INDUSTRIAL RESTRUCTURING: Challenges and demands imposed by flexible specialisation on manufacturing.

A case study of two firms in the Western Cape.

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ABSTRACT

There is agreement that something dramatic has been happening in the international economy over the last two decades. There have been radical and rapid changes in production technology and industrial organisation, a major restructuring of world markets, and consequent large-scale changes in policies of economic management at international, national and regional levels (Hirst and Zeitlin, 1991:1). A variety of theoretical postulations have been developed as basis of analyses on the nature and character of these changes. Piore and Sabel (1984) contend that these changes represent a divide in the historical and production trajectories from mass production (Fordism) to flexible specialisation (post-Fordism). Williams et al (1987) negate this claim. They contend that the characterisation of contemporary production strategies as trajectoral cannot be justified since firms have been altering production and marketing strategies from one point to the other all the time.

Hirst and Zeitlin (1991) and Ewert (1992) allude that developments in production and marketing strategies in industrial economies, over the past two decades coagulate into a neo-Fordist hybrid rather than approximating flexible specialisation shopfloor practices. Ewert (1992:1) continues to say that manufacturing firms in the Western Cape introduced restructuring of the production process under the banner of *world class manufacturing*.

This paper examines challenges and demands imposed by flexible specialisation on manufacturing. I will also investigate how firms respond (react) to these challenges for greater competitiveness, and implications on work organisation, industrial relations, productivity and performance.

The paper argues that while findings justify a neo-Fordist assertion, firms are making considerable progress in the process of restructuring towards greater flexibility. There is significant progress in relations between management and labour. These changes cannot only be attributed to flexible specialisation, but also to new the political scenario in the country and globally.

THE TABLE OF CONTENT

LIST OF TABLES

INTRODUCTION

> *"There is widespread agreement that something dramatic has been happening to the international economy over the past two decades: rapid and radical changes in production technology and industrial organisation, a major restructuring of world markets, and consequent large-scale changes in the policies of economic management at the international, national and regional levels".* (Hirst & Zeitlin, 1991:1)

Extensive research has been conducted in an attempt to analyse and characterise these changes. Studies conducted by various researchers and research institutions point that current changes in technological and production organisation represent neo-Fordism rather than post-Fordism. Ewert (1992:2) contends that although innovations in technology, work organisation and industrial relations have been introduced, they only tend to coagulate into a neo-Fordist hybrid rather than approximating flexible specialisation practices on shopfloor. Neo-Fordism is defined as an attempt to go beyond Fordism, without negating its fundamental principles (Tolliday & Zeitlin, 1989). This involves restructuring of tasks, a quantum leap in automation, and increased internationalisation. Mathews (1989) presents neo-Fordism as either intensification or modification towards innovation and specialisation. The former means intensified application of mass production principles that worked well before, by firms expanding outwards, on a world scale, contracting inwards, mostly behind protectionist measures, rationalising and reorganising production, through the introduction of computer technology along Taylorist lines. The latter represent attempts to introduce flexibility and innovation within the Taylorist framework. This essentially means these firms have abandoned mass production in favour of specialisation and flexibility in production, but have attempted to keep intact Fordist apparatus of work organisation, industrial relations and skills restrictions (1989:31-32).

Hirst and Zeitlin (1991:6) suggest that both mass production and flexible specialisation are ideal-typical models rather than empirical generalisations or descriptive hypotheses about individual firms, sectors or national economies. Neither model could ever be wholly predominant in space and time. According to this analysis firms and industries deliberately mix elements of Fordism with

those of flexible specialisation. It is easier to shift strategies from one pole to the other than these postulations of post-Fordism would lead us to believe.

The locus of the neo-Fordist postulate is that the nature of these shifts and changes is characterised on the one hand by the departure from mass production strategies, while preserving scientific management practices sacrosanct to it. Ewert (1992:18) augments this view (theory) by emphasising (highlighting) that the implementation of these neo-Fordist practices is characterised by differentiation, variation (and unevenness) from one firm to the other, from sector to sector and from national (or regional) economy to the other. He also contends that although his paper is far from conclusive, actual restructuring of labour processes and industrial relations at local firms is going ahead mostly under the banner of *'World Class Manufacturing'*. The neo-Fordist postulation represents an epistemological framework from which the hypothesis for this paper is developed.

For the first half of the century, South Africa and the rest of the developing world depended on their ability to extract raw materials (mineral resources), selling them to the first world. Many of these nations were able to generate enough revenues and capital from producing primary goods. This system also complemented itself well with Apartheid, which ensured that only the few enjoyed a piece of the pie. Over the last forty years, developing countries faced constant pressure to do more than just produce primary goods in order to generate enough revenues for their peoples. With the constantly declining market value of gold and many other raw mineral materials, it is impossible for any thriving developing (*new market*) economy to depend only on primary production. Some of these developing countries have grown to be winners in the global competition through manufacturing processed goods. South Korea, Singapore, Mexico, Cyprus, Taiwan, etc. have become some of the leading producers in their competition. In fact in 1996 South Korea was the worlds fourth largest car producers after Japan, America and Germany.

Political reforms and negotiations towards a democratic dispensation in South Africa pose many implications and ramifications on other aspects of our society. A democratic South Africa implies

also more equitable (re)distribution of resources, of capital, etc. across race, class and gender. South Africa has an even more impelling challenge to develop the economy, as well as to generate more revenues for the state to carry out reconstruction and development. Democracy has also meant incorporation into the global system, including the global economy. South Africa since 1994 has signed as signatories to GATT and WTO. GEAR which is the government's macroeconomic framework bolstered the government's agenda for trade and FDI liberalisation, as well opening our markets to global competition. With the price of gold constantly receding in the global market, South Africa has to develop an alternative competitive edge in manufacturing and corporate industry, that will match any other market internationally.

Most of the research done over the last seven years pertains to how can we become internationally competitive? Most of the case studies done also point that firms which have attempted to introduce flexibility in their production did it in the guise to become more competitive and also to achieve world class production standard known as ISO 9000.

It is in this context that contemporary literature on the South African economic development is grappling with challenges posed by these changes on the South African manufacturing sector in particular. Contemporary literature from the South African Labour Bulletin, the Sociological Review, even the establishment of the Development Policy Research Unit which launched the Industrial Strategy Project, show the urgency of the need for the South African economic stakeholders (participants) and policy institutions to address themselves to current changes in the world economy. The evident phenomenon in contemporary literature on South Africa is that times have changed and the new political and economic dispensation has to address itself to the new international world order. Even those who favoured an isolationist (mostly leftist) alternative for the democratic South Africa, have now abandoned the past rhetoric and are exploring new creative means through which we can exploit markets vulnerable to our advantage. Even trade unionists recognise the relevance of post-Fordist production strategies and social contracts as inventions for more productivity. Kaplinky (1993) contends that it will be easier to forge and sustain post-Fordist practices in a democratic dispensation in South Africa. The new South Africa

is facing mammoth challenges of global competition. We have to develop new competitive strategies rapidly to uplift the economy and eventually the standard of living of the majority of her people.

This research is also another attempt to measure where are we and our industries in relation to global competition. This research investigated the following questions. Firstly, the level of awareness of South African industries on the development of new production and marketing strategies in the global economy. Secondly, challenges imposed by these changes on firms individually and on the South African manufacturing sector in general. Lastly, how are these firms responding to this new competition, and how far has each firm progressed towards *'World Class Manufacturing'*.

The paper consists of Two sections. Part One deals specifically with theoretical contestations and debates surrounding the characterisation of the restructuring in the last twenty years. Chapter One commences with a presentation of Piore and Sabel (1984), who provide the starting point in my analysis of current changes in economies. Subsequently the chapter presents a review of Piore and Sabel by Williams et al (1987), which I conclude that though their critique raises crucial questions as to the validity of the flexible specialisation paradigm, the critique is too cynical and does not provide alternative analytical tools for defining and theorising these changes. Chapter Two moves on to the neo-Fordist debate. Findings extrapolated from several case studies indicate that restructuring changes from most firms researched are neo-Fordist and differentiated than the uni linear postulations of the post-Fordist analysis.

Part Two deals with the findings' report and the conclusion. Chapter Three contains the findings' report. This chapter will also grapple with the validity and reliability of the data. One of the questions this chapter will attempt to respond to is "can these findings be presented as generalised outcomes and reflection of the firms studied?" Chapter Four is the conclusion. This chapter firstly, will attempt to test the validity of the theory in relation to findings, and whether the findings vindicate or nullify the research hypothesis. Secondly the representativeness of the findings to the

broader context is also tested. This entails testing whether one can make generalised statements on the nature of the manufacturing sector from the findings drawn from this research. Lastly, the chapter attempts to raise issues and areas of consideration for the broader South African manufacturing sector. The perusal at analyses and contentions of various stakeholders suggests that there is an urgent need for the South African economy to be involved in a concerted effort to develop a globally competitive manufacturing sector, especially within the present context of a new democratic realm, and public expectations of economic growth, employment opportunities, and redistribution of resources (equity).

METHODOLOGY

INTRODUCTION

Babbie (1989: xxv), contends that social research helps us address social issues and problems in a logical manner and observational rigour. Research allows us to pierce through our personal viewpoints and assists us to view the world beyond our normal vision. He thus says that it is that world beyond us that hold solutions to the social problems we face today. It is generally acceptable that the problems of either over population, starvation, racial discrimination and even economic changes have been studied by various schools mostly for providing solutions to these problems. Social research has also become important in analysing recent and present changes in the production strategies adopted by different economies, in an attempt to redirect our effort to greater levels of competitiveness.

Survey research has become the best known and mostly used mode of observation today. Babbie (1973:I) contends that increasingly social science graduates have to conduct surveys to satisfy thesis and dissertation requirements for original research. Moreover government institutions, developmental structures, etc. conduct surveys for policy formulation. Hence survey research requires rigorous observation methodology, which enables the researcher to draw representative results which reflect the nature and character of an antecedent studied. Rigorous observation is used as the criterion for testing the validity and /or weakness of research findings. All five stages involved in survey research are carefully examined which strengthen the weight of the report. These are Operationalisation, Research Design, Research (Observation) Method, Data Collection, Data analysis and Report Write-up. Fowler (1984:9) states that some research studies conducted are weakened by the inabilities of researchers to choose an appropriate research method for each research. In this chapter I want to give an outline of the research method I used to collect the data and the steps involved in the actual process of data collection.

1. OPERATIONALIZATION

The hypothesis for this research is outlined in chapter two, is based on two presuppositions. First, that during the past twenty years the global economy has been facing shifts and changes unprecedented in previous historical and economic trajectories. There have been changes in the organisation of production, of labour and even of capital in most industries. Second, the nature (form) of these changes (restructuring) is neo-Fordist than post-Fordist, and characterised by unevenness in the pace and variation of choices implemented, from one plant to the other, one firm to the other, one sector to the other, and from one region to the other influenced by inter-firm or regional inter linkages forged.

The thrust of the questions for investigation is: firstly, an examination of the level of awareness of manufacturing firms of current changes in the international economy and challenges they pose on them. Secondly, how have these firms responded to the new global competition, and how far each firm has gone in the implementation of new production strategies.

The themes around which questionnaire schedules were compiled were informed by the aforementioned hypothesis. I formulated five themes, viz.: 1.technological innovation, 2.work organisation, 3.industrial relations, 4.training and multi-skilling and 5.productivity (performance) and competitiveness.[1]

2. RESEARCH DESIGN

2.1. SURVEY RESEARCH

As a method of observation (data collection), survey research is characterised by the use of either questionnaires, or interviews. This form of observation is the most widely used in social research. Fowler (1984:8) contends that most publications used in social sciences, viz. in

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[1]. The questionnaire schedules are listed in the appendix. Appendix 1.A is for management, 1.B is for shopstewards, and 1.C for workers' attitudes and worker satisfaction.

sociology, economics, political science, anthropology, etc. are based on the information obtained from survey research.

In this research I formulated structured questionnaire schedules in order to standardise questions asked to each group of respondents. The questions were carefully structured in sequence to allow coherence and cohesion of interviews, and after each question in the schedule was a space for listing answers of all questions from the respondents, to facilitate recording and coding the data for analysis. The questions had both variations ie, some questions were closed and other were open ended, which allowed the respondent to give ethnographic (qualitative) information where necessary.

Apart from the interviews I formulated a questionnaire for the management for measuring productivity and performance of the firms in the last four years (1991-1995)[2]. The questionnaire included manufacturing and processing indicators, through which each firm was to enter the relevant figures measuring their performance.

2.2. SAMPLING

The research was conducted on two manufacturing firms, in RETREAT (Western Cape's largest industrial area). Initially I had planned to conduct the research on four firms, but due to logistical problems (of inaccessibility of other firms), I ended up conducting my research only in two firms. Because of the nature of the research I was conducting, an assumption of a homogeneous sample would have been inaccurate and simplistic. As a result I stratified the sample employed on these firms into subgroups, viz. management, shop stewards, and operators (on the shopfloor). Sampling is important for validating the relevance of research findings, in terms of the validity of findings and the extent to which research findings can be used to infer general statements on patterns in a wider scope (framework).

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[2]. The questionnaire is enlisted as Appendix 1D.

In the management from both firms I interviewed the Engineering Director (from Gabriel), the General Manager: Operations (from Plessey), the Human Resource Managers, Manufacturing (Business Unit) Managers, and in Plessey Tellumat I also interviewed the Production Manager. From the shop stewards I had planned to interview two shop stewards in Plessey because they had two unions operating in the plant but the other shop steward was on leave for the whole duration of the field work. In Gabriel I interviewed the Chief Shop steward, two Full-time Shop stewards, and one Part-time Shop steward-cum Cell Leader. All these union officials were from NUMSA.

From the workers on shopfloor I had planned to make a stratified random sample, which was to allow variation of workers according to union affiliation, gender, race, and occupational class (grade). But, in practice in both firms it was management (with the union in Gabriel) that arranged workers for interviews. The only stratification they used was in occupational grade variation and in union affiliation (in Plessey). The stratification in terms of race and gender was unnecessary in both firms because Plessey on the one hand had more 80% of the workers being *coloured* and women, and Gabriel on the other hand had the same percentage of the workers being *coloured* and male. As I have indicated, Plessey had two unions operating in the plant, as a result I interviewed two workers from each grade: two Supervisors, two Setter Operators, and two Operators (six workers in total). Gabriel on the contrary is a *closed shop*, ie. all workers are members of NUMSA. In this firm I interviewed a Cell Leader, a Setter Operator & Trainer, a Setter Operator, and an Operator[3]. All the respondents interviewed were arranged by the Human-Resource Manager in Plessey, while in Gabriel it was done in conjunction by both management and the shop stewards.

