

UNIVERSITY OF STIRLING

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THE EFFECT OF THE INTRODUCTION OF NEW TECHNOLOGY
UPON FEMALE LABOUR IN THE RETAIL SECTOR

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TO MY PARENTS

ABSTRACT

The retail sector plays an important role in the economy. It contributes ten percent of G.D.P. and employs 1.87 million people, of whom sixty percent are female. The likely effect of new technology upon the nature and content of retail work is therefore of considerable importance.

The development of microelectronics has led to an increasing number of technological applications in the retail sector. Most of which are designed to increase output whilst reducing the level of human input. This could result in the substitution of capital for labour in a traditionally labour intensive industry. This expected substitution of labour in the retail sector reflects the experience of manufacturing and office work, where earlier technological applications have resulted in the alienation and distancing of the workforce. This experience was expected to be paralleled in the retail sector.

This study considers four separate but related issues concerning the introduction of new technology in the retail sector. Firstly, that technological applications change the nature and content of work. Secondly, that different groups react differently towards technology e.g. older women will be more resistant to change, as would less educated people or those lower in the organisational hierarchy. Thirdly, new technology affects job satisfaction, and lastly, that employment opportunities for women within retailing will also be

reduced with the introduction of technology. The research considers each objective in turn.

The actual experience of the retail workers was significantly different than had been expected or predicted from either factory or office work. The level of job satisfaction was increased and the high level of alienation that already existed in the industry was reduced through using new technology. The experience of the office and manufacturing sector was not mirrored in retail work. Supermarket workers actually welcomed the introduction of new technology. It reduced the boredom of performing repetitive tasks.

Contrary to original expectations, supermarket workers welcomed reduced personal contact with customers. They also expressed favourable opinions towards depersonalising the service further. This was in direct contradiction to the opinion expressed in the manufacturing and office sectors. The skill level as perceived by the workforce, was also found to increase with the introduction of new technology. No significant differences were found in opinions when data was further analysed by sex, age or occupation. The fourth objective could not be tested in the study, due to the lack of empirical data upon which to base analysis.

The study concludes that the introduction of new technology into the retail sector does change the nature and content of work. Although not as originally predicted from the literature.

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Chapter 1 Introduction

Major advances are being made in upgrading the electronic sophistication of retailing. The last decade has shown substantial substitution of capital for labour in this traditionally labour intensive industry. The daily business of the vast majority of retailers consists of very large numbers of specific transactions. The volume of these transactions plus their relatively routine nature suggests that this sector of industry may be well suited to the application of new computer based information processing technologies.

At the same time, the retail sector remains one in which people managed transactions and the role of personal relationships is frequently seen as the key feature of the customer-trader relationship. Retailing is a strongly people, not machine oriented industry. In the past many job losses in manufacturing have been absorbed into retailing and other services. The new computer based systems will affect both these features of the sector. It could enhance job satisfaction, as staff are released to improve inter-personal customer services. However, this might conflict with the search for improved productivity. There is little doubt that any move toward depersonalising the retail service could have major consequences for human relations within the industry, and also upon staff/management satisfaction.

1.1 Research Background

Given the importance of the role of the retail sector within the economy, it employs 1.87 million people and contributes 10% of GDP, a study of the changes that take place when computers are introduced into the retail outlet is an important area of research. It is generally assumed that staff and managers will welcome and accept the new technology. Inevitably, there are likely to be aspects of the innovatory equipment and selling techniques which are not as expected by staff and management. Determination and analysis of the differences between expectation and reality will provide valuable management information when new technology is introduced elsewhere. The author intends to examine the effect at three levels i.e. on three occupational groups. Firstly, upon branch managers, second line supervisors and lastly on sales clerks and shop assistants. Mainly because it is expected that the effects of the introduction of new technology will be different upon each group.

Managers make decisions and influence the course of their organisation. They have a certain amount of control over their work and they have some choice as to whether to use the new technology or not. They are also predominately male. Line Supervisors form the middle category of users who like higher organisational groups, exercise some control over their task content and work environment. Although they do not usually participate in the decision to automate a particular function. They are predominately female and represent the traditional channels of promotion for those sales assistants wishing to progress to management positions.

Sales assistants, most of whom are female, have little or no control over their work environment or task content. They have no option whether to use the new system or not and are not usually consulted concerning the introduction of technology. Their level of use is mandated. As a consequence if there are adverse consequences in using these systems, it is the shop assistants that may be expected to pay the cost. Furthermore, the vast majority of computer based information processors are aimed at routine shop functions, it is at this organisational level that the most resources are being applied and the greatest change is expected to occur. If there are unexpected consequences, then shop assistants, line supervisors and managers all have potential vulnerabilities.

This apparent conflict provides the starting point for this study, which attempts to answer two related sets of questions: Firstly, concerning the real impact on shop work that can be expected in the future with the introduction of new technology. Secondly, the specific impact of retail automation upon retail employees. It is generally assumed that staff and customers will welcome and accept the new technology. Inevitably there are likely to be aspects of the innovatory equipment and selling techniques which are not as expected by staff and management. As suggested earlier, determination of this discrepancy could prove invaluable to other outlets considering introducing technology.

1.2 Problem Statement

This research will investigate whether the introduction of computer-based information systems changes the quality of working life of certain retail workers. If changes do occur, the research will attempt to discover the nature and extent of the changes, the direction in which they occur and if any one group is affected more than any others.

1.3 The Significance of the Research

There is an extensive literature on this area, although it is largely didactic and lacking in systematic empirical investigation. It is wholly inadequate in offering any solutions to the problems posed by these developments.

By the term 'New Technology' the author is principally concerned with one example of computer based information processing equipment currently operating within the retail sector, i.e. computerised check-outs using scanners. The study is concerned with the retail grocery industry, particularly supermarkets, as this sector has a high degree of penetration by the new technologies and the majority of its employees are female. The research aims in this way to contribute to both the academic and practical aspects of technical innovation within a retail environment. Much has been written about the introduction of computers and their effects upon organisations and individuals. This thesis attempts to just more than add to the existing body of knowledge.

This research attempts to assess the effect that new technology will have upon the nature of work in the retail sector. This area is an area of significant research for two reasons. Firstly, because of the large number of females employed in the retail sector and secondly because, although this sector has undergone substantial institutional change over the years, the nature and content of the work has fundamentally remained unchanged.

The introduction of new technology is expected to radically alter the nature of work in the retail sector as machines increasingly are capable of performing the work previously done by individuals. Historically, retailing has absorbed workers displaced from other sectors if the introduction of new technology results in a reduction in employment opportunities in the retail sector then there may be serious repercussions felt throughout the entire economy, particularly for female employment. Similar effects could be realised on the skill levels of retail workers who may no longer be appropriate and who consequently may be displaced. These factors underlie the importance and significance of research topic in terms of its practical application.

The exact effects of technology upon retail work is as yet undetermined. Two alternative scenarios exist; one suggests a future where workers are freed from performing repetitive, manual and boring tasks, working in jobs that allow them to use their discretion, ability and initiative. Alternatively, technology may lead to unemployment or machine pacing of employees, increased management control and alienation.

The purpose of this research is to investigate the organisational and human implications of the introduction of new technology into a retail outlet. From which the author makes recommendations for job design, communication and decision making and employment levels. Implications for management policy will also be considered.

Much of the literature presents two alternative views of technological applications in retailing. The first is that technology can do new things or secondly, that it performs old functions both quicker and cheaper. This is essentially what is revolutionary about new technology i.e. where it differs significantly from previous technical developments.

The research considers only the effects that have taken place in the short run. But in subsequent analysis a more medium to longer term perspective of technological effects is developed. It is expected that in the long run the effects will be substantial.

1.4 Expected Results

By operationalising the research question into a research design, to generate empirical data and analytical results the author hopes to determine:

1. An understanding of what parameters of the retail environment change with the introduction of new technology and in what direction. Also the analysis will determine if computer use decreases the control that a shopworker has over his/her work.
2. Identify what key factors have a direct and those which have an indirect effect on determining the response towards new technology.
3. Observe if there is a differential impact of technology on different groups. To determine if females are affected differently from males, or if managers display a different attitude towards new technology than staff.

4. Determine if there is a mismatch between expectations surrounding the introduction of new technology and experience of it.
5. Gain sufficient understanding of the situation so that strategies to minimise the undesirable effects and to increase the desired effects can be recommended.

1.5 Overview of the Study

Chapter 2 examines the role of the retail sector in the British economy, highlighting its importance in terms of not only numbers employed but also its contribution to overall UK economic performance. This chapter is divided into two major sections. The first section examines the general operational environment of the grocery sector. The second section provides an analysis of female employment in the retail sector, the nature of work and the values and attitudes of those who work there. The general operating environment is considered in relation to the grocery sector. Discussion is also provided of general employment trends.

- Female Employment within the Retail Sector
- Effect of the Recession on Retail Employment
- Reasons for Working
- Importance of certain Job Aspects
- Job Satisfaction

Chapter Three presents a review of current literature regarding the effect of new technology upon the nature and content of work. Analogies are drawn with the manufacturing and office sector both in terms of industrial development and the introduction of technology and its effect on the workforce. This section also examines the nature of the technological revolution and the new equipment developments that are happening in the retail sector. These developments are shown against the background of institutional change in the retail sector. The effect that the introduction of new technology has had in the manufacturing and office sector is presented and parallels drawn with retail work which allows the author to hypothesise the expected effects that technology will have upon retail work.

Chapter Four extends the analysis of the preceding chapter to the statement of formal hypothesis for subsequent testing. A model is also developed of the expected technological effect upon retail work from significant other research that has been conducted in office and manufacturing work. The conceptual framework of the study is also developed.

Chapter Five outlines the research methods and design employed by the author to test the hypothesis identified earlier in the research setting. Not only does the author provide a discussion of the methods employed but also considers the reasons for doing so by comparison with alternative approaches. Results from preliminary work undertaken in the field are also given, providing a framework with which to consider subsequent findings. It also provides the justification for the chosen research approach and the steps taken in constructing a questionnaire.

Chapter Six details the results generated by the research work and the testing of the hypothesis. Systematic statistical analysis is performed on the data generated from the survey using non-parametric techniques. Specific use is made of the Statistical Packages for the Social Sciences (SPSSX). The observation study undertaken and details of management interviews are also given.

Chapter Seven considers the results generated in the preceding chapter with respect to the theoretical framework. Conclusions are reached in each of the specific research hypothesis and recommendations made for retail managers regarding the introduction of new technology in the light of the research findings. Conclusions are also drawn as to the appropriateness of the research objectives, research design and methods employed to generate the data. Lastly, recommendations are made for further study on the basis of the author's findings.

Chapter 2 The Retail Sector

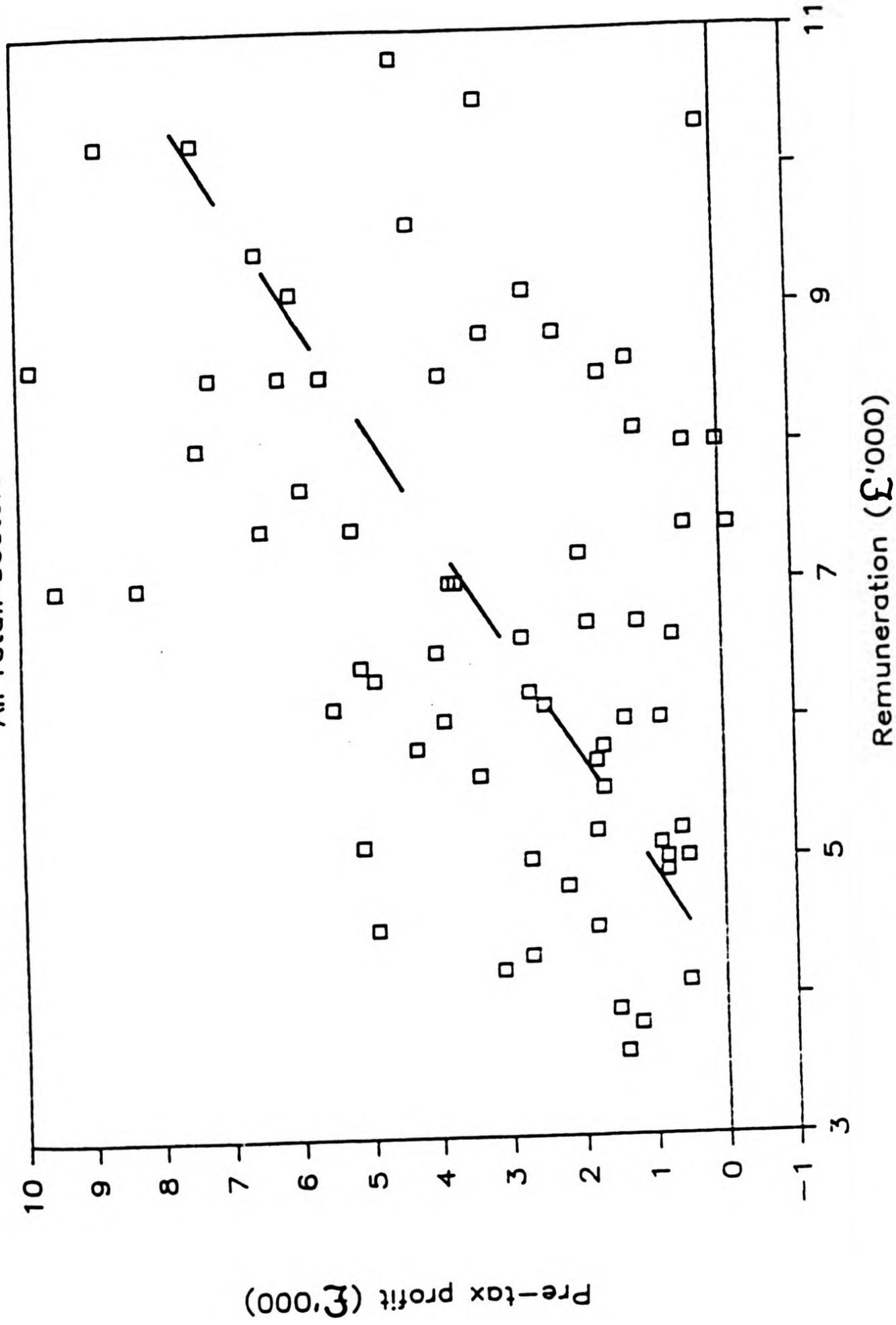
It is a sector

This chapter provides an overview of the UK supermarket industry. In terms of the number of outlets, turnover and numbers employed. The distributive trades sector provides over 10% of GDP and is a major employer, employing in 1980 2.7 million people. The retail trades themselves employ over 1.87 million. It is therefore of considerable importance to the economy as a whole. This chapter also examines the role of the retail sector in the British economy, highlighting its importance in terms of not only numbers employed but also its contribution to overall UK economic performance. Analysis is divided into 2 major sections: the first examines the general operating environment of the grocery sector. The second section provides an analysis of female employment in the retail sector, the nature of the work and the values and attitudes of those who work there. Specific issues examined in this section include a discussion of the reasons why women work, the importance that they attach to certain job aspects and the amount of satisfaction that they derive from their work. The effect of the economic recession upon female employment both generally and within the retail sector is also discussed.

2.1 The Operating Environment

The NEDO 1974 study of 57 companies defined the distributive trades as 'providing the market place which imputes value to goods and services'. (NEDO, 1974). Efficiency in buying and selling contributes to the smooth running of both the production and consumption process. The report concludes that

Diagram 2.1
 Productivity / estimated FTE employee
 All retail sectors



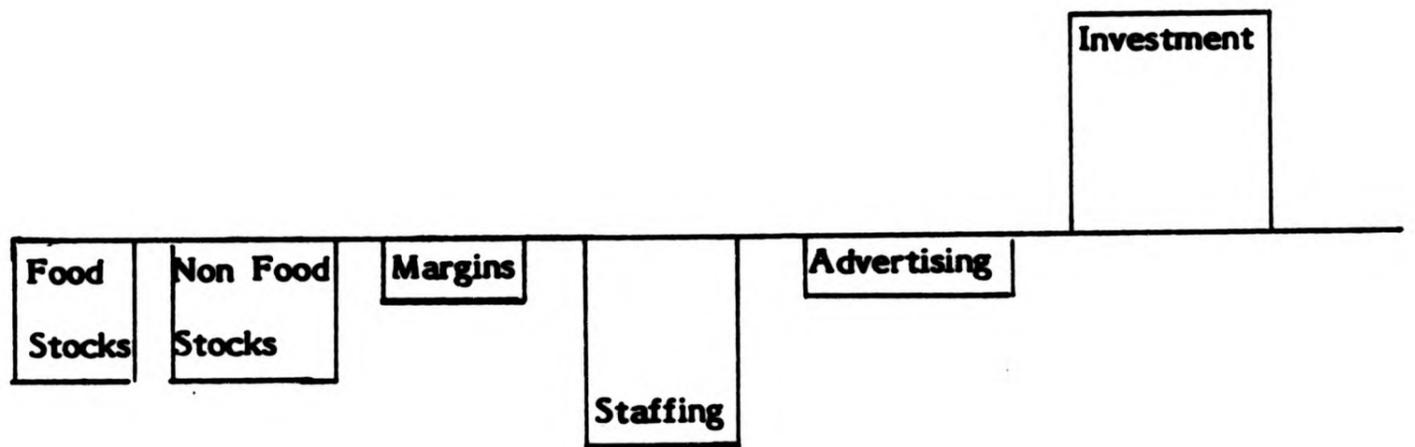
(Source: Clark, 1985)

distribution is one of the nations largest industries. As Moir (1982) notes in 1980 in the UK 230,000 businesses sold approximately £58,000m worth of goods through about 350,000 outlets. These outlets varied in size from 6 square metres to over 10,000 square metres selling space.

The current retail climate is one of static or declining volume sales, highly competitive pricing and rising costs leading to lower margins and a decline in profits. The rate of growth of retail sales has fallen in real terms over the past 10 to 15 years. Similarly there has been a reduction in the proportion of consumer spending on retail goods over a 10 year period. This decline in consumer demand has coincided with severe pressure on retail costs, where the main burden is on staff costs. Management Horizons (1985) estimate that British retailers spend approximately 40-60% of their operating income or gross profits on employees. People in retail outlets represent the largest single important cost. This is illustrated in Diagram 2.1 which highlights the low level of productivity generated by British retail employees. The strive by British retail management to increase productivity and improve efficiency has also had the effect that an increasing quantity of merchandise is sold by a decreasing number of people. A trend which could be exacerbated by any increased deployment of new technology, aimed at reducing human input in the retail sector.

The operating plan of any retailer can be illustrated as in Diagram 2.2. This figure highlights the high proportion of retail costs contributed by staffing as compared to other costs. A typical breakdown of operating costs of a UK supermarket retailer are labour 45%, property (rent, rates, etc) 30% and other 25%.

Diagram 2.2 Illustrative Retail Costs



(Source: Authors own Model)

At the present time wages are currently rising faster than sales. This is because the traditional low paid retail sector has been steadily improving its position relative to other industries. This situation is illustrated in Table 2.1.

Table 2.1 Average Weekly Earnings (1982)

	All	Retail Distribution
Men (21 & over)		
Manual	133.80	108.50
Non-Manual	178.90	134.40
Women (18 & over)		
Manual	80.10	72.70
Non-Manual	104.90	71.60

(Source : Mintel, 1983, pp. 104)

The figures given in Table 2.2 suggest that earnings are below average in retailing particularly in the non manual sector.

Table 2.2 Retail Earnings as % of Average

	%
Men	
Manual	81
Non-Manual	69
Women	
Manual	91
Non-Manual	68

(Source : Mintel, 1983, pp. 104)

Mintel note that average earnings for the whole of industry have gone up by 124.7% from 1972-1982, while those in the distributive trades have risen by 128.5%.

Rates of interest and energy costs have also had significant consequences for operating costs and profit levels. From their historic level of 3.5% in 1972/73 profits have fallen to 1.9% for 1979/80. The current average net margin is approximately 2.5% (Verdict, 1984). Operating within such a constrained environment retailers are continually searching for ways to reduce overheads or to increase efficiency. Computerised equipment provides such an opportunity. Clark (1985) suggests that as a consequence of this competitive pressure retailers have been forced to cut the input side of the labour productivity equation by reducing effective wage rates and by cutting staff. As a consequence the retail trades dominate the Wage Council structure, with poorly paid staff producing low results.

Nevertheless, retailing is one of Britain's largest and most successful industries. The recession and unemployment has hit every sector to some extent but retailing has sustained the effect better than most. Whereas the numbers of workers in employment fell by 7.4% from June 1978 to September 1981, the number in retailing fell by just 5.4%. Consequently, retailing's share of total employment has risen slightly in recent years. In September 1981, 1,770,500m people worked in shops. Rising unemployment elsewhere has increased retailing's national importance.

2.2 Grocery Sector Analysis

As within the retail trades generally, the number of grocers and supermarkets has been declining in recent years. This is illustrated in Table 2.3. This change is paralleled by increasing market dominance by multiples, who in the trend towards larger stores and greater efficiency, are increasingly able to realise significant economies of scale. The trend in British retailing is towards multiple trading at the expense of the independent and co-operative sector. Both these sectors have experienced significant market share reduction in recent years.

The multiple sector accounts for almost 73% of sales, in the UK grocery market with only 10% of the sectors' outlets. However, this 10% share of total outlets represents 53% of the industry selling space. Within the large multiples Sainsbury's, Tesco and Asda account for approximately 40% of the total market for packaged goods (Verdict 1984).

Table 2.3 Numbers of Supermarkets and Grocers

	Grocers and Supermarkets	Total Retail Outlets
	'000s	'000s
1950	143	548
1960	147	542
1970	105	473
1980	61	350
1983	56	340

(Source : Verdict, 1985)

Since 1978 total spending has grown by 10%. When adjusted for inflation, expenditure on food has risen by 1.2%. There has been a 'healthy' rate of growth in food expenditure due to the existence of non-foods, e.g. household cleaners, detergents, clothing, etc., lines being introduced into the supermarkets product mix whilst still retaining dominance in fast moving consumer goods. Table 2.4 provides an overview of the supermarket industry in the UK. The figures suggest that over 60% of outlets are 600 sq.ft. and less, with 80% less than 4000 sq.ft.

Table 2.5 provides an illustration of a typical grocery store operating on 1983 industry averages (Verdict, 1984). The figures underline the restrictive operating environment faced by the supermarket industry in comparison with other retailers. Overall the supermarket industry operates under tight constraints in both the operating and financial environment. The introduction of new technology presents the opportunity for management to gain greater control over the environment by reducing the level of physical input required by staff.

Table 2.4 Structure of Supermarket Retailing in the UK

Average Size	Nos of Outlets		Nos of Checkouts	Average Nos of Checkouts	Share of Sales
sq.ft.	n	%			%
600	22,400	62.0	26,880	1.2	15.0
1,600	8,400	23.0	19,320	2.3	14.5
4,100	3,300	9.0	14,850	4.5	18.0
8,300	1,600	4.0	13,760	8.6	20.5
23,300	600	2.0	11,700	19.5	23.0
	36,300	100.0			100.0

(Source : RMDP 1983)

Table 2.5 Typical Grocery Store Operating Averages

Turnover	£407,545
Gross Profit	£109,630
Net Profit	£ 10,189
Net Sales Area	1,415 sq.ft.
Turnover per sq.ft.	£290 p.a.

(Source : Verdict, 1984, pp. 21)

Table 2.6 GB Labour Force Population (Mid 1983)

	Males	Females	Total (millions)
Employees in employment			
- Full-Time	11.0	5.0	16.0
- Part-Time	0.7	4.0	4.7
- Self-Employed	1.7	0.5	2.2
Employed in Civilian Labour Force	13.4	9.5	22.9

(Social Trends, DOE, 1985)

Table 2.7 Labour Force Estimates by Sex

	Males	Females	Total (millions)
1971	15.6	9.3	24.9
1976	15.5	10.0	25.5
1979	15.6	10.4	26.0
1981	15.7	10.6	26.2
1983	15.5	10.7	26.2

(Source : Social Trends, DOE, 1985)

2.3 The Nature and Content of Retail Work

This section examines the number of women employed in retailing and the types of jobs they perform. It highlights the concentration of women into lower skilled and lower paid jobs within the retail sector and also demonstrates their expected vulnerability to new technology.

In order to isolate the effects that the new technology will have on female employment within retailing the OECD study of the 1974-75 recession is reviewed. From this analysis it is possible to predict the effects of the current recession on female labour generally and so separate those effects created by new technology specifically. The current economic climate is also considered. Discussion is provided of the reasons why women work, the level of job satisfaction and how important different aspects of their job are to female workers. From this data some idea of the values and attitudes that women workers hold can be generated and the likely consequence of new technology on those particular values. From this it is possible to predict how behaviour may be subsequently be affected.

2.3.1 General Employment Trends

The composition of the British workforce is given in Table 2.6. In total men comprise 59% of the GB labour force and women 41%. The total labour force increased by 1.3 million between 1971-83, mainly due to the increased participation rates of women whose participation rate rose by almost 1.5 million from 1971 to 1983. These figures are given in Table 2.7. Over the same period the male participation rate fell. This decline in male activity rates was particularly severe in the older groups but the decline has been compensated to some extent by increases in those entering the labour market.

The total numbers of employees in employment in the UK increased by just over 1 million between 1971-1979 and then decreased over the next 4 years. Between 1971 and 1983 the total number of manufacturing employees fell by 2.5 million (30%). The numbers in metal goods, engineering and vehicle industries fell by 22% and the number in construction decreased by 19%. In the service industries employment expanded by 2 million between 1971-79, but fell slightly between 1979-83. Although in banking, finance, insurance, business services the number employed increased by 10% between 1979 and 1983. Of this total figure, women accounted for 44% of all employees in employment in June 1983. The proportion ranged from 12% in construction to 63% in other services.

