:14).

The current occupation composition in the printing and packaging industry confirms that machine operators reveal the highest proportion of skills gap, followed by skilled trades. Notably these occupations contain the highest proportion of low-skilled workers. The shortage of skills poses a risk for the industry. It is for this reason that industry skills development remains a priority.

It is becoming increasingly clear that despite heavy emphasis on price as a dominant market criterion, many manufacturers are faced with serious challenges in achieving low cost competitiveness. This is the case when products are traded internationally and rely on the use of simple process technologies. The problem of competitiveness is, however, even more serious as firms discover that they are required to achieve both higher quality and often flexibility alongside tight costs. As the locus of competitiveness has shifted from process to wider bundle of attractions, the importance of a skilled workforce has become evident.

1.3.1 Research Questions

In this study, the researcher attempted to match business-level productivity and skills data in order to answer the following two questions:

- (a) Do more productive businesses employ a more skilled workforce?
- (b) How much of the variation in productivity is associated with variation in skills?

1.4 Purpose and Objectives of the Study

The rationale of the research was to highlight the business benefits of a highly skilled workforce. The research objectives of the study comprised of two parts namely, the primary objective and the secondary objectives.

1.4.1 Primary Objective

The primary objective was to study the relationship between productivity levels and skills at the plant level. The research identified the benefits of skills and training on organisational performance measured in terms of productivity. Recommendations are provided to ensure that firms continue to raise the skills of their workers in order to improve productivity and remain competitive.

1.4.2 Secondary Objectives

The secondary objectives were to:

- identify worker competency levels required to improve productivity;
- investigate training methods and techniques that firms can implement in order to improve productivity;
- determine how high performance work practices (HPWPs) can enhance employee involvement, commitment and competencies; and
- determine the levels of skills, education and perceptions of training needs of workers in the printing and packaging industry in South Africa.

1.5 Research Methodology

The methodology of this study was pertinent to the investigation, analysis and objectives that the researcher set out to achieve. The study comprised of literature and empirical work. Data were obtained from participants through the use of questionnaires. The units of analysis in this study were employees in a printing and packaging industry

on the West Rand, Gauteng. The identified employees occupied various positions in the factory.

1.6 Literature Review

The main aim of the literature study was to grow a body of knowledge linking skills training to business performance.

The researcher reviewed existing evidence to discover what is known about the relationship between skills, training and business performance in order to provide evidence that is as straightforward, methodologically robust and as convincing as possible. Human resource practices other than skills training, which have been associated with improved organisational performance, is highlighted. These factors include HPWPs, job analysis and job design.

The researcher identified and analysed research papers containing information relating to the research problem. The following sources were used to gain more insight into the impact of skills development and the manner in which skills can be linked to improved business performance:

- Approved journals
- Approved articles
- Internet websites
- Textbooks
- Industry reports

1.7 Empirical Study

A survey in the form of a self-administered questionnaire was used to collect information regarding the occupational skills, demographic, human capital and structural labour market characteristics of manufacturing workers in one of the Gauteng municipalities on the West Rand. The questionnaire (see Appendix A) was kept simple to accommodate

the literacy levels of the participants. Due to the low literacy levels, some participants were assisted with completing the questionnaire.

1.7.1 Study Population and Sampling

The study population was very small consisted of a total of fifty factory workers employed in the printing and packaging industry, including mainly machine operators, artisans, technicians, pickers and supervisors. The participants were issued with a questionnaire to evaluate their skills levels.

A hybrid sampling method that incorporates aspects of both probability and non-probability sampling methods was used for the study. This method appeared to be most appropriate as a representative sample was required.

Convenience sampling was used as sampling technique, which according to Struwig and Stead (2001:111) is a technique chosen purely on the basis of availability, whereby respondents are selected due to their accessibility. Qualitative research was used to process and analyse the research study statistics. The information was analysed and used as supportive data for the structure of the research.

The questionnaire was distributed to shop-floor workers occupying various positions in the factory as well as their supervisors. Managers were deliberately excluded from participating in the study as there was a risk that their inclusion would distort the results.

1.7.2 Measuring Instrument

The questionnaire was divided into two sections. The first section consisted of 10 questions regarding respondents' profiles and characteristics, such as gender, age group, highest level of education, tenure, hours worked, job occupation, job status and promotion. The second section was a standard questionnaire designed using skills measurements from two sources. The first source was the research done in 2005 by Grand Erie and Waterloo Wellington Skills Survey, the second the Skills Pyramid for High Performance Manufacturing (see Appendix B). The skills pyramid is based on the Advanced Manufacturing Model developed by the Department of Labour in partnership with major manufacturing organisations.

The questionnaire was written in English and was simplified in order to accommodate those factory workers with lower literacy levels.

1.7.3 Data Collection

Structured interviews were conducted by the researcher using a collection of questions from a standard questionnaire. First, the interviewer introduced herself and explained to the individual participants the reason for conducting the survey. Thereafter, participants were assured that the information would be used for academic purposes only and would remain confidential. The questions were read to individual participants and the responses were recorded in the questionnaire. The survey was conducted during tea and lunch breaks.

1.7.4 Data Analysis

Descriptive statistical methods were used for data analysis and interpretation. Data collected was analysed using PHStat 2, 2010 and descriptive statistics were analysed for all survey appropriate measures. These included frequencies, percentages and cumulative percentages for all measures. Multiple regression was employed to analyse the relationship between human capital and structural labour market characteristics and skills. The results obtained from the statistical information were used to evaluate the skills level of factory workers and to draw conclusions about the current state of the printing and packaging industry in Gauteng.

1.8 Limitations

The study was limited to firm level data and explored the skills levels of shop-floor workers, with an emphasis on their knowledge and competence. Competency development was not considered to be more important at the shop-floor level than at managerial level, but the needs of shop-floor workers have traditionally rather been

understated. Thus, by improving the skills levels of shop-floor workers, firms will achieve significant improvements in productivity and competitiveness.

1.9 Layout of the Study

The research is divided into four chapters in the study, each with a different focus area, as indicated below.

Chapter 1: Problem Statement

Define Objectives

Chapter 2: Literature Review

Chapter 3: Define Objectives

Collect Data

Analyse Data

Chapter 4: Conclusions and Recommendations

The impact of skills on manufacturing productivity is evaluated in Chapter 2 (the literature review chapter) and the relationship between skills and productivity is discussed. The latest research evidence is contained in this chapter and the manner in which skills embed within a broader model of workforce capability to impact on business performance is explored. The content is complemented by a body of literature, which explores skills in the context of wider people management policies.

The empirical study follows in Chapter 3 and contains the study population and summary of data collected, as well as the measuring instrument used in data collection. The data analysis method is discussed and overview of the results is provided.

The final chapter contains a summary of the main findings of this study. The results of the study is discussed, interpreted, elucidated and compared with the relevant literature in the preceding chapters, and general conclusions are reached. This is followed by general recommendations, as well as recommendations to managers planning to introduce performance improvement strategies.

Chapter 2

Literature Review on Skills and Manufacturing Productivity

2.1 Introduction

Transformation of skills levels in the manufacturing industry is necessary as advancement in digital and electronic solutions is driving the sector's competitiveness. The shortage of skills poses a risk for the industry. Therefore, industry skills development remains a priority.

Rowley (1995:5) comments: "Training and development is important for the maintenance of the human resource base of the organisation and must be viewed as an integral part of the core organisational strategy, rather than an ad hoc operation".

According to Tamkin (2005:5), emerging evidence suggests that training and development of the existing workforce have benefits for productivity and employee morale and engagement and that this is most clearly realised when such development activity is linked to the business strategy of the organisation. Employers who raise the skills of their workforce through recruitment and activity or through training and development, reap benefits of productivity along with other gains.

2.2 Description of Productivity

Productivity is a relationship between outputs and inputs. It arises when an increase in output occurs with a less than proportionate increase in inputs, or when the same output is produced with fewer inputs. Productivity is measured either in terms of all factors of production combined (total factor productivity) or in terms of labour productivity, which is defined as output per unit of labour input, measured either in terms of number of persons employed or in terms of the number of hours worked (ILO, 2008:1).

Economists view productivity as a ratio that measures the quantity of output produced relative to the amount of work required to produce it (Carbaugh, 2007:243).

Productivity = Total output / Hours worked

An increase in productivity occurs when total output increases faster than the amount of work required to produce it. When there is an increase in the quantity of output with no increase in hours worked, productivity increases. Total output depends on both work and productivity. Output can only be increased through additional inputs or more efficient use of resources.

Productivity improvements can be understood at different levels. The productivity of individuals may be reflected in employment rates, wage rates, stability of employment, job satisfaction or employability across jobs or industries. Productivity of enterprises in addition to output per worker may be measured in terms of market share and export performance. The benefits to societies from higher individual and enterprise productivity may be evident in increased competitiveness and employment or in a shift of employment from low to higher productivity sectors worked (ILO, 2008:2).

Productivity increases can be linked to various factors, for example, new capital equipment, organisational changes or new skills learned on or off the job.

Productivity is affected by factors at the

- individual level, such as health, education, training, core skills and experience;
- enterprise level, such as supportive national macroeconomic and competition policies, economic growth strategies, policies aimed at maintaining a sustainable business environment, and public investments in infrastructure and education; and at the
- national level, such as supportive national macroeconomic and competition policies, economic growth strategies, policies to maintain a sustainable business environment, and public investments in infrastructure and education.

It is evident that skills development and other investments in human capital encompass only one set of factors necessary for productivity growth. Skills development by itself cannot raise enterprise and national productivity. It must be an integral part of a broader development strategy if it is to deliver on its substantial potential to contribute to overall productivity and employment (ILO, 2008:2).

Productivity reorganises the economy by changing the manner in which innate skills and talents are used in the workplace. Each generation of inventions produces tools to take over more of the tasks that were once performed only by human beings. Societies adapt by creating jobs that require new sets of skills. Over time, work moves up a hierarchy of human talents, focusing on new tasks that require higher order skills, ones that machinery cannot do very well. The economy creates a new and more productive mix of technology and human talents by redefining the way people work. In the long term, the country's economy benefits from productivity. Productivity gains increase real income in the economy, which can be distributed through higher wages.

A low wage, low skills development strategy is unsustainable in the long run and incompatible with poverty reduction. "Through investment in education and skills can the economy pivot towards higher value-added activities and dynamic growth sectors" (ILO, 2008:3).

2.3 Productivity and Technological Innovation

The growth in technological innovation affects the economy by increasing productivity for the economy. Labour productivity in the manufacturing sector has risen owing to technological advances, improved organisational practices and increased global competition. An efficient industry allows the economy to produce more output with a given number of resources.

Growth without technological advance eventually becomes sluggish. If you produce the same goods even with modest improvements, the result is stagnation. Without technological breakthroughs, the strategy of improving and refining existing production methods runs into diminishing returns and eventually fizzles out. If the pace of

technological advancement diminishes, there will be less need for skilled workers (Carbaugh, 2007:245.)

A well-trained and skilled workforce strengthens the capacity of both individual creativity and group innovation. The success of innovation requires highly skilled labour in conjunction with research and learning at all levels. The importance of innovation is not just expressed in new products and production processes. Innovation should be viewed as a social process that depends upon people, their knowledge, their qualifications and skills, as well as their motivation and job satisfaction.

2.4 Competences Required to Improve Manufacturing Performance: the Four-Level Model of Shop-Floor Worker Competence

“It is becoming increasingly clear that, despite a heavy emphasis on price as the dominant market criterion, many western manufacturers faces serious difficulties in achieving low cost competitiveness” (Woodcock, 1996:38). This is the case when products are traded internationally and rely on the use of simple process technology. Firms have to find a balance between delivering quality products and containing manufacturing costs. However, the locus of competitiveness has shifted from prices to a wider bundle of attractions; a focused approach that applies to all levels of the organisation.