3. CONCLUSION

It is important in this section to raise the constraints I faced during the research

[3]. The cell leader is equivalent to the supervisor, he oversees the proceedings in the cell. The setter-operator is an employee who sets and operate all machines. The setter operator and trainer, is a setter-operator who trains operators to set and operate machines within the cell.

particularly in the field work. Due to insufficient access, my inability to apply and conduct a scientific sampling method has implications on the representativeness of my research. As I indicated earlier, firstly I had planned to research four manufacturing firms in the Western Cape, but eventually only Gabriel and Plessey Tellumat allowed me access to conduct interviews in their firms. Secondly, I could not use a stratified random sample for selecting respondents from workers, but it was management in Plessey Tellumat and management with the union in Gabriel who provided respondents, stratified by occupational class (grades). Lastly I indicated under the survey research section that I conducted interviews, and I had formulated a questionnaire separately for management, to measure firms' productivity progress over the last four years. Management in both firms declined to complete the questionnaire on the basis that the information required was confidential and sensitive to both firms.

PART I

INTRODUCTION

A *priori* assertion suggests that from the past twenty years, ground rules of economic competitiveness shifted from those of the golden ages of capitalist development (viz. the spreading of mass production from the 1920s and the post Second World War Fordist expansionist boom). There is synonymous agreement on the one hand that this shift is from mass production (Fordism), and a myriad of theoretical contestations on causes, the course as well as the nature of these shifts on the other. In this part one will grapple with different theoretical contestations on the nature of the shift/s, with an attempt to make a synthesis that will form a hypothesis for this research. The first chapter summarizes postulations asserted by Piore and Sabel (1984), which have been used as the starting point of analysis on these shifts. One will also provide a critical review of Piore and Sabel's assertion by Williams et al, which questions both the theoretical plausibility and empirical validity (relevance) of the Second Industrial Divide.

Chapter two attempts to grapple with the notion of neo-Fordism. The debate will draw from various empirical research and analyses, which present these shifts in technological innovation, in work organisation and in the market competitive strategies as representing a neo-Fordist than a post-Fordist trajectory. There seems to be more differentiation, variation and unevenness in the implementation of these strategies, varying from one national economy to the other, from one sector to the other, from one industry to the other and even from plant to plant. As a result any form of a simplistic and uni linear path (homogeneous) analysis leaves much to be desired.

CHAPTER 1

THE FLEXIBLE SPECIALISATION THEORY

Piore and Sabel (1984) contend that the period from the past twenty years represents a new economic (and production) trajectory. This distinctive paradigm shift in production strategies is a divide from mass production *(Fordism)* to flexible specialisation *(post-Fordism)*. They see features of the latter as discontinuous from the former (a dualism thesis). This assertion has sparked extensive research and subsequent analyses on production strategies adopted by world economies over the last fifteen to twenty years.

1. THE SECOND INDUSTRIAL DIVIDE

Piore and Sabel (1984: 6) contend that there is an industrial divide between mass production and flexible specialisation[5]. In the book 'The Second Industrial Divide' they argue that the first divide in the production paradigm was from craft production to mass production during the 1900s. The second divide during the late 1970s was from mass production to flexible specialisation[6].

> *"Throughout the nineteenth century, two forms of technological development were in collision. One was craft production... The other form of technological development was mass production"* (Piore & Sabel, 1984: 19).

Fundamental elements that differentiate features of mass production from flexible specialisation are the following:

1. Product variation, and product quality
2. Market demands
3. Periodisation of each historical trajectory

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5. I am starting with Piore and Sabel not because I am inclined to their analysis, but rather because their analysis has been used by various sociologists and economists as a starting point of analysis of industrial restructuring.

6. Mass production is the production of standardised and specialised goods on a mass scale. Flexible specialization is the production of flexibly specialised and differentiated goods in small batches.

4. Technological innovation

5. Forms of work organisation

6. The role of the state

1.1. THE MASS PRODUCTION PARADIGM

Mass production is characterised by standardised production of specialised goods of economies of scale[7].

> *"Its guiding principle was that the cost of making any particular good could be dramatically reduced if only machinery could be substituted for human skill needed to produce it. Its aim was to decompose every handwork task into simple steps, each of which could be performed faster and more accurately by a machine dedicated to that purpose than by human hand"* (Piore & Sabel, 1984:19).

Eventually, the more specialised the machine the faster it works to produce goods, and the less specialised or skilled is the operator needed. Its greatest contribution was in cutting production costs. The introduction of Ford's Model T cars in 1913 was a culmination of the century's experiment on mass production than its first exploration. The precision of the machinery for producing goods was to an extent that no hand finishing was required or necessary, yet the machines were so easy to use that they could call a man from a farm to operate. Even the final production paced itself by an endless circulating chain which moved the work from one station to the other without any craft skill, but simple operation of the automatic equipment (1984: 20). As a result mass production is characterised by the use of conventional and specialised (product-specific) machinery along the assembly line. This technology ensured scale production of specialised products, because the machinery eliminated differentiation. Mass production technology also ensured division of labour into each specialised part within the production line. Piore & Sabel (1984: 22) argue that the core of the classical theory(ies) of economic development was that increases in productivity (output per unit-input) depended on the increasingly specialised (product-specific) use of resources.

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7. *Economies of scale* means the production of mass goods on an just-in-case basis with the use of large storage base for finished received goods. Eventually economies of scale are characterized by larger inventories, and larger storage costs and longer work-in-progress (time).

> *"For Adam Smith observing in the 1780s a pin factory that his analysis made famous the crucial source of increased productivity was primarily the increasing division of labour, understood in the narrow sense of continual subdivision of manual tasks. According to Smith, a top-of-the-pin maker and a bottom-of-the-pin maker working together produce more pins in an hour than two workers each making whole pins. The reason he gives is that the partial-pin makers' concentration on a narrower range of tasks allows them to perfect their skills faster and waste less time switching operations than the whole-pin makers..."* (Piore & Sabel, 1984: 22).

Because the core of mass production (Fordism) within a capitalist framework is maximisation of profit through extensive reduction of production costs, labour (skilled craftsmen) is regarded as redundant cost, to be eliminated by dividing production into little specialised tasks that require less skill (and eventually less payment). Mechanisation was introduced as a replacement for labour in the quest to reduce production costs. Management introduced new forms of work organisation to devalue and subsequently eliminate and substitute craft production (or skilled labour), to maximise cost reduction. Principles of Frederic Taylor were introduced in the US during the 1920s, to transfer skill and control of the production process away from the shopfloor to management.

The introduction of *scientific management* in the 1920s firstly from the USA which subsequently spread to Europe and third world countries, was based solely on Taylor's principles. Braverman (1974) claims that the twentieth century has more rapid degradation of work, because the level of skill required from the workforce has been progressively reduced by employers (management) through scientific management and automation (machinofacture). This eventually eliminated the element of skill and control of the production process from shopfloor (workers) to management. Taylorist principles introduced rules and regulations which governed workers during production. The system ensured that knowledge and conception of the production process was secluded as a management prerogative, separated away from shopfloor. It also ensured that machines were to assembly, produce and process on their own the production process, thus reducing skill required by craft production to be redundant as labour was only required to operate by the pressing of a button, and did not have any control over the process (speed, quality, and product). Labour required and (employed) was at best semiskilled or unskilled because they did not have

to train to operate the machinery.

The other core feature sacrosanct to mass production is mass consumption. The golden age of mass production was thus characterised by homogeneity of the market, especially during the success period of Fords' T cars. After the American economic recession of the 1930s, it became clear that for Fordism to survive, consumption was the core question to be addressed. This was characterised by state intervention (the New deal), through introducing welfare regulation policies, that introduced a U$5 pay per day (Keynesianism). State intervention was introduced to secure the maintenance of mass markets, who are the workforce.

Piore and Sabel (1984: 166) contend that crises of mass production in the 1970s were not much different from those of the past two to three decades (1930s). These were: the recession of the 1930s and economic regulation of welfare states after the second World War. Problems during the 1970s were compounded by economies, which instead of transforming the production paradigm (of mass production), introduced short term solutions that did not address the inherent crisis of mass production. They argue that amid the confusion (of what happened and what caused the crises), there are two areas of general agreement (near-certainties) agreed upon. Firstly, disruptions in the supply of natural resources, which are primary sources of energy slowed the economic growth. Secondly, the modern welfare state's efforts to control the pace and results of growth obstructed industrial development. Piore and Sabel (1984) reject this generalisation.

> *"We argue that political intervention in the economy-ranging from the formation of the welfare state-has at worst aggravated a crisis that has other, deeper causes... Our claim is that the present deterioration in economic performance results from the limits of the model of industrial development that is founded on mass production: the use of special-purpose (product-specific) machines and of semiskilled workers to produce standardised goods"* (Piore & Sabel, 1984: 4).

These economic crises were characterised and compounded by the following factors:

1.The first and second oil shocks of 1973 and 1979 respectively,

2.The emergence of NIEs and NMEs[8]

3.The saturation of industrial markets

1.1.1. THE OIL SHOCKS OF 1973 AND 1979

The postwar alliance between the United States with Israel resulted in great protest from Arab nations. As a result the oil embargo was a political reaction from Arab states to Western support of Israel in the Arab-Israeli conflicts of 1973. The oil embargo reflected a variation of scarcity as buffers were removed. Differing from protests of the 1960s in which advanced economies were able to create labour reserves, they could not replenish the depleted stocks of oil this time around.

> *"Shortages of food and fuel thus led rapidly to higher prices in the market. Given the rigid wages and prices central to the system of macroeconomic regulation, price increases in these crucial markets levered all wages and prices upwards. This rise set off an unprecedented wave of inflation in virtually all the industrial countries. Everything made for stability in times of plenty increased instability in times of want"* (Piore & Sabel, 1984: 176).

Subsequent price increases created problems of fluctuations in inflation, in most advanced economies. This meant pricing of goods was increasing in relation to increases in inflation from the sale of oil. This was further compounded by increasing uncertainty and panic in industrialised economies. Uncertainties regarding fuel were increasingly becoming phenomenal. On the one hand, the Arabs' ability to ration oil by driving prices up could not be readily controlled by the West. But on the other hand the restraint on supply of fuel resulted in changes in prices and scarcity (less availability) of oil (fuel) relative to other goods. Piore and Sabel (1984: 176) contend this was exactly the kind of uncertainty those mass production corporations, with their long-term investments in highly-fixed cost, and specialised assets found most difficult to manage.

> *"Should they plan production on the assumption of low energy prices or high ones?" (Ibid.).*

The wave of the second shocks of 1979, during the Iranian revolution were even more effective

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[8]. The NIEs are Newly Industrialized Economies, viz. East Asian Tigers. They also use the term New Market Economies, referring to fast growing Third World economies.

(shocking) than 1973 shocks. By this time industrialised economies had tried to settle and redevelop expansionary moves to third world territories. These shocks destroyed confidence in the system of international adjustments, which was untimely because it coincided with the period of resilience of international expansionist moves from the West which encouraged more experimentation in an attempt for greater reforms. Prices rocketed high, inflation continued to fluctuate, although its impact on internal pricing structures showed more differentiation than in the previous crisis.

1.1.2. The Emergence of Newly Industrialised Economies

Some of the third world countries transcended the assumed role given by the neoclassical trade theory and neo-colonial ties to commercial centres. These economies entered the competition for export markets which had been solely dominated by the West (USA in particular). The *Asian Tigers*, viz. South Korea, Taiwan, Hong Kong, and Singapore began to produce goods for export markets from the late 1960s.

> *"These economies, poorly endowed with natural resources, imitated the model of export-led development perfected by the similarly un endowed Japanese. Like the Japanese, they began with labour-intensive, low-technology goods, and then, perfecting their skills, technology, and marketing techniques. They moved into mass-produced consumer durables. By 1978, these four economies supplied 61% of the manufacturing exports of the developing world"* (Piore & Sabel, 1984: 188).

The key of successes of these NIEs was price competitiveness[9]. This form of competition was enhanced by internal characteristics (political peculiarities) of these economies which were different from the West. These were unregulated production systems, which meant greater accessibility to cheap, and unorganised labour as well as autocratic state machinery, which facilitated sustenance of these forms of competition.

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9. Price competitiveness is a concept presented by Professor Wolfgang Streeck, who was presenting a seminar on Co-determination, organised by the Department of Sociology, at the University of Cape Town, in August 1994. This means using price as a competitive tool, by lowering price than the rest on export material (goods). The First World (western) economies could not compete at this level, due to the state (welfare state) institutions, on the one hand, and because of the high inflation fluctuations.

1.1.3. THE SATURATION OF INDUSTRIAL MARKETS

> *"One kind of crisis, easily visible, is marked by the realisation that existing institutions no longer secure a workable match between the production and the consumption of goods; these institutions must be supplemented or replaced". (Piore & Sabel, 1984: 4)*

The consequence of post World War II mass production development was increasing saturation of markets (for durable goods). Domestic consumption of durable goods that led to expansionist techniques after World War II was reaching limits by the late 1960s.

> *"This saturation was especially true in the United States, where by 1979 there was one car for every two residents, compared to one for every four in the early 1950s. Ninety-nine percent of American households had television sets by 1970, compared with 47 percent in 1953. Similarly, more than 99 percent of households had refrigerators, radios, and electric irons, and more than 90 percent had automatic clothing's washers, toasters, and vacuum cleaners"* (Piore & Sabel, 1984: 184).

Production of standardised goods on a mass scale could no longer secure (same) markets for the same production of goods. The problem of mass production was embedded in its technological paradigm, applied in production. Despite the need for differentiation, product-specific machinery could not flexibly produce goods for a varied market.

> *"The increase in efficiency did, have some costs in increased rigidity: the more tasks were subdivided and connected in a precise sequence, the more difficult it became for the network as a whole to produce anything but pins"*[10] (Ibid. 6).

1.2. TO FLEXIBLE SPECIALISATION (POST FORDISM)

The alternative to crises of mass production and multinational Keynesianism, as a new economic trajectory is flexible specialisation. Piore and Sabel contend that flexible specialisation marked the development of a new historical trajectory in the development of productive forces.