2.3.2 Female Employment Within the Retail Sector

One of the most significant trends evidenced over the past 20 years has been the increase in the number of women seeking employment. The majority of women have found employment in the tertiary sector of the economy and in non manual occupations.

Wernke suggests (1983) that as women have entered the market certain activities 'have become increasingly feminised' (Wernke, 1983 pp.99). Women are concentrated in a limited range of occupations and are most likely to be found working in relatively less skilled and lower paying jobs than their male counterparts.

A NEDO estimate shows that retailing accounts for 6% of the total full time workforce and 15% of low paid full time employees (EDC, 1974). More female part time workers are employed in shops than are full time and part time men together. Altogether, women of whom just under half are part time, comprise 2 in every 3 shopworkers in the UK. Female involvement in retailing is so large that on its own shopwork accounts for one in every nine jobs occupied by a woman. (Low Pay Unit, 1978) Table 2.8 outlines the number of employees within the retail sector.

Retailing has traditionally drawn on large numbers of married women, taking advantage of a cheap and increasingly plentiful supply of labour. Married women have been attracted by the relatively flexible nature of the work. Much shopwork is part time and high staff turnover allows a greater degree of employee mobility than could normally be expected without fear of permanent exclusion from the labour market. (Low Pay Unit, 1978).

Retailing distribution is one of Britain's largest and most successful industries. The recession and unemployment have hit every industry to some extent but retailing has fared better than most. Whereas the number of workers in employment fell by 7.4% from June 1978 to September 1981, the number in retailing fell by only 5.4%. As a result retail distributions share of total employment has risen slightly in recent years. Rising unemployment in other sectors has increased retailings' national economic importance.

Despite the rise in the number unemployed in recent years within retailing, the overall picture has changed little since 1974.

'...one of increased turnover and volume sales conducted through a declining number of retail establishments with a labour force virtually static in size'. (CIR, 1974, pp 22).

Table 2.8 Number and Proportion of Employees in Retail Distribution

	'000	As % of All Retail Employees
Men	601.3	34.0
Women	1169.2	66.0
Women (part-time)	639.1	36.1
All	1770.5	

(Source : Employment Gazette, 1982)

Table 2.9 % of Female Workers by Retail Occupation

Category	Females Within Category %
Managers	13
Supervisors	65
Professional & Technical	61
Sales	80
Clerical	97
Trainees	21
Other	40

(Source : Sparks, 1983)

Yet despite the predominance of female employees within the retail sector, this is not reflected in their share of the better paid managerial and supervisory positions. The distributive trades EDC reports that opportunities for women in managerial posts were limited and unlikely to increase in excess of their existing share. This finding was reinforced by Sparks (1983) in a recent survey of female employment within 71 retail outlets. He found that out of a sample of 230 employees, female workers accounted for 71% of total staff. The survey also revealed that females comprised almost 80% of sales staff and yet less than 14% of managers. The % of females within in each category is given in Table 2.9.

Although women constitute 65% of the supervisory category this is as a result of their concentration in the position of sales supervisor. Their under-representation in the managerial and trainee sectors constitutes a greater threat, according to Sparks (1983), particularly to those women wishing to make a career in retailing. Wernke (1983) suggests that this concentration, which is evidenced in all sectors, will have serious implications for where the 'incidence of adjustment to new technology' will fall. Later analysis demonstrates that new technology has the ability to make direct labour savings and will almost certainly change the skills required by retail workers.

2.3.3 Effect of the Recession on Retail Employment

The 1976 OECD report on the 1974-75 recession and the employment of women contains an analysis of the pattern of labour market experience of women during the previous recession in 16 countries. The study shows the levels of and changes for both sexes in the unemployment rate (U) employment and labour force participation. A number of important findings emerged.

Firstly, before the recession the U rate was higher for women in all but 2 countries. If the change in the rate of U is used as an indicator of the impact of the recession on womens' employment, it appears that in most countries the U situation of women deteriorated less than that of men with the recession. Secondly, 12 of the countries experienced an absolute decline in the number of males employed, while female employment declined in only 5 countries.

One general conclusion is that during the recession the employment opportunities for women were less severely affected when compared to the changing employment vacancies for men. Short term changes in the labour force participation rate are related to the business cycle, with demand for labour the important influence. Therefore as the economy goes into a recession the participation rate will decline and rise again with the recovery period. The survey data does not cover the up swing. The short term change is therefore likely to be a drop in the rate for certain groups e.g. women whose rates has been increasing over the decade. In 10 of the 15 countries the participation rate for men declined part of the long term trend. In the other countries the rate either remained stable or increased. For women the reverse was true, i.e. the recession actually forced more females on to the labour market. However, downswings tend to be more severe in manufacturing and construction than in the service industries. Since the majority of women are concentrated in the service sector their overall employment will be less affected during a recession.

The study suggested that working women were not as badly affected by the recession as men. Female U rates increased by 3.3%. Male U rates rose by 3.9%. Female employment increased by 925,000, whilst male employment decreased by 1,111,000. Similarly, female labour participation rates rose by 1.3% whilst male labour participation rates decreased by 1.5%. As suggested earlier these figures reflect a long term trend i.e. declining male labour force (due to early retirements) and rising female participation. Also analysed was the 'potential' labour (i.e. employment if the recession had not occurred) over the period of the recession and compared with the 'actual' labour force data. The difference between the potential and the actual labour force is a measure of discouraged workers. The study suggested that as a direct result of the recession, discouraged female workers increased by 431,000 and the number of males by 458,000. As the female labour force is smaller (2/3 of the male force) this represents a larger proportion of females. Also estimated was the 'labour loss' (unemployment + discouraged workers) due to the recession. It shows that the impact of the recession is larger for both sexes than the changes in the unemployment rate suggests, i.e. that there is considerable hidden unemployment. The potential estimates for female employment were a rise of 2.5 million and a rise in male employment by 1.5 million. The actual rise during the recession was about 1 million for females and a decline of about 1 million for males.

Although in most OECD countries female share of employment increased, in real life women were more adversely affected than men. Since the recession interrupted the strong underlying trend in labour force growth. The various sectors of the economy are unevenly affected during a recession. Since women are heavily represented in retail services (48%) and other services (58%), they are therefore relatively isolated from recessionary impact.

The importance of the service sector to the employment of women in the 13 OECD countries was also demonstrated in the study. It also estimated what the male/female changes in employment would have been if the recession had affected the major sectors equally. In most countries, female employment had been increasing faster than for men. Due to a number of factors, including structural changes in the supply of labour and the changing distribution of sectoral demand for labour. This long term trend is likely to continue into the short period of the recession, therefore it was not surprising that during the recession female employment increased faster than men. In addition, females did not fall away from their pre-recessionary growth as did men, due partly to the demand pull for labour in the service sector. The fact that the recession hit industry harder had adverse effects on male employment, similarly female employment was less affected given that they are less likely to work in industry, and also because of the strength of demand in the service sector, where most females are employed.

By comparing the recession of 1974-75 with that of the current period it is possible to conclude that the economic situation outlined earlier will affect female employment in the following way:

1. Those who remain employed will have lower wage increases than in more prosperous periods.
2. Hours worked per week will have been reduced.
3. Opportunities for job changes may have been restricted.

The major effect of the recession is to slow down the growth of female employment in those industries in which they are traditionally under represented, thereby restricting career opportunities. When compared with their favourable experience in the service sector this may have reduced the incentive for women to enter industry, the recession in fact slowed down labour force growth. Nevertheless, in those sectors of the economy where the demand for labour remained strong, employment of women expanded.

The structure of demand in the post recessionary period will also affect the rate of future labour force growth of females. The OECD believed that there would be a major shift in the structure of demand towards services, which would result in an expansion of employment opportunities for women. This appears to have been the case, except the expansion of female employment in this sector has not been accompanied by increased career opportunities. As in industry, women tend to be concentrated in the lower skill occupations i.e. those with little chance of career progression, males tend to occupy the higher managerial positions.

The study has important implications for the UK situation, if the direct comparison between the OECD labour situation is legitimate. The sectoral analysis is of particular relevance given the fact that a later study by Harris & Taylor (1978) of the UK service sector reached many similar conclusions. However, this later study stressed that service employment growth is largely attributable to a major trend towards part time female employment, a factor neglected by the OECD study. In addition Harris & Taylor (op.cit) suggest that much of the service sector is amenable to productivity improvements as occurred in manufacturing, and it is unlikely that its output will grow fast enough to outstrip labour saving influences.

Current data suggests that over the period 1978-83 retail employment has fallen by approximately 3%. Sparks (1984) has highlighted the changes in employment levels by type of employee. Although both male and female full time employment decreased, female part time employment increased by 1.5%. Furthermore, full time female employment has fallen by 11% since 1981. Sparks (1984) suggests that the retailers response to the current recession has been to increase part time employment at the expense of full time work.

2.3.4 Conclusions

The main finding that emerges from a comparison of the 2 economic periods is that whilst in 1973-74 women were relatively sheltered from recessionary impact, through the absorption of excess labour in the services sector, the current operating environment affords no such opportunities. Indeed, as suggested above the service sector itself is undergoing major organisational change which will ultimately result in, if not direct labour savings, then certainly an increase in output without any additional labour employed. This may have severe implications for future female employment, particularly since the OECD expects the future upward trend in the supply of female labour to continue. Both the CIR and the Distributive Trades EDC agree that the economic situation has deteriorated since 1974 and the numbers unemployed have increased dramatically. They suggest that within the retail sector 'the overall picture is

'one of increased turnover and volume of sales conducted through a declining number of retail establishments with a labour force virtually static in size'. (CIR, 1974).

This last point is reinforced by Harris & Taylor (op.cit) who suggest limited prospects for future growth in services, believing it to be at or at least near its labour saturation point.

The findings from the OECD study suggest that the future for female employment within the services sector is not as promising as the earlier analysis would suggest. The present situation is further compounded by an expanding labour force and already historically high levels of unemployment. The introduction of new technology into this already restricted environment with its ability to save not only labour input but also to increase the productivity of the labour that remains will restrict employment opportunities further.

2.4 Attitudes and Values of Female Workers

Much of the discussion of employees attitudes and behaviour takes place in Chapter 3, where a detailed analysis of the literature is undertaken. This section provides a discussion of a recent report concerned with the lifetime perspective of women workers. The particular aspects of the survey considered in this chapter are firstly, the major reasons of why women work, secondly, the importance that female workers attach to specific job attributes and the level of job satisfaction that female workers derive from work.

In the survey analysis was undertaken by life cycle stage, whether the respondent was a full time or a part time worker and also by occupation. This survey is particularly important for the authors own work since a similar exercise had been undertaken. The author's own study was concerned primarily with one occupational sector i.e. supermarket workers, whilst Martin & Roberts (1984) survey examined the occupational spectrum.

2.4.1 Reasons for Working

The survey constructed 5588 'life histories' of working women, in all occupations, economic categories and marital status. Martin & Roberts' original expectations, which was subsequently validated by their research, was that female consciousness as workers would differ from mens. Female awareness was found not only to be a function of differences in the role towards paid employment, but was also closely related to the respondents stage in their life cycle.

One overriding conclusion from the survey was that financial considerations were the prime motivator for most females working, although some differences were found depending on the workers position in her current life cycle. Full time workers were more likely than part time workers to be working for basic essentials; 47% of full time workers had high financial dependence, 19% had low. For part time workers this finding was reversed, with 21% and 44% respectively. Similarly the study suggested that non married women were more likely than married women to be working for 'essentials' or to have a 'high financial dependence on work'. The study found that this was particularly true of married women with children.

In order to determine the prime reason for working Martin & Roberts conducted a pilot study. By employing this approach the authors' were able to compare financial reasons with other reasons for working, e.g. social contact. In the main survey the most frequent mentioned response to the question 'why working?', was the 'need to earn money', and 'to earn money for extras', both with 47%. The second most important reason given was the 'company of other people', (44%) and 'to earn money of my own', (37%). Significant other differences did emerge in the responses given by both full time and part time workers. Proportionately more part time workers considered 'to earn money to buy extras' a more important reason than full time workers, 28% as opposed to 13%. Conversely, 41% of full time workers' main reason was for 'essentials' as compared to 28% for part time workers. Career reasons were also more important to full time workers 7% as opposed to 2% for part timers.

Differences were also found in the responses generated depending on the respondents life cycle stage. Married women were less likely to be working for basic essentials than non married women, conversely non married women with dependent or grown up children were most likely to say they were working for basic essentials.

Women in semi skilled or unskilled jobs were more likely to be working for essentials than those in other occupational groups. Similarly, more full time than part time workers were likely to be working for money to buy essentials. In considering non financial reasons for working, women in the semi skilled factory and unskilled jobs, were less likely to give this as their main reason for working than were other occupations. Martin & Roberts highlight the significance that the 3 occupations with the highest proportion of women giving 'enjoy working' as their main reason are also the 3 highest paid occupational groups for women. Likewise the authors' suggest that the proportion of women replying that they worked 'to earn money to buy extras' tended to rise as the occupational level of the job fell. Significantly, the data generated from the study suggested that women who worked mainly for enjoyment were least likely to have a high financial dependence on their earnings.

2.4.2 Importance of Certain Job Aspects

Martin & Roberts also examined the non financial attractions of working. Using an estimate of the 'intrinsic' level of work, respondents were asked how important they considered certain statements related to work. No difference was found in the intrinsic value of work as measured between full time and part time workers. Significant differences were found however depending on the respondents position in their life cycle. Women working full time with pre school children tended not to find work attractive. Conversely, a high proportion of women in higher level non manual occupations experienced greater intrinsic satisfaction than women working in semi skilled factory work.

From their pilot study Martin & Roberts had constructed a list of 8 different aspects that women workers felt important about their work. This data is given in Table 2.10. Both full and part time workers ranked the most important aspect of their work as 'work you like doing'.

The second most important was considered to be 'friendly people to work with'. The least important was 'good prospects'. Part time workers rated 'convenient hours of work' as equally most important. Full time workers ranked 'a good rate of pay' and 'a secure job' of equal importance with 'friendly people to work with', whereas part time workers considered both former reasons of lesser importance. Intrinsic factors were ranked less important than other factors by both groups, although they were considered of greater priority to full time workers than to part timers. The variation towards different work aspects that Martin & Roberts detected among different life cycle respondents, they believed to be mostly attributable to whether the women was a part time or full time worker.

The study concluded that women for whom the main reason for working was that they enjoyed work or wanted to follow a career, attached more importance than other groups to the intrinsic features of a job, e.g. 'work you like doing' and 'the opportunity to use your abilities'. Conversely, women whose prime motivation was financial generally considered a 'good rate of pay' more important than average. Martin & Roberts further suggest that women who were working for financial reasons considered 'work you like doing' as important an aspect in choosing a job as 'a good rate of pay'.

Table 2.10 Workers' Rating on Eight Different Job Aspects

Aspect of Job	Full Time		Part Time		All Working Women	
	% Rating as Essential or Very Important	Average Importance Rating*	% Rating as Essential or Very Important	Average Importance Rating*	% Rating as Essential or Very Important	Average Importance Rating*
Work you like doing	93%	1.6	88%	1.8	91%	1.7
The opportunity to use your abilities	78%	2.0	62%	2.3	71%	2.1
Good prospects	58%	2.4	37%	2.8	49%	2.6
A good rate of pay	79%	1.9	68%	2.2	74%	2.0
A secure job	83%	1.9	68%	2.2	76%	2.0
Friendly people to work with	85%	1.9	88%	1.9	86%	1.9
Convenient hours of work	65%	2.2	88%	1.8	75%	2.1
An easy journey to work	53%	2.4	66%	2.2	59%	2.3
Base	1,877	1,877	1,477	1,477	3,354	3,354

* = essential, 2 = very important, 3 = fairly important, 4 = not very important

Source : Martin & Roberts, 1984)

2.4.3 Job Satisfaction

The study also considered the level of job satisfaction that women workers experienced from their work. The level of job satisfaction was analysed by both life cycle positioning and also by hours worked, but additional analysis was undertaken by occupation. Respondents were questioned with respect to 8 different aspects of their present job and asked to rate their level of job satisfaction with each aspect on a 4 point scale.

Overall, an analysis of the average satisfaction rating data suggests that workers, both full and part time, were generally satisfied with their work. The lowest average value rating was 1.5, indicating high levels of job satisfaction, whilst the highest value given was 2.2 suggesting very low level of dissatisfaction. The aspects of work that people found most satisfactory were 'the people you work with' and 'the hours of work', both with 91%. Although part time workers were most satisfied with the hours of work than full time workers. The data generated on the issue of job satisfaction was compared with how important the workers had considered each of these different job aspects.

A direct comparison of results was not possible due to the differences in the measurement scale. However, the relative ordering of the different aspects is comparable. Overall the data suggests a positive correlation between importance and satisfaction ratings, i.e. the most important aspects tended to be rated as the most satisfactory and vice versa. For full time workers the largest divergence between satisfaction and importance ratings related to pay. This was considered an important aspect of work for full time workers, most of whom were not satisfied with the rate of pay that they received for their job. To part time workers this was less important than other factors, therefore, this group was more satisfied with pay.

A significant finding that did emerge from the study was that the priorities of part time workers are different from those of full time workers. The study attributed this factor to domestic constraints upon part time workers.

Martin & Roberts asked respondents to rate their level of job satisfaction with their job overall. The level of satisfaction among the working women in the sample was high. 55% were 'very satisfied' with their job and 36% were 'fairly satisfied', only 9% or 300 respondents expressed dissatisfaction with their job. Little difference was found between part time and full time workers.

Analysis was also undertaken on how the level of job satisfaction varied by both occupation and life cycle position. Little difference was detected between job satisfaction and life cycle position for part time and full time workers. The data suggested that job satisfaction increases with age. Martin & Roberts believe that older women may have had the opportunity to find a job that they liked, they may have changed their job expectations or they may have adapted to their job over time. This finding was reinforced by the results of this study. Women with pre-school children were slightly more likely to be satisfied with their job than women with older children. Martin & Roberts considered this to be a function of the differences in the type of women who work when their children are young - as was illustrated earlier, i.e. the differences in those who are working for financial necessity and those who value the intrinsic aspects of work. Analysis was also undertaken of the level of job satisfaction by occupation. The data suggested that levels of satisfaction vary by occupation, but no consistent relationship was found.

Similar comparisons between full time workers and part time workers revealed no 'significant' difference. The results also suggests that women who said they were working because they enjoyed work were mostly likely to be satisfied. Whereas those whose prime reasons for working was to get money for essentials were least likely to be satisfied with their job.

Variations in the level of stress experienced by the workers and how stress factors changed with the level of job satisfaction was also investigated. The data suggests that among working women there is a tendency for the level of stress to increase as overall job satisfaction decreases. Full time workers were more likely to report difficulty in coping with the demands of a job. Part time workers were more likely to have high stress scores, than full time workers with comparable levels of coping ability.

2.4.4 Discussion and Implications of Findings

The findings generated by Martin & Roberts' study are of great significance for this study. An understanding of the values and attitudes that women workers hold both towards their job and general social issues, plays an important part in understanding or predicting responses towards the introduction of new technology into the workplace. The study revealed that women workers, both full time and part time, value the intrinsic aspects of work, almost as much as the extrinsic aspects. Significant differences in values and attitudes are also revealed between occupations and life cycle positions. The data suggests that many factors influence job expectations and adaptations. The main reason for working were also discussed in relation to how they relate to current levels of job satisfaction. Similarly how important different job aspects were to different individuals was also discussed.

The study allows a fuller understanding of the different job aspects that female workers value and how important these particular aspects are ranked by workers in relation to job satisfaction. The main reasons for working are also investigated.

By relating the findings of the Martin & Roberts study to the current retail situation, it is possible to generate an understanding of the attitudes and motivations of the retail workforce. In later chapters this analysis is extended to a prediction of behaviour towards new technology or the likely effect that new technology will have upon job satisfaction or motivation.

For most workers the prime motivation for working are financial considerations, particularly for full time workers. The second most important reason for working was 'the company of other people'. Career reasons were more important for full time workers than for part timers. The reliance upon the financial rewards of work creates a dependency in the work force. Most cannot afford to give up their job should they wish to leave with the introduction of new technology. Similarly, by placing a high value on the importance of fellow worker and the social aspects of work, this is one aspect of work of workers satisfaction that may be reduced with the introduction of new technology. The importance of 'career reasons' for full time workers also generated cause for concern, particularly since subsequent research on the effects of new technology suggests that traditional career paths or channels of promotion will be restricted for female employees.

The importance of work to the semi skilled or unskilled workers for financial reasons increases the dependency of female workers upon their work and the indications that any move towards reduced work hours or reduction in numbers employed creates a potential area of conflict for this group. This is made all the more serious since this is the group that make up the majority of the retail work force.

In terms of the aspects of work that workers found important were 'work you like doing'. This held for both full time and part time workers. The second most important aspect was considered to be 'friendly people to work with', the least important aspect was 'good prospects'. The data would suggest that female workers do not value the career aspects of work, therefore if the traditional channels of promotion were to be restricted with the introduction of new technology, it is possible that the female workforce may not feel as disadvantaged as with changes in other job aspects. The high degree of correlation that existed between job aspects that workers considered important and how these particular aspects were related to job satisfaction, suggests that should the job aspects that workers consider important be changed then the level of job satisfaction of that particular worker will also be changed. Earlier analysis of employment trends in the retail sector identified a predominately part time labour force. Martin & Roberts' research suggests that such a workforce would not be entirely motivated by financial considerations, but that they would also place considerable importance upon the intrinsic aspects of work.

The supermarket industry is characterised by a relatively young workforce.

If, as the study suggests, job satisfaction increases with age then it is expected that the current level of job satisfaction would be low. Although to attribute this level of satisfaction to age alone would be simplistic. A variety of other factors such as job interest, social interaction and reasons for working are all important.

Nevertheless the study provides a useful backdrop upon which to analyse subsequent research.

Chapter 3 Literature Review

This Chapter examines the nature of new technology and then considers the effect that it is expected to have upon manufacturing and service employment, in terms of both the numbers employed and the content of work. The first section deals with the effect of new technology on the number and types of jobs likely to be affected. The second section considers the effect on the nature and content of work.

Given the small number of similar studies in this field, consideration is given mainly to manufacturing and office employment with similarities and parallels drawn with retail work. Specific hypothesis are generated for further study.

3.1 Technological Change

The development of the retail sector throughout the twentieth century mirrors the changing social, economic and political infrastructure of society. This changing infrastructure of the UK is best considered by using Freemans analysis of "Heartland Technologies" i.e. technologies which have an impact over the entire system. Within this analysis three distinct periods can be determined, with turning points at about 1930 and 1970.

The "Heartland Technologies" identified are:

1. Steam Power
2. Electricity
3. Micro-Electronics

All of which may act as take-off points for growth.

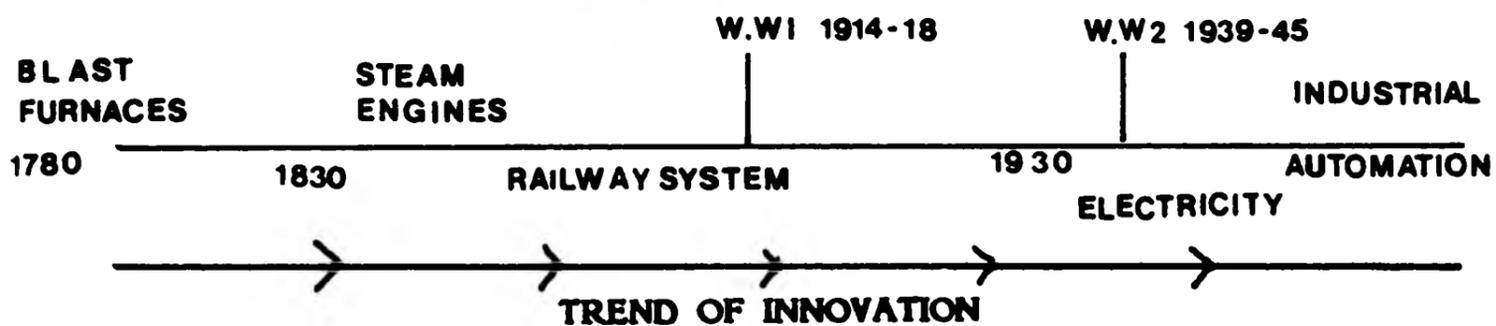
After the massive growth of the industrial revolution precipitated by the introduction of steam power, which resulted in mechanisation and the rationalisation of the production process, the rate of structural change slowed down. This was the result of the disadvantages of an early start, dependence on a narrow range of ageing, staple industries at the expense of new ones and a social and educational system which discouraged professional or better educated people from entering industry. There was also foreign investment at the expense of domestic funding and increasing international competition. The great structural change which was caused by steam power transferred resources from agriculture to industry was completed by the start of the twentieth century - thereafter the service sector grew at the expense of industry.

Historically the introduction of new technologies have brought change to a stagnant economy and led to the growth of new industries and an expansion in the general educational base, with increasing emphasis on science and technology. All of this resulted in the vigorous growth of export industries with a new resurgence in trade. This new found prosperity lasted until the mid-1960's when Britain's competitive advantage had been completely eroded. Since that time our position has changed, so that the economy is not now stagnant, but has gone into decline.

The advent of micro-electronics has allowed new opportunities for British industry and is particularly relevant in a society increasingly conscious of conserving energy and reducing costs. Micro-electronics provides the capacity to process and store information, critical to advanced industrial processes, at incredibly low cost. The way in which this new "Information Revolution" is expected to have a similar impact on society as the Industrial Revolution of the Nineteenth century is discussed in section 3.2 below.