The model provides a more focused approach concerning the knowledge and competence of shop-floor workers. It forms a link between the type of competence and the form of competitiveness presenting a strategic perspective on how manufacturing firms can approach skills development.

It is not that competence development is any more important at the shop-floor level than at managerial level, but rather that the needs of shop-floor workers have traditionally been ignored. According to Woodcock (1996:38), by improving the general level and specific relevance of shop-floor competence, firms will achieve significant improvement in competitiveness.

I. Level one: conventional proficiency

Plants with highly proficient workforces tend to have slightly better yield levels for similar products than those with less skilled workers (Woodcock, 1996:38). Highly proficient shop-floor workers sustain manufacturing performance by

- reducing scrap rates;
- raising direct and indirect productivity;
- enhancing the firm's effective capacity; and
- increasing overall output levels.

Plants with highly proficient workforces stand to have slight gains in primary (direct) and secondary (indirect) productivity. The primary gains stem straight from the work undertaken by shop-floor workers, as it takes less time for staff to perform complex tasks. Firms achieve a significant reduction in their reject/rework levels, since highly proficient workers can perform more complex tasks. The potential benefits of such improvements increase as the manufacturing task becomes more difficult. However, they are likely to be insufficient to deal with the highly complex environments found in most "best practice" organisations. The secondary productivity gains results from reducing the amount of rectification work, supervision and general administration concerned with overcoming problems (Woodcock, 1996:39).

The effects of fewer rejects, less reworks and increased work tempos are increased output levels per unit of time and effective use of plant capacity. The inherent benefits of increasing both the proficiency of individual workers and the proportion of such employees in the workforce enable firms to sustain their expansion for longer periods. While valuable, the improvements in competitiveness from increased proficiency are relatively small, compared with the more advanced forms of skills development discussed below (Woodcock, 1996:39).

II. Level two: widening range of operator tasks

The advent of technological innovation has reorganised the way in which manufacturing plants operate. There has been a major shift towards widening the range of tasks a group of shop-floor workers is expected to perform proficiently. The nature of the tasks

remains narrowly defined and is limited to the conventional range of shop-floor work. Workers are expected to perform narrowly defined tasks rather than one or very few of these tasks. Job analysis is one technique that can be implemented by firms to systematically identify the task that each operator needs to perform. To achieve proficiency, workers should be trained and job rotation should be practised to enable workers to perform a wide range of tasks (Woodcock, 1996:39).

Woodcock (1996:39) identifies the following benefits stemming from this approach:

- increased flexibility to make changes in the workload in response to variations in the customer's required product mix;
- further small increases in quality, as operatives have a better understanding of their task in its wider context;
- improved process capacity; and
- increased productivity.

Managing changes in the plant's workload

The plant's workload varies depending on the type of product mix and seasonal variations in demand. Hence, the need for a multi-skilled workforce using "cellular systems" of production; the cellular system makes it possible to operate work centres with a variable size. Cellular layouts allocate dissimilar machines into cells to work on products that have similar shapes and processing requirements. The overall objective in implementing the cellular layout is to gain the benefits of product layout in job-shop kinds of production (Chase & Jacobs, 2011: 230).

Cellular layout benefits include:

- **Better human relations:** Cells consist of a few workers who form a small work-team; a team turns out complete units of work.
- **Improved operator expertise:** Workers see only a limited number of different parts in a finite production cycle, so repetition means quick learning.
- **Less-in-process inventory** and material handling: A cell combines several production stages, thus fewer parts travel through the shop.

- **Faster production set-up:** Fewer jobs mean reduced tooling and hence faster tooling changes.

When cells are manned by workers who can perform all the production tasks, there is a greater opportunity to adjust output levels more closely with the level of demand. Thus a cell of six machines can be manned by a variable number of workers ranging from one per machine to one per cell, depending on the outputs required. The cellular system requires a high level of competency, and is not practical when workers can only perform limited tasks proficiently (Woodcock, 1996:39).

A number of favourable knock-on effects associated with a flexible plant are noted:

- Firstly, workers are likely to have a better understanding of how their part of work affects other jobs, because they will have done many or most of the jobs themselves at some point in time. Thus, they will better understand the impact of minor problems being passed on to the next station.
- Secondly, further gains in productive capacity are achieved as workers learn to exploit the physical potential of the plant and equipment.
- Finally, other small improvements in productivity arise from reductions in the proportion of time workers spend without work because of adverse product mix problems.

Despite the potential benefits outlined above, a great level of care is required when moving employees between different departments within the plant. Undue movement could weaken or even destroy the existing benefits of these team structures. In addition, some employees who still feel insecure about their new roles are more likely to make mistakes. It is important to recognise that in competence levels one and two, the roles of operatives remain very closely linked to the conventional set of tasks that have been traditionally performed by shop-floor workers (Woodcock, 1996:40).

There are many examples of firms that have successfully developed highly proficient shop-floor workers. One such firm, a canner of fruit and vegetables, was able to train its predominantly rural female labour force to undertake virtually all the production tasks in the plant. Similarly, an engineering plant also gave its workers training. This training

enabled both plants to match their highly variable working patterns with their requirements (Woodcock, 1996:40).

The implication for managers is to realise the importance of recognising the skills levels of their workforce and to align tasks based on adaptability. Some workers may be able to perform tasks at the highest level while others may be able to perform tasks at a lower level. The use of pre-entry tests would assist managers in identifying those employees most likely to be able to perform such tasks well (Woodcock, 1996:40).

III. Level three: widening the shop-floor worker's role into indirect tasks

For firm's seeking "world-class" levels of performance, a change in culture and managerial style of leadership is necessary. It is worth noting that a plant is very unlikely to move successfully directly from a level one to level three approach to shop-floor worker competence. The firm's training initiatives should be implemented in conjunction with major changes in internal cultures to sustain the new working practices. The traditional command and control form of supervisory management needs to change to one based much more on a partnership style of management, in which positional authority is less important than personal leadership and ability to command respect (Woodcock, 1996:41).

The third level of competency development requires "team work". The way in which team leaders operate is a critical issue determining how successful or not the implementation will be. Workers have to learn to function as part of an integrated team. As a consequence, part of their selection and subsequent training for these roles should consider their ability to work well with other people, individually, and at more senior levels in the company. The movement towards this approach is divided into two camps: the majority camp whose perspectives are limited to an increase in productivity, and those who see the shift as also having a significant potential for improving product quality, enhancing flexibility and for the many other benefits that this approach offers (Woodcock, 1996:41).

At this stage of development, shop-floor workers accept more responsibility for many of the tasks performed by indirect shop-floor based workers. This results in improvement in productivity coming from major reductions in the number of indirect employees. One of the first moves is to retrain the shop-floor workers to be responsible for their own quality. When operatives accept responsibility for these tasks, a significant improvement is seen in quality and productivity (Woodcock, 1996:41).

As the shop-floor workers learn to inspect their own work, they further improve their understanding of what is important and what needs to be done to produce good quality. These workers develop new sets of skills and can perform the set-ups/changeovers required to transfer production from one product to another.

Another area in which shop-floor workers can accept responsibility is in respect of machine care and attention. They can start with learning simple tasks like lubricating equipment on a routine basis and then move on to limited programmes of maintenance and routine replacement of some parts of the equipment. This type of programme improves the reliability of the machinery and set-up times. A more direct involvement in inspection generally helps to promote a higher level of compliance with the product specifications. Over an extended period this may even lead to tightening of these specifications and product improvements. In the same way, the involvement in both set-ups and maintenance is likely to promote reliable achievement of delivery promises (Woodcock, 1996:41).

The overall benefits for the plant are set-ups that take place on time and machines that do not break down unexpectedly. A smooth workflow process is maintained resulting in reductions in inventory levels.

The most dramatic improvements are likely to be seen in terms of productivity coming from major reductions in the number of indirect employees. Over the years, manufacturing firms have experienced an increase in the number of indirect employees on the shop floor as well as the number of clerical staff serving the production system (Woodcock, 1996:41).

The complex work systems that have evolved tend to control simple tasks and de-skill shop-floor personnel, further eroding most of the productivity gains. In addition, they

have helped to create a negative culture in the plant, which restricts the potential for learning. It is worth noting that most of these changes stemming from widening the shop-floor workers' roles are individually quite small. However, if the effort is maintained over an extended period, the effects are quite dramatic.

IV. Level four: involvement in problem identification and solution

The highest level of direct shop-floor worker competence occurs when their roles involve positive activities in data collection, analysis and problem solving. When shop-floor workers in the plant attain this level there is a shift in culture and philosophy.

The advantages for the firm in the short term can be seen in improvements in productivity. Firstly, significant process and quality improvements are attained from enhanced process capability. Secondly, process-related quality problems are eliminated. In addition, quality quickly returns to its long-term "norm" when new products are introduced. Further enhancements of range and volume flexibility, reduced lead times and improved synchronisation of processes are realised. The number of bottlenecks in the production process is reduced resulting in an increase in output levels. Finally, the removal of many trivial problems increases the ability to undertake value-adding activities (Woodcock, 1996: 42).

The multitude of smaller problems tends to overwhelm many managers because of their volume and often immediacy. Managers on most occasions do not have the time to deal with smaller problems. When plant workers are able to solve shop-floor problems, managers can concentrate on finding solutions to these trivial problems. Managers have time to tackle more complex tasks enabling them to utilise the high levels of training that they have received. Under this approach, both staff and shop-floor workers can contribute in the areas of problem solving for which they are best suited.

This level of competence is not without its challenges. According to Woodcock (1996:42), the following is likely to occur. Firstly, workers equipped to perform this type of activity may well be far better trained than the conventional supervisor, a situation that can be threatening for staff and supervisor. Staff will certainly fear that their jobs are in jeopardy and that, having spent many years learning their specialist skills, their jobs will be performed by operatives, many of whom the supervisor considers to be less

able than themselves. Secondly, it must not be overlooked that organisations in which the shop-floor workers are expected to make a significant number of suggestions for improvements can be seen as stressful, because lean production pushes responsibility as far down the organisation as is practical. With the right policies of job protection this threat can be reduced, but the biggest fear for these employees is to keep coming up with ideas. It is worth noting that relatively few firms practise the ideas represented in the level four model of competence.

2.5 Productivity and Manufacturing Performance

Higher skills levels not only have an effect on higher productivity. A firm with a highly skilled workforce can also experience improvements in other areas of its operations.

When a firm moves to level three form of worker competence, dramatic improvements in timelines, total productivity and flexibility are evident. How these dramatic improvements can be exploited depends on the chosen business and manufacturing strategies. This level is considered as the gateway into world class manufacturing, as it opens up the realistic possibility of competing in ways which were previously unattainable (Woodcock, 1996: 44).

Level four represents a further dramatic change in concepts and attitudes. It is this approach which really offers the workplace continuous improvement beyond the level of copying other good firms. The level four model of shop-floor competence not only contributes ideas directly from the shop-floor workers, it also frees managers and the remaining staff to attack the major problems faced by the organisation. To be truly “world class”, a firm must push forward in its own right, on some dimension of its manufacturing performance (Woodcock, 1996:44). A world-class firm cannot be a copier of other people’s ideas.

2.6 Factors Affecting Productivity

There is considerable interest among economists and policy makers about which type of workplace characteristics are more conducive to higher levels of productivity. Investment in human capital through higher qualifications and training is considered by Galindo-Rueda and Haskel (2005:4) to be a key step towards achieving sustained long-term productivity and prosperity gains in the economy.