> *"There are two arguments for believing that there is a trajectory, i.e., that the dynamism of flexible specialisation is not transient. First based on the idea that there is an immanent logic of technological development-is that the application of computers to industry favours flexible systems... It draws on evidence of the use of technologies other than the computer to support the claim that under appropriate conditions of competition, increased efficiency occurs with flexibility at every level of technological development... From this second perspective, the use of computers in manufacturing is as much the result of shifts in the competitive environment favouring flexibility as it is of advances in computer technology"* (Piore & Sabel, 1984: 258).

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10. This quote is a continuation of the extract quoted in page 18, i.e. (Piore & Sabel, 1984: 22)

Flexible specialisation is production of flexibly specialised goods and customised products. These products are differentiated to suit different interests, of differing markets.

> *"Efficiency in production results from adapting the equipment to the task at hand: the specialisation of equipment to the operation. With conventional technology, this adaptation is done by physical adjustments in the equipment; whenever the product is changed, the specialised machine must be rebuilt. In craft production, this means changing tools and the fixtures that position the workpiece during machining. In mass production, it means scrapping and replacing the machinery. With computer technology, the equipment (the hardware) is adapted to the operation by the computer program (the software); therefore, the equipment can be out to new use without physical adjustments simply by reprogramming"* (Piore & Sabel, 1984: 260).

This system of production is optimal and compatible with short-runs production contrary to long-runs of mass production. The role of computer technology is essential to flexible specialisation. Piore and Sabel (1984: 258) contend that it provides operational capacity for economies (and firms) to flexibly diversify production range according to variations in market demand. But they criticise technological determinism, rather argue that markets drive flexibility than technology[11]. They contend that had mass markets of the 1950s endured during the 1970s, computer technology would have only assimilated the rigidity of mass production.

> *"In fact where production runs are fairly long (though not as long as to justify specialised machinery), programmable equipment is used just as automatic machinery was used in the past: a programmer (often skilled craftsmen with computer training) program the first part, a semiskilled setup person changes tools and fixtures; and unskilled production workers load and unload work pieces"* (Piore & Sabel, 1984: 261).

The weakness of technological determinism is not only that there are economies which operate through computer-based technology, but still utilising mass production rigidities, as well as there are flexible manufacturing economies that do not depend on computer technology. This means computers are adapted to any production environment, but are used particularly in flexible firms

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[11]. Technological determinism refers to inclinations which suggest that technological development determine changes in economic and production trajectories. For instance, the development of tools (for craftsmen) produced conditions for craft production, the specialised (dedicated) machinery of the 1920s led to mass production, and thus technological advancements to computer use preempted and led to flexible specialisation.

to facilitate adjustments to fluctuating and shifting markets, as a result computer technology is viewed as a product of a new market environment than of technology.

Flexible specialisation reciprocated new forms of work organisation. Flexible specialisation is regarded as a return of craft production, which means a return of skill and control of production on the shopfloor.

> *"As companies become more flexible, they require more flexible and skilled workers. He says 'These developments seem to be producing an employment structure in which low-skilled repetitive tasks are reduced (eliminating semiskilled jobs), but the highly skilled work involved in designing products or in shifting from one product to another remains, albeit often in a new form more closely linked to the computer"* (Matthews, 1989: 46).

Flexible specialisation is characterised by the use of computer numerical control machines (CNC), to produce small-batch goods of differentiated variations. Japan introduced just-in-time (JIT) production *(a kan ban)* system which changed the production line from being production driven (just-in-case production) to being demand pulled. They also introduced a concept of continuous improvement *(kaizen)*, which ensured capacity for firms to improve continuously, according to the ephemeral and fluctuating nature of *niche* markets globally. The ability to lead in continuous improvement is a comparative advantage in competition for diversified markets.

Another feature of flexible specialisation is development of flexible forms of production organisation. Flexible hierarchical structure opens means of communication between various departments. There is more coordination and cooperation among various sectors in the firm and from all layers of control. Differing from mass production, in which labour is divided and scattered all over the place, production is organised through *cellular manufacturing*. Workers are organised in teams, collectively and rotationally in production. These forms of organisation and an element of skill in flexible firms, propagate restoration of human control over the production process. The machinery is again subordinated by the operator.

> *"Whereas most machines have an independent structure, to which the user must conform, the fascination of the computer-as documented in the ethnographic studies-is that the user can adapt it to his or her own purposes and habits of thought. The computer is thus a machine that meets Marx's*

definition of an artisan's tool: it is an instrument that responds to and extends the productive capacities of the user" (Piore & Sabel, 1984: 261).

Due to these developments, labour (the workforce) in flexible firms enjoy better security, and there is more commitment from management in making greater attempts towards cooperation.

Finally, Piore and Sabel contend that there are new forms of competition amongst economies. This is signalled on the one hand by moving concentration of capital from monopolies and an increase in small business sub-contraction, guarded by new competition regulations. Successful flexible economies restrain competition which distracts firms from continuous and permanent improvement. This ensures that the nature and extent of competition as well as restrictions imposed to competition do not discourage innovation (flexibility).

"Corporate limits on labour exploitation are important not only in making competition a spur to innovation, but also in maintaining the organisational cohesion required for flexibility. Without restrictions on placing the costs of readjustment on the weakest groups (the lowest-level workers), the sense of community between workers and employers would be threatened; the vital collaboration across different levels of the official hierarchy would be improbable. Hence employment security arrangements that build trust can be as important as wage systems in fostering innovation (Piore & Sabel, 1984: 271).

Because innovation under flexible specialisation removes wages and labour conditions as tools for competition and by establishing interdependence amongst firms (producers) in the same market, they moderate price fluctuations to survive. These forms of moderation and rigidities differ from mass production.

"In mass production, price rigidities result from a firm's effort to stabilise its economic environment... In flexible specialisation, price rigidities result from a productive community's effort to secure labor's place in the community, as well as the need to stabilise relations amongst federal firms" (Piore & Sabel, 1984: 272).

According to Piore and Sabel there is a clear distinction (dualism) both theoretically and empirically, between mass production strategies from those of flexible specialisation. They constitute distinct production, technological and competitive trajectories (paradigms). Flexible specialisation has replaced mass production from the late 1970s due to market saturation crisis of standardised goods.

2. A CRITICAL REVIEW

William K, et-al (1987), in a review of the Second Industrial Divide critically scrutinised both the epistemological eligibility (plausibility) and evidential (empirical) merits of the book[12]. I want to commence with this review as a base for the neo-Fordist debate in chapter 2. The review is twofold: firstly is a critical scrutiny of theoretical postulations on changes in production paradigms, and secondly is a critical review of empirical validity of claims asserted by Piore and Sabel.

2.1. MASS PRODUCTION VS FLEXIBLE SPECIALISATION

The thrust of this critique is that the distinction and dualism between mass production and flexible specialisation is confused and confusing (unclear). Firstly (Piore and Sabel) do not provide plausible and satisfactory criteria for identifying instances of mass production from those of flexible specialisation. Hence Williams et-al (1987:415) argue that identification that they provided, is arbitrary and unjustified. Piore and Sabel failed to state criteria (to enable us to determine) an area of dominance of one form of a production paradigm over the other, either at the level of enterprise, regional or national economy. There are only three invariable dimensions of difference between mass production and flexible specialisation that can be identified. These are: dedication of equipment, the extent of product differentiation and length of production runs.

The supposition of Piore and Sabel (1984) presents an existence of polarities illustrated in Table 1.1. On the contrary Williams et-al (1987: 416) contend that industries and enterprises cannot be neatly situated on either of these pole variations in relation to these three dimensions. This essentially means many enterprises and industries which Piore and Sabel would classify as mass production do not necessarily use dedicated equipment to produce single standardized products. They also question the dimension of product variation or differentiation. The disparagement on

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[12]. The term plausibility is taken from Hirst and Zeitlin, in the paper on flexible specialisation versus post-Fordism. (1991, Economy & Society Vol 20 No 1:24)

differentiation of General Motors (GM's) is unjustified because Piore and Sabel do not provide any criterion for discriminating between that which formulates fundamental difference and that which is just trivial styling variation, which is claimed to be phenomenal and common in both mass production and flexible specialisation (Ibid.). This critique undermines Piore and Sabel's contention that mass production displaced flexible specialisation (craft production) in the nineteenth century, and now (1970s-), the situation is reverse, ie. flexible specialisation is replacing mass production.

> *"After all if we cannot identify instances of mass production or flexible specialisation how can we determine that one type of production is displacing the other?"* (Williams K, et-al, 1987: 417).

Table .1.1

Flexible Specialisation		**Mass Production**
low	dedicated equipment	high
high	product differentiation	low
short	length of production runs	long

Source: William K, et-al, (1987:415)

2.2. META-HISTORY

The second critique pertains the supposition of meta-history. They criticise the case of Ford's success story until the 1930s and spreading of mass production after Ford. This review questions the validity and relevance of causation arguments claimed by Piore and Sabel. The supposition made on Ford's success as determined by the cheapening of prices and the $5 day pay, contradicts the basis of the meta-history of technical change that they claimed earlier. The contention of this

review is that Ford's mass production was complemented by circumstances within preconditions of mass production already established. Hence Fords' radical process innovation introduced during the 1912-13 period had already existed, eg. the use of interchangeable parts was originally pioneered by Cadillac. They also introduced layout operations and the introduction of a moving assembly line which was already existing in the meat industry. The case for Ford is that his innovations were a culmination and perfection of all these innovations separately introduced by other firms. The dramatic effects of all these innovations were reductions in: unnecessary labour, internal movement of parts and work in progress. As a result what had required 12.5 man-hours in 1912, was reduced to 1.5 man-hours by 1914. Despite the fact that these innovations required capital investment, reduction of labour costs was commensurate with the extent to which Ford could (and did) reduce costs of production. Eventually this impacted on consumers, through the lowering of selling prices.

The critique of the post Ford (T-shape cars) is that Piore and Sabel failed to distinguish and differentiate significant instances that do not fall (exist) within their framework (mass production). Their meta-history presents a homogeneous and static history of mass production with inevitable outcomes after its success. Their analysis presents a history of nothing but 'regulation crises' (1987:420). They continue to argue that the concept of Fordism (itself) is misleading and implausible in characterising the development of production organisation in modern industries. They agree that Ford's innovations were important but refute the claim that they were responsible or determined the whole trajectory of development in advanced economies. Ford's successor did not generally assimilate (imitate) Ford's production strategy of relying on a single long-lived model, but rather most succeeded (and survived) by making interrelated models which were changeable fairly regularly. Their underlying point is that Piore and Sabel ignored and neglected many distinctive features in the development of productive forces that (could have) problematised their claim of a mass production (Fordist) trajectory (meta-history). The concept of Fordism per-se should be rejected because it ignores these differences, but rather establishes an uninformed and uninformative stereotype (1987:423).

"Furthermore any notion of a generic modern system of mass production should be treated with great caution because there are many different ways of organising production, even in the assembly industries... But until that analysis is provided, it would be foolish to produce substantive work where mass production is a central organising concept". (Ibid.)

The ending point is that the argument of Piore and Sabel is overshadowed by confusion of many differing situations that are ignored for convenience sake to their meta-history.

2.3. EMPIRICAL QUESTIONS: Questioning Empirical Merits of Flexible Specialisation

Lastly the review looks at the evidentialisation of claims asserted by Piore and Sabel. They argue that empirical work on the development of industrial production nullifies than vindicate claims of Piore and Sabel. Firstly they argue that it is very difficult to identify particular industries or enterprises as instances of either mass production or flexible specialisation. Secondly Piore and Sabel failed to provide any statistical evidence, which indicate a dramatic reduction of production runs in all consumer durables in the past fifteen years, eg. in the clothing firm:

"If we ask how long is the production run of a mass-produced piece of string, Piore and Sabel's answer would be that the production run of craft string is shorter" (Williams et al, 1987:417).

The review also scrutinizes the benefits of flexible specialisation in terms of quality (production and product) and efficiency, and its implications on labour and industrial relations.

From the insert it is clear that the review by Williams et al (1987), is more than a critique of Piore and Sabel (1984), but in essence they have torn apart the very basis from which the flexible specialisation paradigm is developed. The importance of this review is that it provides both theoretical tools and operational indicators for examining and testing the flexible specialisation paradigm. The three dimensions viz. the dedications of equipment, product variation (or differentiation), and length of production runs, have been used by various researchers and scholars in examining the form and nature of the shift(s). This review provides a fertile superstructure for the neo-Fordist paradigm presented in chapter two. But one should be cautious of the overemphasis presented in this critique of the nonexistence of a change. I disagree with this critique, on their assertion that the period from the past fifteen to twenty years cannot be characterised by changes in production strategies. The biggest weakness and limitation of this

critique are that it fails to provide a comprehensive alternative theory (analysis) to that of Piore and Sabel. Ultimately this review can be overlooked as very cynical and sceptical in their critique of the Second Industrial Divide. But on the other hand the questions and arguments levelled in this review can be useful, both as conceptual tools and operational indicators for policy research, and for analysing development patterns towards flexible specialisation.

CHAPTER 2

THE NEO-FORDIST DEBATE[13]

Research shows that although the flexible specialisation postulation is far from conclusive and bound to continue for some time, actual restructuring is taking place from nation to nation, economy to economy, firm to firm, and sector to sector. These changes though coagulate into a neo-Fordist hybrid rather than approximating flexible specialisation shopfloor practices. The debate is whether these changes constitute a progression from mass production towards flexible specialisation (Fordism towards post-Fordism), or neo-Fordism represents a distinct technological and production trajectory? The last debate pertains to structural implications of restructuring between the first world economies and the new market economies.

2.1. NEO-FORDISM: THE EMPIRICAL WORK

Although mass production had always been challenged by some form of differentiation from time to time, e.g. General Motors during the 1920s challenging Ford with new forms of variation in their products, and the continuing differentiation in the steel industry up until the 1950s. The 1970s were characterised by a series of forces in the world economy which fundamentally challenged the very foundations of mass production (Fordism). The post World War II economic boom was losing momentum throughout the Western world. The culmination of Japanese innovations which began to increasingly outpace the West (The US) both in capital and labour productivity, was product quality and cost competitiveness. This also resulted in product variation, production of wider model ranges as well as flexibility to respond to changing markets (Tolliday & Zeitlin, 1989: 20). Most of the research done in this field has concentrated on the

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13. Neo-Fordism represents an attempt to move beyond Fordism (mass production) without negating its fundamental principles. Most of these firms adopt new production technologies, new innovations, product variations, improved lean production strategies, while maintaining Taylorist shopfloor practices. Other firms adopt flexible specialisation techniques in some lines of production, while leaving other production lines along conventional Fordist principles.

automobile and the clothing and textile industries.