These developments, whilst presented as distinct should be considered as operating upon a continuum. With each innovation dependent upon the last and developed as a direct response to earlier situations. Each with equal importance in changing the UK infrastructure. See Diagram 3.1

Diagram 3.1 **The Historical Development of Innovations**



This diagram illustrates the historical development of technological applications to industry, with specific years as landmarks showing how one development leads into another. The development of the retail sector must be seen in the context of responses to this changing environment. Changes that have been accompanied by continually rising standards of living, increasing population, mobility and life expectancy. The resulting effects of these developments on both the manufacturing and office sector is discussed later, in terms of the change in numbers employed, the nature of work and organisational structure. In employment terms each phase has been accompanied by an increased fragmentation of task and reduction in skill. Freeman's method of analysis highlights the importance of technology, not only in changing production or process techniques but also in terms of the wider implications for the social environment.

Through the application of technology the manufacturing base in the UK extended outwards to a wide variety of different products and processes. Until reaching maturity and then entering decline with existing products and processes. The introduction of microprocessors and related products affords new industrial opportunities and an extended life cycle.

The office sector has similarly expanded. The advent of microelectronics has led to a situation where technology is now cheaper and more efficient than its human counterparts. This analysis can be extended to assess the impact of wider environmental pressure in initiating change within the retail sector. See Diagram 3.2 over.

The diagram illustrates a variety of outlets which are part of a wider distribution system. Operations are totally dependent on the communication and distribution chain behind them, a process that starts at the point of manufacture.

Gillespie and Hecht (1977), trace the historical development of retailing through:

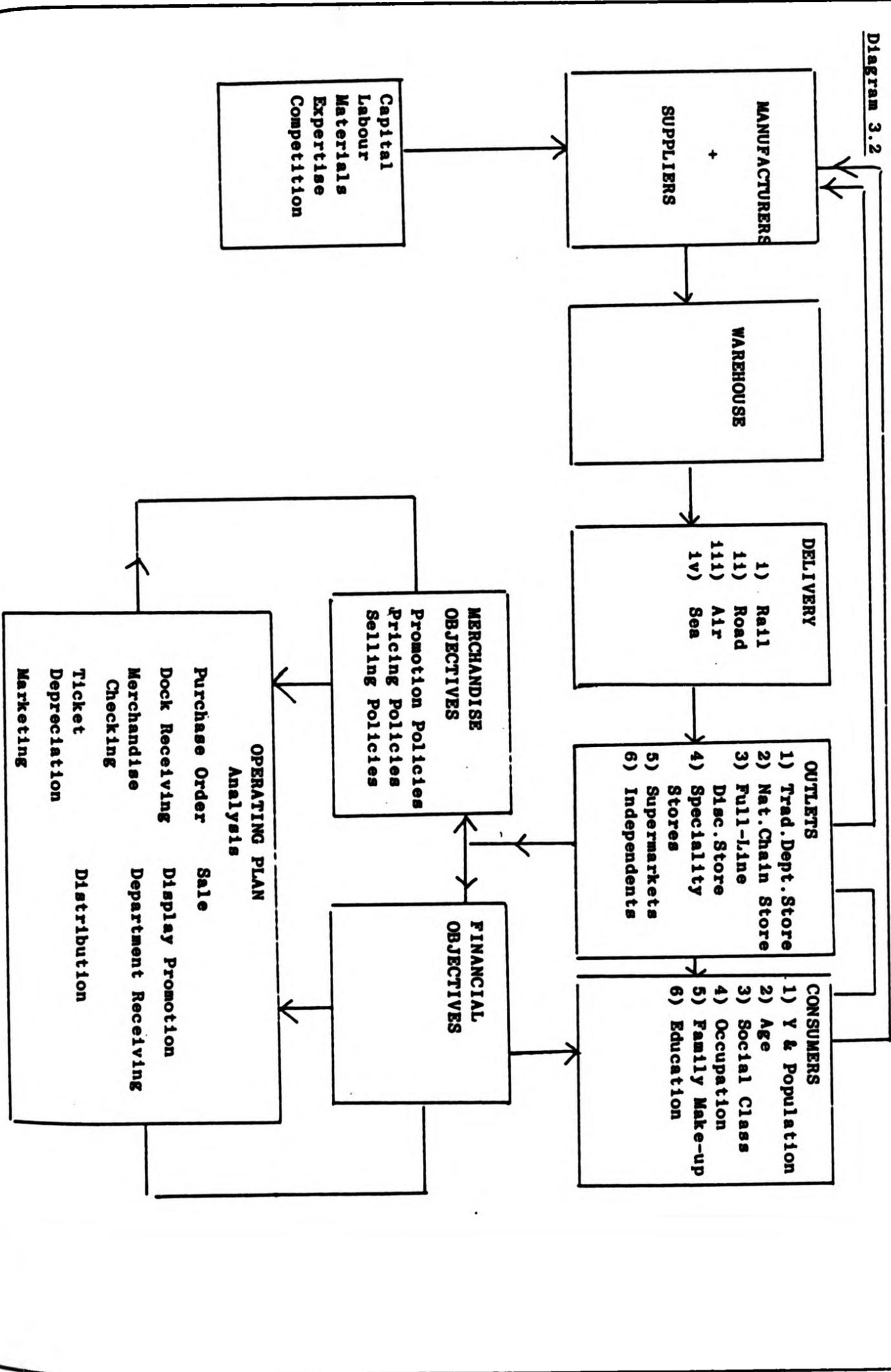
- (a) Bartering/Trade
- (b) General Stores
- (c) Department Stores
- (d) Secondary Shopping Areas
- (e) Discount Stores
- (f) Suburban Shopping Centres

Diagram 3.3 provides a visual illustration of this development.

Diagram 3.4 parallels a similar historical progression in the manufacturing sector.

These developments should not be considered as distinct but rather as parallel. All related and interconnected with each other. The development of technology presents the opportunity to develop new products and processes that were not physically possible or economically practical before. As the manufacturing sector evolves with new products and processes, so must distribution channels adjust to meet changing elements of demand and supply. Likewise, the manufacturing sector must take account of consumer preferences and desires. As a consequence these developments can be of both a "consumer

Diagram 3.2



The principal analytical tool to explain the development of retailing is the "Wheel of Retailing" concept of McNair, (1978).

Current thought (McNair, May, Hirschman, Stampfl) suggests changes in retailing are primarily the consequence of competitive innovation based on opportunities arising from changing economic, technological and social conditions and by consumer reaction to these developments. This situation is best illustrated through consideration of Diagram 3.2 and 3.3 which show all the competing influences that are involved in retail development. Essentially, eight important but distinct influences can be identified in initiating the change process, (McNair & May, 1978), most of which compliment those already suggested in Diagram 3.3. These are:

1. Evolution from small stores to large scale operations.
2. Shift from product specialisation to product heterogeneity.
3. The existence of an indirect relationship between retail changes and economic, technological, demographic and social changes.
4. Acceleration of socio-economic change and the shortening of the life cycle of different retail businesses.
5. The rise of mass distribution.
6. The importance of the consumer in influencing retail change.
7. Technological change directly leading to retail change.
8. The re-emergence of the speciality shop.

There is an alternative method of analysis developed by Davidson, Bates & Bass, (1976) which is perhaps more useful in considering retail developments. The "Institutional Life Cycle" concept is an extension of the "Wheel of Retailing". In this analysis, just as different manufacturing processes follow a cycle from introduction through progression leading to maturity and ultimately decline, as other products and processes are taking their place - so does the retail sector. The Life Cycle concept is illustrated in Diagram 3.5.

Diagram 3.3 Retail Development

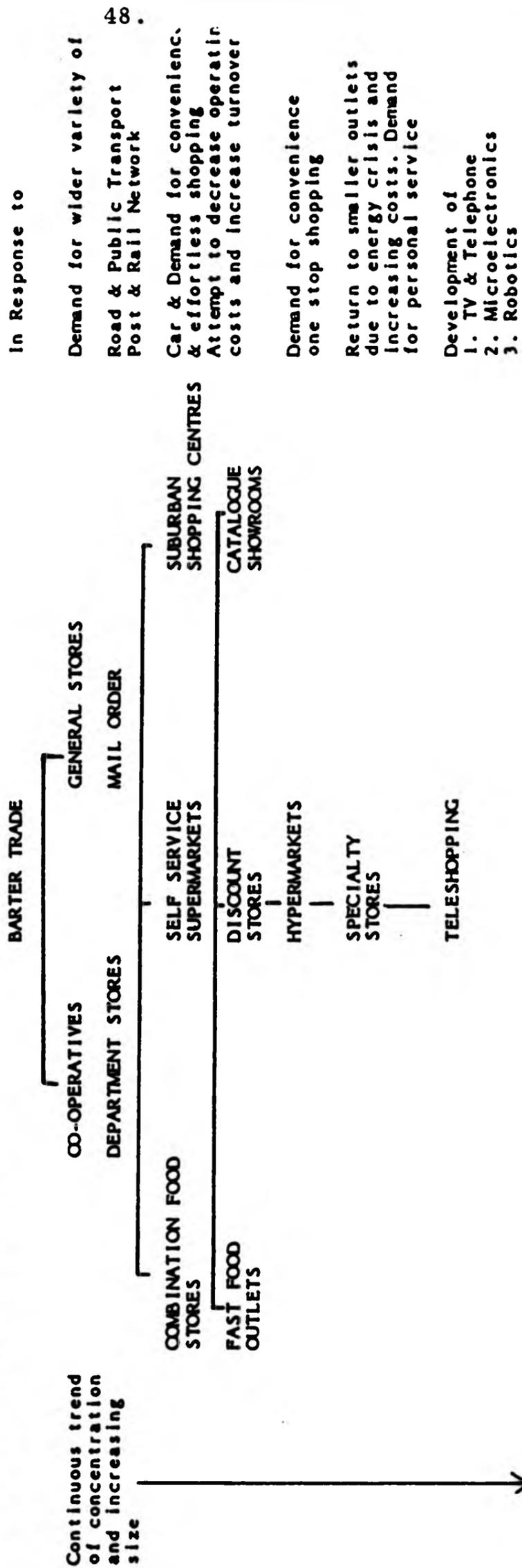


Diagram 3.4 Technological Developments in Manufacturing

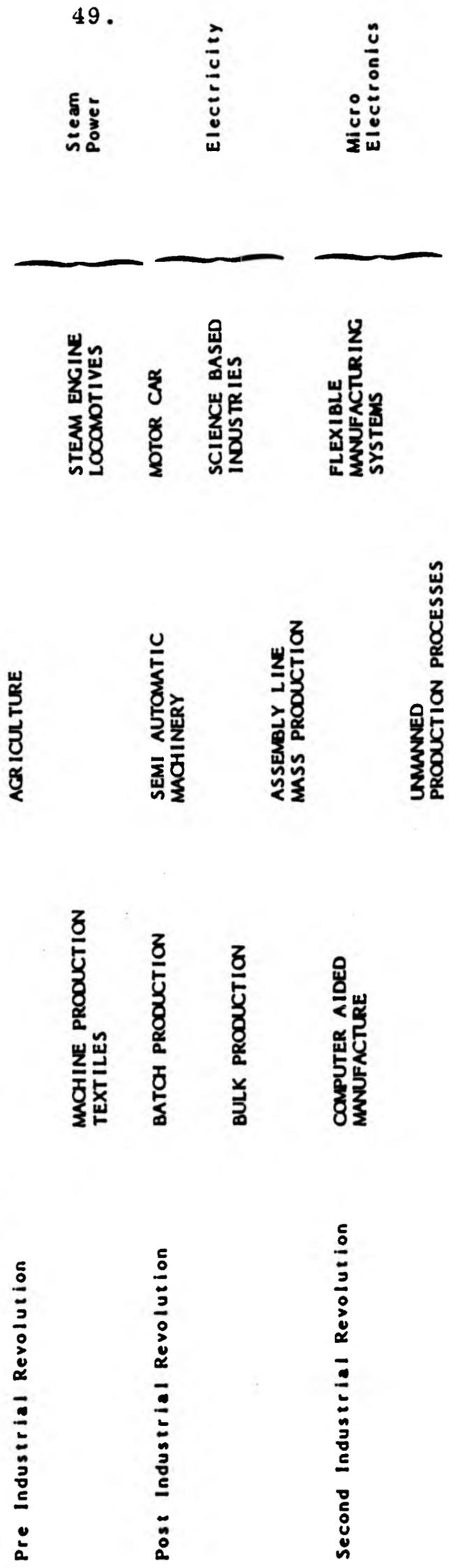
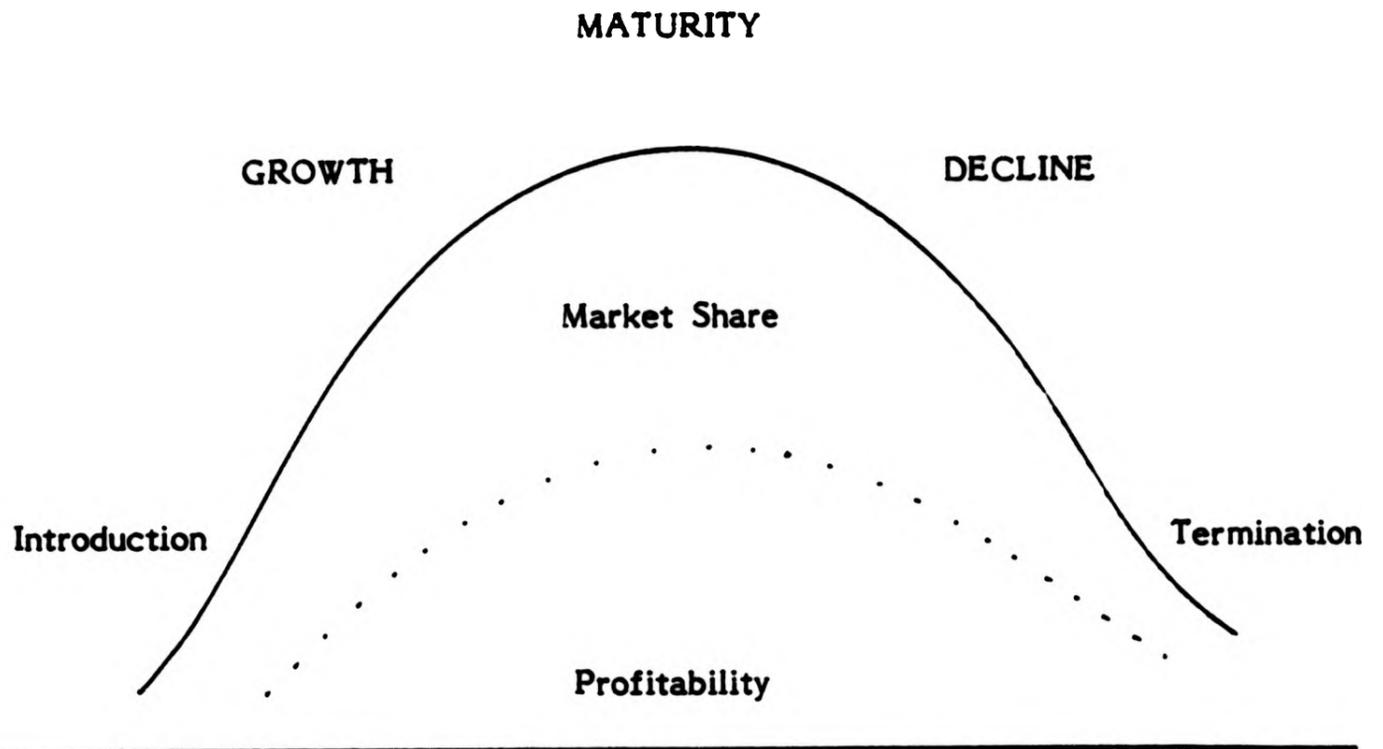


Diagram 3.5

"The Institutional Life Cycle"

(Source: Management Horizons Inc. 1981, pp34)

Each section on the horizontal axis is of equal size - in reality this is not always the case e.g. organisations may grow very rapidly followed by a long period of maturity. Institutional life cycles cannot be avoided but they can be prolonged (Davidson & Smallwood, 1980), if management identify their position in the cycle and take remedial action. It appears that the life cycle cannot be avoided but it can be extended. Davidson & Smallwood (Stampfl & Hirscham, (eds), 1980) have detailed different management activities associated with different aspects of the retail cycle. See Table 3.1 over.

These writers suggest that the mature institutions need to develop new market segments while maintaining existing customers. The supermarket is believed to be in the mature stage of the cycle, where strategies need to be developed to extend its operational existence.

"Since the supermarket's share of the total food dollar peaked at around 70% in 1965 - declining to 64% and still falling - retailers have come up with at least a half dozen special types of stores to get growth out of a shrinking market." (Supermarket News, 1977).

Mason & Mayer (1981) have identified selected aspects of retail institutional change for the US. See Table 3.2 The table considers the type of outlet, it's period of fastest growth, how long it has taken to reach the maturity stage of the cycle and it's present stage. (Mason & Mayer, 1981). Each stage of the life cycle has identifiable characteristics. (Davidson et al). See Table 3.1.

Table 3.1 Management Activities in the Life Cycle

	INTRODUCTION	GROWTH	MATURITY	DECLINE	TERMINATION
SALES	Low/Growing	Rapid Acceleration	High, levelling off	Declining	Low
PROFITABILITY	Negative to Break even	High Yield	High, declining	Low to Break even	Negative
PATRONAGE	Innovators	Broad Market	Broad market	Special need	Late
COMPETITION	None	Limited	Extensive	Intensive	None
CENTRAL MANAGEMENT CONCERNS	Concept Management	Establishing a preemptive market position	Excess capacity prolonging maturity and revising the retail concept	Minimal capital expenditure and only when essential. Run out strategy	
USE OF MANAGEMENT CONTROL TECHNIQUES	Minimal	Moderate	Extensive	Moderate	

(Source: Management Horizons, 1983, pp34; Davidson et al, 1976)

Table 3.2

Institutional Change

Institutional type	Period of fastest growth	Period from inception to maturity (yrs)	Stage of life cycle
General store	1800-40	100	Declining (D)
Single line store	1820-40	100	Mature (M)
Department store	1860-1940	80	M
Variety store	1870-1930	50	D
Mail order house	1915-1950	50	M
Corporate chain	1920-1930	50	M
Discount store	1955-1975	20	M
Supermarket	1935-1965	35	M/D
Shopping centre	1950-1965	40	M
Co-operative	1930-1950	40	M
Gasoline station	1930-1950	45	M
Convenience store	1965-1975	20	M
Fast food outlet	1960-1975	15	Late growth
Home improvement centre	1965-1980	15	Late growth
Super specialist	1975-1985	10	Late growth
Warehouse retailing	1970-1980	10	M

N.B. Date taken from the US market.

(Source: Mason & Mayer, 1981, pp93)

This method of analysis proves doubly useful, as it not only illustrates the historical development of innovations discussed earlier, but it also demonstrates retail institutions like processes and products pass through an identifiable life cycle.

Much of the UK retail sector has reached the maturity stage of its life cycle. Already new forms of retailing are beginning to emerge e.g. teleshopping and viewdata. A parallel development to what has happened in the manufacturing and office sector. The author however does not attempt to examine the new forms of retailing that emerge with the development of a new technology, but rather attempt to determine how older retailing forms adapt. In particular how supermarkets, their managers and staff are affected by this new revolution of the retailing wheel and to determine if the patterns that emerge within the manufacturing and office sector are repeated within the retail environment.

3.2 Information Technology

"Information Technology is a recent and comprehensive term which describes the whole range of processes for the acquisition, storage, transmission, retrieval and processing of information."

(A. King, 1982, pp35)

Information technologies are distinguished from mechanical and electro-mechanical devices by their ability to combine the following features in single or closely linked pieces of equipment.

- (a) Capture Information : i.e. gather, collect, monitor, detect and measure information
- (b) Store Information : convert information to digital form and retain it in some permanent memory which allows the information to be retrieved when required
- (c) Manipulate Information : re-arrange and perform calculations
- (d) Distribute Information : transmit, move and display information electronically

Each function happens inside the equipment without human intervention beyond activating the procedures. (Boddy & Buchanan, 1983).

The European Pool of Studies (No.2, Dec 1981) suggests that it is the technology itself that makes it necessary to review its effect on the economy. To determine what is "New" in new Technology they suggest listing the specific features of the technology. The main features that underline the immense potential of new technology are:

- * cheapness
- * reliability
- * small size
- * speed of operation
- * accuracy
- * low energy consumption
- * low material usage
- * safety and environmental acceptability

New technology is significantly different from previous technologies in that it has the capacity to not only alter the product or processes to which it is applied, but also to alter the infrastructure of society and the nature of the work/leisure relationship. Another unique feature is the capacity of the technology to exercise "intelligent" functions and compete directly with man's most specific attribute and not merely with his physical strength as before (Rada, 1980). As a result any given product or process can be produced with less labour input. Barron & Curnow (1979) suggest that the improvement in productivity that information technology will allow is inherently "good" because it can be converted into greater leisure or a higher standard of living. However, they warn that unless the introduction is properly planned the short-term consequences may be disastrous. This is because in the short term the demand side of the economy has a much slower response than the supply side, any productivity increases may lead to higher unemployment and the unequal distribution of wealth.

The "Information Revolution" has been described as analogous to the development of mechanical power at the time of the Industrial Revolution. (Barron & Curnow, 1979).

"The development of it is manifestly analogous to the development of mechanical power at the time of the industrial revolution.....creating as fundamental an effect on society....."

(Barron & Curnow, 1979, pp39)

A report of the National Academy of Sciences in Washington stated that:

"The modern era of electronics has ushered in a second industrial revolution.....it's impact on society could be even greater than that of the original industrial revolution."

(N.A.S. 1979)

Others consider the development of microelectronics an important technological advance in that it will lead to improved productivity, new products, economic growth and new jobs. They consider it an "evolutionary" rather than a "revolutionary" process. Given these unique features of the technology this chapter attempts to assess the possibilities which are opened up by new technology, and to evaluate the likely course of its development within the retail sector, through discussion of the experience of manufacturing and office work. The author examines the impact of New Technology upon 3 levels:

1. Structure
2. Employment
3. Nature of Work

If new technology is of a more "revolutionary" than "evolutionary" nature then we would expect its introduction to have immediate and significant effect. Similar in effect as those of earlier technical innovations.

3.2.1 Technological Development

Technological developments have historically been identified with economic cycles that have lasted for approximately 50 years. Since industrialisation over 200 years ago (Deane, 1969), long booms that have lasted 25 years have been followed by long depressions of similar duration. These cycles were documented in the 1920's by Kondratiev. (Barron & Curnow, 1979; CSE, 1982).

Three such waves have been identified:

1. 1790-1840 associated with the introduction of the steam engine.
2. 1840-1890 associated with the introduction of railroads.
3. 1890-1940 associated with electric power/automobile

Each boom has been accompanied by the growth of one or more particular industries. Barron & Curnow (op.cit, 1979) suggest that the first of these was associated with the introduction of the steam engine and lasted approximately from 1780 to 1840. The second was associated with the introduction of railroads and lasted approximately from 1840 to 1890. The third was associated with the introduction of electric power and the car and lasted from 1890 to 1940. See Table 3.3.

Table 3.3

Industrial Growth Periods

Dates	Industry	
1790-1815	Cotton	Mechanisation of spinning
1848-1873	Textiles	Mechanisation of spinning/weaving
	Engineering	Production by machine of textile machinery/steam engines/locomotives
1896-1921	Engineering	Batch production
		Semi-automatic machinery
		Marine engineering
		Motor car
		Electrical
1945-1974	Chemical	Rise of science based industries
	Steel	Bulk production
	Motor cars	Assembly-line mass production
	Mechanical and	
	Electrical	
	Consumer durables	
	Petro-chemicals	Continuous-flow process production

Characteristic of the Kondratiev wave is that in the 1st phase the economy speeds up as the new technology is being generated. This leads to a small, rapidly expanding sector which is highly profitable and attracts heavy investment. In the 2nd phase the effects of this technology are spread throughout the economy but there is a reversal of this trend leading to a major depression in the downswing.

This would suggest that micro-electronics is a major development within the economy and that from the historical parallels it is expected to have a significant effect upon the economy. However, the development of micro-electronics is significantly different from many earlier major developments in 2 ways:

1. It gives rise to an important, new and exceedingly fast-growing industry at a time of economic recession.
2. Its products can be applied in nearly all sectors of society and economy with greatest potential for productivity increase and for the reduction of dull, dangerous and dirty work."

(A. King, 1982, pp38)

Given the large number of potential new product and process applications of this new technology the author suggests that micro-electronics is of a more "revolutionary" than "evolutionary" nature, in this respect it differs from earlier technological developments. Indeed, not since the invention of the steam engine has any one invention had the potential to have such an impact upon all sectors of the economy. Barron & Curnow (op. cit, 1979) have developed an analogy between the development of the steam engine in the seventeenth century and present day micro-electronics.

Originally, when the steam engine was developed its initial application was to pump water. This enabled coal to be mined at greater depths and the canal system practicable. Subsequent improvements in the design allowed a greater range of industrial and commercial applications. Thereafter, the applications of the steam engine occurred in waves over a period of seventy years as major sectors of the economy were affected - manufacturing industry, rail transport, agriculture and shipping. The major significance of the steam engine was that it allowed a "step function" increase in productivity. Even the availability of electrical power merely gave added impetus to the process of mechanisation initiated by steam power. (King, 1982). Nearly all other significant inventions have been sectoral or vertical in their applications to create new products or new industries. (King, 1982).

Barrow & Curnow suggest that a similar growth pattern to that of the steam engine is being exhibited by micro-electronics. They believe that the development of computers was a direct consequence of the increased demand for information aids. This demand in turn led to the development of micro-electronics, which has numerous potential applications throughout the entire economy. Both at the work place and in the home and leisure time. The author believes that micro-electronic applications to different sectors of the economy will continue in waves over a long period of time (op. cit, 1979). Micro-electronics is expected to not only transfer many of the traditional activities of the agricultural, industrial and service sectors but will also change the nature and direction of development. Curnow (1982) suggests that the present day decline in employment in the manufacturing and service sector is as inevitable as the decline in agricultural employment that resulted from automation of agriculture and the coming of the first industrial revolution.