Galindo-Rueda and Haskel (2005:4) attest to the internal and external benefits associated with investment in human capital. These investments are supposed to provide a direct economic return to the individuals who benefit from them. Firstly, internally, workers seem to gain from skills acquisition but firms might also gain to an equal or greater or lesser extent. Secondly, externally, it has been suggested that firms gain skills in a local area owing to interactions and related spillovers and hence other firms might also gain from the skills level of a given firm or surrounding population in general.

Evidence from the matched ABI/Employer Skills Survey, using firm-level data set with matched productivity and qualification data, suggests that firms with a higher share of college-educated, full time and male workers tend to be more productive, with considerable variations across sectors (Galindo-Rueda and Haskel, 2005:1).

When using productivity as a proxy, organisational top performing manufacturing companies are associated with a workforce with, on average, an extra qualification level (a proxy of skills) than the workforce of bottom performing companies. Using two matched plant level skills and productivity datasets for UK manufacturing skills differences exist between the top 10% of companies with workforces that obtained on average two years of additional education than those in the bottom 10%. The skills difference accounted for approximately 8% of the productivity gap between the top and bottom 10%. This is explained by the higher level of skills within these high performing manufacturing companies, which leads to innovation and more sophisticated production processes, in turn leading to higher quality and higher value products (Haskel *et al.*, 2005:2).

The importance of training for the workplace and the need to engage in it must be viewed in the context of the enterprise rapidly changing internal and external environments. The rapidly changing market environment has a profound impact on the strategies that are available to the enterprise and its training needs.

The radical transformational change in technologies has increased productivity, and in terms of skills and human resource development has had divergent effects. On the one hand, it has required higher levels of skills and provided the means for more decentralised and less routine production and service systems. On the other hand, it has made possible the spread of mass production work to developing countries

(ILO, 2008: 57).

The changing market and technological advances have shortened the product and service life cycles. A product that would have lasted for a decade may now only be fashionable and acceptable for a few years. This generates a demand for new knowledge and innovation and for skills and ways of working that can keep up with changes. The globalisation of financial markets is also increasingly affecting the context within which firms operate and is shaping their strategies (ILO, 2008:58). This is evident in the increasing international money flows; the interdependence of financial markets; the growth of international markets in mergers and acquisitions; the spread of notions of shareholder value and the activities of private equity and hedge fund investors.

The introduction of new workplace practices, such as just-in-time inventories, worker teams, total quality management and benchmarking, is also changing the way in which enterprises manage their workplaces. They necessitate the development of particular new skills. Finally, organisations are changing their business structures. Firms are moving towards more decentralised forms of organisation. Value chain management and cluster organisation are also changing business strategies and organisational structures (ILO, 2008:58).

2.7 Linking Training and Skills to Business Performance

The key aim of most organisations is to improve business performance. Understanding the link between people and business performance is of enormous value to managers and leaders. There is now substantial evidence that investing in people is one way in which an organisation can make positive gains in productivity and other business outcomes. According to Tamkin (2005:3), such investment can have a greater impact than investment in IT, in machinery, or in research and development (R & D). A series of hugely influential and robust research projects has indicated a link between business skills and productivity. A number of well-known "matched plant" studies by the National Institute for Economic and Social Research (NIESR) has considered the impact of workforce skills and development on productivity alongside a range of other factors such as investment in capital equipment and maintenance practices for matched comparator establishments. A clear connection between higher skills and higher productivity has been identified particularly at the intermediate skills level. All the studies have found that higher average levels of labour productivity in firms in continental Europe are closely related to the greater skills and knowledge of their workforces, especially intermediate skills (Tamkin, 2005:4).

Other studies have explored whether there is a relationship between skills and other organisational outcomes. This burgeoning body of research shows a strong association between what has been termed "high performance working practices" and firm performance (Black & Lynch, 1997:3). These findings suggest that establishment practices that encourage workers to think and interact in order to improve production processes are strongly associated with increased firm productivity. The higher the average educational levels of production workers within a plant, the greater the likelihood that the plant will perform better than average. Lynch and Black (1997:3) also maintain that the higher the average educational level of production workers or the greater the proportion of non-managerial workers who use computers, the higher the level of plant productivity.

These findings suggest that a more highly qualified and educated workforce is associated with greater productivity, greater innovation and higher quality products or

services. The implication for employers is the necessity more rigorous and demanding recruitment standards to increase the average education or qualifications levels of their workforce.

It is intuitively convincing that a more highly skilled workforce should be beneficial to organisations and the human capital approach reflects the view that the market value of the firm increasingly depends on intangible rather than tangible resources (Tamkin *et al.*, 2004:2).

2.8 Impact of Training

Tamkin *et al.* (2004:18) state that evidence of individual gains from education, qualification, skills or training supports the argument that these gains enhance individual capability and the individual's value to the firm. A number of studies have explored the benefits to the individual of attaining higher skills. This relationship has primarily been assessed by looking at the varying years of education or the attainment of different levels of education and to a more limited extent, the varying amounts of training undertaken. Greenhalgh and Stewart (as quoted by Tamkin *et al.*, 2004:19) note that there is now considerable evidence in the United Kingdom (UK) of an association between the amount of education, level of qualification and individual benefits, reflected by salary level or likelihood of being unemployed. A noteworthy exception to this evidence is the lack of individual return on the acquisition of vocational qualifications in marked contrast to the benefits accruing to academic qualifications (Tamkin *et al.* 2004:19). There has, however, been considerable criticism of the fundamental assumption behind such calculations that the increase in earnings can be attributed to the added benefit of the study undertaken (Tamkin *et al.* 2004:19). Others argue that education may not in fact add value but instead may signal to employers the higher capability and potential of the individual – what is termed the "screening" hypothesis (Tamkin *et al.*, 2004:20).

Skills development is an ongoing investment in training. If skills are said to have a positive influence, then it might be expected that skills development should be

associated with performance outcomes. This is not a simple relationship, as training is an intricate intervention of variable duration, complexity and performance.

An Organisation for Economic Co-operation and Development (OECD) study on innovation in the UK's small and medium enterprises suggests that higher qualification levels of both managers and staff boost innovation. Higher training expenditure per employee is also associated with higher technological complexity and originality. A number of studies by the NIESR have investigated the influence of investment in skills and training and the association between skills and productivity. Through a series of "matched plant" studies the impact of workforce skills and development on productivity has been considered alongside a range of other factors such as investment in capital equipment and maintenance practices. The results from data taken from UK businesses and similar firms in competitor countries within a variety of sectors, identify a clear connection between higher skills and higher productivity at the intermediate skills level. These cross- country studies confirm that the higher levels of productivity in firms in continental Europe are closely related to the greater skills and knowledge of their workforces, especially intermediate skills. Within manufacturing, lower skills levels in the UK have been found to have a negative effect directly on labour productivity and on type of machinery chosen, the ways in which machinery was modified in line with particular needs, the smoothness of machinery running and the introduction of technology (Tamkin *et al.*, 2004:23).

2.8.1 Training and Productivity

Organisations do not train and develop their employees just for the sake of doing so. Rather, it is because employees represent a competitive advantage that enhances organisational performance (Muchinsky, 2002:170).

Productivity improvement efforts are, for the most part, brought about by an increase in human endeavour and/or from changes in the methods and processes used to produce and deliver goods and/or services. At the centre of productivity improvement lies some form of human involvement. Training and productivity improvement, therefore, are logical extensions of each other. It is implausible to produce improvement in human

performance without relying, to one degree or another, on training. Furthermore, training should not be undertaken without first determining whether it is necessary or required. When training needs are considered with a productivity improvement goal in mind, training becomes an integral part of almost any productivity improvement effort. As such, training and productivity effort share a common objective: to improve performance on both the individual and collective levels, thereby increasing efficiency, quality and output while simultaneously controlling (reducing) costs (McClelland,1993:15).

The question then is how strong the evidence is that workforce development and raising skills in the economy bring real benefits to business and efficiency. It is intuitively convincing that a more highly skilled workforce should be beneficial to organisations and that the human capital approach reflects the view that the market value of a firm increasingly depends on intangible rather than tangible resources. Therefore, human capital suggests that individual capability is enhanced by higher qualifications and higher skills levels. If this can be accessed and used to good effect in the firm then better human capital should, *ceteris paribus*, enhance organisation performance. Better organisational performance should, in turn translate into better national performance (Tamkin *et al.*, 2004:2).

McClelland (1993:15) supports the evidence that a more highly qualified and educated workforce is linked to greater productivity, greater innovation and quality products or services. Providing individuals with a formal education is one way to increase their human capital thus contributing to aggregate productivity growth. Another way of increasing human capital is training workers on the job. Research reveals that companies offering more training enjoy higher rates of productivity growth (Carbaugh, 2007:242).

The returns from receiving education, as measured by the difference in incomes between college and high school graduates, have risen sharply over the past 20 years. Today the average college graduate can expect to earn between 5% and 15% more than the average high school graduate; much of the disparity can be explained by the importance of computer skills in the workplace. Moreover, the payoff to formal training including apprenticeships can be quite substantial (Carbaugh, 2007:243).

The importance of human capital was evident in the shipbuilding that took place during World War II. Between 1941 and 1943 United States shipyards produced more than 2500 units of cargo ships, known as the Liberty Ship, to a standard design. In 1941, the hours required to construct a ship numbered 1 200 million labour hours. By 1943, construction required only 500 000 labour hours (Carbaugh, 2007:243). This improvement in productivity is linked to workers learning from their experience and acquiring skills that more than doubled productivity in two years.

The key question should be: when are education, training and skills are most effective? Evidence suggests that training is most effective. When there is a strategic association between training and development policy and business strategy. The emerging evidence have suggests that training and development of an existing workforce has benefits for productivity and employee morale and engagement, and these benefits can only be attained when such developments are linked to the business strategy of the organisation. Superior performance is ultimately based on the people in an organisation; the capabilities that create competitive advantage also come from people .The spill-over effect for employers who raise the skills of their workforce through recruitment activity or through training and development reaps benefits of productivity and other gains (Woodcock,1996: 3).

The rapid pace of change, especially in work methods and technologies also results in training needs and confidence problems (Thad, 2000: 216). Confidence problems stem largely from conditions that all too often are present. These include downsizing with changed and enlarged job responsibilities, but with little training.

The impact on productivity improvements of technological and other business advances cannot be fully realised without a workforce capable of exploiting their capabilities and making new arrangements work. A skilled workforce is a major contributing factor to the enhancement of productivity capacity. A substantial body of research shows that companies that invest in their workforces to build knowledge-based organisations can achieve a return on their investment through higher productivity and profitability. According to (Tamkin, 2005:8), the key message that emerges from the literature is that skills make a significant difference to a firm's performance and that skills can be

enhanced through careful recruitment processes and through training and development of the workforce.

The relative importance of training with the purpose of enhancing job performance is increasing. A major reason for this emphasis is growing reliance on computers in the conduct of work, and their effect on the human requirements of work. Computer-assisted manufacturing and computer-assisted design are two major technological innovations in production. Manufacturing employees are now expected to have some fluency in computer-based operations. These talents can be acquired only through additional preparation for work. There is a growing emphasis in all areas of work to operate efficiently, that is, work procedures that require less time or produce less waste. The majority of manufacturing firms have adopted lean manufacturing production practices. Lean production systems focus on eliminating as much waste as possible in an attempt to improve productivity. Such advances are the basis for enhancing organisational performance in increasingly competitive markets. Training, therefore, is a process of narrowing the gap between job demand and human attributes.