2.1.1. Differentiation in Implementation by Nation and Sector

The automobile industry in the US in particular had experienced tremendous growth and success after the second world war. With the oil crises of 1973 and 1979, the US automobile industry faced an unending problem of producing big engine machines, which were losing out in the market to Japanese (fuel efficient, small engines) cars. With the demand for variation, efficiency (fuel efficiency in particular), the US automobile industry found itself in constant pressure from the Japanese competition. In fact Japan became the leading car producers by 1982, with 60% of their 6.5 million units going for exports. 28% of those went to the US, 6% to Europe, despite quota concessions for limited Japanese import in some European markets. The American automobile industry had to restructure its production, even more than the European, which was dominated by the German auto industry (Hirst & Zeitlin, 1991: 4-8). These changes were mostly characterised by the emulation of Japanese technologies, the CNC machinery, CAD, CAM and CAD techniques. The US automobile industry was easily able to transport, and implement new technologies for improving product quality, efficiency and speed. The implementation of technologically advanced machinery, improved their efficiency, diversity, as well as just-in-time requirements. But the US auto industry was slow in restructuring Taylorist industrial relations and work organisation, to adopting post-Fordist ones.

Kelly, M (1989) conducted a study on the engineering sector in the US. Her research examined the forms of work organisation implemented under new programmable automation. Her indicators for work organisation were: (a) strictly Taylorist control, (b) shared control, and (c) worker centred control. Most of the firms had either strict Taylorist or shared control. The only firms with a worker centred control were small, specialising in small batch production, with a median batch of fewer than 50 units per lot. She found that there was not one intrinsic imperative for work organisation but a myriad of factors influence this. In large plants there is more division of labour, and bureaucratic forms of managerial control. She argues that a simplistic analysis would suggest

that in unionised work places, blue collar workers would have the best chance of attaining at least shared control over programming. Her research found the opposite. In the US, managers with unionised workforce use strictly Taylorist control over programming as an industrial relations tactic to weaken the bargaining power of the unionised workers.

From other studies, there is a pattern in the US industries, either automobile, steel, or engineering firms, of which there have been tremendous improvements in technological innovation. Most American firms, probably because of capital availability, have been able to assimilate Japanese technological innovations while maintaining work organisation practices characterising Taylorist principles. There is also reluctance particularly from US big manufacturing giants in transforming their work organisation practices. Kelly (1989) concludes by stating in the US the management is more likely to maintain Taylorist approach to work organisation even if the technical preconditions favour a post-Fordist model. At this level the US firms have differentiation from their European counterparts, Germany in particular. Studies conducted by Ulrich (1987), Streek (1989), as well as Joachim (1991) indicate that the German automobile industry firstly had always been an up market industry, which ensured some level of differentiation and variation in their production even during the golden days of mass production. The other area of difference was the political organisation of the US as opposed to the German. The political imperative in Germany allowed bargaining processes, as well as relatively higher levels of industrial democracy.

There is also sectoral differentiation in the implementation of new production technologies. There are interesting parallels between the automobile manufacturing and the clothing and textile manufacturing sectors. Greig (1992) conducted a study on 18 firms in the Australian clothing and textile sector. He drew up three determining variables (dimensions), through which levels of restructuring were empirically examined. These were the degree of:

(a) product innovation, (b) process variability, and (c) labour responsibility.

A number of firms had improved their product innovation through CNC machines, and other new technologies. Some had changed by moving for up market segments of the market and, or

exporting to the US and Europe. On process variability a number of firms were becoming more market sensitive, hence many began operating at shorter lead-time. Greig (1992) registered that the number of firms operating on shorter lead-times was higher than those using new production systems, suggesting that these firms were able to improve flexibility within confines of their traditional manufacturing systems. Labour responsibility and worker participation was very poor. Even firms which claimed to have introduced formal shopfloor involvement, it was only restricted to setting consultative committees. Very few had set up formal training budgets for workers, most complained of costs incurred in training of labour. The data shows very little indication of post-Fordist mentality among the principals on work organisation.

He concludes by arguing that caution needs to be taken that post-Fordist leaning firms are merely a facade covering deep-rooted Taylorist (Fordist) production techniques. The restructuring itself is rather haphazard and ad-hoc, mostly from sporadic attempts to meet the demands of the market. The clothing and textile industry in particular is characterised by double-faced scenarios, where the front production lines are restructured, with new technologies, product variation, etc. and the back production lines, epitomising Fordism practices of intensive labour, sweat jobs and no innovation.

2.1.2. POST-FORDISM - NEO-FORDISM DEBATE[14]

The second important debate is whether these changes constitute a progression towards flexible specialisation, or they represent a distinct neo-Fordist trajectory? The first contention is presented by Mathews (1989), which is also implicitly indicative in the works of Greig (1992), Ulrich (1987), as well as in Piore (1991). This argument asserts that various crises referred to in chapter one can be attributed as manifestations of the limits of Fordism. These limitations (crises) necessitated modification of Fordism towards innovation and specialisation. Mathews refers to

14. The Former refers to the transition from Fordism to post-Fordism, thus neo-Fordism represents a transient interface towards a full grown post-Fordism. The latter on the other hand refers to neo-Fordism as a new production trajectory.

intensification, innovation and specialisation as the main modifications implemented by major firms which diffused (combined) Taylorist management practices with new technologies and product flexibility. He argues that these modifications although produced some success stories particularly in the Newly Industrialised Economies, failures are more likely to outnumber the successes (Mathews, 1989: 34).

From this logic it is argued that indications are starting to emerge of a willingness, on the part of forward thinking firms to decisively jettison Fordist assumptions. This progression from Fordism towards post-Fordism or from mass production towards flexible specialisation is neo-Fordism, in which firms although progressively adopt new production techniques yet retain old practices associated with a Fordist managerial ethos. From studies in the automobile industry in Germany, and with leading GM automobile manufacturing in the US, they see constant progress towards a post-Fordist future.

The second strand presents neo-Fordist practices as representing a distinct trajectory in production economies. Firstly they view both Fordism and post-Fordism and distant ideal typical polarities, with differentiated variations at a practical level. This argument is pursued by Hirst and Zeitlin (1991) as well as Amin (1994). They assert that the evidence for a new organising principle of work and production is flawed: while certain changes can be identified, these are less dramatic than implied by the post-Fordist paradigm. These changes rather than representing a radical break, they tend in many cases to represent an intensification of existing tendencies (Amin, 1994: 157). One of the problems they have against the post-Fordist paradigm is its inability to deal with diversity of outcomes, and the unevenness and quantum leaps between Fordism and flexibility, evident in most industries. They also emphasise the eclectic nature of innovations, not entirely principle driven but eclectic pragmatic application of winning tactics. They also question the evidence of benefits post-Fordism (flexible specialisation) assumes to have for labour. Firms deliberately mix elements of Fordism with post Fordism, because it is easier to shift from strategies from one pole to another than the post-Fordist theory would lead us to believe (Hirst

and Zeitlin, 1991: 6).

2.1.3.POST-FORDISM AND NEW MARKET ECONOMIES

Piore and Sabel (1984), claimed that as advanced economies shift towards flexible specialisation, Fordist (mass production) practices were relegated to new market economies (names), which are still producing non-differentiated products, and price and as a competitive urge. More recent research shows the contrary. In fact new market economies are also progressively shifting their production strategies and introducing new technologies after their Western counterparts. It is important to note firstly that the pace of these economies to restructuring was not as quick as the West, due to their inability to capital invest contrary to advanced economies.

During the 1980s many of these economies were still characterised by labour intensive, Fordist manufacturing practices, still emulating their Western counterparts. South Korea is a classic example of this. Cheap labour, despotic government, many were also used as outsourcing destinations for most Western industries, particularly in the clothing and textile sector. Currently South Korea is the fourth largest auto producer worldwide behind Japan, USA and Germany (Times Magazine, 1997). Kaplinsky, R (1994) conducted a study of a clothing industry in Cyprus, in which he was investigating the diffusion of new production organisation strategies in the semi-industrialised economies. Firstly he identified that NMEs as well as least developed countries' (LDCs') access to global markets becomes increasingly dependent on their ability to achieve non-price attributes into production. This essentially means that these economies are increasingly force to compete with the most industrialised economies on the basis of product quality and innovation. Even trade policy reforms adopted by most of these LDCs result in automatic openness to world class competition, either in domestic markets or in export markets.

Findings from his study suggest firms in NMEs have six major issues:

-The competitive advantage of firms engaging in new forms of strategic orientation and work organisation are significant.

-These innovative measures include pecuniary measure, ie. reducing costs and allowing firms to target niches, as well as non-pecuniary measure, like firms' abilities to meet customer demands rapidly and greater product variety.

-The costs of reorganisation were not very high, and did not involve significant investments in new capital equipment, as well as foreign exchange content costs were very minimal.

-These organisational reforms were necessary prerequisites for NMEs to penetrate European markets.

-The new global opening of trade restrictions meant that it would have been very difficult for these economies to compete in design, quality, variety as well as costs of foreign exchange goods had they not undertaken these organisational changes.

-These economies were responding to competitive pressures, with an imperative for improved competitiveness and productivity in order to survive. This meant that organisational restructuring was only a tactical move for survival than a paradigmatic shift in principles adopted (Kaplinsky, 1994: 337).

Other studies in Latin America, South East Asia, as well as Africa denote that NMEs are faced with the challenge of the new competition, and up-market production strategies were becoming an essential prerequisite for market competitiveness. Most of these economies introduced computer technology, to improve their production efficiency and quality, but within strict Taylorist management control. Similar to the West, computer technology was no implemented as a holistic strategy for flexibility, but for quality improvement and lead-time reduction. Restructuring in most of these economies was ad hoc and haphazard, and had no clear strategy consciously adopted, and they were characterised by peculiarities and differentiation from nation to nation, sector to sector, firms to firm, even from plant to plant. (Humphrey, J 1993; Posthuma, A, 1993; and Rous, R, 1993).

2.1.4. RESTRUCTURING THE SOUTH AFRICAN MANUFACTURING SECTOR

Extensive research has been undertaken, mostly investigating how South African industries implement strategies for global competition, as well as where does the manufacturing sector fit within the Fordist vs post-Fordist paradigm. Most of the research project a progression by leading manufacturing industries for new restructuring of technologies, innovation, as well as new forms of work organisation. Restructuring in these industries is neo-Fordist, and marked by differentiation, variation from sector to sector, firm to firm, and plant to plant.

Ewert, J (1992) conducted a research in four firms in the Western Cape. His findings indicate there is actual restructuring of the production processes and industrial relations. These innovations rather amount to a shift in the direction of neo-Fordism than post-Fordism, in fact these changes are under the banner of 'world class manufacturing[15]' (Ewert, 1992: 1). There is also phenomenal differentiation and variation in strategic orientation from firm to firm which nullifies any simplistic homogenous analysis. In four firms he studies, there is an interesting contrast between the engineering firm and the clothing and textile firm, who almost form a polar situation in their variation.

The engineering firm on the one hand introduced new technology for lean production, quality improvement and response to supply and consumer demands. They had introduced new forms of work organisation to facilitate the development of a multi-skilled workforce. They introduced new training and grading structures, with consultative involvement of the union shop steward's council in the formative levels of those structures. This process was complemented with the introduction of labour responsibility policy programmes, and restructuring the hierarchy grading system on the shopfloor. But this process did have casualties, in retrenchments of redundant lower and middle

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[15]. Most of these firms are overseas subsidiaries, hence they implement strategies from the directives of their respective mother organisations either from the US, Europe or Japan. The notion of '*world class manufacturing*' comes within this context, as these firms grapple with ways to become more globally competitive.

management (mostly expatriates), computer programmers as well as labour. Production also changed from being labour intensive to flexible manufacturing cells, and the firm is beginning to recruit new labour due to increasing labour demand as a result of increasing productivity.

The clothing firm on the contrary is characterised on the one hand by introduction of computerised automation in the front end of the firm (the warehouse). The system is flexible, fast and it saves an enormous amount of space. But the rear end sections are solidly based on Taylorist principles. While flexible technology has been established in the front end of the plant, piecework and Taylorism are phenomenal in other departments. Management is not yet convinced multi-skilling is appropriate for the clothing industry. He concludes by asserting that restructuring is being introduced in a selective and uneven manner, in accordance with their imperative for global competitiveness. The ability of these firms in exporting goods can be ascribed not only to the advantage of the weaker Rand in foreign exchange value, or in general export incentives (GETS) by government policy, but also on the ability of these firms to deliver varied and quality products on a *just-in-time* basis, resulting from their innovations in technology, work organisation and industrial relations introduced by these firms.

Other studies conducted by Black, A (1992,3); Kaplinsky (1993); and Maree, J (1993), indicate a shift in most manufacturing industries, particularly the automobile industry. There is a clear indication of the political imperative that propels change in most spheres of the country including the economy. The negotiations towards a new democratic state imposed imperatives for change particularly in work organisation and industrial relations. During apartheid relations between white management and black labour were characterised by animosity, hostility and antagonism. Negotiations opened doors to labour and management to review shopfloor practices, resulting in the introduction of worker participation in PG Bison, Toyota, VW and other auto industries. The political climate also saw South Africa reintroduced in to the global framework, the UN, OAU and WTO (then called GATT). These measure meant our economy was also opening to global markets, as well as global competition. With isolation and sanctions, our economy, in particular

had remained secluded, this compounded by trade protectionism against thrust of global competition. For the manufacturing industry to thrive, we need a fundamental review of strategic organisation along the lines of global competition. Kaplinsky argued there is more imperative for post-Fordist practices in the democratic state (Kaplinsky, 1993: 13).

2.2. CONCLUSION

In formulating the hypothesis one should start by developing a conceptual base from which this research is based. In accord with Piore and Sabel (1984, 1991) there are major shifts and changes in organisation of production strategies in the past twenty years. But these changes coagulate into a neo-Fordist hybrid than approximating post-Fordist (flexible specialisation) practices on shopfloor. These changes are uneven, varied and differ in implementation from firm to firm, and from sector to sector (Ewert, 1992: 18). Mass production and flexible specialisation represent ideal-typical models than an empirical generalisation, or descriptive hypothesis about individual firms, sectors, or regions.

> *"As historical research conducted within this framework show, firms in most countries and periods deliberately mix elements of mass production and flexible (craft) production because they are acutely aware of dangers involved in choosing an unalloyed form of either model... The resulting interpretation of elements of flexible specialisation and mass production also means that firms often find it easier to shift from one pole to another than an abstract consideration of the two models might lead us to expect".* (Hirst and Zeitlin, 1991: 6).