3.2.2 Microelectronics

Mechanisation of the industrial sector has proceeded since the first industrial revolution. Additional momentum was added with the advent of the computer in the 1950's that allowed partial or complete automation of the production process. It was not until integrated circuits became relatively cheap and compact that the trend towards automation accelerated. The reason being that integrated circuits allowed computerised intelligence to be stored in the machine. Information technology can be said to have originated 30 years ago with the development of solid state electronics and the transistor. During these years technological development has made it possible to continuously increase operational efficiency.

"to reduce costs enormously, to improve performance, to elaborate increasingly simple, interesting and effective solutions, to invent quickly and easily understandable solutions, and to offer the world of organisation and production the possibility of unimagined productivity, flexibility, efficiency and diversification." (U. Columbo and G. Lanzavecchia, 1982, pp4)

The advent of solid state electronics has led to the development of a number of systems, notably computers. In recent years electronic computers have shown an enormous improvement in performance and a large drop in costs: 10 times in 10 years. Initially computers were very expensive, slow in processing information, unreliable and took up a large amount of space. As a result they were only available to a small number of large organisations.

Central to the development of micro-technology has been the development of the microprocessor i.e. silicon chips that can be programmed to perform the processing functions of a computer. These "chips" cost \$20 to produce and have the computing power of a machine that cost \$1.5m 15 years ago. Microprocessors have reduced computation costs 100,000 times since 1960. (Wernke, 1982). This is best illustrated through consideration of Diagram 3.6 below which shows how the "cost per transaction" of a medium sized mainframe computer declined during a period when the cost of virtually every other commodity escalated sharply. Diagram 3.7 shows how miniaturisation has progressively reduced component size. (Curran & Mitchell, 1982).

Diagram 3.6

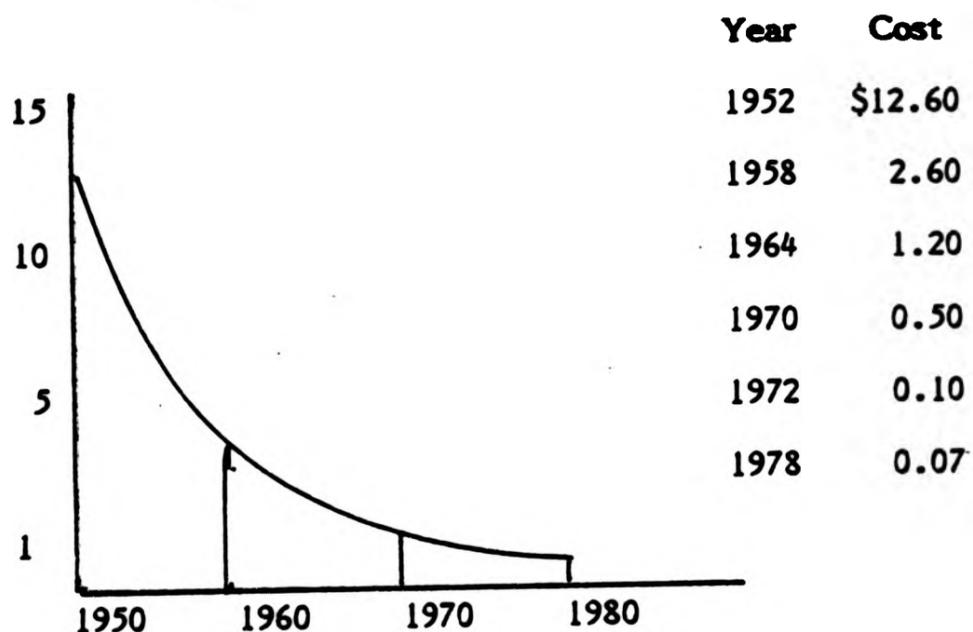
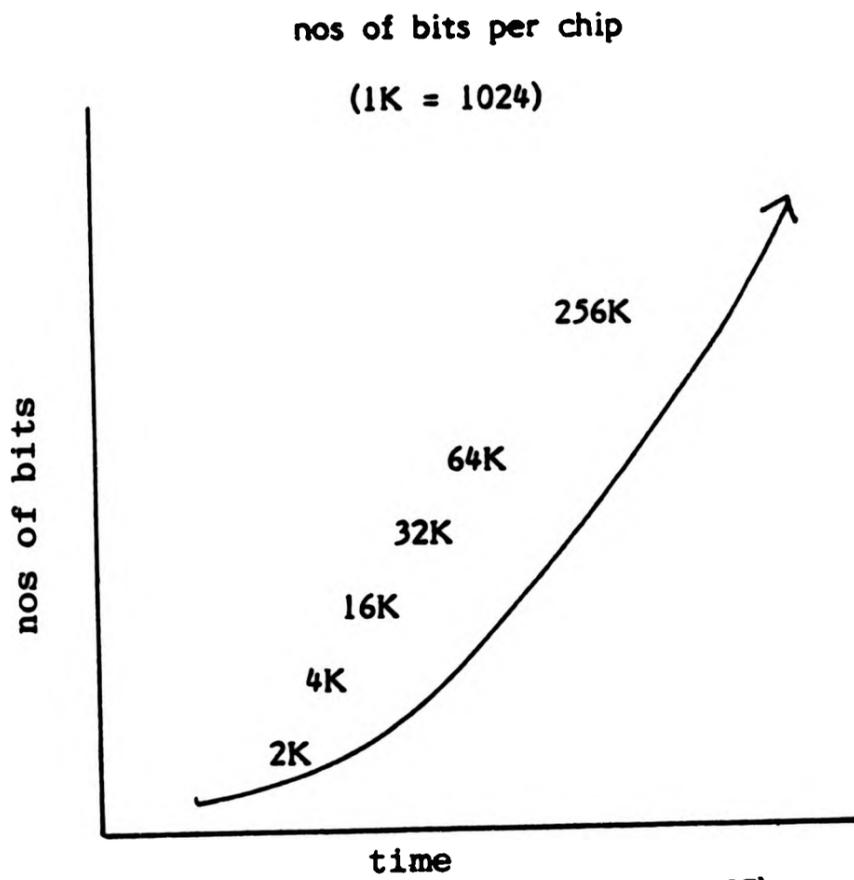
Cost Per Transaction

Diagram 3.7

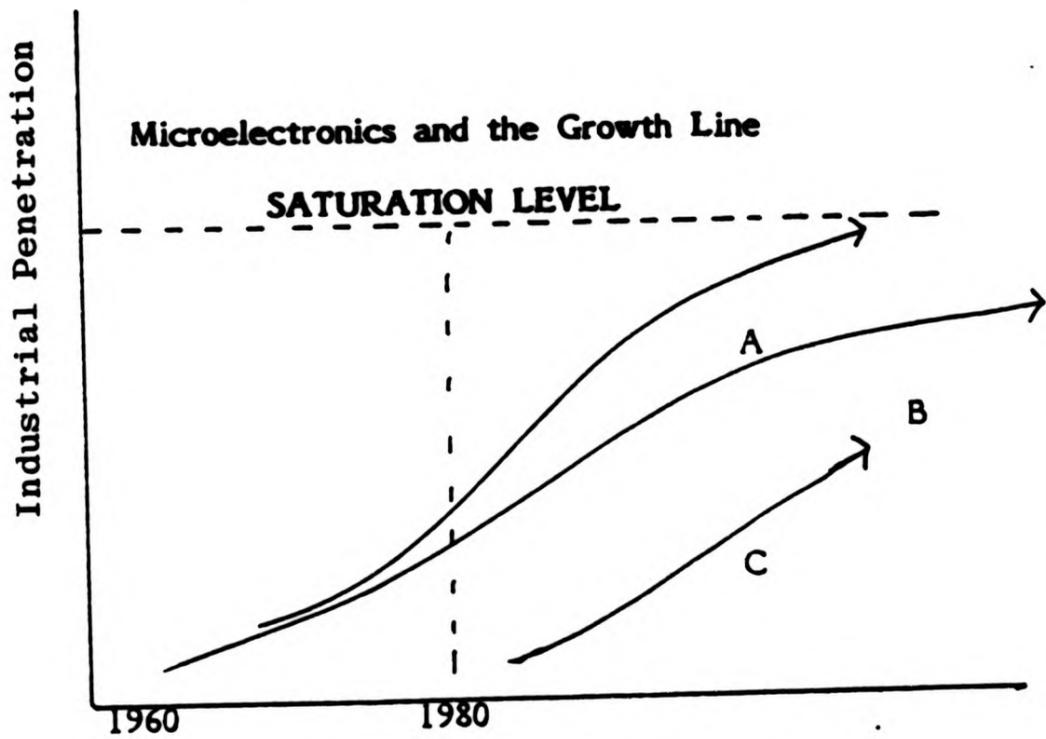
Miniaturisation of Component Size



(Source: Curran & Mitchell, 1982 pp.27)

Diagram 3.8

Microelectronics and the Growth Line



(N.B. Not scale, curves are only illustrative)

Source: (Twiss, 1982 pp.3)

Accompanying this reduction in cost has been the increase in the speed of calculating power, the increase in the volume of information that can be stored and the reduction in storage costs. Additional cost savings to the user involve reduced energy requirements by the computer and the reduction in unit housing size: currently \$100 can now buy a microcomputer with the same performance as a machine once worth \$1,000,000, at today's prices.

Micro-electronics have shown the same growth path as technologies in the past. This is characterised by an S-shape growth curve. See Diagram 3.8 overleaf.

Growth varies in timing and rate.

Curves A, B and C show the different curves for:

- A. electronic watches
- B. industrial robots
- C. fully automated mining machinery

(Twiss, 1982, pp 2-3)

The shape of the S-curve is determined by the fact that its initial impact is likely to be where its technical features are suited to a specialist application, where high cost and relatively low reliability are acceptable. As experience accumulates so costs fall and reliability improves and the number of applications rises.

3.2.3 The Effects of Technology

The effects of the development of technology are very different in different areas of industry. It is possible to make a 4-fold division:

1. Process Industries: (e.g. oil, chemicals, glass, etc.)

Dealing with flows of materials, these industries are continuously operating. They are already highly automated and often use computers in their control systems. In this production process large amounts of raw materials undergo transformation during which maintenance of temperatures, pressures, flow rates etc. are critically important.

The introduction of micro-electronics allows more systematic control to be exercised by management. Greater flexibility is also introduced into the system. The number of workers required to operate the system is usually very small whereas a large number are employed to carry out the maintenance, planning and office work connected with the operation.

2. Engineering Production

Numerically controlled tools and robotics are beginning to spread fairly rapidly, and offer great scope for development. In the mechanical industries automation has largely been confined to specific operations rather than applications to the entire production cycle. Microprocessor computer controlled equipment allows repetitive operations to be performed relatively cheaply and also extends equipment versatility. Making short production runs and "one-off" products economically feasible. Trier (Twiss, 1981) has listed some major trends in the application of microelectronics to manufacturing industry. Firstly, he suggests that present day controls and operators will be replaced by electronic controls. "Since control mechanisms transmit information, not power, it is wasteful to use physical rather than electrical channels." (Trier, op.cit.).

Secondly, electronic controls provide not only lower costs but also increased flexibility, as network configurations can be changed whenever required by different programming rather than by changing hardware connections. Thirdly, the use of "robotics" to replace repetitive precision manual operations and lastly, the use of computers to design complex electronic circuits involving millions of elements which removes the error and fatigue created when the job is done by draughtsmen. In addition, electronic controls make it possible to introduce a flexible degree of alteration of specifications into the production process, as minor product variations will no longer create difficulties in flow production.

3. Office Work

Capital investment within the office sector has historically been low, with the result that new equipment does not have to bear the cost of making older equipment obsolete. It is expected that a relatively small investment could bring large increases in productivity. Wernke (op.cit) has identified two major applications in the of micro-electronically based office equipment. Firstly, the equipment facilitates the handling of information, it is therefore expected to be labour saving with respect to those office occupations involving information handling activities. Computerised equipment lessens the amount of time needed for filing, reduces the time required to gain access to data, texts and even people. Word processors also reduce the time taken to prepare texts. Secondly, new microprocessor based office equipment generates a large volume of information. Wernke also suggests that the effect of new technology upon the office sector depends on the rate of growth of demand for information.

The new equipment also has the ability to change the job content, skills required and the organisation of office work, e.g. word processors allow tasks to become fragmented and also makes traditional typing skills obsolete, (in terms of page layouts, speed and accuracy) as well as freeing typists from repetitive tasks. Furthermore, new technology allows greater autonomy and decentralisation of operation but it could also lead to centralised monitoring and control. Wernke suggests that the direction of the effect appears to be dependent upon its application.

4. Retail work

A more recent development of the application of microelectronics has been in the retail sector. Traditionally retailing has had low capital output ratios. Like office work it has tended to be a people-based industry. A small investment in microelectronic equipment is expected to lead to significantly larger increases in productivity. This particular aspect is developed in later sections.

3.3 Industrial Applications

The application of microelectronics in all sectors of the economy is still at an early stage of development, i.e. at an extremely low point on the S-curve. The next decade is expected to see a rapid increase in the number of applications.

A recent survey carried out by the Policy Studies Institute (PSI, 1981) into the extent of microelectronic use in industry found that of the 1,200 manufacturing establishments in the sample a total of only 49% were using microelectronic technology in their products or production process.

A more detailed analysis is contained in Table 3.4 overleaf which illustrates the use of microelectronics by industry.

Table 3.4

Use of Microelectronics By Industry

Industry	% of the Establishments in Each Industry					
		Product	Process	All	Non	All
	Base	users %	users %	users %	users %	users %
Food & drink	(125)	0	56	56	44	100
Chemicals & metals	(134)	0	51	51	49	100
Mechanical engineering	(165)	29	43	55	45	100
Electrical & instrument engineering	(133)	58	60	76	24	100
Vehicles	(92)	16	51	54	46	100
Other metal goods	(99)	4	40	40	60	100
Textiles	(97)	0	31	31	69	100
Clothing & leather	(92)	1	21	21	79	100
Paper & printing	(99)	0	52	52	48	100
Other manufacturing	(164)	5	40	40	60	100
TOTAL	(1200)	13	45	49	51	100

(Source: Microelectronics in Industry
PSI, 1981, pp14)

The figures show that about 13% (156) of establishments were using microelectronics in their products - PSI believe this low figure reflects partly the lack of scope of applications in certain products and also the great difficulty involved in some product applications. 45% (540) were using microelectronics in their production process. 9% (108) were using the new technology both in the products themselves and in the process by which they are made.

The Policy Studies Institute calculates that about 8% of all the manufacturing establishments in Britain employing 20 or more people are using microprocessors in their products and that they represent about 15% of total manufacturing employment. The corresponding figures for applications in production processes are about 27% and 52% (PSI, 1981). However more distinct disparities emerged when the author examined microelectronic applications by sector. 58% (77) of establishments in electrical and instrument engineering have applications in their products. Mechanical engineering has 29% (48) and vehicles 16% (15), with very few in other industries. The electrical and instrument engineering industry accounts for just over half of all the establishments with product applications, the mechanical engineering and vehicle industries for a further 41%, with only 9% distributed between other industries. (PSI, 1981).

Production process applications are much more widely spread across the whole range of industries, but with high proportions in electrical and instrument engineering with 60% and food and drink 56% of those companies questioned having a microelectronic production process. Clothing and leather 21% and textiles 31% have particularly low proportions. Table 3.4 shows these results.

The PSI questioned establishments on their reasons for introducing microelectronic technology. (See Table 3.5). They found that of the establishments in the sample with applications in their production processes, only 13% want them for producing a new product, 26% for an improved product, compared with 80% wanting them for manufacturing an existing product more efficiently.

(The % add to more than 100% because some of the establishments have more than one application with more than one purpose.)

Table 3.5 Purpose for Which Process Applications Used

Employment size			New	Improved	Existing	Total
			product	product	product	
			%	%	%	%
	Weighted	Unweighted				
20-49	(25)	(120)	8	33	58	99
50-99	(40)	(19)	16	32	68	116
100-199	(61)	(31)	6	23	84	113
200-499	(78)	(44)	9	18	80	107
500-999	(105)	(54)	17	26	83	126
1000-	(123)	(62)	15	31	84	130
TOTAL	(432)	(222)	13	26	80	119

(Source: Microelectronics in Industry, PSI, 1981,)

These figures show that even within the manufacturing sector technological penetration of microelectronics is still at an early stage, less than half the sample were using the new technology. Despite the fact that we are still at a relatively low level in the S-curve it is still possible to examine these developments, which have had a significant impact upon the manufacturing sector, and to attempt to assess the direction and nature of their effect. The expected outcome can then be projected to the service sector to determine how it will be effected by new technology.

3.3.1 The Effect of New Technology: Manufacturing

The process of industrialisation is an integrated process involving three simultaneous stages:

1. The division of labour: the subdivision and simplification of tasks.
2. Mechanisation: direct replacement of man by machine.
3. Automation: substitution of human guidance and control by machine.

Factory work has historically developed through the elimination of skill, subdivision of tasks and the introduction of machine paced work. All of which can be shown to have led to a reduction in the number employed in that sector.

The most extreme form of repetitive and sub-divided task is mass production/assembly line working. In this process of machine-based production monotony and boredom are intense. Batch production produces less intense monotony, as the sub-division of work is less possible. Labour productivity is low and as a result this is an area where development is being concentrated with the application of numerically controlled tools. The sequence of operations is determined by an electronic control system, requiring human assistance only for loading/unloading or general supervision.

When groups of numerically controlled tools are formed a Flexible Manufacturing System is created (FMS). In this process a group of numerically controlled machine tools are operated by a robot, itself controlled by a microcomputer. The number of workers required for such a system is very small and the level of skill required very low.

At present 8,000 robots may have directly replaced 16,000 people throughout the world. This proportion is small when the size of the world's industrial labour force of 1.83m is considered. But the Council for Science and Society (CSS, 1981) cite that out of a range of 1,000 jobs studied in West Germany about 2% (20 jobs) could be done by robots. This proportion would increase to 35% (350 jobs) if the robots had elementary sensing devices.

The Council for Science and Society have also identified a pattern in the development and application of new technology to industry:

"Existing unskilled jobs are replaced by a smaller number of mixed skilled and unskilled jobs, with a cost saving. Then in turn these new skilled jobs are deskilled with a further saving." (CSS, 1982, pp26-27).

This situation would seem to have been borne out in the development of the manufacturing system. Where increasing developments in mechanisation and automation has practically removed all the traditional craft-based skills from the point of production. Traditionally it has been the manual skills/dexterity that has systematically been removed by mechanisation, automation and re-organisation. Developments in computerised equipment have allowed more creative and skilled work to be undertaken by machines. Computer aided manufacturing systems (CAM) and computer aided design (CAD) have enabled more sophisticated functions in the production process to be programmed into the computer. As a result, more skilled and managerial jobs will be reduced e.g. architects, draughtsmen, etc.

Barron & Curnow (1979) believe that:

"Micro-electronic based circuits can be substituted for a large proportion of assembled devices used throughout the economy."

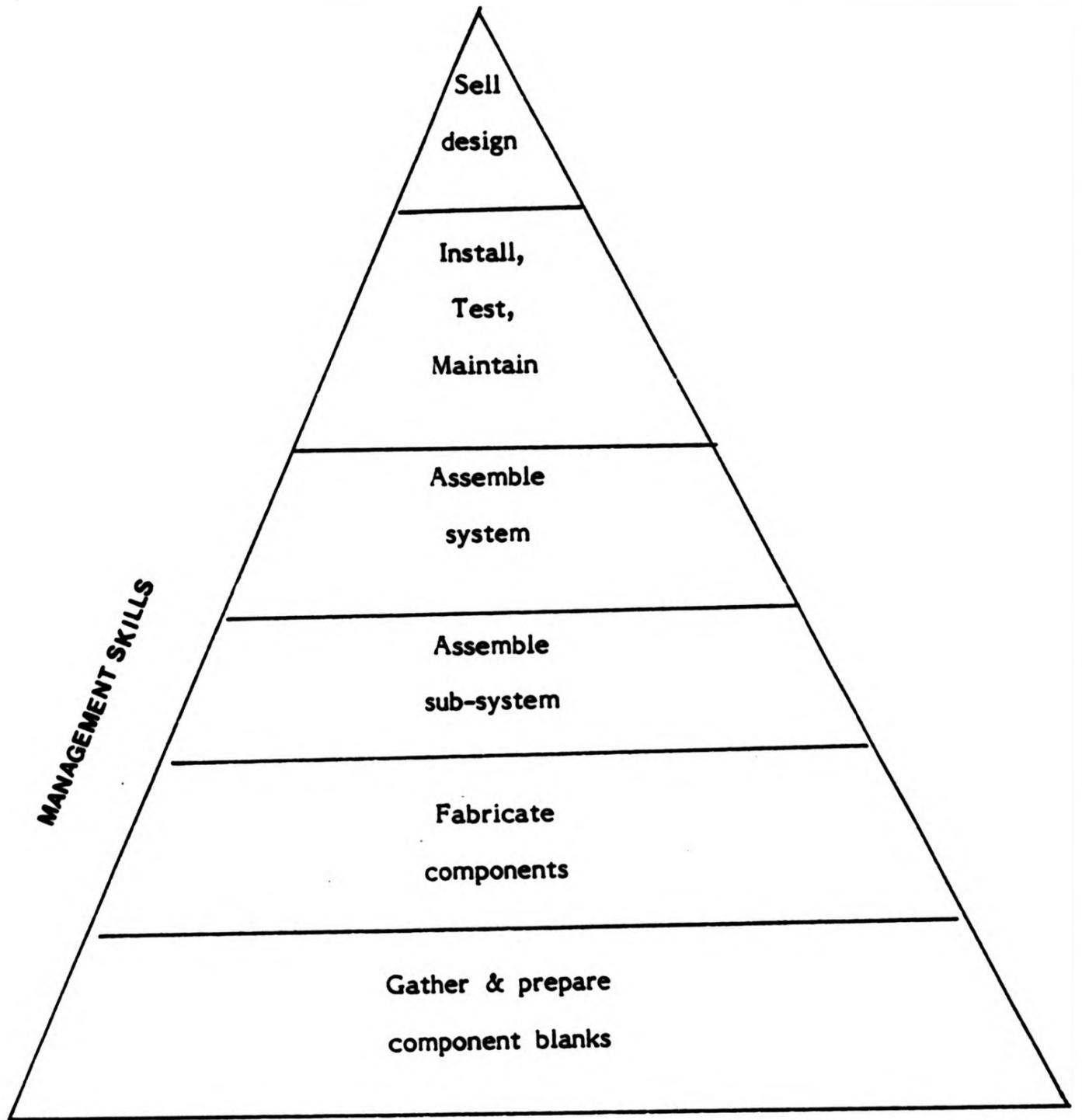
To support their proposition they employ the concept of a "Labour Density Pattern of Production" and how it will be affected by the introduction of new technology. Both authors believe that microelectronic-based circuits can be substituted for a large proportion of assembled devices. They believe that it is characteristic of the production technology of such current devices that the labour density pattern of activities involved in production can be represented by a pyramid.

With relatively large numbers of low skills at the base activities and a smaller number of higher skills near the top of the pyramid.

A typical distribution would be:

Diagram 3.9

Activity Density Pattern



Source: Barron & Curnow, 1979, pp196

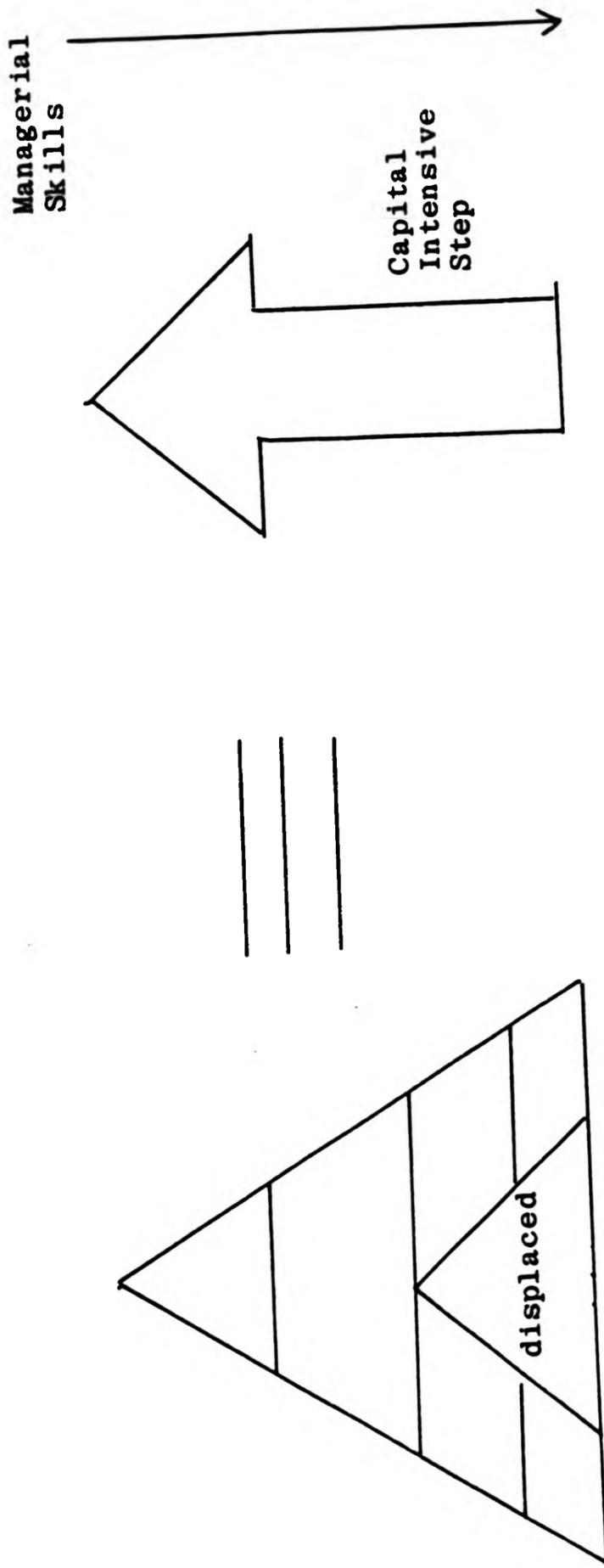
This activity density pattern is product based, not necessarily firm based.