2.8.2 Training Methods and Techniques

On-site training methods are conducted on the job site. On-site methods usually involve training in the job as a whole whereas off-site instruction focuses on some part of the job.

2.8.2.1 On-the-job training methods

i. On-the-job training (OJT)

OJT is conducted at the worksite and in the context of the actual job. Approximately 90% of all industrial training is conducted on the job (Fischer *et al.* 1993:286). OJT has several advantages (Erasmus & Van Dyk, 1999:174). Because the training setting is also the performance setting, the transfer of training to the job is maximised. The cost of a separate training facility and full-time trainer is avoided. Training motivation remains

high because it is obvious to the trainees that what they are learning is relevant to the job.

The trainer should conduct trainee performance tests to ensure that the material is being mastered and to maintain trainee motivation through feedback. This is the most common form of instruction. This type of training does not need special equipment as training occurs at the actual job location. Workers learn by imitation; they watch an experienced worker perform a task and try to imitate the activity. OJT has several limitations. It is often brief and poorly structured; also many established workers find teaching the new recruit to be a nuisance, and the new employee may be pressured to master the task too quickly. OJT may suffer from frequent interruptions as the trainer or trainee is called away to perform other organisational duties. Moreover, what many organisations call OJT is really no training at all. Employees are abandoned on the job and expected to pick up the necessary skills as best they can. Often these employees are not informed about important but infrequent events (such as emergency procedures or annual maintenance) and may learn bad habits and unsafe procedures (Erasmus & Van Dyk, 1999:174).

ii. Job rotation

Job rotation involves increasing the range of jobs and the perception of variety in the job contents. This practice involves rotating managers and non-managers from one job to another. The individual is expected to complete more job activities since each job includes different tasks. This method also provides new and different work on a systematic basis giving employees a variety of experiences and challenges. Employees increase their flexibility and marketability because they can perform a variety of tasks (Muchinsky, 2002:175). Job rotation acquaints workers with many jobs in a company and gives them the opportunity to learn by doing. Job rotation creates flexibility during staff shortages; workers have the skill to fill vacant slots.

Research studies (Ivancevich *et al.*, (2005:185) show that increasing task variety should increase employee satisfaction; reduce mental overload; decrease the number of errors caused by fatigue; improve production and efficiency; and reduce on-the-job injuries.

Critics state that job rotation often involves nothing more than having people perform several boring and monotonous jobs rather than one. An alternative strategy should be job enlargement. Another limitation of job rotation is that people are not equally suited for all jobs; workers may be reluctant to rotate out of their best jobs.

iii. Apprentice training

Apprentice training is a combination of on- and off-the-job training. Apprenticeship programmes require a minimum number of hours of classroom instruction per year, together with on-the-job experience of working with a skilled worker.

Apprentice training is commonly used in the skills trade. A new worker is tutored by an established worker for a long period. One weakness of the method is that the amount of time an apprenticeship lasts is determined by the members of the trade. This method does not take into account individual differences in learning; all workers have to work for a fixed period before they are upgraded. This limitation can be avoided by modifying the apprenticeship programme to allow fast learners to progress at a more rapid rate (Muchinsky, 2002:176).

2.8.2.2 Off- the-job training

Off-the-job training is conducted in a location specifically designed for training. This location may be located near the workplace or away from work, at a special training centre or a resort. Conducting training away from the workplace minimises distractions and allows trainees to devote their full attention to the material being taught (Erasmus & Van Dyk, 1999:175). However, off-the-job training programmes often do not provide as effective a link between the training and the actual job as on-the-job training programmes.

i) Lectures

This method is a popular form of instruction in educational institutions and is also used in industry. In instructor-led classes employees have an opportunity to learn while receiving feedback from the instructor and sharing their experiences with classmates. This sort of training allows people to reflect and develop away from the immediate pressures of the job (Johnston, 2002:42). With this method, a large number of people can be taught at the same time; it is quite cost efficient. However, the more diversified the audience, the more general the content usually becomes; therefore its usefulness in imparting specialised knowledge is very limited.

Other alternatives, including CD-ROM or Web-based training, offer large measures of flexibility and ensure that learners receive a consistent message, even when they don't train together. On the negative side, lecturers are usually one-way communication. There is little chance for dialogue questions or discussions of individual problems or special interests. Instructor-led training is often delivered in a concentrated format, with learners obliged to attend class all day, for one or more days in a row. Although popular, lecturing is not the best method to use for acquiring skills (Muchinsky, 2002:177).

ii) Conference

The conference method is widely used. It involves one or more meetings in which the conference leader and the trainees discuss relevant topics or problems. The trainer or conference leader identifies the objectives of each session and retains responsibility for the achievement of these goals. The success of this method depends on the skills and personality of the discussion leader (Muchinsky, 2002:177).

iii) Simulation

Simulation is designed to reproduce the essential characteristics of the real world necessary to produce learning and transfer. Many simulations use games. Business games train employees in certain skills; within the rules of the game participants try to meet the stated objectives of the exercise. A problem with simulations that have a game

component is that the participants know it is a game. Failing at the game is not the same as failing at the job. Participants often behave differently from the way they would in real life (Muchinsky, 2002:180).

iv) Role-play

Role playing provides a better opportunity for personal involvement and practical experience than the other formats mentioned. This training method is aimed at enhancing either human relations skills or sales techniques. As opposed to programmed instruction, which is only aimed at the individual, role playing involves many people. Participants are assigned roles in the scenario to be enacted. The enactment is followed by a discussion and participants then suggest how the problem could be handled more effectively in the future. One advantage of role playing is that participants are highly active. By “putting their feet in the other person’s shoes”, they gain an understanding of what it is like to experience interpersonal conflict in someone else’s position. The main criticism of role play is that some people put more emphasis on acting than problem solving. Despite this criticism this method is very useful in developing interpersonal relations skills (Muchinsky, 2002:181).

v) Programmed instruction

Programmed instructions (PI) involve an actual piece of equipment (usually called a teaching machine) or a specially constructed paper booklet. Both methods have three main characteristics. Firstly, the participants are active in the training process by determining their own learning pace. Secondly, the subject to be learned involves many separate pieces of material and the participants get immediate feedback on whether they have learned each one. Finally, the material is divided into an organised sequence. Thus the sequence of material is highly integrated and verified to ensure that each piece contributes to understanding and that the entire process covers the entire theme.

The advantage of PI is that participants receive immediate feedback, given that there is constant exchange of information between themselves and the programme. Fast learners do not have to wait for slow ones to catch up (Muchinsky, 2002:178).

vi) Peer training

Most people have heard the adage “You don’t really learn a subject until you have to teach it”. The act of teaching someone else to perform a task increases the teacher’s own ability to perform that task (Mayo & DuBois, 1987:95).

vii) Computer assisted training (CBT)

After several decades of research, development and the use of (CBT), two points have become increasingly clear:

- CBT will not replace other training methods, as has been predicted and
- CBT is not going to go away, as some people have hoped (Mayo & DuBois, 1987:79)

CBT is very cost effective in that it reduces training time and eliminates travel for training. The trainee is able to work at his or her own pace, to begin and end the lesson when it is convenient, and to enter a programme at his or her time. Providing training programme on CD-ROM, or corporate intranet sites, lets busy employees decide when and where to undertake the learning. Training is delivered in segments, with testing of competency at each increment.

Another form of computer based-training is a PowerPoint presentation for basic training of new employees. New employees can undergo the programme at their own pace, review parts of it again if they need to. The programme can also be easily updated to cover new procedures or programmes (Lang, 2003:69).

2.8.3 Job analysis

The purpose of a job analysis is to explain the tasks that are performed on the job and the human attributes required to perform the job. Job analysis contributes to determining

the content of training required to perform the job. The tasks identified as the most frequently performed, or those that are important become the primary content of training (Muchinsky, 2002:68).

A work-oriented procedure focuses on the human attributes required to perform the job successfully. The human attributes can be classified into four categories: knowledge (K), skills (S), abilities (A) and other (O) characteristics.

- Knowledge means specific types of information people need in order to perform a job. Some knowledge is required of workers in order to perform the job, while other knowledge is acquired on the job.
- Skills are identified as the proficiencies needed to perform a task. Skills are usually enhanced through practice.
- Abilities are defined as relatively permanent attributes that are generally stable over time. They include cognitive ability, physical ability and spatial ability.

Skills can be seen as the cultivations of innate abilities. It is important to recognise that high levels of innate ability can be cultivated into high skills levels. However, low levels of innate ability prohibit the development of high skill levels (Muchinsky, 2002:61).

2.8.4 Job design

Organisations are turning away from the idea of one person doing only one specialised job. Many manufacturing firms are now analysing jobs to determine the extent to which content and requirements can be increased in order to tap into a larger portion of the individual's talents and abilities.

Job design may be defined as the function of specifying the work activities of an individual or group in an organisational setting. Its objective is to develop job structures

that meet the requirements of the organisation and its technology and that satisfy the jobholder's personal and individual requirement (Chase & Jacobs, 2011: 175). But with the passage of time and the development of tools and processes, management's expectations change and the job will be redesigned.

The job performed by workshop workers is characterised by high depth (the amount of discretion an individual has to decide job activities and job outcomes) and low range (the number of tasks a jobholder performs). For example, machine minders on the factory floor perform limited tasks pertaining to repairing and maintaining machines. They can however decide how breakdowns on the machines are to be repaired (Woodcock, 1996:41).

Approaches to job design

- **Job enrichment**

Job enrichment entails adjusting a specialised job to make it more interesting to the job holder. A job can be enlarged horizontally allowing the worker to perform a greater number or a variety of tasks, and enlarged vertically with the worker involved in planning, organising, and inspecting his or her own work. Vertical enlargement attempts to broaden workers' influence in the transformation process by giving them managerial powers over their own activities. The organisation benefits if job enrichment occurs in both quality and productivity.

Quality improvements are significant because when individuals are responsible for their work output, they take ownership of it and simply do a better job. Also, because they have a broader understanding of the work process, they are more likely to recognise errors and correct them than if the job is narrowly focused. Productivity improvements also occur from job enrichment, but they are not as predictable or as large as the improvements in quality (Chase & Jacobs, 2011:177).

▪ **Sociotechnical systems**

The sociotechnical systems approach is consistent with the job enrichment philosophy but its main focus is more on the interaction between technology and the workgroup. This approach develops jobs that adjust to the needs of the production process technology, to the needs of the worker and the worker group. Studies conducted in the 1950s of weaving mills in India and coal mines in England revealed that work groups could effectively handle many production problems better than management if they were permitted to make their own decisions on scheduling, work allocation among members and so forth. Most major international service and manufacturing firms use work teams as the basic building blocks in the high employee involvement plants (Chase & Jacobs, 2011:178).

The individual or work group requires a logically integrated pattern of work activities that incorporate the following job design principles:

- **Task variety.** An attempt must be made to provide an optimal variety of tasks within the job. Too much variety can be inefficient for training and frustrating for the employee. Too little variety can lead to boredom and fatigue.
- **Skills variety.** Research suggests that employees derive satisfaction from using a number of skills levels.
- **Feedback.** There should be some means of informing employees quickly when they have achieved their targets. Fast feedback aids the learning process. Ideally, employees should have some responsibility in setting their standards of quantity and quality.
- **Task Identity.** Whenever possible, tasks should be separated from other tasks by a clear boundary. A group or individual employees should have responsibility for a set of tasks that is clearly defined, visible, and meaningful. In this way, work is seen as important by the group or individual undertaking it and others understand and respect its significance.
- **Task autonomy.** Employees should be able to exercise some control over their work. They should have room for decision-making (Chase & Jacobs, 2011:178).