The implication of neo-Fordist restructuring on South Africa, on work organisation and industrial relations in particular is fundamental, with specific reference to the history of our politics and the demand for competitiveness and performance of respective industries.

2.3.1. QUESTIONS FOR INVESTIGATION

The first issue of investigation is the level of awareness of South African firms to world class manufacturing, as well as challenges imposed by current patterns in attaining global competition standards. This research also investigated how different firms respond to the call for 'world class' manufacturing standards. The research scrutinized specifically which strategies have been adopted

and implemented, how have they been implemented, as well as when did different firms restructure their production organisation. How far have they gone both in technological and organisational restructuring in relation to their global counterparts, as well as levels of their productivity improvements? Lastly, implications of restructuring on labour, specifically on industrial relations, work organisation and job security.

PART II

The core of this paper is encamped in this section. This section is divided into two chapters. Chapter Three is a findings' report. The report will include inter alia, patterns and relationships in findings from the data recorded, coded and analysed. This chapter will also highlight limitations from these findings, already briefly mentioned in the methodology, to be dealt with also in the conclusion. Chapter Four is the conclusion. Three areas are addressed in this chapter. Firstly, testing the validity of the hypothesis and theory to findings. Secondly, testing the validity of findings for drawing generalised analysis on a broader framework. Lastly, a perusal at challenges and alternatives facing the South African manufacturing sector in this new dispensation.

CHAPTER 3

THE FINDINGS REPORT

INTRODUCTION

This chapter is a presentation of findings or results of this research. As indicated earlier, my research was conducted on two firms in the Retreat area. Retreat is one of the largest industrial substructures in the Western Cape. There are various manufacturing firms situated in this area, viz. Plessey Tellumat, Gabriel, Grinacker and Armstrong to mention a few. The whole sub-metropolitan of Retreat, Tokai up to Muizenberg revolves around Retreat for capital output as well as employment. The two firms studied are Plessey Tellumat SA (Ltd) and Gabriel SA (Ltd). These were the only firms in which I was allowed access to conduct my research.

The first firm is an electronics and engineering company. Plessey Tellumat SA (Ltd) is a subsidiary of a Japanese Electronic and Engineering firm. In South Africa they have six branches, with this branch being the head office for all subsidiaries in the Southern African region. The firm is multipurpose, producing a variety of more than forty seven different products. These range from electronics to mainstream engineering. The manufacturing division is producing electronic materials, which range from cables, electronic settings, to computer and television hardware material. This division employs in excess of about two hundred employees. Ninety-five percent of the workforce in this division are women, and more then eighty percent *"coloured"*[16]. The majority of workers are unionised, and the largest union in the plant is MEWUSA. This union is an affiliate of NACTU, but has subsequently withdrawn to become an independent union from 1994. There is also another independent union called Radio and TV. These are well-established

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16. The term coloured is used differently in South Africa than any where in the world. Viz. in the USA the term was used in the 1950s and 60s, referring all non-white people as people of *colour*. In the South African context it is used for descendants of San/Khoi, Malay slaves from South East Asia, as well miscegenation between indigenous people and European settlers. This population group was developed and entrenched by racial segregation principles of the apartheid system.

union representatives in the firm with CNETU only enjoying two percent of the workforce affiliation. There is also a minority of non-unionised workers.

The second firm is a shock absorber manufacturer. Gabriel SA (LTD) is also a subsidiary of an American Arvin/Marement Shock Absorber firm. They also have branches around South Africa, with this plant representing one of the largest in the country. This firm is producing shock absorbers for cars and trucks. Because of her competition with Armstrong[17], Gabriel concentrates on the *after market*. Gabriel employs in excess of about 150 workers. Gabriel is a *closed* [18]shop, and NUMSA is the only union affiliate in this firm. NUMSA is the second largest union affiliate of COSATU. This union, wields great support and influence in the industrial manufacturing sector countrywide.

1. PLESSEY TELLUMAT SA (LTD)

1.1. INTRODUCTION

Restructuring to world class manufacturing started around 1990/1. Management stated that the earlier simulations of Japanese techniques did not succeed because of resistance both from management and workers. The just-in-time (JIT) *kan ban* system, which they implemented did not produce performance results anticipated. There is general agreement in the firm that the start of concrete restructuring only took place from the end of 1992. This meant the impact and effect of restructuring only started at this time. The leading factors which prompted the firm to restructure production were:

-High and rising levels of competition both on the local as well as the international market.

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[17]. Armstrong manufactures shock absorbers similar to Gabriel. But Armstrong has secured trading and contracting with most Japanese car manufacturers in the country.

[18]. The concept refers to firms that reach an agreement with the majority union in the plant, in which all workers including new recruits employed will affiliate with that union. This means the union in question becomes the only recognised legitimate representative by both management and workers in the plant.

-Feedback time was too long and quality improvement was becoming an inevitable requirement.

- As a subsidiary firm, directives from Japan were towards world class restructuring to all her subsidiaries.

The underlying and driving objective of the firm in restructuring is to become *"a World Competitor"*. The General Manager of Operations gave 1996 as their target year for realising this objective. They regarded their progress towards this objective as progressing, albeit with variations from section to another, and from operation to another. The General Manager added that they are specialising at different aspects of restructuring at each time. For example, presently they are transforming the culture (ethos) of the firm, developing new forms of a work ethic and developing product process.

1.2. WORK ORGANISATION

The firm has transformed the organisation of the production line from different assembly lines to cells, called *Cellular Manufacturing*. The assembly line was previously organised along a Fordist *conventional*[19] order. In this system each worker took only one task along the line, eg. a setter, an operator, an inspector, etc, for each and every machine used in production. In the cell system workers are organised in teams where ultimately every worker can set, operate and even inspect the production process. This system is complemented by *team works* which is the organisational mechanism to facilitate cellular manufacturing. The firm has also introduced Surface Mount Technology (SMT). SMTs are applied in the Printed Circuit Board (PCB) The PCB with the use of SMTs facilitates maintaining efficiency and quality, as it provides cells with raw material processed for quality. They are also reintroducing[20] the JIT *kan ban* system. The JIT

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[19]. Conventional production refers to production of goods in a Fordist (mass production) system through the assembly line. This involves the use of conventional production-driven machinery and the division of labour (unskilled or semiskilled) along the line.

[20]. The firm firstly introduced JIT in 1989-90. This introduction backfired on the firm and failed to produce results anticipated by the plant in productivity. This was because the firm neither had capital capacity (CNC machinery) to operate the JIT system nor the organisational capacity in terms of the working relations between management and labour.

complements all other flexible production techniques introduced. All these implementations revolve around cellular manufacturing system. Quality and efficiency have become buzz words for world class competition. Quality testing is done through Manufacturing Quality Test System (MQTS). This programme ensures that testing is conducted at/in each and every point of production, to guarantee minimal feedback time or test steps after the completion of each product.

1.3. TRAINING AND MULTI-SKILLING

As indicated on the outline all shopfloor training in this plant has only been firm and task specific training. Management regard training the workforce both as a prerequisite and by-product of world class restructuring. Training programmes are task specific, meaning workers are trained according to job requirements and description. Different ranks also receive training according to respective rank specifications at every given time. The lowest rank of the workforce (Operators) receives cell training which enables them to perform any task within the cell. The second rank of Setter-Operators and inspectors receive SMT training and repair training for abilities to repair machines when needed. Eventually all workers in each cell will receive training to operate and inspect all machines within their respective cell.

The top rank of the workforce (Supervisors), on the other hand go through training in relation to cells they lead. They also receive excellence training, green fields course, which enables them to lead green fields/areas. They are trained to run day to day programmes in production, to deal with problems and targets of production within their respective cells. They also go through a supervision course. This training is conducted specifically to equip supervisors to deal with people, improving their communication skills, ability to relate to operators on shopfloor, floor management as well as senior management. The incumbent Production Manager grew from the ranks of workers. She has been with this firm for the past 29 years. She started as an operator and in 1990 became Chief Inspector. She completed a management diploma. Finally in 1994 she became a Production Manager. The Manufacturing Manager stated that most of these training

programmes take a period of four to twelve weeks, differing with skills required. The cost of lost production and training is estimated at about five percent (5%) of labour costs. He added that the plant's current cost of lost production is approximately 2.5% (time).

1.4. THE CHANGING NATURE OF PRODUCTION

There was general agreement within the plant that from 1993 there has been considerable change in production, in the manufacturing division. These changes are twofold:

A. An improving level of work organisation and productivity.

B. The development of cooperative industrial relations.

A. An Improving Level of Work Organisation

Workers interviewed from different ranks seemed to agree that the introduction of cellular manufacturing has improved the production process. Supervisors stated that quality has improved because feedback is more immediate. Problems, faults and inconsistencies on the board (PCB) are rectified immediately during production. As a result this has improved the division's value-added time, through minimising testing steps after production. On the one hand there is more quality and more efficiency in what is produced and distributed to consumers. On the other hand there is more productivity (unit output). She mentioned that in the past they averaged 3 - 4000 units per month, but presently it is doubled at 8000 units.

The other contributing aspect to improving productivity is training and multi-skilling. Management and MEWUSA agreed that restructuring through training and multi-skilling broadened the knowledge and awareness of workers about their work. Workers are more enabled to engage themselves creatively in the production process, as well as they are able to expand their terrain of decision making. This ability to respond instinctively and spontaneously to immediate problems harnesses efficiency and productivity. Skills acquired by the workforce enable the production process to be quicker, because the time for consulting floor managers is saved through

creative intervention of the employees at hand. As a result workers are also able to rectify faults within the production process, implying less and fewer defaults (more guarantees on quality).

B. The Development of Cooperative Industrial Relations

Management viewed restructuring to have made a great contribution in the development of industrial democracy[21]. This is evident in the participation of workers in improving communication, through consultation and information distribution, in work forums, union-management forums and in Health and Safety forums. The General Manager stated that the situation of *us versus them* is being gradually eliminated on the shopfloor. He even felt that workers are pursuing their role within this process, and there is inevitable intensifying improvement with time. Management viewed retrenchment as the biggest threat (fears) for workers, they claimed to be dealing and addressing it through guarantees of employment as the firm expands in growth and productivity.

1.5. WORKERS ATTITUDES (Worker Satisfaction)

Interviews were conducted on workers from MEWUSA and Radio &TV unions. Although one cannot generalise, the response from workers exhibited contradictory attitudes towards restructuring from that of the union. With specific reference to restructuring and its implications on industrial relations, there was an interesting contrast in responses from union officials and workers on shopfloor. The chief shop steward stated that there is not enough change. Under section work Organisation and Industrial Relations, the question was: *"Is the process facilitating the development of industrial democracy (active participation of workers)?* His response was:

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[21]. This concept refers to active participation of both workers and management as indispensable stakeholders in decision making (co-determination). This is not a neo-classical definition of co-determination. I use the term flexibly, specifically in relation to continuing simultaneous and juxtaposed existence of both co-operative and conflictual relation between workers and management, in the current South African scenario of capitalist development.

No. *"Workers are not involved in the planning of implemented programmes*[22]. His response indicated an existence of difference and animosity between management and the union. He continued to state that there is still a lack of trust between management and unions. Although he acknowledged some changes, he emphasised that management still operate on an individualistic and unilateral basis. Workers on the contrary were positive about the restructuring process, as well as about its prospects for them. The workers interviewed stated that the restructuring process has developed them. They argued that their skill levels have improved, and training enables them to be more aware and more pro-active during production. They believed there is absolute improvement in industrial relations from the past.

Most of the workers in this plant have been with the firms for more than ten years. Many were able to identify differences in attitude and production from how things used to be done, a few years earlier. One employee stated that the new organisation of production has improved the quality of production. She said: *"quality has improved because feedback is much more immediate, on problems on the board. It has also increased our levels of output*". Another worker said *"it has improved my productivity (in value added time and work in progress). Time and production matches better than it used to in the past"*. Workers also stated that they were more motivated, they had more latitude in making decisions during production and as a result there is improved communication within the plant.

Pertaining training and multi-skilling, all respondents responded positively. One of them said *"I used to work only on one machine in the production line. Now I can do anything (everything) in the cell"*. (The respondent is an inspector operator). Both supervisors interviewed stated that cellular manufacturing has increased motivation, team work, decision making as well as improved communication. They were also impressed by the training they went through for supervision. They expressed that they are better able to lead the cells and to relate both with management and

[22]. The questionnaire schedule for Shopstewards is enlisted as Appendix B. Question E is under Section B in the questionnaire. viz, Work Organisation and Industrial Relations.

workers, and maintain that communication line. One of the operators emphasised productivity improvements wrought by cellular manufacturing. She also stated that it has improved efficiency, as many workers can perform any task in the cell. These workers also felt there is improvement in wages. But they still felt the firm could still improve wages in line with inflation and their productivity rates.

2. GABRIEL SA (LTD)

2.1. INTRODUCTION

The restructuring process was first started in 1990. Similar to Plessey, initial processes of restructuring viz. the introduction of the just-in-time production (JIT) or *kan ban* did not yield optimal results as anticipated. There was general agreement that these innovations were unsuccessful during their first implementation. The Chief Shop steward stated that the failure was a result of a lack of understanding and communication between management and workers. He said

"management were just imposing instructions on incapacitated[23] *workers".*

The same view was shared by the Engineering Director, who stated that productive restructuring only started after 1992. He also shared some of the views mentioned by the union.

The leading factors that prompted the firm to restructure its production are:

Lower levels of productivity (output and quality).

Stagnation within the local market[24] demanded quality improvement for export to international

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[23]. He explained this word by stating that workers were unable to execute tasks required by new lean production computer systems because they did not have sufficient training and skills to set, operate and inspect these machines. He also stated that the industrial relations *ethos* was unsuitable for this production system. Relations between management and workers (union) were hostile and paternalistic. As a result, workers neither had the motivation nor political will to perform at maximum levels.

[24]. I indicated earlier that Gabriel deals only with the *after market* locally because their competitor (Armstrong) has contract trade agreements with all Japanese *first market* auto companies.

markets.

Arvin/Marement which is the US mother firm is streaming down restructuring directives to all her subsidiary firms.

The main objective of this plant is to achieve World Class manufacturing standards, lead the continuous improvement competition and become the market leader by the year 2000. Their short term targets are:

To produce 12 000 units (stocks) per week.