Managerial and technical skills are believed to be required to control this pyramid of activity - but need not extend throughout. Each level of the pyramid represents the proportion of work involved at each stage of the manufacturing process (both production and employment). As we move up the pyramid so do we move on a stage in the production process. From gathering and preparing components at the bottom level to the design and marketing of new products at the top.

With the introduction of microelectronics this structure is believed to alter - due to the transformation of the design and production process. As illustration they show how the part of the pyramid is displaced by the introduction of a large scale integrated circuit (LSI). See Diagram 3.10.

Under the impact of microelectronics the entire pyramid is believed to shrink in size: the authors suggest job losses of up to 25% within certain occupational groups. Less raw materials are used to make less, and often small components; sub-assembly and final assembly are simplified as are installation, testing and maintenance. The peak of the structure is not immune from this process either, design of new products is proving to be an area ideally suited to automation with CAD techniques supplementing traditional engineering design skills. The introduction of word processing and integrated information technology systems will also affect the administrative and support levels, this in turn is expected to affect sales and managerial staff as the pyramid of clerical support staff shrinks beneath them.

Diagram 3.10 ADP with the Introduction of a LSI



(Source: Barron & Curnow, 1979, p197)

Barron & Curnow believe that in the medium to long term the introduction of microelectronics will lead to a reduction in available jobs. Between 1970 and 1975, NCR reduced its workforce in the manufacturing sector by more than 50%, from 37,000 to 18,000. This was as a direct result of the introduction of microprocessors which enabled them to discard all the mechanical moving parts from the cash register. (New Scientist, 1978).

Not only does information technology effect the numbers employed and the type of work done, but it has also led to a review of the concept of factory and firm where traditional definitions and methods of operation no longer apply. Columbo & Lanzavecchia (1982) identify 3 major potential developments with the widespread introduction of information technology into the manufacturing sector. Firstly "External Changes", where the automation of the production process will necessitate the transfer of ancilliary functions (design, warehouse, administration, maintenance, etc.) to the place of production. Allowing separation into self-sufficient units and a decentralisation of organisations, so that they can all be managed and used at the place of work without any waste of time.

Secondly, "Boundary Changes" which refers to physical structures (e.g. walls and buildings). With the development of new technology these parameters can no longer be strictly defined owing to the increased utilisation of external maintenance and services. Finally, "Internal Changes" which Columbo & Lanzavecchia suggest makes it possible to eliminate all the mechanisms and moving parts between controls and operators. They believe that this gradual replacement of mechanisms is:

"frequently a passage from analog to digital solutions"

(U. Columbo & G. Lanzavecchia, 1982, pp22)

Similarly they believe that the organisation will move from a mechanical concept of production to one of a systems based. Favouring functional relations over the mechanical type which will eventually prove too rigid for the new style of operation. It will tend to utilise electronic methods of data transmission e.g. facsimile and telematics equipment as opposed to using forms, filing documents and transmitting them by post. They conclude from their analysis that:

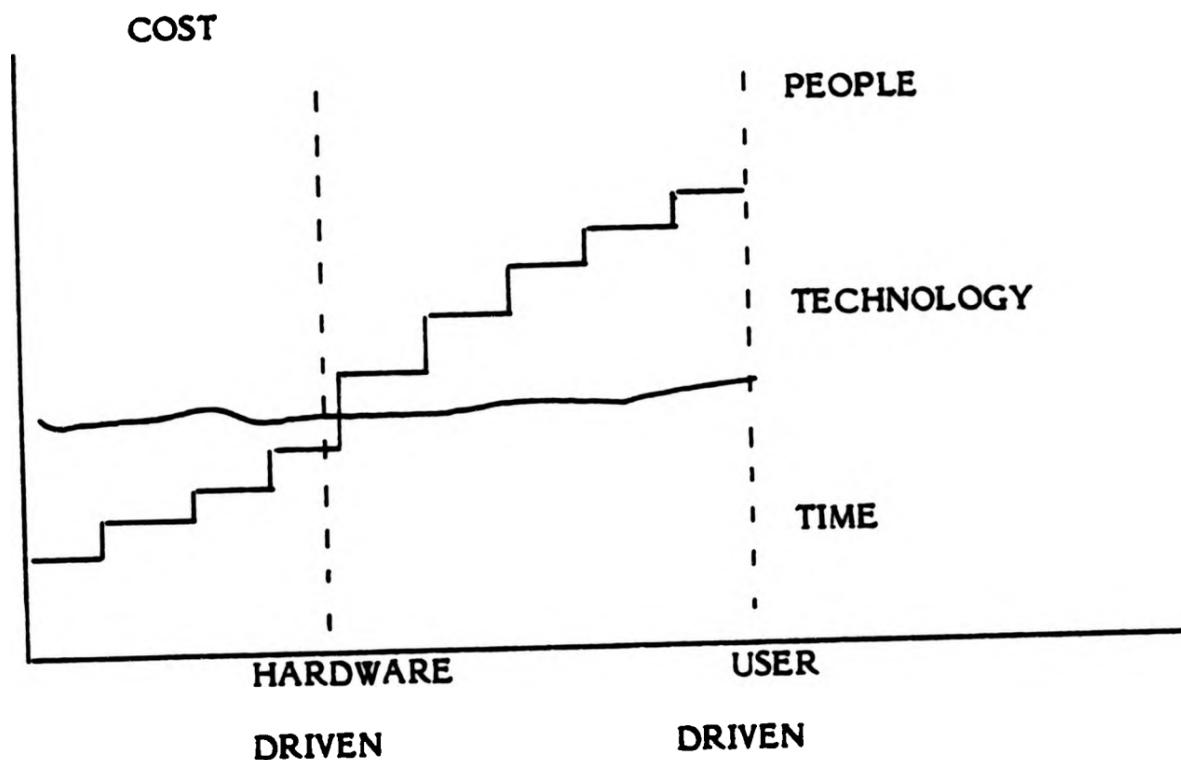
"In the coming years 'mechanical' solutions will be replaced by 'informatics' at an exponential rate, with dramatic consequences for the industry especially the mechanical branch." (op. cit, pp22).

3.4 Microelectronics in the Office

The introduction of new technology in the office has created an "Information Revolution" equal in its effects as the application of microelectronics to industry. Office productivity has remained stagnant over the last decade while costs have doubled. US estimates suggest that office productivity has risen by only 4% while, in the same 10 years industrial productivity doubled. Each production worker had a capital investment of \$25,000 while the equivalent office worker had \$2,400. The scope for productivity improvement, therefore appears all the greater. (CIS Report, No.13).

Curran & Mitchell (1982) believe that we are currently seeing a dramatic shift in costs and relative significance between people and technology. They suggest that within the office the respective roles of technology and people have been reversed, rather than technology taking over from people. Their argument is illustrated below in Diagram 3.11.

Diagram 3.11 The Impact of Changes in Relative Costs



(Curran & Mitchell, op.cit, pp 139)

Before the advent of the microchip, office labour was available in good supply and at a relatively low cost. Technology was new, expensive and difficult to implement. They consider that as the cost of labour has risen, in terms of those with appropriate or adequate skills, the cost of computers and allied technologies has fallen, as well as becoming more flexible and manageable in their applications. As a consequence, roles within the office have been reversed and it is technology that is "the ready available factor".

"For its staff costs which dominate the office balance sheet; and as increases in the use of high technology are balanced by the fall in its costs, they are likely to retain this position.

(Curran & Mitchell, op.cit, pp 139)

Rothwell & Zegueld (1979) suggest that current expenditure on data processing equipment forms only 6% of total office running costs, while expenditure on other types of office equipment adds an additional 10% to the bill. Direct or indirect labour costs total 84% of office costs. In the US in 1977 of total office costs of \$441 billion - labour account for \$353 billion. Parallels can be drawn with the retail sector which traditionally has also been labour intensive. Within a typical retail outlet labour costs account for 45% of running costs. With an average productivity rate in the industry of 2%, the fall in the cost of technology presents considerable opportunity for productivity improvement.

3.4.1 Technical Developments

There have been four major developments in office equipment in recent years: the use of word processors which facilitate the preparation of text materials. Facsimile equipment or electronic mail that transmits source mail via telephone lines. Computer output-microfilm/microfiche which is information held on film and which reduces the need for manual filing and the space required for document storage. And the development of minicomputers/microcomputers or desk top computers.

Word processors are the most predominant piece of microelectronics-based office equipment. (With 2 word processor forevery 10 clerks in the US; Werneke). Their main advantages are:

1. Speed of document production
2. Increased accuracy
3. Reduction in staff required

The main effect of the introduction of word processors is increased productivity, although they also relieve typists from compiling repetitive documents. Typically productivity in the office is measured by the number of pages typed per day/counting key strokes or operating time records. The CIS estimate that a typist spends her day in the following way. If we assume an 8 hour work day, this can be illustrated as:

Table 3.6 Time Allocation of Typists Work

	CONVENTIONAL		STAND-ALONE	
	TYPEWRITER		WORD PROCESSOR	
	% of day	time taken	% of day	time taken
Typing text	27	2hrs 10mins	55	4hrs 24mins
Telex	6	29mins	6	29mins
Retyping	17	1hr 22mins	5	24mins
Correcting errors	11	53mins	5	24mins
Paper handling	10	48mins	-	-
Waiting time	5	24mins	5	24mins
Rest allowance	24	1hr 55mins	24	1hr 55 mins

(Extended table based on CIS Report No.13)

A secretary is believed to spend 30-35% of her time at her typewriter, a high proportion of this time is spent retyping corrected drafts, standard letters and forms. With the introduction of word processors the time spent on typing doubles with significant reductions in time spent correcting mistakes or editing.

The above figure demonstrates a 20%, or 1 hour 36 minutes per day, saving on the time that a typist spends on retyping, correcting errors and handling paper. The word processor therefore allows a greater proportion of the typists time to be spent on more productive tasks - as a consequence productivity in terms of worker output rises. For example, the proportion of her time now allocated to typing text has risen to 55% as compared with only 27% before. In the US a major bank saved \$500,000 through the use of word processor pools. The number of secretaries required was reduced from 200 to 100 and a word processor centre was established resulting in a net reduction of 60 secretarial posts. In another company, the application of advanced equipment did not result in the actual loss of jobs, but few new jobs were created despite an increase of 200% in output which was of 500% higher quality. (Werneke, 1982).

3.4.2 The Effect of Microelectronics in the Office

The pattern within the office sector so far with the introduction of microelectronics has been that a large number of jobs have not been lost with this increase in productivity, but rather because of the high turnover of labour in this industry much of the jobs that could have been displaced as a direct result of the technology have been absorbed by natural wastage, in effect reducing job opportunities, or by redeployment. In addition, for those that operate word processors, the intensity of work is increased and those aspects of office work that make it less unpleasant than factory work are systematically removed. Staff visibility is increased in terms of the volume of physical work done and as a consequence the output of the typists becomes subject to tighter management control procedures. The use of word processors allows the office workers task to be fragmented e.g. more than one typist can work at the same time on the same document, or the typist no longer has to carry out the editing etc. and the application of scientific management principles become viable in the office. Where individual tasks are observed and timed, and the "one best way" to accomplish the task is determined. As a

"Among the subsidiary benefits management expects to derive from (office automation) is the reduction and thus cheapening of the skills of administrative employees, and not least, the squeezing out of the minutes and hours of labour power lost in the personal relations and contacts among secretaries and between secretaries and their 'principals'."

(Braverman, 1978, pp347)

Braverman believes that with the introduction of new technology in the office, clerical staff are transformed from being members of a social office, responsible for all stages of document preparation to skilled machine minders. He suggests that the technology not only increases the productivity of the operator but also removes responsibility and control over the work process.

"The fact that many machines may be paced and controlled according to centralised decisions, and that these controls may thus be in the hands of management.....these technical possibilities are of just as great interest to management as the fact that the machine multiplies the productivity of labour."

(Braverman, 1978, pp195)

Word processors reduce the amount of time taken to prepare text. Microfilm/Fiche storage reduce the time required for filing and the time needed to gain access to data, texts and people can be lessened through the use of computers, office communications networks and teleconferencing. Similarly concern is being expressed at the health hazard associated with working in front of a VDU (visual display unit): eyestrain, headaches and fatigue, etc. have already been detected. Wernke's study highlights the increase in stress brought about by the increased work pace and the health hazards of VDU's.

Because microelectronics is essentially labour saving the preceding analysis would suggest that its introduction in the office sector is likely to be accompanied by significant unemployment - as organisations attempt to rationalise their production processes/service levels. The conclusion to be drawn from those studies investigated is that the use of microelectronics will lead to some job displacement in the office and will drastically alter those jobs that remain, in terms of both skill and content.

The Nora-Minc Report (1978) in France found that new technology will bring a considerable saving in jobs in the large service organisations. Predicting that 30% of the jobs in banking and insurance that would have been created during the 1980's would not be as a result of new technology. A study of office work by Siemens in West Germany found that about 30% of office jobs could be automated. German trade unions have calculated that this could mean the loss of 2 million of Germany's 5 million office workers. In the UK several analysts have forecast massive unemployment as the result of the introduction of new technology, with potential job losses of 20% (Green et al, 1982).

Table 3.7 overleaf shows that the bulk of information handling activities are carried out by women. Within the UK, 31% of the female labour force is employed in clerical work and only 1% in administration and managerial jobs. The figures for the US are 34% and 6% respectively.

3.4.3 Conclusions on the Office Sector

Within the office sector, the overleaf data suggests that it is women who will be most likely to experience the greatest loss of opportunity. Table 3.8 overleaf provides an estimate of the potential number of job losses within female white collar occupations. Although the data was not ranked the most vulnerable groups to new technology appear to be those with the greatest proportion of females.

Table 3.7 **Concentration of Women Workers by Occupation**
 (% of labour force)

Country	OCCUPATION				
	Clerical	Sales	Professional & technical	Administrative & managerial	Service workers
F R of Germany	31.0	13.2	13.8	1.5	16.9
France	26.9	10.4	19.7	1.5	15.3
Italy	14.4	12.4	13.1	0.2	13.5
UK	30.8	12.2	12.2	0.9	23.3
US	34.3	6.8	15.2	5.9	21.0
Canada	34.0	10.5	19.3	4.8	18.0
Australia	33.7	13.0	4.4	2.7	15.5

(Source: Werneke, 1983, pp30)

Werneke in her analysis of US labour force data, found that one third of all women workers are concentrated in white collar occupations - mainly clerical - only 16% are professional and technical. Within management occupations the number is only 6%. Those information handling occupations - bookkeepers, secretaries, cashiers and typists - are dominated by women. In many of these occupations more than 90% of these workers are women. See Table 3.8

**Table 3.8 Female White Collar Occupations Likely to be Affected
by Microelectronics in the US (1980)**

Occupation	% of women	Nos. of women employed ('000s)
Bookkeepers		
Cashiers	90.5	1,723
Secretaries	86.6	1,346
Typists	99.1	3,841
Bank tellers	96.9	991
Billing clerks	92.7	515
Clerical supervisors	90.2	147
Collectors	70.5	169
Counter clerks	56.4	44
Estimators	73.4	257
File clerks	56.2	300
Insurance adjusters	86.4	280
Office machine operators	57.5	100
Payroll and timekeeping	72.6	682
Receptionists	81.0	188
Statistical clerks	96.3	606
Stenographers	78.0	302
Telephone operators	89.1	57
All other clerical	77.1	1,435
TOTAL EMPLOYED		41,283

(Source: Werneke, 1983 pp32)

Wernke adds a note of caution on the interpretation of these figures. She does not suggest that one third of all women in the US, or over half of women in the UK, are being threatened by job loss through the introduction of microelectronics. Rather she believes that as a large number of women are working in information handling occupations, it is this group that will be required to make the largest readjustment to the change.

Given the nature of current technological applications within the office sector many writers (Bird, 1980, Wernke, 1983, Boddy & Buchanan, 1982) expect the introduction of computer based equipment to lead to some job displacement and alter those jobs that remain. Boddy & Buchanan (1982), in a study of typists, revealed that job satisfaction had decreased, partly due to the way their work had been reorganised with the introduction of word processors. Their study suggested that the word processing jobs now done by the typists was more mentally and physically demanding than that of the conventional

Table 3.9A shows that in the UK unemployment among clerical workers was already increasing at a faster rate than unemployment overall before the start of the current economic recession.

Table 3.9A

Unemployment by OccupationIndex of Unemployment by Occupation

	Clerical	Manual & related	All workers
June 1975	100	100	100
June 1976	147	135	134
June 1977	169	136	138
June 1978	168	132	133

In the UK, one third of women work in offices and of these more than 90% are employed in routine clerical work. The top three occupations are clerical, cashiers and typists. Between 1970-1978 there was a 21% rise in female clericals. About 90% of those clerical jobs were in routine work while only 17% of women held managerial posts. (Werneke, 1982). In the absence of more current data to illustrate the male/female split, figures up to the 1971 period demonstrate the female dominance of the lower level job categories. It is not possible to determine if the reduction in jobs in the 1966-71 period continues. See Table 3.9B.

Table 3.9B

UK Clerical Employment

Secretarial, Shorthand & Typing Employment

	Total	Nos. of Males	% of Total	Nos. of Females	% of Total
1951	510,337	15,346	3.0	494,991	97.0
1961	663,960	13,940	2.1	650,020	97.9
1966	803,520	14,620	1.8	788,900	98.2
1971	747,400	10,100	1.4	737,800	98.6

(SPRU, 1982, pp59)

The preceding analysis shows that the bulk of information handling activities are carried out by women. In contrast, the upper jobs are occupied mostly by men. It is expected that the introduction of new technology within the office sector will have the greatest impact on the lower levels of the hierarchy i.e. on the information handling jobs and become less severe as it moves up the office organisational pyramid.

This potential to destroy jobs will not only affect current employment but will also affect future female employment prospects and the traditional channels of female labour and promotion. Women have limited access to alternative occupations due to geographical/location immobility, domestic/family responsibilities and their lack of formal training/qualifications. Any new opportunities that new technology may provide in the office sector are likely to be in the computer applications/system analysts side, an area where women are not traditionally well represented. Mostly due to their lack of appropriate technical education and skill.

Table 3.10 overleaf outlines the main conclusions reached by several major studies in this area to determine the effect of office automation on employment. Estimates vary depending on the length of the study and the method of investigation, but they all expect some job loss to accompany the introduction of new technology within the office sector.

Given the relative "newness" of the application the overriding finding generated by the data would seem to be that the effect of office automation upon jobs is, at the present time, unclear. Much analysis appears to be based on speculation. However 2 alternative scenarios do exist. Some authors (Sleigh et al, 1979) believe that new technology will enhance jobs and upgrade the skills of information workers. They believe that new technology will reduce the boredom of routine tasks by allowing workers to undertake more varied and interesting activities. It may also result in workers becoming more highly specialised and less susceptible to easy substitution and replacement than at present. Alternatively, new technology may cause jobs to become more routine and less skilled as within the manufacturing sector. Following Taylorist principles jobs will become fragmented and deskilled. Related to this is the potential to remove autonomy and independence of a worker (Blackwood, 1958).

"The mechanisation of office work occurs when office machines subordinate the work of the clerk to the tempo of the machine, which takes over the larger part of the discretion involved in the operation, and which requires full-time specialised attendants.....not unlike the factory assembly line".

(Blackwood, 1958, pp89)

The outcome of new technology on the structure of the organisation, the numbers employed and the nature of the work done when it is introduced in the office sector appears to be determined by how the technology is introduced and work subsequently organised around it.

(Werneke, 1982, Boddy & Buchanan, 1983,)

3.5 General Conclusions

In conclusion we can state that from our analysis it appears that the relationship between technological change and its effect upon employment and structure is complex and dynamic. As Twiss (1982) suggests microelectronics is at the centre of an interlocking system of changes and developments. Two factors need to be taken into account when estimating the effect of the introduction of new technology upon employment. Firstly, the speed and patterns of diffusion of the technology i.e. how fast technological change is introduced into the workplace and what sectors are most involved. Secondly, the capacity of an economy to accommodate the structural changes that take place as new technologies are increasingly introduced. (Werneke, 1982)

A recent study into the effect of micro-electronics upon the employment prospects of different industrial sectors by Green, Coombs and Holyoyd (1982) came to the following conclusions:

They assigned 13 sectors 2 different ratings:

1. Technological scope (TS) for micro-electronic technology applications.
2. Direct employment displacement (DED) effect i.e. the effect on employment due to micro-electronic applications - all other factors (e.g. output) remaining unchanged.
3. Values where assigned to the ratings High/Medium/Low.

The TS rating is qualitative, the DED rating High/Medium/Low refers to 20%, 10% and 5% respectively. The DED operates on a longer time scale than TS. As the displacement of labour will necessarily be a longer term process than the introduction of the techniques which are supposed to displace it, due to trade union/worker resistance or mismanagement. In addition, the DED and TS will have different timescales in manufacturing activities compared with information processing activities. The authors believe that displacement within the information processing sector (particularly office work) may be observable within 3-5 years whereas in manufacturing, activities displacement may take up to 10 years, this is due to the longer life expectancy of capital equipment already employed in the manufacturing sector. The study undertaken refers to national industrial sectors and not to specific occupations or regions. As a result, values within a particular sector may not reflect the DED or TS effect on specific occupations, but rather the effect on the entire sector.

Table 3.10 **Forecasts of Effects of New Technology on**
Office Employment

Report	Forecasted Impact on Office Employment
Siemens (1978)	40% of office jobs in Germany carried out by computers by 1990. Two million typing and secretarial jobs lost.
Nora & Minc (1978)	30% reduction in banking and insurance jobs in France over the next 10 years.
Central Policy Review Staff (1978)	• Applications on service side lead to new services. Will tend to reduce scope for staff savings. Clerical jobs can be improved.
TUC (1979)	Employment in occupations traditionally held by women could fall substantially.
Sleigh et Al (1979)	Slow movement toward electronic office. Demand for file clerks likely reduced. Slight impact on typists and secretaries. In banking modest increase in employment. In insurance shift from lower grade clerical positions toward computer-related jobs.
Barron & Curnow (1979)	Biggest impact on information sector. Job losses in most pessimistic scenario equal to 27% by 1995.

Table 3.10 **Forecasts of Effects of New Technology on**
Office Employment (continued)

Report	Forecasted Impact on Office Employment
Jenkins & Sherman (1979)	Largest impact on banks, insurance companies and offices in general. 750,000 - 1.5m typing jobs could disappear. 30% displacement of office jobs by 1990.
Bird (1980)	Estimated in 1979, 6,000 typing jobs lost to word processors, partly offset by 14% of that figure in new jobs in word processor sales and customer support. By 1990, the maximum expected job loss to word processors will be 170,000.
Green et Al (1980)	High technological scope with potential job displacement effect of 10%.
Policy Studies Institute (1982)	Forecasts a substantial drop in employment in banking, but spread over a very long period and absorbed by natural wastage and redeployment.
HUWS (1982)	Job losses in all areas, both directly and indirectly.

(Adapted from: Bird, 1980, pp3; SPRU, 1982, pp55-56; Wernke, 1983, pp79).

From the findings of their local study it was possible to construct a table of the expected effect at the national level. The figures are given in Table 3.11

Table 3.11 Technological Scope & Direct Employment Displacement
Effect For Selected Industrial Sectors at the National Level

Sector	TS Effect	DED Effect
Professional/Scientific Services	H	M
Public Admin. (ex. Defence)	H	M
Distribution	H	M
Mechanical Engineering	M	M
Other Metal Goods	L	L
Other Manufacturers	M	L
Textiles	H	H
Clothing/Footwear	H	M
Food/Drink/Tobacco	H	L
Transport/Communications	H	M
Electrical Engineering	H	M
Miscellaneous Services	L	L
Construction	L	L

(Source: Microelectronics in Industry, PSI, 1981)

Green et al believe that the TS effect within distribution is high due to introduction of electronic point of sale systems and stock control systems, but they suspect that the employment impact will be medium due to the large number of small employers and the large proportion of employment within transport in this category. This represents an expected labour displacement effect nationally of 10% over a 10 year period.

Whilst the authors did not analyse the TS or DED effect by sex within each category, they did highlight the concentration by sex within particular industries. In their sample of the Thameside area male employment is predominant in manufacturing (60%) compared with only (42%) of females. In the service sector, women outnumber men. The distributive trades has 57% female participation; financial services 53%; professional and scientific services 74% and miscellaneous services 67%. They also found that within these SIC orders the number of part-time workers is high. The study found that over 70% of Thameside's female part-time workers are employed in the service sector. This finding appears to be representative of national employment figures as discussed in Chapter 2. From their analysis Green et al concluded that micro-electronic technologies will have different employment effects industry by industry. This would suggest that the jobs of men or women, full-time or part-time will be affected to different degrees.

A similar type of analysis was undertaken by Barron & Curnow (op. cit). They suggest that another way of looking at the impact is to replace the sector concept by an occupational concept. Using the US Bureau of Labour Statistics 1970 data on occupations and the UK 1974 Earnings Survey data on occupations the following occupational categories were constructed, to predict the potential number of job losses in each sector. The resulting occupational breakdown was as follows.