2.9 High Performance Practices (HPWs)

HPWs are designed to improve organisational financial and operational performance. Although there are many definitions, the most comprehensive definition is “an organisation system that continually aligns its strategy, goals, objectives, and internal operations with the demands of its external environment to maximise organisational performance” (Luthans, 2008:357). The factors contributing to HPWs, and in particular the role of training, have attracted considerable attention in recent years. This attention is primarily driven by recognition that creating an enabling environment is essential, but not sufficient to ensure high productivity, and competitiveness organisational issues at the workplace are also critical.

The term “high performance workplace” describes the desired outcomes of innovative work organisations and human resource practices. Human resource practice defines how work is organised, how employees share the benefits of improved productivity and how they participate in decisions on how to improve productivity. The HPW concept is about managing in a way that enables and encourages people to maximise their potential in their own interests and in the interest of business performance (ILO, 2008:183).

High performance work systems (HPWS) are organisations that use a distinctive managerial approach that enables high performance through people. Although different Human Resources Management authors have emphasised slightly different features and management practices in describing HPWS, the essential characteristics usually involve three main sets of management practices designed to enhance employee involvement, commitment and competencies. They describe these as

- changing the design and conduct of jobs through functional flexibility, by broadening the pool of who does what through training, teamwork, quality circles and suggestions schemes;
- ensuring that employees are given the knowledge and competences to handle high performance work through team work and training, interpersonal skills, appraisal and information sharing; and

- resourcing development practices designed to attract and keep the right people with the right motivation.

HPW practices benefit employers, as they contribute to achieve good, successful businesses with high turnover and solid profit margins. Employees benefit from a high degree of investments in skills development and training, combined with open communication channels between managers and workers, flexible working policies and the involvement of employees. Training is an essential prerequisite for, and one of the integral parts of, HPWs. Human resources affect productivity and competitiveness and form a key part of innovation.

High performing companies tend to hire workers with higher skills, both soft generic skills as well as hard technical skills. This evidence highlights the contribution of human resources (HR) practices to organisational performance. While there is disagreement about what combination of practices contributes “best practice” and how this should be defined, the evidence commonly highlights positive improvements in performance. The body of evidence from many different countries, and many different industries using different methodologies, indicates shows positive outcomes on a firm’s performance as a consequence of the adoption of HR practices. Research suggests that practices have to be bundled into meaningful groups of practices, as the adoption of a single practice will not deliver the same improvement of results. When an organisation selects a group of HR practices it has to be appropriate to the strategy and the circumstance of the firm (Tamkin et al , 2005:7).

2.10 Training in the Printing and Packaging Industry

The sustained success of any business is dependent on maintaining a motivated and competent quality workforce. The provision of relevant and diverse training for the development of employees is essential to attract and retain talented quality individuals, especially given South Africa’s skills shortage. Hence, the need exists for internal and external training programmes structured to develop individual competencies in line with business needs.

The Printing Industry Federation of South Africa (PIFSA) has a long and proud history of representing the best interests of employees in the printing and packaging sector and has demonstrated the ability to “re-invent” itself to meet the ever-changing economic, structural and technological requirements of the industry. PIFSA has received a mandate from its members to urgently address the sector’s scarce and critical skills needs by affording the necessary training modules in the identified skilled occupations. The skills programmes are based largely on the current Competency-Based Modular Training Programmes (CMBT) for the training of apprentices in the various designated trades in the sector and will facilitate progression path training.

To address the pressing need for relevant training in the printing, newspaper and packaging sector, PIFSA in 2012 introduced a practical in-house skills training programme. The newly established Quality Council for Trades and Occupation (QCTO), in collaboration PIFSA, is tasked with developing curricula to cover all the trades and occupations in this sector. This process will, however, take a number of years to complete.

What is of great concern is the alarming reduction in the intake of apprenticeship. An investigation by SETA staff reveals that many employers, awarded discretionary grants at the end of 2010 for the express purpose of training apprentices, have not requested the funds because they have not employed apprentices. The unintended consequence in some cases is that having too few students does not justify running a class for some subjects. However, the gravest loss is predicted for the future when, during the next upward phase in the economy, the industry will again suffer from a critical shortage of skills, causing huge increases in artisan wages and prolific use of “moonlighters”, with consequent health and disciplinary problems.

2.11 Summary

There has not been consensus on which practices are most strongly advocated and the degree to which practices need to be aligned internally to create cohesive bundles of practices or externally to align with organisational strategies. The literature cautions against too simplistic a view of the contribution of skills to performance. Organisations use skills differently; some compete on a quality basis and therefore rely on a higher

skilled workforce while others compete on cost and therefore produce goods to lower specifications with lower demand for skills. The literature reflects that skills are only one aspect of performance; other factors affect performance such as good management, motivation and the morale of individuals.

Training is an essential prerequisite for, and one of the integral parts of HPWs. Human resources practices affect productivity and competitiveness and are a key part of innovation. Although many studies have found training to have positive effects on productivity, they have not fully considered the costs of training on the rate of return. The evidence is that the benefits to the firm exceed the wage costs paid back to the individual. High performing firms tend to employ better educated people than lower performers, given that a better educated workforce is associated with higher productivity and other organisational outcomes. Several studies link higher levels of training to business outcomes, but not all studies find this association. There seems to be mixed evidence regarding the kinds of training and their link to business outcomes.

Skills need to be entrenched within an approach to managing people in a way that captures their motivation and enables them to apply themselves fully at work. Good management, good communication and meaningful jobs all have a role to play in turning the promise of skills to reality

Overall evidence suggests consistent trainers achieve greater returns. Skills should be seen as one input, which in combination with a number of other inputs can make a positive contribution to organisational performance.

Chapter 3

Results and Discussion of Empirical Study

3.1 Introduction

The purpose of this chapter is to present the results of the empirical study, in relation to the problem statement in Section 1.3 and the objectives of the study in Section 1.4 of Chapter 1. The discussion of the findings in this chapter will be concluded and associated with the research questions. The different methodological factors and reflections regarding data gathering are discussed.

3.2 Gathering of Data

This section of the chapter outlines the methodological approach on how the survey was conducted and the method employed to obtain the data used in the study. Each section describes a different factor of the data collection and gathering process. The first part comprises of information pertaining to the development and construction of the questionnaire and the second part of information pertaining to data collection.

3.2.1 Development and Construction of Questionnaire

It was stated in Chapter 1 that the instrument used in the study was derived from two sources: the Human Resources Development Canada's (HRDC) Essential Skills Data Base (HRSDC, 2006c) and the Skills Pyramid (Appendix B) based on the Advanced Manufacturing Competency Model.

Information regarding the questionnaire (Appendix A) was obtained through structured interviews. The questionnaires used were developed from the literature review done on manufacturing skills and contained questions and items relevant to the initial research problem. Questionnaires used in the study were divided into two sections: namely,

Section A

Section A, which captures demographic, human capital and structural labour market characteristics in the survey analysis. The following questions were addressed:

Demographic and human capital characteristics

- Respondent's age
- Respondent's gender
- Highest level of education of the respondent
- Respondent's highest level of education

Structural labour market characteristics

- Occupation title of the respondent
- Respondent's union status
- Respondent's job tenure
- Number of hours worked per week by the respondent
- Full-time and part-time status of the respondent
- Whether respondent has been promoted at least once during the past five years.

Section B

Section B captures the essential skills, industry sector technical and foundational workplace competencies for the jobs of manufacturing workers. The following skills were explored:

- i) Essential skills
 - Reading
 - Document use
 - Numeracy
 - Writing

- Communication
- Problem solving
- Decision-making
- Planning and organising
- Teamwork (working with others)
- Computer use

Industry sector technical competencies

ii)

- Production
- Maintenance installation and repair
- Quality assurance and continuous improvement
- Health and safety

iii) Foundational workplace competencies

- Adaptability and flexibility
- Marketing and customer focus

In Section B the following questions were addressed:

- The level of skill required by the job (respondent)
- Whether or not the skill is learned on the job
- Whether or not the skill is required for entry
- Whether the performance of the skill changed during the past five years?
- How often the skill is used to perform the job

3.2.2 Data Collection

The standard questionnaire was administered to 50 workers employed in a printing manufacturing firm. This research used a convenience sampling method to collect data.

Structured interviews were conducted during tea and lunch breaks. These structured interviews were conducted to accommodate workers who had difficulty understanding and interpreting the questionnaire as the questionnaire was written in English. The majority of the respondents did not have a good comprehension of the English language; some of the questions had to be interpreted in their spoken language. The structured interviews were conducted over a period of three weeks.

3.2.3 Measurement Instrument

The measurement instrument uses 18 skills measurements taken from the 2005 Grand Erie and Waterloo Wellington Skills survey administered to a random selection of manufacturing workers between May and August 2005 (Gawley, 2006:1). Each of these skills are measured according to the following four themes derived from the US Occupational Information systems (O*NET):

- a) **Skill level:** the level of the skill needed to perform the job as judged by the worker.
- b) **Skill requirement:** whether the skill is required for entry into the job or whether it is learned on the job (a 3- point yes, no or don't know scale).
- c) **Skill change:** how performance of a skill has changed during the past five years (on a 4-point scale measuring skill decrease, skill remaining unchanged, skill increase and don't know).
- d) **Skills utilisation:** how often the workers are able to apply their own skills at their job (on a 1-5 point scale).

The Essential Skills Database uses a numerical scale of 1 - 4. For the purpose of this study a 5- point scale was used consistently for skills level and utilisation. Each one of the ten essential skills chosen for analysis is defined below. These definitions were slightly modified from the definitions provided by HRSDC for clarity of understanding on the part of the survey participants.

Essential skills

- **Reading text** refers to the reading of materials that are in the form of sentences or paragraphs. Reading text involves reading notes, memos, manuals, regulations, books, reports or journals.
- **Document use** refers to tasks that involve the display of graphs, lists, tables, blueprints, schematics, drawings, signs or labels.
- **Numeracy** refers to the use of numbers and the ability to think in mathematical terms. For example, counting stock, job scheduling, budgeting, taking measurements and data analysis.
- **Writing** refers to writing text, writing in documents, and non-paper-writing (for example, computer typing).
- **Communication** refers to the use of speech to give and share thoughts and information.
- **Problem-solving** refers to proposing solutions to problems. The ability to eliminate possible causes and propose corrections.
- **Decision-making** refers to the ability to make choices from among different options (for example, deciding which tools or materials to work with on a printing job).
- **Planning and organising** refers to the extent to which you are able to plan and organise your work task.
- **Working with others (teamwork)** refers to whether you are able to work with others to carry out work tasks. This ranges from working alone, working around others, working in partnership to working as a member of a formal team.
- **Computer skills** refer to various computer-use activities ranging from basic interaction with computer-controlled equipment.

The remaining eight skills were taken from the Skills Pyramid for High Performance Manufacturing (Appendix B) based on the Advanced Manufacturing Company Model. The Industry-Related Technical Skills were developed to reflect the necessary skills for entry-level workers across all manufacturing sectors in a high-performance workplace. These skills represent an area of agreement among manufacturing trade associations.

Industry-sector technical competencies

- Manufacturing process development and design
- Production
- Maintenance
- Supply chain logistics
- Quality assurance and continuous improvement
- Health and safety
- Adaptability and flexibility
- Marketing and customer focus

The following measures represent demographic, human capital and structural labour market characteristics in the survey analysis. These were used to build multiple regression models that explain the factors that most strongly impact the skills levels and utilisation experiences of workers in the printing and packaging Industry.