Every employee to be able to set, operate and inspect machines, with a maximum of 1 000 rejects in every million produced.

To have ISO 9 000 status (in product quality).

Both workers and management view the restructuring process as progressive. The Business Unit Manager stated that the extent and pace of change is tremendous in comparison with the past. The Engineering Director said *"we are about 25 - 35% of world class, but we are moving very quickly from the last two years"* (1994-5). The Chief Shop steward stated that the new technology is blending very well, especially Computer Numerical Control machines (CNCs). But he also added that there are still problems, mostly with the lack of training and skills, which eventually affect targets (either in output or quality). The other problem is with suppliers, who fail to meet material requirements' deadlines.

2.2. WORK ORGANISATION

Similar to Plessey, Gabriel has changed the organisation of the production line. The firm is applying Cellular manufacturing techniques similar to Plessey. As a result there has been a change in the organisation of the production line from subdivided assembly lines to a more convergent organisation of workers and technology into cooperatives within cells. The firm has as a result also introduced *team works*. The firm also reintroduced[25] the just-in-time (JIT) within cells, to improve stock turns (inventories), to reduce costs of idle stock and reduce *work-in-progress*.

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[25]. Please check footnote number twenty, in this chapter. It contains similar reference.

The union stated that they are fully committed to the restructuring process in negotiation with management on all processes of this development. They await in return for their commitment a realisation of worker satisfaction, improved working conditions and job security. The Chief Shop steward said *"we are committed to anything that promotes a win-win situation"*. They agreed with the management assertion that decisions are mostly made on a round table presently, although lower and middle management do have tendencies of resorting to old Taylorist practices. The union saw lower and middle management as lacking creativity and too dependent on senior management. They also view them as too concerned about their position than improving the firm to greater productivity. His view was echoed by the Engineering Director as well during the interview. Lastly the union stated that there is a progression towards industrial democracy, but also stated that they would like to see this trend broadening even into financial (monetary) issues of the firm, particularly those that relate to restructuring. They also expect multi-skilling, training and upgrading systems put in place, which will harness functional flexibility in the workforce.

2.3. TRAINING AND MULTI-SKILLING

The firm has introduced intensive training schemes for every variety of workers under: *Arvin Total Quality Production System* (ATQPS). The firm also runs *Cell Training Schemes* (CTS) for operators prior their qualification for ATQPS training. The firm has also introduced an *Education Assistance Scheme* (EAS). The scheme supports workers who enrol for outside firm training, like, in Technical Training Colleges, Technikons and even University financially. Outside firm training is given on the condition of workers successfully completing their respective studies in record time, as well as a stipulated service to the firm.

Table 3.1 shows a full sketch of various job categories in the firm and respective training requisites for filling those job categories[26]. I would like to highlight just a few of these categories and training requisites for them. Under (1) an operator is trained to set and operate machines in

[26]. Please open page 18, Table 3.1 is inserted in that page because of its size.

the cell. He is also required to perform functions to standards required and determined by the ATQPS certification requirement. This means employees are trained for tasks until they qualify, then they can proceed for further training. The training works concurrently with the grading system. After first certification one becomes an operator, to Audit Inspector and Store Person. This grade has a raise in a wage notch from R10, 00 to R10, 74 an hour, which is approximately from R1 600, 00 to R1 718, 40 per month. Table 3.1 also shows clearly different steps and grading levels from Operator (which is the lowest rank) to a technician, even to Artisan in fact up to Junior Engineer. This table shows that with time and training there are chances that workers might start as Operators, and some years down the line end up being Artisan even Engineers within the firm.

The Human Resource Manager stated that they want to have finished with *Employee Initiative* training (EI) by the end of 1996. The selection of workers for training is random, according to production demand. The Shop steward and the Human Resource Manager stated that each worker who applies for training receives training according to his application, whether that is firm or external training.

The Union also initiated an establishment of the education committee, which consist both the union and management. The committee specifically deal with outside firm training. The EAS is a product of this committee. Every worker who enrols for outside firm training is funded from this scheme. The committee also selects candidates who qualify for funding. Certification without deferring and returning of services to the firm converts the funding (loan) to an automatic bursary. The Chief Shop steward stated that the scheme has tremendous incentives for workers. Workers with potential are motivated to work harder, particularly because most never had opportunities to develop due to apartheid, but this training and grading scheme offer potential flexible mobility, horizontal and vertical mobility, increasing job security, stability and salary increase. He said *"this is definitely a motivating factor to many, and the firm benefits greatly on the other hand"*. He smiled and then said *"a win-win situation I was referring to earlier"*.

2.4. THE CHANGING NATURE OF PRODUCTION

From 1993 the firm has experienced a tremendous transformation in production and performance. Similar to Plessey this change is twofold:

A. Improving level of work organisation and productivity.

B. The development of cooperative industrial relations.

A. Improving Level of Work Organisation and Productivity

The Introduction of CM and the restructuring process holistically has improved production. One cell leader said *"it makes the job much easier and it improves productivity (quality and output)"*. The introduction of JIT system and the use of CNC machinery has improved the pace of production as well as productions - supply interface. He said *"it reduces excess time, the change over is quicker from one job to the other"*. The firm has also improved its output levels. Finished Received Goods FRGs in the past (1993) averaged between six and eight thousand units per day. Presently (late1995) they average between 10 and 12 000 units per day. If you ramify this figure by each employee, presently each operator produces between 450 and 500 units per day.

Training and multi-skilling introduced through various schemes already mentioned has improved production and performance of the firm. Skills and training development have broadened the knowledge and the mental base of workers about their work. It has also empowered workers to be decision makers as they engage with different tasks and problems during production. Training enables workers to engage creatively in the production process, as they are more able to respond instinctively and spontaneously to immediate problems encountered during production. As a result there has been a tremendous reduction and elimination of faults and defects in production. CM ensures that workers are adequately equipped to rectify faults and defects during production, which consequently reduces the number of *Test Steps* conducted after completion of every production cycle. This also increases the guarantee for quality on products to consumers.

B. The Development of Cooperative Industrial Relations

The Senior Shop steward said he believes that workers have full participation (co-determination) in this process[27]. He continued to say that workers are beginning to have influence on the direction the firm is taking. *"Although there are still problems of lack of training for some workers, as well as attitude problems from some circles from both management and workers, change is continuing, developing and gaining ground in the firm, in fact the whole environment is beginning to embrace this attitude of change"*, he said. Both the union and senior management agree that the *ethos* of participation and industrial democracy is progressively developing through restructuring. They also agree that there is an increase and growth of opportunity for all workers on shopfloor to progress, and more workers are beginning to be exposed to that reality than before.

The biggest obstacle is the inability of both workers and management in dealing with the pace of change, and adapting to the new paradigm shift. The union also listed loss of employment as another obstacle particularly for workers. But they also mentioned that there is consolation because animosities and hostilities of the recent past are being eliminated, as problems are dealt with soberly and openly. Both sectors showed willingness and commitment to ultimately achieve a win-win situation. Management felt that workers are pursuing their role, especially in terms of their commitment to greater productivity. The union on the other hand was convinced that senior management had adopted a new paradigm about production, but were worry about middle and lower management who still pounce around in Taylorist practices.

2.5. WORKERS ATTITUDES (Worker Satisfaction)

As a *closed shop*, all employees in Gabriel are members of NUMSA. Contrary to Plessey, the view of workers correlated well with that of the union officials. Similar to Shop stewards' responses, workers interviewed stated that the restructuring process has developed healthy and

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[27]. Please look at footnote number twenty one in this chapter. I have clarified the use of the term Industrial Democracy there.

cooperative relations between them and management. A cell leader stated that this process is phasing out the old hierarchical system, which was characterised by rigid mobility of workers from one rank to the other. *"The old system almost made it impossible for workers on the last grid to develop and move to higher positions. But the new system of cells has opened avenues much better for any worker to develop. In fact only the top brass of the workforce had opportunities of mobility (promotion), the rest were literally stuck in the mud"* he said. He added that with the new system it takes much shorter time for workers to upgrade their ranks frequently than in the past. Another cell leader as well as an operator also stated that this system of training and grading serves as an incentive and motivation to all members of the firm to perform at their very best, although they also mentioned the threat the system has on lower and middle management. One of the cell leaders said *"I'm telling you, these guys are threatened by us,* (most lower and middle managers are White) *that we are going for their jobs"* (the workforce is almost exclusively Black). The Chief Shop steward had earlier said *"we are encouraging our guys to develop themselves. Its about time that we have our own* (working class-black) *people in management"*.

Workers were also satisfied by the improvement in working conditions in the firm as well as industrial relations. The area of contention for mostly lower ranking workers was in wages. Although they acknowledged improvements, they stated that the firm can still raise wages even higher. One worker who had been employed just over a year said *"all other things are really well done in this firm. We are treated fairly well by management and there is clear and mutual relationship between us and them. But I feel although wages have increased they still do not reflect my productivity level as well as my needs in relation to the economy and inflation"*. He added that he is hoping that the union is able to strike an agreement with management that will settle wages for the next five years. In fact when I began conducting interviews, management had just struck an agreement with the union on opening debate about addressing apartheid wage disparities between first world management salaries on one the hand and third world labour wages on the other.

CONCLUSION

Earlier research has been conducted in both firms by Joachim Ewert (1992) and Anthony Black (1993-4) respectively. Plessey Tellumat, after their initial Just-in-time (JIT) system attempt at restructuring backfired, decided to conduct a pilot project. This project was to focus on quality costs, manufacturing *lead-times* and *work-in-progress* in inventories. An engineer from Stellenboch was contracted to conduct this pilot study. His recommendations were that the firm must embark on a world class manufacturing strategy, by introducing Japanese style of involvement process. The thrust of these recommendations was that the firm needed to jettison the old style of production organisation and technology to new style for world class manufacturing competition.(Ewert, 1992: 13-14[28]). Research by Ewert indicates that the firm began to implement restructuring systems as per recommendations. From this research the firm began to reintroduce the just-in-time system. Presently the firm has introduced cellular manufacturing, green fields, where day to day applications and assessment and planning of production is discussed and illuminated for workers.

The research by Black (1994) shows that the firm restructured its production organisation, and did result in increased profitability. These dividends though were not from capital productivity but were results of reduced production costs from the rationalisation process which resulted in retrenchments on shopfloor. Management had also not yet bought CNC machinery for the just-in-time system. My findings on the contrary show that the firm has begun to re-employ workers on shopfloor, due to increased productivity resulting in increased labour demand. They have also purchased and introduced CNC machinery within cells, for the JIT system.

It is imperative to point out the limitations on my findings, as well as areas of generalised

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[28]. This information came from a discussion with Professor Joachim Ewert, after a Masters Course Seminar at the University of Cape Town in 1995. It is also found in his paper as referenced.

strengths. The validity of these findings with reference to management and unions is reliably unquestionable. In both firms I conducted interviews with all relevant management portfolios that are directly involved in the restructuring process. I managed to interview top managers who run these firms, as well as senior manager who run the restructuring process. I was also able to interview union officials. With reference to Plessey Tellumat SA, I interviewed the chief shop steward for MEWUSA, (who runs all industrial relations issues within the firm for almost all workers). I also interviewed another shop steward from Radio & TV. With reference to Gabriel SA, I managed to interview four shop stewards. I interviewed the chief shop steward, two senior shop stewards, and one part-time shop steward, who is also a cell leader. One has confidence that the data collected from these two stakeholders can be generalised across each firm.

One would also acknowledge the limitations of the findings on worker attitudes and worker satisfaction. One cannot generalise these findings as workers' attitudes across each firm. The reasons for my inability to solicit adequately reliable data is discussed in the methodology section. But it is important to note that all workers interviewed firstly, were aware of the restructuring process. Secondly, they were part of the process at their different ranks. These workers showed also reasonable levels of satisfaction, particularly on the organisation of production, training, as well as the new *ethos* in their respective firms. Almost all these workers although they acknowledged increases in wages, they still felt their respective firms can still upgrade their wage notches in relation to their productivity and market and inflation rates. Many of them were single bread winners, hence the wages did not meet their living demands and their families.

TABLE 3.1.

GABRIEL'S TRAINING AND GRADING SYSTEM

GRADE NEW	DESCRIPTION	PAY	TRAINING TO BE COMPLETED BEFORE OPERATOR IS COMPETENT IN GRADE
1	OPERATOR I AUDIT INSPECTOR STORE-PERSON I * Set and operate all machines in cell/ perform functions to standard determined by ATQPS certification requirements * Perform O.P.M * Ensure health and safety standards are maintained * Member of EI team OPERATOR I (CERTIFIED) AUDIT INSPECTOR (CERTIFIED) STORE-PERSON I (CERTIFIED)	(R10-00) 1 Module R10- 00 2 Modules R10- 00 3 Modules R10-24 4 Modules R10-48 5 Modules R10-74 60% R10-74	Entry requirement health & safety 1 Set/Operate own machine + 2 others 2 E I Training 3 Q C Training 4 O P M Training 5 Set/Operate all machines in the cell * Basic Quality Assurance (PERFORMANCE EVALUATION)
2	OPERATOR II WARRANTY INSPECTOR GAUGE CONTROLLER PATROL INSPECTOR STORE-PERSON II * All grade i functions and training * Operate all machines linked by process OPERATOR II (CERTIFIED) WARRANTY INSPECTOR (CERTIFIED) GAUGE CONTROLLER (CERTIFIED) PATROL INSPECTOR (CERTIFIED) STORE-PERSON (CERTIFIED)	(R10- 74) Example 1 Module R11- 09 2 Modules R11- 44 3 Modules R11- 79 4 Modules R12- 14 5 Modules R12- 53 70% R12- 53	6 Set/Operate all machines + 2 machines previous process 7 ATQPS 8 ATPM/ATQPS 9 S P C Advanced 10 NTC I (or 3yrs from date of registration) * Intermediate Quality Assurance (PERFORMANCE EVALUATION)
3	OPERATOR III CHEMICAL CONTROLLER * All Grade 1 and 2 functions and training * Set and operate all machines in process * Motivate, supervise, counsel team members * Maintain/Measure to ATQPS standards TEAM LEADER CHEMICAL CONTROLLER (CERTIFIED)	(R12- 53) Example 11 - R13- 32 12 - R14- 32 80% R14- 32	11 Leadership Training 12 NTC 2 (or 3 yrs from date of registration) (PERFORMANCE EVALUATION) * TBA
4	TEAM LEADER (CERTIFIED) APPRENTICE QE INSPECTOR GOODS RECEIVING CONTROLLER BUF I	(R14- 32) Example 13 - R15- 11 14 - R16- 11 90% R16- 11	13 * 6 months qualifying period and * Performance Evaluation or * Modular apprentice training or * Advanced Quality Assurance 14 NTC 3 15 NTC 4 (PERFORMANCE EVALUATION)
5	BUF I (CERTIFIED) B.U.F. II/ARTISAN	16 95% R17- 01 17 100% R17- 90	16 NTC 2 + Certification 17 Passing of Trade Test
6	TECHNICIAN ARTISAN FOREMAN JUNIOR ENGINEER	120%	Additional job related technical skills NTC 6/T 3

L/Grade 1 21 June 1995

CHAPTER 4

CONCLUSION

This chapter will attempt to grapple with two critical issues. Firstly, I will test the validity of the theory and hypothesis against the findings. This entails juxtaposing theories presented in Part I to findings. I will also attempt to answer the following questions: Is the distinction between mass production and flexible specialisation clear conceptually? Can we identify both instances of mass production and flexible specialisation as distinct trajectories operationally? To what extent can these findings be generalised as body of knowledge about the nature of the shifts in technological and production strategies? Do these shifts coagulate into neo-Fordism rather than approximating post-Fordist practices on the shopfloor? What are the factors and forces driving the restructuring processes? The last question will be why firms retain Taylorist management practices while other features of mass production are jettisoned?