Information handlers	165 occupations totalling 29.4m
Industrial workers	108 occupations totalling 15.1m
Service workers	120 occupations totalling 26.3m
Agricultural workers	8 occupations totalling 3.2m

They then graded each occupation in turn as high, medium, low or zero-risk with equivalent potential job loss over the next 15 years of 50%, 25%, 10% and 0%, over the next 15 years. The expected job loss was quantified as follows:

Information handlers	7.8m equivalent to 26.5%
Industrial workers	3.3m equivalent to 21.8%
Service industries	2.3m equivalent to 8.7%
Agricultural workers	0.1m equivalent to 3.1%

The authors expected a total job loss of 13.5m or 18.2%.

By reducing the potential job-loss rates to 25%, 10%, 1% and 0% for high, medium, low and zero-risk categories respectively, a projection of some 7.2% weighted overall job loss is obtained. On a similar basis using the higher rates of possible job loss, the UK data projects a displacement of approximately 16% (Barron & Curnow op.cit).

Barron & Curnow suggest that an impact on such a scale will place great stress on many firms, and considerable industrial restructuring would be probable. The projections by Barron & Curnow are significantly less optimistic than those of Green et al, who state that the 1980's will see a rather slow application of micro-electronics in all areas of industry. A belief reinforced from both their own small cross-industry study and that conducted by the PSI nationally of the manufacturing sector. Both sets of results suggest that the UK is still at a relatively low point on the micro-electronics S-curve. However, Green et al believe that a more rapid pace of development will be reached by the 1990's, particularly in the manufacturing sector.

The extent of the above applications and the expected effect upon almost all sectors of the economy demonstrates the micro-electronics is not a limited technology.

"From primary production to sophisticated software programming, in factories and in offices, the micro-electronics revolution is taking place, and a corresponding effect upon employment will become apparent in all these areas."
(Curnow, 1982)

Within manufacturing, as outlined earlier, the PSI study (op.cit 1982) showed that micro-electronics can either be used in the production process directly or replace mechanical parts in the product itself. Both applications have the capacity to result in severe employment displacement. In the production process direct operatives can be replaced by machines e.g. assembly lines and paint-spraying, as can production control jobs through the introduction of automated computerised control. Where micro-electronics is used in the products, the production process becomes simplified and this eventually will lead to automated production as the work involved is a great deal less than was involved previously.

"Throughout, the development of more automatic machinery has been accompanied by fragmentation of the jobs associated with them, removal of initiative and skill from the worker, and the pacing of work by the machine."
(CSS Report, 1982, pp7)

Most of the studies highlighted suggest that there will be a differential employment effect upon different occupational sectors. The most immediate effect is expected to be on unskilled, manual workers. Green's study reinforces this point.

In the short to medium term the major effect is expected to be experienced in by the semi-skilled and the skilled worker, whose previous task and job knowledge can now be undertaken by a computer or micro-electronically controlled equipment. Another group equally at risk are clerical and secretarial jobs of comparable level of complexity. Routine and semi-routine clerical operations, typewriting, manual filing and switchboard operations are employment already under decline. Barron & Curnow believe (op.cit, 1979) that the types of labour likely to be affected by displacement can be characterised into various groups; assembly workers (chiefly rote-skill based and working with fairly complex but not very high-value products), repair/maintenance workers and low-skilled or even highly skilled but rote-based.

As demonstrated earlier automation leads to the fragmentation of processes. At the bottom of the occupational pyramid the jobs that remain after automation are likely to be of a low level nature, 'back-up' jobs as unrewarding as those replaced. Those skills removed from the workplace have been concentrated in planning and supervisory roles. New skills and new occupations may arise but not in sufficient numbers to compensate for those removed. In addition, most of these skills will be of a professional and scientific nature effectively precluding those with the skills no longer required. Curnow (Twiss, 1982) believes that a 2-nation situation may develop with a polarisation of employment between very high level skills and those at low levels.

Just as the impact will differentially effect types of work, so to will it differentially effect different sectors of the working population. Particularly upon the young, immigrants and women.

There are three large areas of female employment:

1. Light assembly work in factories
2. Office based secretarial and clerical
3. Distribution

As shown earlier females traditionally occupy the lowest levels of the occupational pyramid i.e. those jobs which could be effectively destroyed by the introduction of micro-electronics. In the first sector job opportunities are being reduced by micro-electronic products and the development of robotic assemblers. The second set of job opportunities are being lost through the introduction of word processors and the 'paper-less' office. It is to a discussion of the effect of micro-electronics within the retail or third sector and the resulting effect upon the nature of work, numbers employed and industrial structure that is now investigated. Using the preceding analysis of the effect of micro-electronics upon manufacturing and office employment as a basis for analysis.

3.6 The Retail Industry and New Technology

The advent of the "microchip revolution" has encouraged retailers to turn increasingly to computers and micro-electronic equipment both on the shop-floor and behind the scenes. This is as a direct response to both external and internal pressures and as demonstrated earlier represents significant cost savings.

As Phillips notes,

"The real threat posed by escalating operating costs - triggered by inflation - that were increasing at a faster rate than sales volume, in addition to the problems created by the recession, have inclined retailers to make more use of capital intensive equipment." (K. Phillips, 1981, pp25)

These economic factors have been compounded by a decline in the total numbers of retail outlets and a trend towards larger superstores and hypermarkets for which traditional retailing philosophies are no longer applicable.

Never since the advent of self-service in the 1960's has the potential for change within the retail sector been so great. Many department stores and non-food chain stores have already introduced sophisticated electronic point-of-sale (E.P.O.S.) equipment, using the optical character recognition (OCR) systems with light pens, mainly in response to the demand for management information on a wide range of products. Martin and Zeilunger (1982) estimate that a supermarket may carry as many as 4,000 line items in stock, and a large department store as many as 250,000.

3.6.1 Technological Developments

Both in North America and in the UK it is the supermarket industry that is at the forefront of scanner-based experiments. This is due firstly, to the high incidence of scanner coded merchandise, the UK has now assed the 70% economic barrier for coded merchandise going through the checkouts. This figure was identified by McKinsey (1974) as being the proportion of stock that was required to have a bar code before the potential benefits to the operator would be forthcoming. Secondly, the measurable improvement in checkout efficiency that results almost immediately. As Churchill (1982) points out the technological revolution seems to have made most impact in he area of food distribution, where the high volume of food sold each day on low margins makes it an area ideally suited for more efficient data handling.

The primary reasons for the rapid growth of computerised equipment in supermarkets has been the cost-cutting possibilities. The advantages include low labour costs, improved labour scheduling and helping to control shrink (Mason & Mayer, 1980). In the US, computerised check-outs are estimated to show savings of over 1% of sales. On a supermarket's small profit-margin, this could represent between 5-20% increase in profits.

In a survey published in 1982 of EPOS trends in the 1980's by the American National Retail Merchants Assoc. 57% of respondents had at least some EPOS terminals and more than one third, 35%, had converted fully to EPOS terminal systems. The principal trading reasons given by the respondents for installing their first EPOS systems where:

- * improved merchandise operations and decisions
- * management information systems
- * management information benefits
- * expected clerical cost savings
- * credit authorisation

Table 3.12 overleaf shows the current uses of scanning POS data by supermarkets.

Table 3.12 The Current Use of Scanning Data by Supermarkets

	All companies	Chain	Independent
TOTAL	4,191	3,867	324
	%	%	%
Checker performance	94.0	96.0	92.8
Coupon accounting	72.9	66.0	77.1
Specials	69.2	66.0	71.1
Work scheduling	66.6	66.0	66.3
New product evaluation	39.8	32.0	44.6
Shelf allocation	33.8	24.0	39.8
Product dept. analysis	30.8	30.0	31.3
Mean dept. analysis	24.1	18.0	27.7
Shrink analysis	22.6	28.0	19.3
Price elasticity	16.5	8.0	21.7
Re-ordering	6.8	4.0	8.4
Not making use of available data	3.0	2.0	3.6

Note: Unweighted data

Source: Management Horizons, 1983, (Food Marketing Industry Speaks, Food Marketing Institute 1982)

The study revealed that 94% of companies using scanning systems used the data generated to monitor checkout operator performance, this represents 3,940 companies. The second most frequent use was to total the number of product coupons presented in-store, 3,059 stores and 2,808 stores used the information generated to schedule work at the checkout. Much of the usage of the POS systems are ranked similar by both groups investigated. But considerable difference exists with respect to the analysis of stock losses on shrink. Within the chain store group 28% (1,083) use the data for this purpose. Whereas in the independents only 19% or 62 stores utilise the information for this purpose. In the sample, 3% (126) of all stores were not using the data for any purpose other than as an alternative to conventional checkouts.

A recent investigation by the National Economic Development Office (NEDO, 1982) into the impact of information technology in the distributive trades, considered that the rapidly decreasing cost of computer hardware was bringing the benefits of computerisation and data processing to smaller businesses. It considered that:

"the potential for change in the smaller business is perhaps greater than in any other section of the distributive trades. It is now possible for even the smallest business to have available management information equivalent in relation to its needs, to that available to the larger groups." (NEDO, 1982, pp6)

Another important recent development it recognised was the spread of technology to medium-sized independents who are members of voluntary groups.

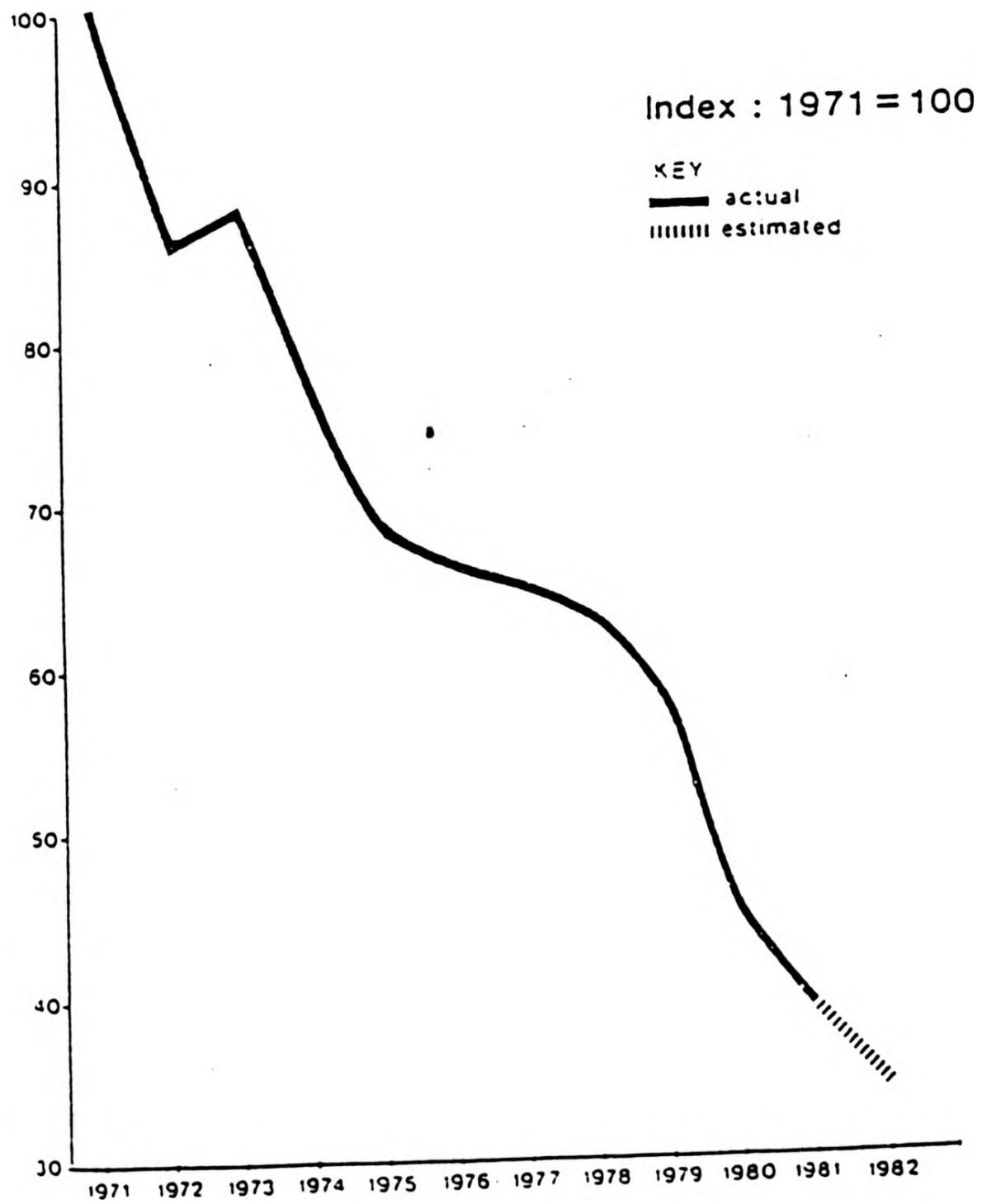
Index calculations undertaken by the Retail Management Development Programme (RMDP), an independent consultancy, relating the cost of electronic point of sale (EPOS) installations to total retail turnover, show that EPOS prices have fallen in real terms to one third of their level in 1971. (See diagram 3.12 overleaf). Similarly, the number of suppliers in the market for EPOS equipment has expanded from 3 in 1971 to 34 in 1985. Each offering equipment at various price levels and degrees of sophistication, from simple "stand-alone" electronic cash registers (ECR's) through to powerful multi-terminal systems capable of extensive data handling capacity.

The development of the UK retail market for EPOS lags behind that of the US and other members of the European Article Numbering Association (EAN). The EAN represents the system of bar code numbers for enabling automatic scanners at the checkouts in shops to identify individual products which has been agreed for use in Europe.

In 1985, Britain had between 130-160 scanning stores out of a total 100,000 retail outlets, i.e. shops equipped with devices which incorporate a low-powered laser beam to reach a barcode and transmit the result to a computer, in order to record the sale of the item in the system. France leads the way in Europe with 411 installations, Germany has 281 and Japan has 3,200 scanning installations. The US leads with, in early 1985, 11,000 installations. (Post News, 1985).

Diagram 3.12 Fall in the Price of EPOS Terminals

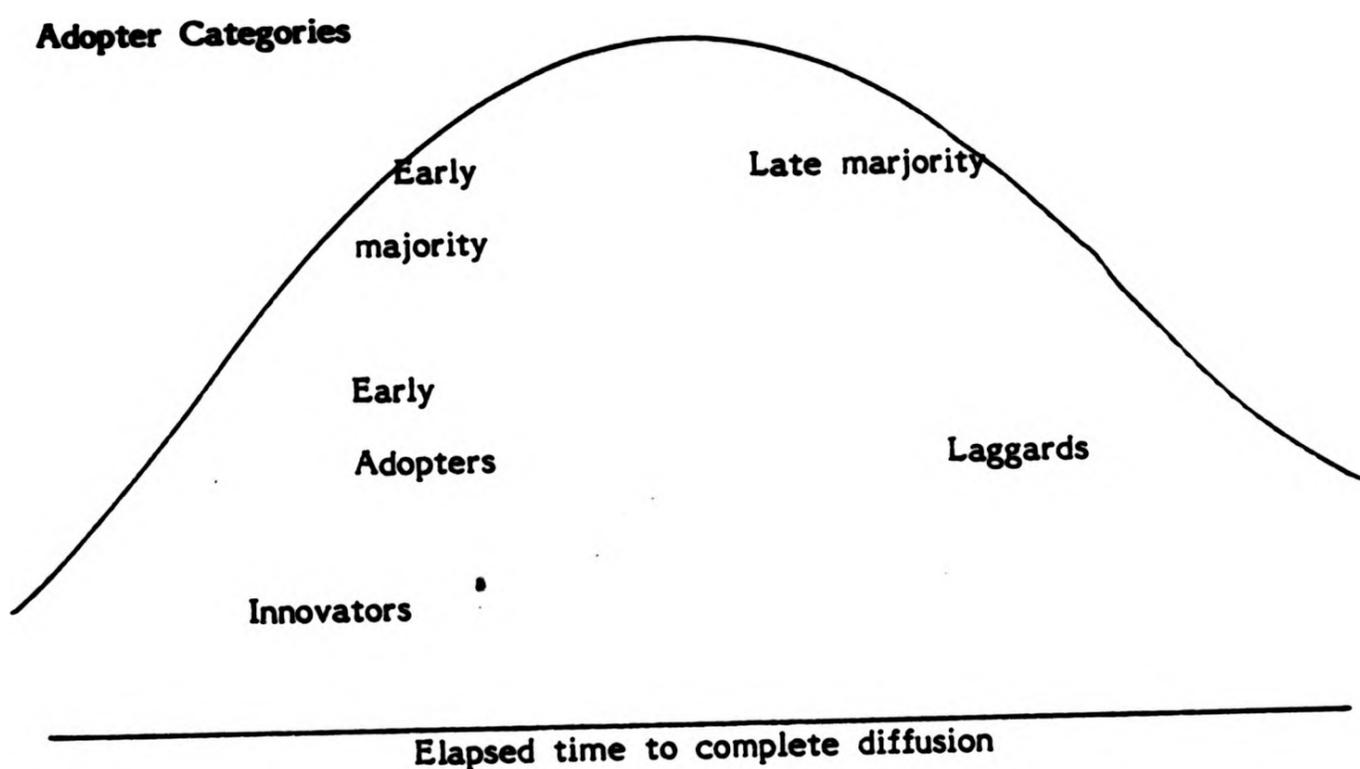
AVERAGE COST OF EPOS TERMINALS IN REAL TERMS



(Source: RMDP, 1982, p7)

According to Baker (1983) the shape of the curve is determined by two factors. Firstly, the characteristics of the technology itself and secondly, the way those characteristics are perceived by potential users. The second factor has been investigated by Rogers (1962) who developed a framework to analyse the characteristics as perceived by those firms who innovated at different stages of the curve. He identified five stages which can be illustrated as follows:

Diagram 3.13



(Baker, 1983, pp.77)

Relative advantage measures the economic benefit available to the adopter. Compatibility and complexity are inversely related. The more compatible a technology is with existing systems or methods then the more likely it is to be accepted. The less compatible an innovation with existing methods, the more complex it is likely to be. The extent to which it is possible to try an innovation before reaching an adoption/rejection decision refers to divisibility. Communicability reflects the degree of difficulty associated with communicating the benefits of an innovation - which is dependent on the preceding four factors (Baker, 1983). It is expected that adopters perceive these factors differently from followers and laggards. This analysis can be applied to a consideration of scanning applications in the UK. The S-curve identified in Diagram 3.13 suggests that the innovation is in the early stages of adoption, i.e. in the "innovators" and "early" adopters stages. Those firms which have introduced this new technology in the retail sector have perceived the development differently from others who have not innovated.

3.6.2 Retail Applications

Given the size of the potential market in the UK, many commentators and organisations are forecasting a massive growth in the number of scanning installations. Post News, a point of sale research organisation predicts that by 1988 the penetration of EPOS equipment will be in some 1,250 stores with 16,600 checkouts in use. A.C. Nielson (1980) have estimated that between 1986-1990 about 1,000 stores will be using scanning systems. Office of Fair Trading (1984) predicted that by the end of 1985 there would be between 300-600 scanning installations in the UK.

Table 3.13 and Table 3.14 illustrate the extent of technological penetration in the UK. From this data we are able to construct a retail industry S-curve for the rate of micro-electronic applications in the UK.

Table 3.13 Scanner Penetration Among Top 10 Scanner-Equipped Retailers
(April 1985)

Rank based on nos. of scanner equipped stores	Retailer	% of retailers total stores equipped with scanners
1	Tesco (Victor Value)	29
2	Co Operatives	14
3	Shoppers Paradise	11
4	Tesco	9
5	NISA	6
6	Independents	6
7	Sainsbury	3
8	Dee Corporation	2
9	Presto	2
10	Spar	2
		120

(Source: Management Horizons
Unpublished Data, 1984)

Table 3.14

Scanner Equipped Food Store
Total Installations at Year End

Year	US	UK
1974	14	-
1975	60	-
1976	171	-
1977	309	-
1978	642	-
1979	1,472	1
1980	2,899	5
1981	4,568	8
1982	6,677	30
1983	9,144	83
1984	11,227	120
1985	13,470	

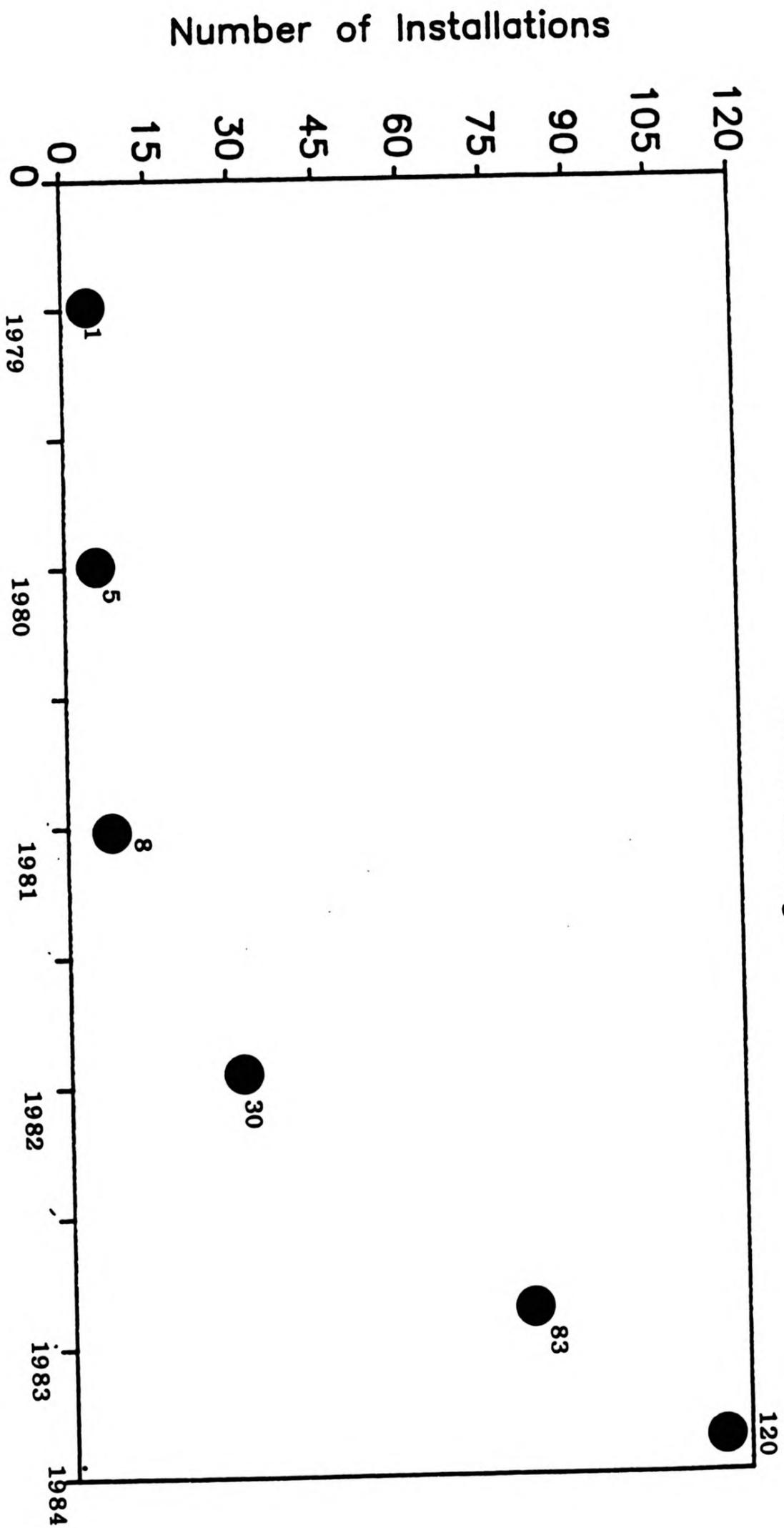
(Source: Based on Progressive Grocer, 1985; Retail Automation, 1984)

Post News (Vol. 11, No.1) suggest that the growth of scanning installations outside the US is only two and a half years behind. This compares with a lag rate of 4-5 years only three years ago. They consider that:

"The potential market for scanning systems outside North America is far greater than that inside." (Post News, Vol 11, No.1, pp4).

Diagram 3.14 overleaf shows that the adoption of micro-electronics in the UK retail industry demonstrates a similar curve as that in the manufacturing sector.

Diagram 3.14 S Curve of Scanning Installations
 S Curve Of Scanning Applications
 in Retailing



(Based on: Euromonitor, 1985)

Year Scanners Installed

Scanning installations however are still very much in the exploratory stage in the UK, as the major retailers attempt to justify the heavy investment of between £2,000 and £10,000 per terminal. Some retailers could be expected to make an investment of over £100,000 per outlet. The Office of Fair Trading estimates that retailers could be expected to recover the cost of capital expenditure within a period of between 8-10 years. They consider the benefits of the system to retailers as sufficiently attractive to make investment on such a large scale worthwhile, even in the present economic climate. A survey carried out by Spectra Services into the state of EPOS in Europe indicates that the penetration of EPOS terminals is still as low as 4%, ECR's account for 43%, with electro-mechanical registers still maintaining 53% of the presently installed base of cash points. (RMDP, 1982)

Electronic cash registers (ECR's) are now normal equipment for new stores. A survey in 1980 by the Institute for Grocery Distribution (IGD, 198..) found that 82% of new multiple shop outlets opened in 1979, and 94% of new co-operative shops were equipped with ECR's.