- **Demographic and human capital characteristics:** respondent's age, respondent's sex, and highest level of education of the respondent.
- **Structural labour market characteristics:** occupational title of the respondent, respondent's union status, respondent's job tenure, number of hours worked per week by the respondent, full-time and part-time status of the respondent and whether the respondent has been promoted at least once during the past five years.

3.3 Demographic Information of the Respondents

This exercise is about evaluating the skills levels of manufacturing workers in the printing and packaging industry. The research concentrated on the West Rand region of

Johannesburg. Participants were selected from a printing manufacturing firm that specialises in printing production and value-added fulfilment services. The printing products include the manufacture of business forms, label production and personalisation. The printing and packaging industry is classified under the wood, paper and pulp industry sector in South Africa.

3.3.1 Question 1: Gender Distribution

- **Purpose of question**

The respondent's gender was important as it provided a benchmark for the sample's population representation.

- **Results obtained**

Table 3.1 indicates the number of males and females who participated in the survey. This was addressed in Question 1 of the questionnaire (Appendix A).

Table 3.1: Gender Distribution of Respondents

Gender	Frequency	Percentage (%)	Cumulative Percentage (%)
Male	48	96.0	96.0
Female	2	4.0	100.0
Total	50	100.0	

- **Analysis of results**

An analysis of the respondents' gender revealing a distribution of males (96%) and females (4%) demonstrates a high underrepresentation of females in the sample. The 2004 wood, paper and pulp sector analysis reported 99% of male employees.

Men clearly made up an overwhelming majority. Pending small increases in the sector since 2004, this sample is generally representative of the population by gender.

3.3.2 Question 2: Age Group

- **Purpose of question**

The main purpose of the question (Appendix A) was to establish the age distribution of the sample. This question determined whether the industry has an ageing workforce.

- **Results obtained**

The age group category of factory workers that participated in the survey illustrated in Table 3.2 below.

Table 3.2: Age Group Category of the Respondents

Age Category	Frequency	Percentage (%)	Cumulative Percentage (%)
15-24	1	2.0	2.0
25-34	4	8.0	10.0
35-44	8	16.0	26.0
45-54	20	40.0	66.0
55-64	17	34.0	100.0
Total	50	100.0	

- **Analysis of results**

Age distribution indicates that most respondents were between the ages of 45 and 64 at the time that the questionnaire was distributed, but certain discrepancies should be noted. The 2004 census data showed skilled trades having the largest proportion of employees younger than 40 years. The sample over-represents workers between the ages of 55 to 64 and under represents workers between the ages of 25 to 34.

3.4 Human Capital Characteristics of Respondents

The human capital characteristics evaluate educational attainment. This is important in establishing the skills levels and identifying skills gaps for manufacturing workers.

3.4.1 Question 3: Highest Academic Qualifications of Respondents

- **Purpose of question**

The main purpose of Question 3 (Appendix A) of the questionnaire was to analyse the human capital levels of manufacturing workers. The main purpose of this question was to establish the academic levels of manufacturing workers participating in the study.

- **Results obtained**

The academic level of manufacturing workers participating in the study is presented Table 3.3.

Table 3.3: Highest Academic Qualifications of Respondents

Qualification	Frequency	Percentage (%)	Cumulative Percentage (%)
Less than grade 9	2	4.0	4.0
Grade 9 and 10	3	6.0	10.0
Some college, trade or vocational	27	54.0	64.0
College dip., trade or voc. certificate	18	36.0	100.0
Total	50.0	100.0	

- **Analysis of results**

The frequency/percentage table for the highest level of education of the respondents indicates that the overwhelming percentage of the sample had either completed or had some college diploma, trade or vocational qualification (90%).

3.5 Structural Labour Characteristics of Respondents

3.5.1 Question 4: Job Tenure of Respondents

- **Purpose of question**

The purpose of question 4 (Appendix A) of was to determine employee turnover. This was beneficial in analysing the impact of skills training and its effects on manufacturing productivity.

- **Results obtained**

The job tenure of respondents participating in the study is presented in the Table 3.4.

Table 3.4: Job Tenure of Respondents

Job Tenure	Frequency	Percentage (%)	Cumulative Percentage (%)
13 to 24 months	2	4.0	4.0
25 to 36 months	1	2.0	6.0
37 to 48 months	7	14.0	20.0
More than 5 years	40	80.0	100.0
Total	50	100.0	

- **Analysis of results**

An overwhelming majority (80%) of the participants had been with the same company for more than five years. This reflects low levels of turnover.

3.5.2 Question 5: Hours Worked by Respondents per a Week

- **Purpose of question**

The purpose of Question 5 (Appendix A) was to determine the number of hours worked by manufacturing workers in one week.

- **Results obtained**

The hours worked per week by respondents participating in the study is presented in Table 3.5.

Table 3.5: Hours worked by respondents per week

Hours worked per week	Frequency	Percentage (%)	Cumulative Percentage (%)
21 - 40 hours	2	4.0	4.0
41 - 50 hours	19	38.0	42.0
More than 50 hours	29	58.0	100.0
Total	50	100	

- **Analysis of results**

The results indicate that 90% of the respondents had worked more than 40 hours in one week. This meant that worked overtime.

3.5.3 Question 6: Current Job Titles of Respondents (Occupations)

- **Purpose of question**

The purpose of Question 6 (Appendix A) was to determine the occupational composition of the workforce.

- **Results obtained**

The results on the occupational composition of the workforce are represented in Table 3.6.

Table 3.6: Current Job Titles of Respondents (Occupations)

Occupation Title	Frequency	Percentage (%)	Cumulative Percentage (%)
Driver Fork	1	2.0	2.0
Packer	1	2.0	4.0
Picker	3	6.0	10.0
Operator	9	18.0	28.0
Technician	1	2.0	30.0
Supervisor	2	4.0	34.0
Foreman Maintenance	1	2.0	36.0
Artisan Assistant	14	28.0	64.0
Assistant Machinist	10	20.0	84.0
Artisan Machinist	3	6.0	90.0
Operator Machinist	5	10.0	100.0
Total	50	100.0	

- **Analysis of results**

The results obtained from the survey indicate a shortage of operator machinists (only 6% of the respondents were operator machinists).

3.5.4 Question 7: Job Positions of Workers Compared to Five Years Prior

- **Purpose of question**

The main purpose of Question 7 (Appendix A) was to determine whether the respondents' job positions had changed. The reason for the question was to identify whether the respondents had acquired new skills enabling them to perform new tasks, or pursue career progression.

- **Results obtained**

The results of changes in the respondents' job positions compared to five years prior are presented in the Table 3.7.

Table 3.7: Job Positions of Workers Compared to Five Years Prior

Workers' Job Position	Frequency	Percentage (%)	Cumulative Percentage (%)
Hold different positions	8	16.0	16.0
Hold same positions	42	84.0	100.0
Total	50	100.0	

- **Analysis of results**

The results indicate that 84% of respondents had occupied the same position in the five years prior to completing the questionnaire.

3.5.5 Question 8: Promotion

- **Purpose of question**

The main purpose of Question 8 (Appendix A) was to determine whether the respondents had received promotions during the five years prior to completing the questionnaire.

- **Results obtained**

The results indicating whether respondents had been promoted at least once during the five years prior to completing questionnaire are presented in table below Table 3.8.

Table 3.8: Promotion

Promotion	Frequency	Percentage (%)	Cumulative Percentage (%)
Non-promotion	40	80.0	80.0
Promotion	10	20.0	100.0
Total	50	100.0	

- **Analysis of results**

The results reveal that 20% of the respondents had been promoted at least once during the five years prior to completing the questionnaire. The results correspond with the information in Table 3.6. It is clear that there were at the time insufficient enough opportunities for career progression.

3.5.6 Question 9: Employment Status

- **Purpose of the question**

The purpose of Question 9 (Appendix A) was to determine the number of permanent workers and part-time workers.

- **Analysis of results**

In the survey, respondents were asked to provide their full-time or part-time job status. The results indicate that all respondents that participated in the survey were employed full-time. Therefore, this report presents patterns for full-time workers only.

3.5.7 Question 10: Union Status of Respondents

- **Purpose of question**

The purpose of Question 10 (Appendix A) was to gain insight into the role and involvement of trade unions in the skills development of their members.

Table 3.9: Union Status of Respondents

Union Status	Frequency	Percentage (%)	Cumulative Percentage (%)
Non-union member	5	10.0	10.0
Union member	45	90.0	100.0
Total	50	100.0	

- **Analysis of results**

The results indicate that the printing and packaging labour market is highly unionised, with 90% of respondents belong to a union.

3.6 Essential and Industry related (Technical) Skills Requirements for manufacturing Jobs

Table 3.10 summarises the skills requirements for the sampled workers. The Essential Skills Database offered by HRSDC proposes that the ten skills adopted for this study are essential for the productive performance of occupational tasks. However, certain skills are more essential than others under certain contexts. The left half of Table 3.9 summarises the percentage of workers who think that the ten essential skills are entry-level requirements for their jobs; these skills are required to acquire a job versus those skills that are more likely learned on the job. The results confirm the essential character of these skills.

Table 3.10: Essential and Technical Skill Requirements for Manufacturing Workers

Essential Skills	%	Technical Skills	%
Reading	80.0	Production	50.0
Document use	70.0	Maintenance installation and repair	64.0
Numeracy	82.0	Supply chain logistics	2.0
Writing	52.0	Quality assurance and continuous improvement	10.0
Communication	2.0	Health and safety	10.0
Computer use	2.0		
Problem solving	32.0		
Decision making	32.0		
Working with others	20.0		
All Essential Skills	41.3	All Technical Skills	27.2

Table 3.10 summarises the skills requirements for the sampled workers. The results represent entry-level skills that were identified by the respondents.

Firstly, the average percentage (41.3%) for all essential skills was used as a benchmark from which to analyse the skills rankings. The results indicate that reading skills were above average (80%), numeracy (82%), document use (70%) and writing (52%). Below average were problem solving (32), decision making (32%) followed by working with others (20%). The majority of respondents thought that job-related computer-use skills are learned on the job. This is not unusual when information and computer-technology are particular in different production conditions. Other skills are indicative of a worker's need to solve problems independently, make decisions, plan and organise. Workers believe that such skills are generally not required for entry into their jobs and are acquired after entry.

The right side of Table 3.10 presents worker responses to technical competencies required for entry. The industry-related technical competencies were selected because they are specific to occupations. Therefore, it is accepted that the majority of these skills score lower scores than essential skills. The average percentage of respondents believing that industry-related skills are required for their jobs is 17% lower than the essential skills average. Only production (50%) and maintenance, installations and repairs (64%) were above the essential skills average. These high scores are a reflection of the technical job requirements of manufacturing workers in a printing production firm. The majority of workers were machine operators and their jobs involved working with machines that were manually operated. The remaining technical skills were primarily learned on the job

3.7 Skills Change in Manufacturing Jobs

Table 3.11 reveals that the following essential skills had remained unchanged for the highest percentage of workers: numeracy (21.4%), reading (19%) and writing (17.9%). The highest percentage of workers stating increases in the performance of essential skills was evident in decision making (14.7%), problem-solving (14%) and teamwork (working with others -14%). The essential skills with the lowest increases in the five years prior were reading (0.8%), numeracy (0.8%) and writing (0.8%). The results indicate a slight percentage increase in computer use (4.7%).