Secondly, this section will attempt to highlight current debates and issues, as well challenges facing the manufacturing sector. It is the assertion of this paper that recent and current political developments in South Africa, globalization, and world trade pose serous implications for our economy and manufacturing sector. Lall (1993) asks this very impelling question on our industry and economy *"What Will Make South Africa Internationally Competitive?"* One will attempt to integrate several points and policy suggestions for greater flexibility, competitiveness and economic growth.

4.1. TESTING THE THEORY AGAINST THE FINDINGS

There are three theoretical contestations presented in the theory chapters which I want to test in this conclusion. Firstly Piore and Sabel (1984) contend that the changes in the production techniques and strategies represent a change in historical and economic trajectories, from mass

production (Fordism) to flexible specialisation (post-Fordism). The indicators that they used which distinguish one history from the other are technological innovation, length of production runs, product variability, competition regulations, forms of work organisation and industrial relations. Case studies show that both firms introduced restructuring firstly under the banner of *'world class manufacturing'* (Ewert, 1992:1[29]). Secondly, the just-in-time system pioneered by Japan was introduced in these firms initially without the introduction of new CNC machines, it was only in 1993 that both firms either bought, or were supplied with the CNC technology compatible to JIT and *cellular manufacturing* (Black, 1994:89[1]). Thirdly both Plessey and Gabriel are going through changes, and both respectively implement strategies to improve their competitive edge. There are changes in work organisation through the introduction of *cellular manufacturing*, these firms have even introduced green areas (fields), through which production is outlined on a daily basis in each firm. These implementations represent a conscious departure from mass production (Fordism). But the findings also show that the process is Taylorist control[30], because it is still only management who are driving the process, even the green areas only work as informative centres where the management runs down the processes and requirements for the workers daily.

Secondly Williams et al (1987) developed a deconstructionist analysis of the flexible specialisation thesis. The thrust of their review is that changes in production organisation from mass production to flexible specialisation are chaotic and uncharacteristic rather than clear and distinctive. They (1987:416-17) contend that the very characterisation of these production strategies of the 1900s to the 1960s as mass production (Fordism) is misleading and hence the displacement thesis of

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29. The same information was also obtained from the interviews I conducted with the management and the shopstewards from both firms.

30. The concept *Taylorist Control* is borrowed from Kelly, M, who used it to characterise firms in which daily production organization is controlled by management. This term can be contrasted to either *shared control*, referring to a process of shared control of daily production organization between management and shopfloor, or even *worker control*, in which shopfloor have full control of production running daily.(Kelly, M. in The Transformation of Work, by Wood, S, 1989).

flexible specialisation (post-Fordism) is even much more confused. On the contrary the findings from both firms and the findings of earlier studies conducted by Ewert in Plessey and Black in Gabriel, showed an identifiable pattern in the nature of recent developments in these firms. These firms introduced new production concepts that have been introduced by international competitors in the world, to improve their level of productivity and eventually establish a competitive edge in the domestic and international markets. Moreover the features of a mass production paradigm are an identifiable hypothesis rather than a superfluous rhetoric as suggested by Williams et-al (1987). The findings indicate that the strategies introduced either in technological innovation, work organisation, and/or industrial relations show distinct manifestation of post-Fordist developments over the past few years[31].

Thirdly the assertion of this paper is that changes in production organization coagulate into a neo-Fordist hybrid rather than approximating flexible specialisation practices on shopfloor. Ewert (1992:1) contends that manufacturing firms in the Western Cape introduced restructuring under the banner of *'world class manufacturing'*. The findings vindicate these assertions. Firstly the major or overwhelming feature with the two firms is that, they have both started to introduce new production strategies, mostly through the reorganisation of production (by introducing JIT, Cellular manufacturing, and green fields/areas) and the introduction of new CNC technology, (particularly from 1994). These firms have also established new competitive supplying contracts to facilitate just-in-time production. But both firms are still characterised by Taylorist management practices, although there are attempts to develop participative initiatives.

The subsequent question is: do these changes represent dynamic changes in the development of productive strategies from mass production (Fordism) to flexible specialisation? And the answer is yes and no. When comparing the findings from both studies of Ewert (1992) in Plessey and Black (1994) in Gabriel with the findings from this research it is clear that both firms have

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31. Post-Fordism is used generically in this extract to show a departure from Fordism or something after Fordism, but not necessarily as a synonym of flexible specialization as a paradigm.

intensified and improved the implementation of flexible production strategies from the level they had during the previous studies respectively. Both firms have progressed in restructuring their production processes by introducing new CNC machinery, they have also improved and intensified JIT system, and introduced cellular manufacturing. It has been indicated in both previous studies that the initial introduction of JIT system backfired on the firms due to improper planning and the resistance from the labour force. Gabriel in particular has even formulated a comprehensive training and multi-skilling programme (ATQPS), by which labour is developed and trained to apply their skills on diversified products and machines. Moreover the union has established the support scheme (EAS) for the workers who enrol for technical training either in a technical college and/or even at the university. Plessey is also in the process of developing their own programme.

Can we then argue that the changes in industrial relations in both firms are the result of post-Fordist work organisation changes towards flexible specialisation or these changes can be explained by the historical outcome of the SA's political economy? The post-Fordist postulation asserts that flexible specialisation with its forms of work organisation breeds the development of cooperative industrial relations. My assertion is that the two factors are not mutually exclusive from each other. The Chief Shop-steward in Gabriel agrees with the Engineering Director that the new forms of work organisation (particularly) cellular manufacturing and the green areas, have in developed participation and exchange of ideas, aspirations and information of both management and labour. They contend that these forms of work organisation facilitate an environment in which the *us-them* relationship eliminated. The Human Resource Manager in Plessey adds that the training and quality circles introduced in the plant have intensified the mutual relationship the firm is developing between management and workers. On the other hand they acknowledge the role played by the political and economic processes both of the past and the present. What seems to be the driving factor for restructuring is competition and the need for greater flexibility. As noted by Evert (1992), firms are more driven by pragmatic, competitive demands, than rhetoric classifications. These firms only want to achieve greater and continuous flexibility in order to keep

abreast of their competitors.

The general agreement by workers (union) and management from both firms is that the polarisation of racial groups under apartheid compounded the conflictual industrial relations. Moreover government oppression and discrimination on black people entrenched racial animosities between management (white people) and workers (black people). The 1980s in particular were characterised by recurring industrial action, mostly in the form of strikes by the workers. They were also characterised by rapid emergence of the labour movement viz., COSATU which destabilised both capital and the apartheid regime through mass struggles. Hence the political changes, from the unbanning in 1990, and the starting of negotiations for a political settlement effected a change in the approach of the two conflicting parties. This means that the political transition created a convenient and suitable environment for industries and sectors to implement production strategies for world class competition.

The next important question is, can these findings be used as a unit for analysing the nature of the manufacturing sector in the Western Cape? , And the answer is no. Because of the size of the area researched and the size of the sample used, the findings are only valid in analysing the restructuring process in Gabriel and Plessey Tellumat. But for a broader analysis it is important to note that several studies have been conducted on the restructuring process in the Western Cape especially in the manufacturing industries. These studies have been conducted namely by Bauman (1991), Ewert (1992), Black (1994) for the Industrial Strategy Research Unit, COSATUs Economic Trend Research Group (1994, and still continuing), and some research is still underway particularly on the clothing and textile industries (researched by Maree J et al) to mention a few. My assertion is that these studies can all be classified as snapshots in a continually changing and developing environment. Hence individually they can only explain individual pieces of the developments in individual firms. But these studies after consolidation can be used to develop a framework for analysing regional and national patterns eminent in the manufacturing sector on a broader scale.

Lastly a much more difficult question is why neo-Fordism is an outcome of the restructuring either than post-Fordism. That is why do the management retaining Taylorist or scientific management practices while other features of mass production are eliminated? Several explanations can be developed in an attempt to respond to this question. A single sided explanation will be very naive and paranoid, but a much complex analysis at a multiplicity of possible factors can provide us with a more plausible analysis.

2. IMPLICATIONS FOR THE SA MANUFACTURING INDUSTRY

The current changes and developments in the South African political arena do not only pose serious challenges on the political future of the country, but they also have serious implications on the economic development of the country. The South African economy, during the apartheid era was characterised by the two features:

1. The South African regime was isolated from the rest of the world both politically and economically. As a result South Africa faced sanctions and embargo from the international community for almost four decades.
2. The protection of the South African industries by the state through duties and tariffs from international competition, and the government subsidisation of the monopolies to maintain them against economic crisis.

These two factors resulted in the proliferating development of an inefficient, unproductive, incompetent, yet surviving and thriving manufacturing sector (Lall, 1993:50). The South African manufacturing sector is thrust by static and backward technologies, work organisation, marketing strategies and regulation systems. Research shows that although manufacturing exports amounted up to $7,6 billion in 1991 from 5,3 billion in 1988 (mainly in neighbouring, far less developed countries), large areas of the industry are neither competitive nor technologically dynamic. Besides exports to neighbouring countries local industries only trade with international markets through exporting primary goods (unprocessed raw material) and imports of capital goods.

The economy also faces a mammoth limitation of acute inequalities and scarce human resource

base. Thanks to apartheid, average an illiteracy rate for adults in African communities is estimated at 45%, and less than 10% of the manufacturing workforce is trained to the level of being artisans (ISP Report, 1994:67)[32]. World Bank and UN statistics put South Africa well below the dominant competitors in international trade, even below the average of NIEs like South Korea, Taiwan, Singapore, Malaysia and even Brazil.

Reforms in the political arena had immense and major implications on South Africa, both politically and economically. On the one hand South Africa was welcomed back to the international community, (and the international economy, through the lifting of sanctions from 1992, South Africa rejoined the Commonwealth in 1994, and registered under GATT, and later WTO as a signatory in 1994/5). These reforms also meant that the economy was opening up to the international competition, from which we have been isolated and protected for more than 60 years. Now we do not only have to compete for export markets internationally but local industries have to compete with the international investors for previously secured domestic markets. This obviously poses serious challenges to a static, inefficient, and uncompetitive industry.

One certainty seems clear, that the South African manufacturing sector has to address and overcome substantial structural and institutional constraints in order to achieve world class manufacturing standards (Black, 1994; Ewert, 1992; Joffe & Ngoasheng, 1992; Kraak, 1992; Lall, 1993; and Maree, 1995). Lall (1993) firstly deals with government and regulation which encourage greater competition and innovation. She argues that developing economies should encourage outward centred development towards exports, which will pressurise these economies to improve technological capabilities, rather than hiding behind inward protectionist ones. She also argues for serious, vigorous and conscious government intervention in this promotion of export oriented industries. Government should encourage schemes that will protect infant industries, while also setting limits and targets which will force them to adopt technological

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[32]. The abbreviation SALB is used for the South African Labour Bulletin (journal).

capabilities for export competition. She criticises the South African economy for selective protection, as well as for not encouraging competitiveness through protecting monopolies and inefficient sectors.

The second challenge is building technological capabilities (TCs)[33]. Ewert (1992) cites skills' shortage, high costs of imported technology, as well as lack of a research and development infrastructure (R&D) in local technology as main obstacles towards world class manufacturing standards. Skills' development, investment in research and flexible technology, is necessary to achieve flexibility and technological dynamism associated with world class manufacturing (Black, 1994; Ewert, 1992; Joffe & Ngoasheng, 1992; Kraak, 1992; Lall, 1993 and Maree, 1995). The biggest concern amongst commentators is that both business and government seem reticent and shy in these forms of investments. In fact the government and business rather opt for labour market flexibility options in an attempt to lure FDIs, without examining long-term implications. Lall (1993) emphasises that we should look at the pattern of South Korea, Singapore and Taiwan, in how they balanced government protection, investment in a research and development infrastructure, which landed these economies to world class standards. She does though acknowledge that this route is costly, which is added by Ewert (1993: 6-7), that this is a costly and dragging path, against the thrust cheaper and quick solutions.

The government, business and other stakeholders should take R & D seriously. Kaplinsky (1989) had argued that it would be easier to implement flexible specialisation practices in a post-Apartheid South Africa. There are two broad debates as to what will constitute sustainable innovation towards greater flexibility. The NPI & SEIFSA[34], (1990) present technological

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[33]. This term is introduced by Lall, (1993:52), referring to engineering, technical, and operational skills and knowledge that allow the plant or firm to be used at its best practice level of efficiency. These also refer to skills technical, managerial and institutional -that allow productive enterprises to utilise equipment and technical information efficiently.

[34]. The NPI is the National Productivity Institute, and SEIFSA represents Steel Engineering Industries Federation of South Africa.

innovation, computer numerical control machines, just-in-time, total quality control, total preventive maintenance, as factors for greater flexibility, lower costs, higher quality, innovative and productive technologies. On the other hand there seems to be more agreement that world class manufacturing should be implemented fundamentally on a simple cellular manufacturing system. This line of thought also asserts that world class manufacturing requires a particular work organisation and industrial relations ethos of: no retrenchment undertaking, full consultation over the process of change, formation of self-directed work teams, multi-skilling, cross-training and career progression based on a skill-based ladder of jobs (Greenfell, 1992: 34-35).