A number of benefits of scanning systems for the retailer were indicated in the McKinsey Study for the Standard Product Number Steering Group. These are still seen as valid today. McKinsey estimated that the Standard Product Numbering System (SPNS) with codes could bring a net benefit to the UK grocery industry of £5 million per annum at 1974 prices. The benefits thought to accrue to the innovating company were divided into three types. These are hard benefits, soft benefits and very soft benefits. Phillips notes that:

"In the view of some US executives, hard savings should pay for an installation, but soft savings will bring the profit on it." (Phillips, 1980)

"Hard" Benefits: are those which can be quantified. "Soft" Benefits: are those which are less quantifiable and generally manifest themselves over a longer period in improved management control. French has further extended this classification to encompass what he considers "Very Soft" benefits.

The "Hard Benefits" identified by the McKinsey study were:

1. productivity improvements at the checkout through the more efficient use of labour
2. the removal of misrings at the cash register
3. savings on cashier training
4. speedier reconciliation of cash
5. savings through the removal or reduction of labour for item price-marking and price changes
6. the elimination of the cost of the item price labels."

A study by Cohen (1979) of a \$150,000 per week store revealed a \$119,000 saving in direct costs the first year of operation with scanning equipment.

The savings were itemised as follows:

1.	reduced under-ring's	\$47,000
2.	lower front-end costs	\$36,000
3.	reduced marking costs	\$22,000
4.	a saving of 18 hours a week in streamlined book-keeping	\$ 6,400
5.	elimination of 7 hours a week in coupon redemption	\$ 2,400
6.	time saved in check authorisation and price checking	\$ 3,500

"Soft Benefits" are mainly management information benefits. These include:

1. improved re-ordering
2. tighter stock control
3. fewer out of stocks
4. improved sales administration and accounting procedures
5. reduced losses due to shrinkage
6. more efficient marketing techniques store layout
7. customer satisfaction through improved service
8. access to detailed information on all aspects of the business.

(McKinsey, 1974)

The "Very Soft Benefits" identified by French consisted of:

1. ability to make quick price changes
2. front-end space savings
3. better knowledge of achieved margin

(French, 1980)

French however adds one important qualification. He emphasises that EPOS systems are only techniques to aid management in daily operations and decision-making. Unless account is taken and any necessary adjustments made to the operational and systems environment in which they are used, no real benefits will be achieved.

A recent survey by Management Horizons in the US was able to quantify many of the scanning benefits achieved in a large food retailer. See Table 3.15 which illustrates the bottom line benefits which a store can achieve with scanner technology.

The data was generated from an internal study conducted by a US supermarket chain. The largest productivity benefit came from additional throughput at the checkouts, scanning stores saved 26.5% of the time taken per week to process an average basket of goods compared with a conventionally equipped store. The study also revealed that it took an average of 16 seconds to look up a price, set a gun and mark all the items in a case. The removal of item pricing therefore represented a significant decrease in employee work load. Initially the supermarket realised the "hard benefits" identified earlier. Unlike the observation study undertaken by the author which suggested that within UK retail outlets it appears to be the "soft benefits" that are realised earliest.

Table 3.15 **Initial Benefits of Scanner Equiped Stores**

Scanner advantage	% of savings	% of store sales
Checkout productivity	42%	0.85% (checkout time reduced 26.5%)
Elimination of price marking	23%	0.46% (42 man hours per week store savings)
Register balancing	15%	0.29% (50 man hours per week store savings)
Routing ordering of merchandise	9%	0.19% (32 man hours per week store savings)
Under-rings	8%	0.06%
Register replacement	3%	0.06%
TOTAL	100%	2.00%

(Source: Management Horizons, 1983)

3.7 Conclusions

The impact of micro-computers upon the retail sector can be classified into two areas of response:

1. those experienced by those working with the technology
2. those affecting the outlet

Within the service sector the introduction of new technology is expected to take place over a long period of time and initially result in an increase in employment. Although as Green (op.cit) noted earlier there is scope for employment displacement in the long term. The loss of jobs appears to be a likely outcome mainly because micro-electronics has been introduced to retailing for the same reasons as in manufacturing i.e. to aid the process of rationalisation. Achieved through the reduction of costs, increased competitiveness and increased management control.

"Equipment is often developed in response to a need felt and expressed by retailers as a direct result of their immediate environment." (Jones, 1978)

One organisation particularly concerned with this aspect is the Union of Shop, Distributive and Allied Workers (USDAW), which has a total membership of 441,500 (1977) out of a total of 1.8 million retail employees. USDAW have generally welcomed technological developments within retailing. They have expressed some concern, as they are aware that the capacity to improve check-out operations and remove many tasks presently done manually may destroy some retail jobs. This outcome they believe is reinforced by the effect that technology has had within the manufacturing and office sectors. (USDAW, 1982)

Studies by Bamber indicate that:

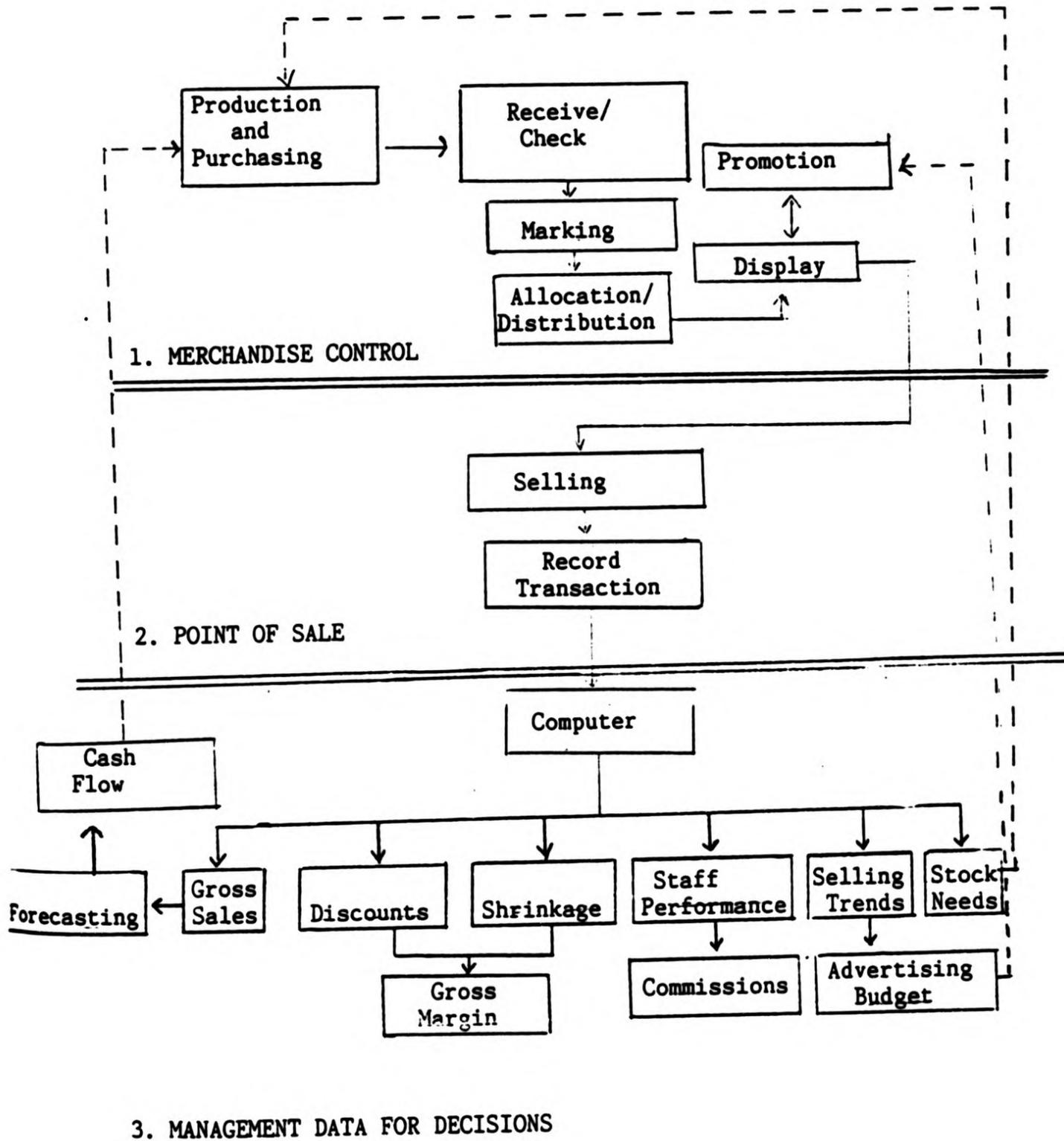
"the introduction of micro-processing technology appears to be intended to increase efficiency and to reduce or re-schedule labour."

(G. Bamber, 1980)

Since most source data in a retail organisation originates from the point of sale function, this is the centre of the retail management information cycle. Retail businesses are centred around the selling function, the other areas can be regarded as a service to the selling function and dependent upon it for their livelihood. The efficiency and accuracy of this function is therefore essential to the entire retail operation (See Diagram 3.15)

The underlying principle with the introduction of new technology in the retail sector is the desire to capture increased and improved management information to improve organisational efficiency and productivity. Retail organisations, like all other organisations, have need of management information of all types and at all levels, in order to effectively manage its business. The purpose of this management information is to assist the taking of decisions - decision making being the essential job of management. Previously, the data was available but the 'enabling technology' did not exist to transform the raw data e.g. sales records, inventory levels etc. into management information, i.e. to give historical trends and forecasts. The advent of the new information technologies has enabled computers to capture, store, manipulate and distribute this data and to pass it on into the management information cycle at an acceptable price and without massive organisational dislocation. This, in turn, affects

Diagram 3.15 The Retail Cycle



(Source: G T Jones, Computer Management, 1974, p 7)

control of the organisation by management (money, stock, manpower etc.).

Just as organisational pyramid in manufacturing and the office sector was considered, a similar type of analysis can be undertaken in retailing.

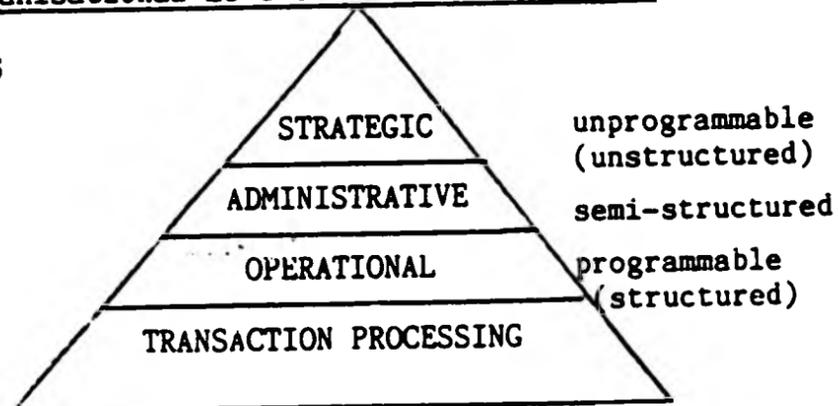
There are four decision areas that confront management in retail business.

1. Strategic Level
2. Administrative/Managerial Control Level
3. Operational Control
4. Transaction Processing Level

The strategic level is where the process of deciding or altering company mission and objectives takes place. The administrative level is where management control is exercised (e.g. merchandise manager, personnel manager etc.) The operational level is responsible for assuring that specific tasks are carried out as directed (e.g. department sales manager, distribution centre foreman etc.). The transaction processing level is at the base of the organisational pyramid. It is here that the actual details of a task are performed (e.g. clerical, checkout operator, sales assistant etc).

Organisational Levels and Decision Making

Diagram 3.16



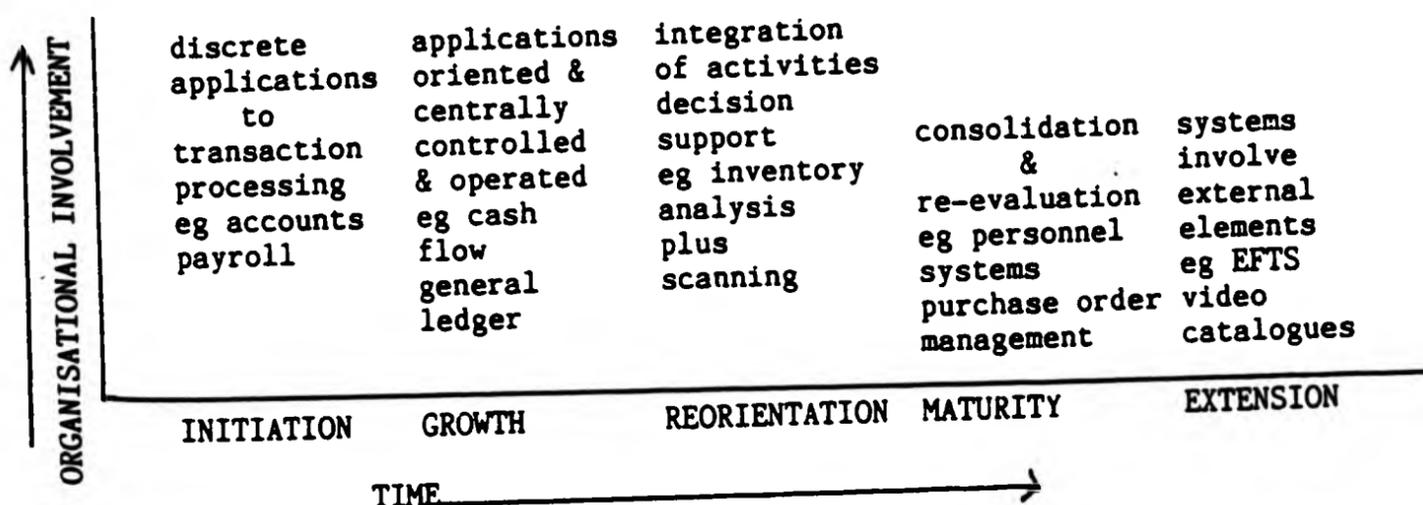
(Management Horizons, 1983, pp11-13)

In progressing from the base of the pyramid to the top, the nature of decision-making evolves from 'programmable' to 'unprogrammable'.

Computers have historically entered organisations at the base level, mainly because available technology was best suited for this level and the cost-saving benefits were most easily identifiable and measurable at this level. Computerisation at this level involves automation of tasks where little, or no, decision making is involved and a computer routine can be written to replace the decision maker. Recent technological developments have allowed organisations to better match the power of the computer to the needs of the other organisational levels. In general, the new technology has provided the foundation for change from a Transaction Oriented Data Processing System to an Intergrated Management Information System (MIS). As a result increasingly there is computer access to even higher levels of use within the organisation.

Diagram 3.17 illustrates the extent of computer development within retail organisations.

Diagram 3.17 Introduction of Retail Technology



(Source, Management Horizons, 1983)

The Figure also provides an alternative illustration of the S-Curve shape of innovations within a retail environment. As price falls and reliability improves so applications increase following a Rogers Diffusion path.

The cycle has five identifiable stages:

1. Initiation: at the first stage firms perceive technological opportunities for reducing costs or increasing productivity. They will begin to use mechanised computer based office and store equipment. With each function operating independently of each other.
2. Growth: there is rapid expansion of applications to new areas, with mechanisation of tasks at the transaction processing level wherever possible. The merging of more than one application into a 'system' concept becomes apparent.
3. Re-orientation: move towards integrating applications. The application of the computer moves up the organisation.
4. Maturity: stabilisation; some earlier systems are removed with higher levels of the firm involved in computer use for information benefits.
5. Extension: systems are integrated to include suppliers and customers.

The authors believe (Management Horizons, 1983) that the use of technology within a retail outlet follows a predictable path. Which gives technological leaders a competitive advantage over less sophisticated rivals. As the organisation becomes increasingly committed to the use of new technology and as it moves up its learning curve, so the effects of the technology are felt at increasingly higher organisational

levels. Through an examination of the number of existing UK and US scanning installations, the author would suggest that the British supermarket industry is at the initiation/growth stage of the curve, whilst the US supermarket industry has reached maturity/extension. Within the UK applications are mainly controlled or operated, with all tasks at the transaction processing level mechanised. Whilst in the US, most scanning systems have been consolidated and applications are continually involving external elements eg EFTS, home banking and video shopping. By utilising this approach the author can incorporate a predictive into the analysis. Which would allow a forecast on the likely effect of any development within the retail sector to be constructed.

The involvement of the various levels of the organisation and the extent of decision-making support roughly corresponds to even higher levels of the organisational pyramid as development evolves along the curve.

Nolan and Gibson suggest that:

"the application of technology to higher levels within the organisation and the successive commitment of resources to improve productivity results in fewer benefits and fewer options within current boundaries but builds the base to, or acts as the catalyst for, a strategic shift to a higher plane."

(Management Horizons, 1983, pp 39)

This situation is outlined over in Diagram 3.18

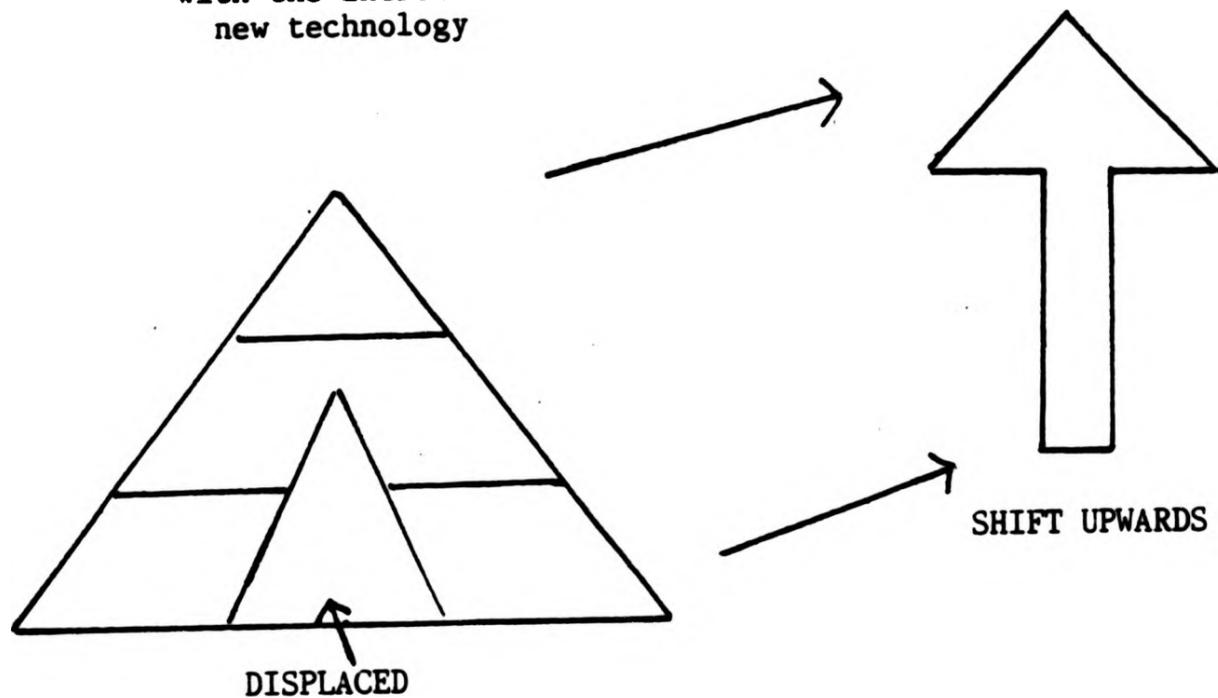
The decision to introduce computers is a strategic one taken by management within a long term perspective. If successful, shifts to

higher levels in the plane represent a competitive advantage gained over rivals. This movement up the operating plane corresponds to all development stages of the S-Curve. By implication the greater the extent of computer integration, the greater the economies and efficiencies achieved, therefore the greater the shift upwards along the operating or competitive plane.

Change in Retail Organisational Structure

Diagram 3.18

with the introduction of
new technology



(Source: Authors own model)

3.8. Implications of the Preceding Analysis

The preceding analysis attempted to show the benefits that management can expect to achieve with the introduction of new technology within the retail environment. It also outlined the current extent of technological adoption within retailing and the nature of future trends. The author believes that within retailing the effect of micro-electronics is expected to be very similar to that experienced in the manufacturing and office sectors of the economy. The author reached this conclusion through consideration of the organisational pyramid concept.

In manufacturing and office work there was a narrowing of the bottom to middle tiers, with a new sub-system established at the pinnacle, reflecting the creation of new scientific and professional jobs. The levels beneath are systematically reduced from the base upwards with ever increasing amounts of technology and degrees of sophistication. The jobs remaining now lack the skills and knowledge once required, and are now of a more routine and unskilled nature. Simultaneously, as the organisational pyramid changes form so the extent of management control increases from the top down - as the jobs of subordinates become more visible and accountable.

A similar situation is expected to be experienced within the retail sector as new technology is introduced. However, not only will the pyramid change in structure, but it is also expected to move slightly upwards reflecting an improvement in strategic decision making within the organisation. (Management Horizons, 1983)

From our preceding analysis of the technological effects on manufacturing and office work, it could be concluded that new technology has three simultaneous effects on employment: the displacement of tasks, a change in the nature of tasks, and the reduction in job creation potential.

Many writers, eg Boddy and Buchanan, Barron and Curnow etc. expect these three effects to bring about an overall decline in the jobs on offer. Electronic equipment is basically labour saving. Even a large increase in the output of new products will not affect the long-

term trend. (Rada, 1980) Whilst highlighting the difficulties in isolating the technological factor, Rada suggests that substantial job losses will continue throughout the 1980's. From our earlier analysis these prospects are consistent with the historical tendency for employment to fall in agriculture and more recently manufacturing industry, partly through the introduction of more advanced methods of production. (Gershuny, 1979)

The vulnerability of many female jobs to the application of new technology is not a function of the workers being female, but rather is related to the job themselves. As identified earlier, (see Chapter 2), the majority of women workers are concentrated into a few occupations, often those at the bottom of the occupational hierarchy. Those of the most routine nature and therefore those most likely to undergo systematic change by the application of new technology.

Using Green's (1980) and Barron and Curnows' analysis, and considering only the job categories outlined over, the author suggests a potential job loss of approximately 209,812 or 10% in the retail sector. In the manufacturing and office sectors new technology has the potential to affect all organisational levels. The projected job losses for the various occupational levels within the supermarket industry are therefore calculated as follows. See Table 3.16

Unlike the manufacturing sector, the potential job loss in the service sector may be reduced by the provision of personal service which cannot be directly substituted by the application of technology. Retail work provides a gap between the theoretical increases in productivity

Table 3.16 Expected Job Displacement in Selected Retail Occupations

Store Level Occupation D.E.D. effect expected	Men	Nos. of men in occupation as a % of all men	Women	Nos of women in occupation as a % of all women
Store Managers med-low 10901	359,480 (35948)	39.1	191,240 (19124)	14.4
Sales Supervisors med-low 10%	10,200 (1020)	1.1	24,370 (2437)	1.8
Shop Assistants med-low 10%	116,030 (11603)	12.6	652,380 (65238)	49.0
Cashiers, Check-Out Operators high-med 25%	N/A	-	69,500 (17375)	5.2
Clerks high-med 25%	18,940 (4735)	2.1	124,000 (31000)	9.3
Secretaries & Receptionists	N/A	-	43,490 (10872)	3.3
Bakers low 10%	2,810 (281)	0.3	N/A	-
Butchers low 10%	43,910 (4391)	4.8	4,700 (470)	0.4
Storekeepers High-med 25%	40,810 (4081)	4.4	12,370 (1237)	0.9

592,180
DED (62059)

1,122,050
DED (147,753)

The author used these examples of job categories only as an illustration of the potential job losses that could be realised with the introduction of new technology within retailing.

(Source: Census of Population 1981
Economic Activity Tables 14)

attributable to the new equipment in specific tasks and the actual effects in operation. This is because many retail tasks cannot be quantified or directly measured e.g. personal service or customer interaction.

Curran and Mitchell (1982) suggest that productivity savings and service levels are not directly substitutable:

"....cost cutting and productivity increases are frequently in contention with service levels."

(Curran and Mitchell, 1982, p 149)

In their study of new technology and office work they suggest that some companies are so obsessed with the productivity of clerical staff that they tend to remove support altogether from non-quantifiable tasks in search for greater accuracy in production measurement. (op cit, p148) They consider that secretaries are grouped together despite the inefficiencies this creates for their bosses. This expectation is reinforced by the work of Boddy and Buchanan (1983). Their study conducted on typists transferred into word processing pools, highlighted the reduction in job satisfaction and increase in work pressure and pace that resulted. Although there were no direct employment displacement effects.

Curran and Mitchell (1982) believe that the productivity/efficiency philosophy may be inappropriate within a service environment, though they suggest that the 'productivity' approach may be utilised because it is easier to quantify.

"For marketing proposals relating to a competitive, high-value transaction, a 'service' emphasis is needed."

(op cit p149)

The author has adopted the Productivity vs Service table developed by Curran and Mitchell (1982) to consider the application of scanning in a supermarket.

Table 3.17 Productivity vs Service (Retail Example)

Elements Leading to Higher Productivity	Elements leading to Improved Service
longer work queues (reduced idle time spent waiting for customers)	shorter work queue (quicker response, shorter turn round)
Work overload (no idle time, pressure to work faster)	work underload (spare capacity, ability to tackle peaks)
measurement focussed on quantity (high output per worker)	measurement focussed on quality (emphasis on service provided)
mechanisation to reduce costs (reduce labour content)	mechanisation to increase range of services (new ways of dealing with customers)
strictly defined tasks (consistent work pattern)	loosely structured jobs (responds to customer/service priorities)

(Based on: Curran & Mitchell, 1982)

As with a typist, a shop worker does not work alone. They provide a service to customers as well as operating the outlet. Her value and contribution can only be measured effectively by considering the entire retail operation. To automate shop work may increase productivity and shopworker output in terms of reduced labour costs or increased shop earnings. But the worker loses touch with customer preferences and the amount of product knowledge is reduced - with an accompanying

decrease in job satisfaction for the employee - ultimately the provision of service to the customer is reduced.