Table 3.11: Skills Change Percentage on ten essential skills measurements

Essential Skills	Skills Change (%)	
	Unchanged	Increase
Reading	19.0	0.8
Document use		1.6
Numeracy	21.4	0.8
Writing	17.9	0.8
Communication	0.6	-
Computer use	-	4.7
Planning and organising	0.6	-
Problem solving	6.0	14.0
Decision making	5.4	14.7
Teamwork (working with others)	6.5	14.0
All Essential Skills	8.6	5.1

An interesting pattern emerged from these results. The highest percentage of workers citing skills that had remained unchanged generally corresponded with low levels of skills increase: reading, numeracy and writing. The highest percentages reported for skills increases were accompanied by low levels of skills changes: problem-solving, decision-making and teamwork (working with others). A speculative interpretation of these results suggests that reading, numeracy and writing had decreased for this sample owing to the highly technical nature of the job requirements. Similarly, while skills such as reading, numeracy, writing and document use and writing were among the most required skills (See Table 3.11), their performance levels were comparatively constant through time in manufacturing. However, skills such as teamwork (working with others), problem-solving and decision-making, computer use and communication were more sensitive to the changes that may occur in the social and technical aspects of production in the specific industry. Skills that were sensitive to social and technical adaptation require periodic upgrades, hence the need for on-the-job training. The results indicate an overall increase in the demand for people-oriented and discretion-oriented skills in manufacturing jobs.

Table 3.12: Skills change in Measurement of Technical Skills

Technical Skills	Skills Change (%)	
	Unchanged	Increase
Production	8.3	13.2
Maintenance installation and repair	6.5	13.2
Quality assurance and continuous improvement	3.6	7.0
Health and safety	4.2	10.1
Adaptability and flexibility	-	5.4
Technical Skills	5.66	9.78

Table 3.12 summarises the skills change patterns for technical competencies in a sample of manufacturing workers in the printing and packaging industry. Skills that had increased in the five years prior as cited by respondents were production (13.2%), maintenance installation and repairs (13.2%) and health and safety (10.1%). The lowest increases were found in quality assurance and continuous improvement (7%) and adaptability and flexibility (5.4%). The results indicate the highest percentage of respondents reporting that production (8.3%) and maintenance installation and repairs (6.5%) had generally remained unchanged in the five years prior. This trend suggests an increase in the skills upgrade for manufacturing workers.

3.8 Essential Skills Levels and Utilisation in Manufacturing Jobs

The remaining sections focus on the self-reported skills levels and utilisation experienced by participants. Table 3.13 reports the mean and standard deviations representing the skills level and utilisation judgement of workers for the ten essential skills and eight technical skills as identified by industry stakeholders.

Table 3.13: Means and standard deviations of skills levels and utilisation responses for essential skills measurements

Essential Skills	Skills Level		Skills Utilisation	
	Mean	Standard Deviation	Mean	Standard Deviation
Reading	3.36	1.16	2.83	0.89
Document use	3.34	1.20	2.89	1.11
Numeracy	4.02	0.92	3.50	1.11
Writing	2.55	0.94	2.76	0.74
Communication	2.80	1.10	4.50	0.71
Planning and organising	3.67	0.58	3.80	0.45
Problem solving	3.50	0.95	2.94	0.97
Decision making	3.60	0.88	2.94	0.97
Teamwork (working with others)	2.83	0.72	2.73	0.69
Essential Skills	3.30	0.94	3.21	0.85

The skills level column in Table 3.13 reveals that the average skills level reported for the sample was 3.30 on a scale between 1 and 5, with 1= low level of skill level and 5 = high level of skill. The results indicate that the sampled workers, on average, believed that planning and organising required a higher level of skill than any other essential skill (mean = 3.67) followed by decision-making (mean = 3.6), problem-solving and numeracy (mean = 3.5). Lower than average skill levels reported were document use (2.89), reading and teamwork (mean = 2.83), communication (mean = 2.80), writing (2.76), computer use and problem-solving (mean = 3.5).

The right half of Table 3.13 summarises the results for the average skills utilisation of all skills as 3.21. Compared to the overall mean, workers seemed to be able to utilise their own communication most often (mean = 4.5), followed by planning and organising skills (mean = 3.8) and numeracy (mean = 3.5). The least utilised skills were teamwork (mean = 2.73), writing (mean = 2.76) and reading (mean = 2.83) and computer use (mean = 3). The results in Table 3.13 suggest that the highest level of essential skills required of the manufacturing workers were connected with people and data. The low level of computer

use required of workers was consistent with the findings regarding skills requirements and skills change.

3.9 Technical Skills Levels and Utilisation in Manufacturing Jobs

Table 3.14 summarises the skills levels and utilisation responses of respondents for technical skills. The highest skills levels were seen for production (mean = 4.3), followed by maintenance installation and repairs (mean = 4.37) and quality assurance and continuous improvement (mean = 4.14). Scoring below average were health and safety (mean = 3.25) and adaptability and flexibility (mean = 2.95).

Table 3.14: Means and standard deviations for skills levels and utilisation responses on technical skills measurements

Essential Skills	Skills Level		Skills Utilisation	
	Mean	Standard Deviation	Mean	Standard Deviation
Production	4.38	0.74	4.70	0.74
Maintenance installation and repairs	4.37	0.67	4.60	0.67
Quality assurance and continuous improvement	4.14	0.73	4.39	0.73
Health and safety	3.25	0.94	3.80	0.94
Adaptability and flexibility	2.95	0.67	2.95	0.67
Technical Skills	3.82	0.75	4.09	0.75

Skills utilisation patterns in Table 3.13 are consistent with skills requirements (refer Table 3.10) and skills change (Table 3.12) patterns. Skills utilisation was highest for production (mean = 4.70), maintenance installation and repairs (mean = 4.60) and quality assurance and continuous improvement (mean = 4.39). Skills that were the least utilised by respondents were health and safety and adaptability and flexibility. Skills associated with material-oriented tasks were utilised at the highest levels.

3.10 Human Capital and Skills

Table 3.15 (on the following page) indicates the mean comparisons of skills levels and utilisation by the respondents' highest level of educational attainment. Only the five essential skills for which statistically significant comparisons are indicated and show that respondents who hold a college diploma (skilled) were more likely to state higher average skills level ratings.

The majority of semi-skilled workers had attained some college, trade or vocational certification (semi-skilled). It is likely that these diplomas and certifications provide workers with specialised skills that were more easily judged in comparison with tasks performed. What these results suggest is that workers who possessed more specialised forms of training were able to perceive their tasks as more highly skilled. A tight skills-to-job match potentially improves one's judgement of skills level and utilisation.

Table 3.15: Mean comparison of skills levels and utilisation by respondents' highest level of education

	SL		Mean Difference	SU		Mean Difference
	Semi-skilled	Skilled		Semi-skilled	Skilled	
Essential Skills						
Document use	3.21	3.75	-0.54	2.96	2.80	-0.16
Numeracy	3.87	4.41	-0.55	3.75	3.38	-0.38
Writing	2.69	2.33	-0.36	3.75	2.64	-1.11
Decision making	3.27	3.60	-0.33	2.83	3.14	-0.31
Teamwork (working with others)	3.04	2.93	-0.11	2.63	2.83	-0.21
Essential Skills	3.22	3.41	-0.38	3.18	2.96	-0.43
	SL		Mean Difference	SU		Mean Difference
	Semi skilled	Skilled		Semi-skilled	Skilled	
Technical Skills						
Production	4.24	4.63	-0.39	4.65	4.80	-0.15
Maintenance installation and repair	4.27	4.64	-0.37	4.60	4.57	-0.03
Quality assurance and continuous improvement	4.00	4.43	-0.43	4.27	4.57	-0.30
Health and safety	3.20	3.33	-0.13	3.70	4.13	-0.43
Technical Skills	3.93	4.26	-0.33	4.30	4.52	-0.23

The results 3.15 are particularly interesting with respect to decision-making. Skilled workers were more likely to utilise decision-making in their job than unskilled workers. The results also revealed that on average skilled workers had high skills levels. The results show that skilled workers had high skilled levels in production, maintenance

installation and quality assurance and they were more likely to utilise those technical skills in their work environment.

3.10.1 Skills Level and Productivity

The research results in Table 3.11 indicate a 5.1% increase in the skills change measures. These results highlight a skills gap, in terms of upskilling manufacturing workers. Table 3.12 results show a 9.7% increase in technical skills change measure in The results obtained reflect that little had been done in terms of upgrading the skills level of manufacturing workers.

Table 3.16 indicate that skilled trades and artisans account for a third of the sector's employment in the wood, paper and pulp industries in South Africa. The survey results indicate that the skills level for machine operators was very low. Only 36% of workers were qualified trade artisans or technicians with formal qualifications.

Table 3.16 Primary processing employment and occupation.

	Employment
Primary Processing	35 000
Occupations	
Mangers and Senior Officials	6%
Professionals	1%
Associate Professionals	3%
Administrative and Secretariat	4%
Skilled Trades/ Artisans	33%
Sales and customer service	2%
Transport/ Machine Operators	22%
Other occupations	29%

Source: A sector analysis of wood, paper, pulp industries in South Africa: Sector studies research project March 2008 (Table 7.4 pg 61).

Human Resource programmes are required to help promote skills acquisitions particularly by operators in areas related to equipment maintenance, in order to improve their ability to service and trouble-shoot equipment. These measures can help manufacturing firms to improve productivity.

The Printing and Packaging industry has to promote training for both machine operators and technicians as part of their continuous improvement activities. Long-run trends in employment and automation strategies have profound implications for the skills requirements of manufacturing workers. This means that the demand for high school graduates will continue to fall as a result of an increased preference to hire workers with some form of college or technical qualifications.

Chapter 4

Conclusions and Recommendations

4.1 Introduction

The study highlights the importance of continuous upskilling across all occupations in order to address the current skills shortages within the sector. These shortages are critical to manufacturing firms at an operational level owing to the technical expertise they provide and it is therefore vital that they be addressed. The findings demonstrate the need for a highly skilled workforce in improving manufacturing performance.

4.2 Conclusions Regarding the Empirical Study

Firstly, an analysis of essential skills requirements highlights the importance of reading, numeracy, writing and document use as prerequisites for entry into manufacturing jobs. While it is expected that these skills be required, more surprising are the high scores for decision-making, problem-solving and planning and organising. Skills requirements, levels and utilisation responses suggest that thinking skills such as problem-solving, decision-making and planning and organising are on the rise. While computer use skills are shown to be inessential for entry into manufacturing jobs, this does however not mean that computer skills are not necessary. Skills change analyses suggest that the need for computer-use skills is growing slowly and that requirements for manufacturing jobs have changed in the past five years. The results indicate a rise in decision-making, problem-solving and teamwork (working with others).

Industry-related technical skills analysis indicates an increase in percentage changes in technical skills, which may signal upskilling. The results indicate high levels of performance in tasks that involve production, maintenance installation and repair, and health and safety. This trend of a shift from traditional to computerised and flexible technologies may be responsible for the enhancement of these skills.

Secondly, the results suggest that job designs in manufacturing do not necessarily reflect traditional methods of manufacturing in which workers are isolated cogs in an assembly line. Manufacturing workers are a critical link in the solution relating to improving manufacturing productivity. Essential for entry into many 21st century manufacturing jobs is the need to communicate with others, the ability to think about problems, make decisions and the ability to plan and organise. It is important that young people that enter the industry be educated in the skills requirements and expectations of contemporary manufacturing jobs; particularly the value of social interaction, thinking skills and basic-level computer skills along with the ability to adapt to social and technical change.

Both general and essential skills are important to the success of workers and the productivity of manufacturing employers. These skills are screened upon entry after the completion of secondary education and post-matric qualifications. However, general skills need to be emphasised and promoted among the youth, which means urging them to remain in school to complete at least a high school qualification. Manufacturing firms should invest in job-transferable skills such as those relating to thinking and people. The focus should not be only on occupational-specific or technical skills.