Lall (1993:140) concludes that the choice facing the South African economic policy makers is not *whether* the country will have to compete on world markets, but the choice is on the nature of competition, of products, and markets (*niche)* we target. The Industrial Strategy Project (ISP), in relation with the Economic Trends Research Group (ETRG), which was commissioned by COSATU has developed extensive research on industrial strategy policy formulation for the manufacturing sector, which investigates areas ranging from technological flexibility, human resource development, marketing strategies and the role of the state and civil institutions, Trade Unions and the Employer Organisations in the new phase. I agree with Kraak (1991:402-420) that there is a need for a more differentiated approach to the human resource policy formulation, than the uni linier policy presented by the previous regime and corporate business. Policy formulation should establish education and training (ET) and research and development (R&D), in South Africa as tools for harnessing technological dynamism and international competitiveness.

APPENDIX 1 A

THE QUESTIONNAIRE SCHEDULE FOR MANAGEMENT

1. BIOGRAPHICAL DETAILS

1. Age .....

1.2. Race group .....

1.3. Home language .....

1.4. Sex .....

1.5. Highest school qualification .....

1.6. Other qualifications .....

1.7. Position held at the firm .....

1.8. How may years of working experience do you have with this firm? .....

9. Do you still have the same position (rank, grade) as when you started? yes \ no. (if no, please state all the positions held in sequence) .....

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2. GENERAL

2.1. Previous studies have listed your firm as one of the leading firms in the process of industrial restructuring.

When did your firm commence to reorganise production?

Year .....

2.2. What are the leading factors which prompted your firm to change?

1. Lower level of productivity,

2. Deteriorating industrial relations,

3. High and rising competition levels

4.Any other .....

.....

.....

2.3. What are your (1)immediate (short term) targets and (2)long term (broad based) goals and objectives?

2.3.1. Targets .....

.....

.....

.....

2.3.2. Objective .....

.....

.....

.....

2.4. How far has the process gone in realising these targets, goals and objectives you have just mentioned?

2.4.1. Not at all,

2.4.2. Moving very slowly,

2.4.3. Mixture of both success and failure depending on goals set and production line,

2.4.4. Improving progressively.

Comment .....

.....

.....

3. WORK ORGANISATION AND INDUSTRIAL RELATIONS

3.1. One of the fundamental features in restructuring production systems is work organisation and industrial relations.

What specific restructuring programmes have you implemented in your firm, on shopfloor?

1. JIT (*kanban*),
2. Continuous improvement (*kaizen*), though CNC, C.A.S/D/M, T.Q.P, T.Q.M, etc,
3. Work Teams,
4. Job rotation, job enrichment and job enlargement,
5. Any other .....

.....

.....

3.2. Is there a relationship in implementation of one programme/s to the other/s?

1. No
2. More or less
3. Yes (a)Adhoc, or haphazard

   (b)Planned

3.3. Are the workers in your firm involved in this process of restructuring?

1. No
2. Partially
3. Yes

3.3.1. How and when do they participate? .....

.....

.....

3.4. Does this process harness a progression towards industrial democracy (active worker participation in decision making)?

1. No.

2. Yes.

3.4.1. How?.....

.....

.....

.....

3.5. Can you identify specific obstacles in the process that hinder the realisation of these goals?

1. No.

2. Yes.

Comment.....

.....

.....

.....

3.6. How do you address them in the pursuit of your goals?.....

.....

.....

.....

3.7. In your observation, how committed and sincere is management to this whole process?

1. Low

2. Average

3. High

3.8. What are you prepared to (1)sacrifice or compromise and to (2)push forward, and fight for (put into) this process? to enhance change?

3.8.1. .....

.....

.....

3.8.2. .....

.....

.....

3.9. Has this process improved industrial relations in your firm, or has it lead to more conflict with the union/s and workers,

3.9.1. Unions

1. Increased cooperation
2. Status quo
3. More industrial conflict

3.9.2. Workers

1. Increased cooperation
2. Status quo
3. More industrial conflict

3.10. What should be the role of the workers in this process? .....

.....

.....

.....

3.11. Do you think they are pursuing their role in this restructuring?

1. No.
2. Yes.

Comment .....

.....

.....

3.12. What have you identified as fears on the part of workers to this process? .....

.....

.....

.....

3.13. How do you address these fears to the benefit of this process? .....

.....

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4. TRAINING AND MULTI-SKILLING

4.1. Do you consider multi-skilling of workers as both a pre-requisite and outcome that is crucial, important and integral to industrial restructuring?

1. No.

2. Yes.

Comment .....

.....

.....

4.2. Is there any comprehensive programme in your firm, in which re-grading and multi-skilling takes place?

1. Yes

2. No.

4.3. What is the programme(s)? .....

.....

.....

.....

4.4. What is the time frame for each program/s .....

.....

.....

4.5. Average costs incurred .....

.....

.....

4.6. What criteria do you apply in selecting workers for multi-skilling or for skills re-grading?

.....

.....

.....

4.7. What are incentives motivate workers for retraining and multi-skilling?

1. Improved in career development (grading ladder system skills based),
2. Job security,
3. Increase in salaries,
4. Mobility (ability to move from on job category to another, and across firms).
5. Any other .....

.....

.....

5. FIRM PRODUCTIVITY AND COMPETITIVENESS

5.1 Have you increased your level of competitiveness?

5.1.1. On the local market

1. No
2. Partially (in some areas)
3. Yes.

5.1.2. On the international Market

1. No.
2. Partially (in some areas)
3. Yes

5.2. How do you know and measure?

5.2.1. Local market .....

.....

.....

5.2.2. International market .....

.....

.....

5.3. Are you facing any obstacles in this regard?

1. No

2. Yes

5.4. What are these obstacles? .....

.....

.....

5.5. How do you address and eliminate them? .....

.....

.....

.....

APPENDIX 1 B

THE QUESTIONNAIRE SCHEDULE FOR SHOP-STEWARDS

1. BIOGRAPHICAL DETAILS

2. Age .....

1.2. Race group .....

1.3. Home language .....

1.4. Sex .....

1.5. Highest school qualification .....

1.6. Other qualifications .....

1.7. Position held at the firm .....

1.8. How may years of working experience do you have with this firm? .....

9. Do you still have the same position (rank, grade) as when you started? yes \ no. (if no, please state all the positions held in sequence) .....

.....

.....

.....

.....

2. GENERAL

2.1. Previous studies have listed your firm as one of the leading in the process of industrial restructuring.

When did your firm commence these production techniques?

Year.....

2.2. What are the leading factors which prompted your firm to change?

1. Industrial relations

2. More worker control and bargaining power

3. Lower level of productivity

4.Any other .....

.....

.....

2.3. What are your (1)immediate (short term) targets, and your (2)long term (broad based) goals and objectives in this process?

2.3.1. Targets .....

.....

.....

.....

2.3.2.Objectives .....

.....

.....

.....

2.4. How far has the process gone in realising these set goals and objectives you have just mentioned?

1. Not at all

2. Moving very slowly

3. Steadily progressing

4. Goals almost realised.

Comments .....

.....

.....

3. WORK ORGANISATION AND INDUSTRIAL RELATIONS

3.1. One of the fundamental features in restructuring production systems is work organisation and industrial relations.

What specific restructuring programmes have been implemented on shopfloor?

1. J.I.T (Kan ban),
2. Continuous improvement, (*kaizen*), through C.N.C, C.A.S/D/M, T.Q.C/M, etc.
3. Work teams,
4. Job rotation, job enrichment and job enlargement,
5. Any other .....

.....

.....

3.2. What can you characterise as the nature of your involvement in (1)conceptualisation and (2)implementation of these programmes?

1. Full participation (co-determination),
2. Partial participation,
3. Rubber stamping management decision.

Comments .....

.....

.....

3.3. Are you able to exert maximum influence on the direction of these forms of work organisation?

1. No

2. Partially

3. Yes.

3.4. What are practical constraints and obstacles that you face on shopfloor in implementing these programmes? .....

.....

.....

.....

3.5. Does this process harness a progression towards industrial democracy (active worker participation in decision making)?

1. No

2. Partially

3. Yes

Comments .....

.....

.....

3.6. Does it encourage greater cooperation between labour and management?

1. No

2. Partially

3. Yes

Comment .....

.....

.....

3.7.Can you identify specific obstacles that hinder greater cooperation between labour and management? .....

.....

.....

.....

3.8. On your capacity as a participant what is the level of your commitment to this whole

process?

1. Low

2. Average

3. High

3.9. What are you prepared to (1)Sacrifice or compromise and put into, and (2)What are you expecting to gain in return for your participation in this process?

3.9.1 .....

.....

.....

.....

3.9.2. .....

.....

.....

.....

.....

3.10. Do you think that the management (1)Senior and (2)Middle are playing the role they are supposed to play in this restructuring?

3.10.1. Senior management

1. No

2. Yes

Comment .....

.....

3.10.2. Middle management

1. No

2. Yes

Comments .....

.....

4. TRAINING AND MULTI-SKILLING

4.1. The other crucial aspect both as a pre-requisite and outcome of industrial restructuring is multi-skilling of workers.

Do you have a comprehensive programme in your firm, through which re-grading and multi-skilling takes place?

1. No

2. Yes

4.2. What is the programme/s? .....

.....

.....

.....

4.3. The time frame of each programme .....

.....

.....

.....

4.4. Average costs incurred .....

.....

.....

.....

4.5. Who decides on the selection of workers for multi-skilling?

1. Management

2. Shop-stewards

3. Selection committees, (comprising of both the union and management).

4.6. On what bases are the workers selected for multi-skilling? .....

.....

.....

.....

4.7. Is every worker expected to benefit fruitfully from these processes?

1. No

2. Some

3. Yes

4.8. How are the workers going benefit?

1. Career development

2. Increase in salary

3. Job security

4. Job mobility (ability to change firms flexibly)

5.Any other .....

.....

5. FIRM PRODUCTIVITY AND COMPETITIVENESS

5.1. Have you increased your level of productivity (labour)?

1. No

2. Partially (in some areas)

3. Yes

5.2. How do you measure? .....

.....

.....

5.3. Are you becoming more competitive?

5.3.1. On the local market

1. No

2. Partially (in some areas)

3. Yes

5.3.2. On the international market

1. No

2. Partially (in some areas)

3. Yes

5.4. How do you measure?

5.4.1. Local market .....

.....

.....

5.4.2. International market .....

.....

.....

5.5. Are you facing any obstacles in this regard?

1. No

2. Yes

5.6. What are these obstacles? .....

.....

.....

5.7. How do you address them? .....

.....

.....

.....

APPENDIX 1 C

THE QUESTIONNAIRE SCHEDULE FOR WORKER SATISFACTION

This questionnaire is an attempt to obtain information which will assist in measuring the level of satisfaction of workers, pertaining the restructuring process on shopfloor.

1. BIOGRAPHICAL DETAILS

2. Age .....

1.2. Race group .....

1.3. Home language .....

1.4. Sex .....

1.5. Highest school qualification .....

1.6. Other qualifications .....

1.7. Position held at the firm .....

1.8. How may years of working experience do you have with this firm? .....

9. Do you still have the same position (rank, grade) as when you started? yes \ no. (if no, please state all the positions held in sequence) .....

.....

.....

.....

.....

2. WORK ORGANISATION

2.1. What programmes are presently implemented in your production line eg, work teams, just in time production, or computer numerical control? .....

.....

.....

2.2. What changes have these brought forth in your work, and to the production process? .....

.....

.....

.....

.....

.....

.....

2.3. In which did these programme/s start? .....

2.4. Has it increased the level of your productivity, in output?

1. No

2. Yes

2.5. How do you compare? .....

.....

.....

2.6. Who decides on the implementation of these programmes,

1. Management

2. Workers

3. Joint, or consensus decision.

Comment .....

.....

.....

2.7. How are decision disseminated to shopfloor for execution? .....

.....

.....

3. TRAINING AND MULTI-SKILLING

3.1. Have you enrolled for any company retraining programme?

1. No

2. Yes (if yes, please state the course, its duration, costs, and its value on you and the firm in skills development and performance) .....

.....

.....

.....

3.2. Have you developed any new skills within the production process, through either job rotation, enrichment and multi-tasking?

1. No

2. Yes

Comment .....

.....

.....

3.3. How do you feel about your work,

3.3.1. Does it allow you to exercise creative thinking while on the production line?

1. No

2. Yes

Comment .....

.....

.....

3.3.2. Does it make you feel being an active participant in the firm within a collective of other members?

1. No

2. Yes

Comment .....

.....

.....

4. INDUSTRIAL RELATIONS

4.1. How are the relations between workers and management in this firm, in (1)human relations, (2)organisational attitude, (3)collective participation (in decision making)?

(State your measure in the scale of 1 - 10, ie. poor to excellent)

4.1.1. .....

4.1.2. .....

4.1.3. .....

4.2. How are these relations in comparison to the previous times? (tick the appropriate class)

1. Absolute deterioration

2. Worse than before

3. No change

4. Better than before

5. Absolute improvement

Comment .....

.....

.....

4.3. Has your salary increased over the years?

1. No

2. Yes.

4.4. What would you state as the reason for this fact? .....

.....

.....

4.5. Does the remuneration system motivate you (workers) to improve your skills, effort and performance?

1. No

2. Sometimes

3. Yes (definitely)

4.6. How?.....

.....

.....

.....

APPENDIX 1 D

QUESTIONNAIRE FOR MEASURING PRODUCTIVITY AND PERFORMANCE[35]

VARIABLES YEAR

CAPITAL PRODUCTIVITY	1988	1990	1992	1994
1. Stock Turns and inventories \ yearly				
2. Throughput time (per unit)				
3. Value added time (per unit)				
4. Assembly lead time (per unit)				
5. Production time (per unit)				
6. Unplanned downtime (hourly)				
7. Rejects (per unit) %				
7.1. finished goods %				
7.2. processed raw material %				
8. Rework (per unit) %				
8.1. finished goods %				
8.2. processed raw material %				
9. Maximum number of Test Steps				
10. Work-In-Progress				
11. Total Factory ordering Lead times				

LABOUR PRODUCTIVITY	1988	1990	1992	1994
1. Turn over per employee (yearly)				
2. Average working hours (weekly)				
3. Working hours per unit (weekly)				
4. Maximum number of worker per unit				

35. This questionnaire was formulated to measure the level of productivity and performance in respective firms. Unfortunately both firms declined and with-held the relevant information. They regarded this information both as sensitive and confidential.

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