Studies of human capital or the attainment of formal educational diplomas, degrees or certificates, show that formal education credentials have relatively less influence on the salaries, incomes and mobility of manufacturing workers owing to the technical, occupational or industrial structure of manufacturing. Formal educational attainment is most often used as a screening device from which prospective workers can be selected. Compensation and mobility are then influenced by the successful acquisition of job-specific skills and advancement through promotion or enhancement of skills levels. It is evident that the achievement of a college, vocational or trade certification is important for entry into manufacturing. The most insightful result of the survey was that most of the respondents are over the age of 45. The industry needs to increase participation of youth by providing training programmes and offering learnerships.

The results of the empirical study also highlights the importance of matching skills to jobs. Skills-job matches are achieved to a greater extent among workers who have completed at least some post-secondary qualification, particularly college, trade or vocational. While general skills are essential, specific skills acquired in these post-secondary programmes also help workers to perform at higher levels and use their skills to a greater extent.

In conclusion, while the empirical study has generated many findings, it has also generated topics for further research.

4.3 Recommendations

- **Emphasising the upskilling of operators particularly for equipment maintenance activities:** Through human resources policies, manufacturing firms can extend the breadth and depth of their employees' skills particularly the skills of their operators and technicians. This strategy will enable operators and technicians to be self-sufficient in maintaining their own equipment rather than using vendors. Moreover, firms can save on maintenance costs and improve their manufacturing performance.
- **Using self-directed work teams:** Each self-directed team should consist of production specialists, supervisors and engineers in a particular equipment area across all shifts who will be responsible for goal setting, prioritising workflow, specification changes and performance reviews. All members of the team should meet at least once a week.
- **Heightening the skills level of manufacturing personnel:** This can be achieved by implementing structured human resource systems to promote skills acquisition, particularly by machine operators in areas related to equipment maintenance, in order to improve their ability to service and trouble-shoot equipment.
- **Introducing intensive classroom-based skills upgrade programmes for operators and engineers:** The industry needs to gear up for a number of changes in technology and organisational structure. Changes in technology

require a workforce with high levels of computer skills. The new trend is towards technology-intensive solutions. The printing and packaging Industry in partnership with PIFSA needs to promote training for both operators and engineers as part of their aggressive continuous improvement activities rather than in response to implement change.

-
- **Developing recruitment strategies that will attract qualified manufacturing personnel:** Long-run trends in employment and automation strategies have profound implications for the skills requirements of skilled personnel. Manufacturing firms as part of their human resource practices need to promote the hiring of people with college diplomas, qualified trade artisans, technicians and operators. This suggests that demand may fall for high school graduates in the manufacturing sector. The empirical study results suggest that a high number of respondents hold a college diploma, trade or vocational certificate. There is need to train operators to assume more problem-solving responsibilities. This will equip operators to attempt high-level tasks depending on the degree of skills upgrading through on-the-job and classroom training.
- Finally, the printing and packaging industry needs to do more to promote and boost the attractiveness of manufacturing as a career choice. There are highly varied and rewarding career paths within the sector, with good potential for mobility. However, these are often not apparent to students or those working outside the sector.

4.4 Suggestions For Future Research

Future research can examine the occurrence and influence of technological and organisational change on skills needs in manufacturing. Further research is required in establishing the role played by trade unions in upgrading the skills of their union members. This is very important as the nature of the industry is highly organised and the influence of trade unions in this industry cannot be ignored.

REFERENCES

- Black, S. & Lynch, L. 1997. How to compete: The impact of workplace practices and information technology of productivity. Mc Graw Hill: New York.
- Carbaugh, R.J. 2007. An Applications Approach to Contemporary Economics. 4th ed. Thomson: South Western.
- Chase, R.B., Jacobs, F.R. 2011. Operations and Supply Chain Management. McGraw-Hill: New York.
- Erasmus, B.J. & Van Dyk, P.S. 1999. Training Management in South Africa. 2nd ed. Oxford: South Africa.
- Fischer, G., Nakakoji, K., Ostwald, J., Stahl, G & Summer, T. 2003 Embedding Critics in Design Environments. *The Knowledge Engineering Review*, 8(4):286.
- Galindo-Ruenda, F., Haskel, J. 2005. Skills, Workforce Characteristics and Firm-Level Productivity: Evidence from the matched ABI/Employer Skills Survey.
- Gawley, T. 2006. Skills requirements, Skills change and Utilization for a sample of manufacturing workers in Grand Erie and Waterloo Wellington.
- Haskel, J., Hawkes, D., Pereira, S. 2005. Skills, human capital and the plant productivity gap: UK evidence from matched plant, worker and workforce data.
- Human Resources and Skills Development Canada. 2000. Essential Skills. Tools and Applications. URL:
http://srv600.hrdchrhc.gc.ca/esrp/English/general/ToolsApps_e.shtml.shtml. Date accessed 22 September 2013.
- ILO (International Labour Office). 2008. *Report V; Skills for improved productivity, employment growth and development*. Conference proceedings of the International Labour Conference, 97th Session held in Geneva. Conducted by the International Labour Office (ILO). Geneva: ILO.

- Ivancevich, J.M, Konopaske, R., Matteson, M.T. 2005. Organizational Behaviour and Management. 7th ed. McGraw-Hill: New York.
- Johnston, S. 2002. Investing in well-structured training programmes leads to higher productivity: developing effective training methods with diverse approaches to learning. *Journal of Health Care Compliance*, 4(3):41-42.
- Lang, J. 2003. Here's the (power) point: basic training. *Foodservice Director*, 16(1):69.
- Luthans, F. 2008. Organizational Behaviour. 11th ed. McGraw-Hill: New York.
- Mayo, G.D. & Dubois, P.H. 1987. The complete book of training: theory, principles, and techniques. San Diego, California: University Associate, Inc.
- McLelland, S. 1993. A systematic approach to determine productivity improvement training needs. *Industrial Management*, 35(4):15–18.
- Muchinsky, K S. 2002. Personnel Psychology. Oxford: University Press Southern Africa.
- Pogue, T. E. 2006. A sectoral analysis of wood, paper and pulp industries in South Africa. Institute for Economic Research on Innovation.
- Rowley, R. 1995. Management development: new agendas for information professionals. *Library Management*, 16(1):5.
- Struwig, F.W. & Stead, G.B. 2001. Planning, Designing and reporting research. RSA. Maskew Miller Longman. (Pty) Ltd.
- Swanepoel, B., Erasmus, B., Van Wyk, M. & Schenk, H. 2000. South African Human Resources Management Theory and Practice. 2nd ed. Cape Town: Zebra Publication.
- Tamkin, P., Giles, L., Campbell, M. & Hillage, J. 2004. Skills Pay: The Contribution of Skills to Business Success. Institute for employment studies.
- Tamkin, P. 2005. Measuring the Contribution of Skills to Business Performance. Institute for Employment Studies.

Thad, G. 2000. Motivation Management: Fuelling performance by discovering what people believe about themselves and their organizations. Palo Ato CA: Davies Publishing.

Woodcock, D. 1996. Integrated manufacturing systems. University of Nottingham: Nottingham UK.

Appendix A

Evaluating the impact of training on productivity in a Printing and Packaging Firm: Questionnaire

The purpose of the questionnaire was to identify skills needs in a Printing and Packaging firm. The survey addresses several aspects of occupational skill examining the skills levels, skills requirements, skills change and skills utilisation patterns for essential skills and technical competencies for high performance manufacturing. The questionnaire attempted to identify those skills that were required and utilised by shop floor workers. Manufacturing firms can improve productivity by focusing on upskilling the the workers in terms of essential and technical competencies.

1. Gender (Mark: X)

Male	
Female	

2. Age group

15 – 24	
25 – 34	
35 – 44	
45 – 54	
55 – 64	

3 Highest level of education

Less than Grade 9	
Grade 9 to 10 (STD 7 to 8)	
Grade 11 – 12 (STD 9 to 10)	
Some College, Trade or Vocational	
College Dip., Trade and Voc. Certificate	
University Bachelor's Degree	
Professional Degree	
Other	

4. Number of years of employment with the company

Less than 6 months	
7 to 12 months	
13 to 24 months	
25 to 36 months	
37 to 48 months	
More than 5 years	

5. Number of hours worked in a week

20 Hours or Less	
21 – 40 Hours	
41 – 50 Hours	
More than 50 Hours	

6. Occupation Title _____

7. Has your job position changed in the past five years:

Yes		No	
-----	--	----	--

8. Have you been promoted at least once during the past five years: (Mark: X)

Yes		No	
-----	--	----	--

9. Are you employed Full-time or Part-time

Yes		No	
-----	--	----	--

10. Are you a Union member?

Yes		No	
-----	--	----	--

Question 11

Essential Skill	Rate the level of skill required to perform your job? (Scale 1 – 5 ; 1 = Low; 5 = Very High)
Manufacturing process development and design	
Production	
Maintenance installation and repair	
Supply chain logistics	
Quality assurance and continuous improvement	
Health and safety	
Teamwork (<i>working with others</i>)	
Adaptability and flexibility	
Marketing and customer focus	
Planning and organising	
Problem-solving	
Decision-making	
Reading	
Document use	
Numeracy	
Writing	
Communication	
Computer use	

Question 12

Essential Skill	Is the skill learned on the job? (Yes ; No; Don't Know)
Manufacturing process development and design	
Production	

Maintenance installation and repair	
Supply chain logistics	
Quality assurance and continuous improvement	
Health and safety	
Teamwork (working with others)	
Adaptability and flexibility	
Marketing and customer focus	
Planning and organising	
Problem-solving	
Decision-making	
Reading	
Document use	
Numeracy	
Writing	
Communication	
Computer use	

Question 13

Essential Skill	How has the performance of the skill changed from five years ago? (<i>Decreased (D)</i> ; <i>Unchanged (U)</i> ; <i>Increased (I)</i> ; <i>Don't know (DN)</i>)
Manufacturing process development and design	
Production	
Maintenance installation and repair	
Supply chain logistics	
Quality assurance and continuous improvement	
Health and safety	
Teamwork (<i>working with others</i>)	
Adaptability and flexibility	
Marketing and customer focus	
Planning and organising	
Problem-solving	
Decision-making	
Reading	
Document use	
Numeracy	
Writing	
Communication	
Computer use	

Question 14

Essential Skill	Is the skill learned on the job? (Yes; No; Don't know)
Manufacturing process development and design	
Production	
Maintenance installation and repair	
Supply chain logistics	
Quality assurance and continuous improvement	
Health and safety	
Teamwork (<i>working with others</i>)	
Adaptability and flexibility	
Marketing and customer focus	
Planning and organising	
Problem-solving	
Decision-making	
Reading	
Document use	
Numeracy	
Writing	
Communication	
Computer use	

Question 15

Essential Skill	How often do you use the skill in your job? (Scale 1 – 5 ; 1 = Low; 5 = Very High)
Manufacturing process development and design	
Production	
Maintenance installation and repair	
Supply chain logistics	
Quality assurance and continuous improvement	
Health and safety	
Teamwork (<i>working with others</i>)	
Adaptability and flexibility	
Marketing and customer focus	
Planning and organising	
Problem-solving	
Decision-making	
Reading	
Document use	
Numeracy	
Writing	
Communication	
Computer use	

Appendix B

Skills Pyramid for High Performance Manufacturing

Source: www.careeronestop.org/competecymodel.com: Date access 23 June 2013.