In a pilot observation study undertaken by the author in a retail outlet that was high service based and which was introducing new technology, there was a frustration and distancing and reduction in job satisfaction on the part of many workers throughout the occupational pyramid. (See Chapter 4) With the introduction of a computer based stock system inevitably the direct service offered by the staff to customers was reduced.

The preceding analysis has predicted some change in the structure of jobs and the numbers employed with the introduction of new technology. However, technology is expected to not only change the structure but also to change the nature and content of work itself.

As demonstrated earlier as the number of innovations increases and the industry moves up the microprocessor S-Curve, the price of equipment falls and the extent of applications increases. At the same time the potential for new applications arise in areas that were until that time considered either impractical, uneconomic or not suited to automation.

Historically, most procedures/processes in the service sector have been done manually - the introduction of microprocessing equipment allows many of these objectives to be substituted by machines. Some examples are: Typewriters by Word Processors; Bank Tellers by Auto Tellers and Manual Stock Ordering by Portable Data Capture Units (PDCU).

Earlier analysis has shown that most women are employed in the service sector, and within the industrial sector on 'service jobs'. Within these 'service jobs', women do very specific tasks - usually the simplest, the most repetitive and the least skilled. Most service tasks are associated with information - be it customer or product related - and most women are usually assigned to the handling of this information (its transmission, formatting and storage). In retailing this information is product related. As earlier demonstrated, within retailing men have taken over the higher status and more highly skilled information analysis and decision making jobs, in the retail occupational pyramid women disproportionately occupy more of the lower levels.

It is believed that technological change will have a profound radical and rapid impact on service jobs (European Pool of Studies, 1982). Many factors are expected to bring this about: Firstly, equipment is becoming cheaper, microprocessors are now one tenth of their value in 1971. Secondly, information handling, due to its routine nature, lends itself to new technology. Furthermore, work organisation in the service sector has not yet been subjected to systematic rationalisation and therefore the scope for higher productivity is all the greater.

The introduction of new technology within retailing is likely to be met by little resistance from the workforce (E.P.O.S. 1982). This is because the majority of retail employees are female, sixty-nine percent out of a total of 1.87 million. The retail union, USDAW, has a total membership of 441,500, or twenty-five percent of the workforce, mainly recruited from the warehouse and distribution sector. Historically

females are less likely to join unions than males, partly through social conditioning and partly through their high mobility in entering and leaving the workforce.

Because there has been less rationalisation of shop-work than in the office or industry, it tends to consist of a multitude of individual tasks which make up a whole that is more coherent socially than technically.

3.9 The Effect of New Technology Upon the Nature of Work

A major theme of the literature concerned with the introduction of technology in a work environment has been with its effects on the quality of working life. The primary notion is that basic changes in technology lead to major changes in the division of labour and the content of jobs (Mann 1962). Earlier analysis has demonstrated that these changes in the structure of jobs have the potential to affect social relations among workers, and thus career patterns, channels of promotion and job security.

Most earlier writings were concerned with manufacturing and industrial workers or processes, later investigations applied these findings to clerical and office work.

One over-riding similarity between manufacturing, office and retail sector employment is the vast number of routine tasks or procedures carried out by workers in all these sectors. Another common feature is the repetitive nature of such tasks and the frequency with which they

are undertaken. Some examples from each sector would be:

Manufacturing: car assembly

Office: typing standard letters

Retail: recording supermarket purchases.

Each of these appears a priori to be suited to the application of micro electronics. Given the distinguishing features of the technology outlined earlier and the areas to which application are appropriate. Many additional similarities exist between service occupations within retailing and clerical work: the large number of female employees, the nature of the task performed, the role of inter-personal relationships and traditional channels of promotion etc. This suggests that many of the findings generated from investigations into the clerical and manufacturing sectors would be equally applicable to the study of the introduction of new technology within a retail environment.

Having earlier investigated how the introduction of new technology affects the structures of organisations and the numbers employed, the author expands here analysis to a discussion of the effect of new technology upon the nature of work within the office and manufacturing sector. The author then superimposes these findings on the retail sector to determine the extent of the transformation on the nature of jobs and identify if the effect is differential between occupational groups or sexes.

3.10 The Literature

Huws (1982) has identified the need for empirical research into the effects of the introduction of new technology upon female employment. Firstly, because it seems likely that the introduction of new technology

will have a transforming effect on domestic life and the nature of communities. Secondly, because of the concentration of women in service employment and in un-skilled and semi-skilled manufacturing jobs, both areas where new technology is being rapidly introduced. Huws suggests that it may have a disproportionate effect on women's employment. The author therefore needs to determine if women's work is differentially affected during technological change. There are few references to the employment consequences for women specifically in the literature. Most writings ignore gender as an important analytical variable. Studies tend to concentrate on the relationships between size and management hierarchies, organisational structures and control. In this analysis, the author first tries to determine how the introduction of new technology affects the nature of work within the manufacturing and office sector and then attempts to apply these findings to the retail sector. And within this framework consider the special case of female labour.

Sleigh et al (1980) report that computerised systems have been alledged to result in staff reductions of up to twenty percent in stores in the US. They suggest possible staff reductions in store clerical functions of up to fifteen percent, arising from computerised ordering and invoicing and automatic stock-taking.

In 1980, the retail union USDAW believed that

"the next two or three years will be years of experimentation and that only after that has taken place will the full effects of change be felt."

(USDAW, 1980)

Their preliminary assessment of effects on employment were that clerical work associated with ordering, stock-taking and price marking, were likely to be significantly reduced by the use of point of sale systems connected with price look-ups. Since these early forecasts were made, no significant findings of job displacement as a consequence of new technology have been forthcoming. Mainly due to the high level of labour turnover within the industry that may conceal displacement effects.

Efficiency gains arising from more extensive computerisation may enable larger stores to expand, transferring redundant clerical staff into selling. With the automation of point of sale functions and the current economic climate, these vacancies may no longer exist. But such improvements of competitiveness of large outlets may lead to their expansion at the expense of smaller, more labour intensive, retail outlets (Sleigh, 1980). These consequential effects could have a substantial impact on total employment in retailing and would be particularly serious for female employment (SPRU, 1982).

Starting with this outline, several lines of reasoning are developed in the literature concerning the impact of technology on shop-work.

Huws (1982) has indicated the need for empirical research into the effects of the introduction of new technology upon female employment. Most writings on the introduction of new technology ignore gender as an important analytical variable. As suggested earlier studies tend to concentrate upon relationships between size and management hierarchies,

organisational structure and control. As a result, it is very difficult to determine what happens to women workers during times of organisational change. The author has identified several recent major studies that have investigated the effect of the introduction of new technology upon the nature and content of work. From this work the author hopes to determine whether women's work is differentially affected during technological change. The studies investigated are not grouped in any particular analytical order, but rather are arranged within the context of the theoretical argument developed in Chapter 4.

3.10.1 Mumford (1967, 1968)

As early as 1967 Mumford (Mumford and Banks, 1967) suggested that as computers are used to control larger areas of business activity so the social and organisational problems associated with their introduction would become increasingly complex.

Mumford (op cit) believed that technical change in the office may be more difficult than in the factory. As many production departments of manufacturing firms have become accustomed to handling and adjusting to frequent changes in technology and may have learned to do this efficiently and easily. Since Mumford's research (conducted in 1967) before the advent of microchip technology, the development and penetration of technological equipment has advanced so much that the same may now be said of the office sector. With the growth in applications, the retail sector is currently undergoing structural adjustment, similar to the office sector in the late 1960's and early 1970's.

Mumford and Banks (1967) conducted a number of studies to investigate the effect of the introduction of computers upon clerical staff. The survey consisted of three stages. Firstly, a pre-change attitude survey designed to obtain information on the office clerk's social class, educational background, formal qualifications, occupational history and their present job. Secondly, attitude data was collected on working conditions and promotion prospects and the effects of automation on the role and position of the clerks. Lastly, a post change survey was conducted covering the same areas, but which concentrated on eliciting differences in the clerk's perceptions of his job, role and status after office automation compared with before. The study was carried out over a three year period within two service firms. The number of clerks interviewed was not stated.

In their final analysis the authors concluded, that although there was no evidence of downgrading among the clerks, they considered their jobs to be more routine and 'narrower' in terms of content than prior to automation. With respect to specific job attributes that changed the most with automation, Mumford and Banks found that interest and variety were the aspects that decreased the most after automation. Accuracy and the amount of work done exhibited the greatest increase.

3.10.2 Whisler (1970)

Whisler (1970) investigated the impact of the use of computers in nineteen insurance companies. Research data was gathered by personnel within each firm. The period covered extended from pre-introduction through to several years use - this data was unstated. Data was gathered through the use of personal interviews. Whisler examined the

effect of the computer on four levels:

1. Organisational Structure/Employment Effects
2. Decision Making
3. Authority and Control
4. Job Content

The conclusions Whisler reached from analysis of his data was that employment effects were concentrated at the clerical level, where employment declined. At the supervisory level the effects were mixed and at the managerial level little employment change occurred. With respect to decision making he found that decision systems were consolidated with the use of computers, i.e. decision making is increasingly quantified and rationalised and moved to higher levels in the organisation. As a result jobs become more formalised and clerical workers were less involved in decisions. Their job was also less autonomous.

The evidence on the impact of computers on authority and control indicated that computers increased the centralisation of control. Computers take over certain aspects of controlling or supervising human behaviour, and as a consequence control or discipline with respect to the individual's behaviour is tightened, particularly at lower levels of the organisation.

The basic expectation of Whisler's study was that computer systems will eventually have an effect on the content of virtually every job in the organisation (op cit p25). He believed that human activity within the organisation would be affected in at least three areas. Firstly, on the content of jobs, secondly on patterns of communication,

and thirdly, on the skill requirements for individuals in the organisation. He expected that jobs would become increasingly routinised at lower levels of the hierarchy and that this would spread upwards throughout the organisation. Until the organisational point is reached where new goals and ideas are introduced. At this level, the mix and variety of activities should increase, jobs should become broader and less routine, Whisler suggests that the upper level jobs, gaining in control, should increase in variety and richness (op cit, p127).

Whisler believes that the computer system superimposes the machine onto existing communication channels. Within organisations members perform different tasks all related to the output of services - where the activities in one job affect those in another. To operate effectively individuals must communicate with one another, with information flows paralleling the flow of work. With computerisation people must communicate with a machine. Whisler expected that man-machine communication would be substituted for formerly man to man communication, as a result individuals would be expected to work alone more or to perform their jobs with less interaction with other people. He also expected that computer systems would take over many of the computational functions of the clerk. The effect upon supervisory and middle management jobs, he expected, would be related to the stage of systems development. As the system becomes fully integrated and operational, so the skill required by these occupational groups should be decreased. Senior management skills, at least in the long run, were expected to be upgraded.

Whisler's data revealed that with respect to the effect on jobs, with the introduction of a computer, clerical work became more routinised while supervisory jobs tended towards enlargement. No evidence was found in terms of the routinisation or enlargement of managerial jobs. He also found that where systems had been in operation for some - particularly at the clerical and supervisory levels - the result was to diminish the level of interpersonal communication. Where computers were in the process of development - chiefly at the managerial or supervisory level - the result was to increase the flow of interpersonal communication. Skills were affected at all organisational levels, but the skill changes were most pervasive at the clerical level, diminishing at successively higher levels. The overwhelming effect was an upgrading of skills, though the upgrading effect was 'tempered' at the clerical level, with approximately one third of the changes in the direction of downgrading.

Summarising Whisler's findings, clerical jobs required a greater skill level and were less autonomous, less interdependent, more formalised, more routinised and more productive after the introduction of computer systems. In fact so much so that the companies would have to hire approximately sixty percent more clerical staff if they were to attempt to maintain the same level and quality of service as they had without computers. This reinforces the belief of Curran and Mitchell (1982) that service and productivity, within the service sector, are incompatible. One can only be achieved at the expense of the other.

3.10.3 Boddy and Buchanan (1983)

Boddy and Buchanan analysed seven case studies of various firms using computer aided manufacturing and office automation systems. The authors believed that new technology would have a similar effect in different settings.

They used a variety of research methods: loosely structured interviews with managers and operators; analysis of company reports and minutes from meetings; observation of the technology in action and the feedback of findings to individuals to check accuracy.

They identified three weaknesses of their case study approach:

- "1. the lack of control over a large number of variables that can influence the findings.
- 2. Results from one unique set of circumstances may be generalisable only to a limited number of similar settings.
- 3. Data were gathered after the technological change had taken place, therefore results rely on respondents memory."

(op cit, 1983, p5)

The over-riding assumption of their study was that there was a choice in how new technology is used. In addition, they believe that all information technologies have features in common. The new technologies they were investigating as listed in Table 3.18. In total there were seven manufacturing and four service sector applications.

Table 3.18 Technological Applications: Boddy and Buchanan

COMPUTER AIDED MANUFACTURING	COMPUTER AIDED ADMINISTRATION
computer aided design numerical controlled computers robots automated storage computer aided stock and production systems computerised process controls computer measurement & testing	word processing electronic mail computer aided order processing computer data base management systems accounting procedures

(Source Boddy and Buchanan 1983, p5)

Boddy and Buchanan identify the most pervasive reason behind the use of new technology as the concern to achieve better information about the control over the work-flow and operations. However, the cases investigated revealed a variety of management objectives and goals associated with the introduction of new technology. These objectives can be classified into three areas.

Table 3.19 outlines the various motives and goals involved.

The case examples of Boddy and Buchanan can be considered under three separate headings. Strategic objectives, operating objectives and control objectives. The figures in Table 3.18 give the number of times that an objective was expressed as significant by the companies in the sample. The table also shows the diversity in management goals with respect to new technology. It highlights the importance of operation and control objectives to management, with sixteen operating and fourteen control objectives mentioned as significant by management and only five strategic. The opportunity to improve product quality was considered the most important operating objective with four responses. The ability to reduce human error and intervention was considered the most important control objective with four responses.

This finding reinforces the work of Barron and Curnnow outlined earlier in terms of the organisational pyramid. Within companies, strategic decisions or objectives are of a long term nature, the preserve of senior management. From the S-Curve of innovations we know that most

Table 3.19 Managerial Motives/Goals with New Technology

STRATEGIC OBJECTIVES	OPERATING OBJECTIVES	CONTROL OBJECTIVES
meeting changing market conditions (1)	improve product quality (4)	reduce human error and intervention (4)
reduce production lead times (1)	reduce costs (1)	over the workflow (2)
become market leaders (1)	replace obsolete equipt (2)	reduce staff co-ordination problems (1)
	overcome bottlenecks (1)	
	exploit capabilities of other technological advances (1)	
reduce costs and improve quality (1)	increase capacity (2)	improve consistency(2)
achieve product consistency (1)	improve product flexibility (1)	achieve machine autonomy (2)
	reduce numbers & costs of support staff (1)	computerise and centralise production control (1)
	reduce production waste (1)	get rapid management into on key aspects of production (1)
	reduce labour & plant running costs (1)	improve recording & analysis of process performance (1)
	achieve consistency in the workflow (1)	
Total	5	14

(Source: Management Horizons, 1983)

UK companies are at an early stage of innovation - where applications are at a lower level in the organisation. The majority of applications would therefore be concerned with short to medium term decision making i.e. operational and control objectives. A pilot observation study undertaken by the author (see Chapter 4) revealed similar results. The over-riding aim of management with the introduction of new technology was to achieve specific operating and control criteria.

In their case studies, Boddy and Buchanan found that often these objectives conflict in operation, but that:

"....reducing uncertainty and increasing control
....appear to be important features of management
thinking in the use of computing technologies."

(p224)

The authors suggest that changes in structure that accompany technological change reflect the expectations and objectives of management and indirectly the characteristics of the technology. They found that different management levels had different expectations about technological change and the opportunities and threats it presents in the workplace. Senior management concentrated upon costs, ROI and competitiveness. Middle management tended to be more concerned with control over the workflow. Supervisory management focussed on reducing disruption of the workflow and human frustrations. Service departments were concerned mainly with the ability of the technology to handle information previously done manually. Such a finding corresponds with the observation study undertaken by the author.

All the companies in the survey experienced a change in structure with the introduction of new technology, an effect similar to that

predicted by Barron and Curnnow (1979), most notably a reduction in lower to middle management functions. Boddy and Buchanan suggest three possible reasons for this finding. Firstly, computing technologies provide machine pacing of operatives. Secondly, production performance information is captured and analysed automatically. Thirdly, management lose their traditional skill superiority as operators become knowledgeable about the functioning and output of the technology.

Specific examples from their data include:

Computer generated machining schedules: first line supervisors' knowledge is made redundant.

Computer aided draughting: co-ordination of staff effort was achieved through the computer system.

Word processing: terminals encouraged typists to maintain work pace.

Computer monitors and controls: visual displays alerted operatives to take action.

Many similar parallels are drawn with the author's own observation study in Chapter 4. Some specific examples within retailing could include:

Automatic stock re-ordering; no unique product knowledge is required by the manager/department head or sales assistant.

Scanning systems: no skill or manual dexterity is required to enter the price of products, rather this is now done automatically by the machine.

Boddy and Buchanan believe that:

"The changes to structure that accompany technological change reflect strongly and directly the expectations and objectives of management, and weakly and indirectly the characteristics of the technology. Control objectives are particularly influential, leading to specialisation and isolation of functions, in ways that may interfere with strategic and operating objectives."

(p 244)

As the authors suggest, some commentators see technology as more sophisticated devices for controlling the workforce, others see the computer as an opportunity for automating repetitive manual work and for creating more interesting and challenging forms of work organisation. But the technical features of a given innovation are not sufficient for predicting the effect of its application. Rather the consequences depend on the goals, assumptions and values of those who make decisions about the use of technologies in organisations. Boddy and Buchanan (op cit) suggest that the changes to job characteristics that accompany technological change are a combination of the technology itself the objectives and expectations of management.

"Computing technologies make demands on human information processing and decision making skills, reduce the need for some manual effort and skill, and introduce new forms of work discipline and pacing. The extent to which responsibility, discretion, challenge and control increase, however, depends on managerial decisions about the organisation of work. Control objectives are again influential, leading to forms of work organisation that may interfere with operators' ability to use the technology effectively."

(op cit, p 246)

Boddy and Buchanan believe that new technology can both complement and frustrate the human problem solving, decision making and information processing abilities. One example of 'complementarity'

was demonstrated through the introduction of computerised process controls. Where the computer controls corrected some deviations automatically, but mainly fed information back to the operator who in turn interpreted this information before taking any remedial action. Effective plant operation depended on the judgement and experience of operators. An example of 'complementarity frustrated' was the case of the word processing pool. The isolation of typists from report authors meant that the typists could not develop and use knowledge of authors preferences, did not know if the report was final copy or a draft, and did not check the spelling or layout. As a result efficiency suffered as authors had to spend more time proof reading. This frustration was not dependent upon the technology itself, but rather is a function of the way management arranges work around it - often in an attempt to reduce human intervention and tighten control over the work flow.

Both authors believe that no technological determinism accompanies the introduction of new technology. Rather that the impact on the experience of work depends on the choices that are made about the organisation of work around the technology. These choices are influenced by management orientations concerning the control of work. Yet despite management desires to replace people with machines, the cases demonstrated that people appear to be essential to system control and reliability and will still therefore be needed in offices and manufacturing systems. As a result, new technology opens up areas of discretion and creates demands for new skills rather than simply deskilling and replacing people with machines. They believe that control objectives are influential in creating new forms of work

organisation that may interfere with the operators' ability to use the technologies effectively.

In summary, the studies undertaken by Boddy and Buchanan suggest that new technologies are opening up areas of discretion and creating demands for new skills rather than simply deskilling and replacing people. Where the number of jobs lost will depend upon:

- a) The unit of analysis
- b) The time scale
- c) The use to which the technology is put.

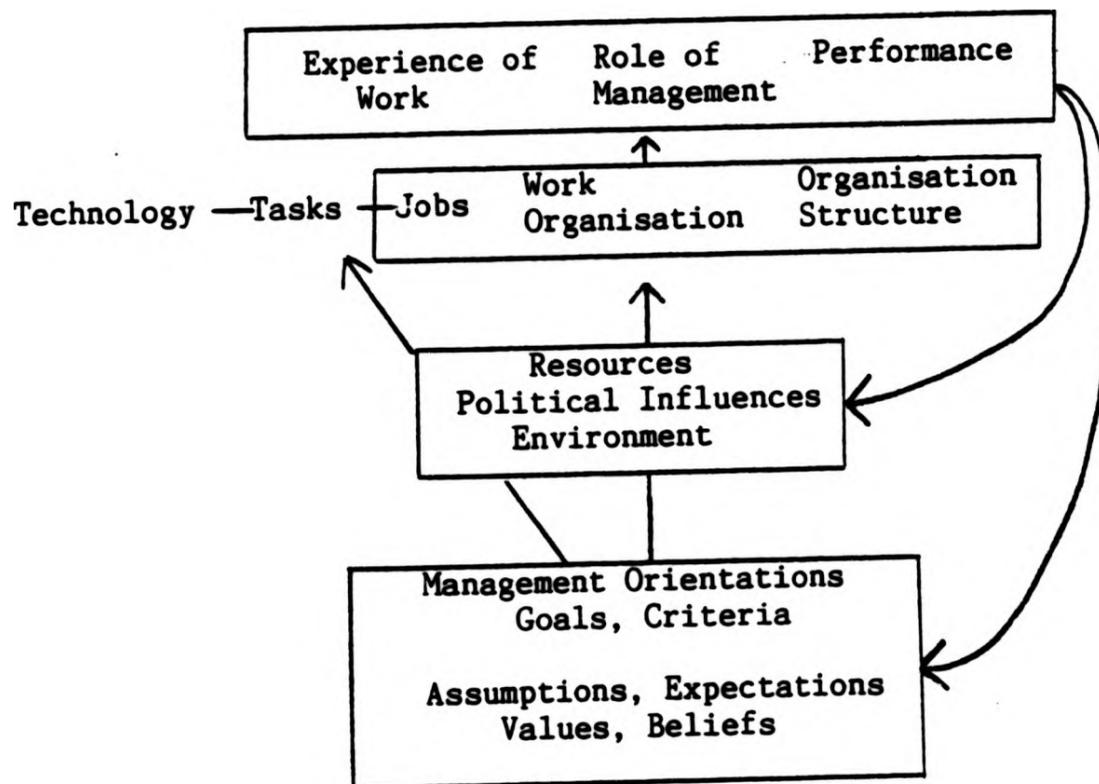
They conclude that:

1. Computing technologies make demands on human information processing and decision making skills.
2. Reduces the need for some manual effort and skill.
3. Introduces new forms of work discipline and pacing.
4. Creates a need to understand how the technology works.
5. Leads to more employee isolation.
6. Gives higher 'visibility' of operators through automatic recording of performance.

"It is not the technology, but decisions or choices concerning how the technology will be used, that determine the experience of work, organisation structure, the role of management and performance. The capabilities of technology are enabling, rather than determining. They facilitate the pursuit of particular goals in particular ways, but determine neither the ends nor the means. End and means are ultimately determined by the decisions of those in positions to direct the use of the technology, and design jobs and organisation structures around it."

(op cit, p 255)

Boddy and Buchanan have also developed a general model of technological change:

Diagram 3.19 Model of Technical Change

(Source, Boddy & Buchanan 1983, p254)

Within this model tasks are regarded as elements of the job. Tasks can be combined in different ways to form jobs. Different forms of work organisation can be created by grouping jobs together, organisational structure is determined by the way work is controlled. Job design and work organisation affect demands made on employee knowledge and skills, the experience of work and performance. The decisions made about jobs, structure and organisation are not determined solely by technology but also by management goals and objectives which are themselves constrained by the operating environment and resources.

This model can be used to examine the 'problems, choices and opportunities' associated with new technology on three levels within the retail sector:

1. On the quality of working life. How the individual experience of work at managerial, shop and office levels will be affected.
2. On the structure and functioning of organisations. The ways in which control of work flows are affected, and the way in which new sources of organisational conflict may arise.
3. On occupational and employment patterns. They expected that changing skill requirements will put pressure for change on organisational recruitment and training procedures.

Although Boddy and Buchanan criticised many of the earlier writings on the effect of new technology on the grounds that it considered only one development i.e. microprocessors, their work generally reinforces many of the earlier findings.

- a significant change in organisational structure/pyramid through the reduction of the middle tier.
- a change in the level of skill required at all levels
- job displacement
- creation of new jobs of a scientific or professional nature
- indeterminate effect at the base level i.e. complementarity vs frustration.

The significant development identified by Boddy and Buchanan is that these changes are not necessarily the result solely of the introduction of new technology. They found no 'technological determinism' i.e. there was nothing in the technology itself that dictated how tasks should be performed. Rather, they suggest that the effect of new technology is a direct consequence of management objectives on introducing the technology and how they subsequently reorganise work around it. Many

of the earlier studies suggested that the effects were as a direct consequence of the introduction of the technology itself.

Because Boddy and Buchanan believe that all new technologies have something in common, the author intends to take their analysis and model one step further and test its appropriateness in the retail sector and determine if the findings generated in the manufacturing and office sector still hold in a retail environment. Which, as demonstrated earlier, is not significantly different from the office sector.

3.10.4 Huws (1982)

Ursula Huws' 1982 study was a cross-sectional analysis of the effects of technology on employment in one area, West Yorkshire. Twenty-seven cases were considered ranging through the entire industrial spectrum e.g. printing, engineering, universities etc. The only substantial group with similar occupations were clerical workers.

The data was gathered through questionnaires. Over two thousand were mailed out, only forty replied. This was supplemented by informal discussions and an extensive literature search. With such a poor response rate, the findings must be regarded with some scepticism. Nevertheless, some important findings are generated that may have some relevance to the introduction of technology within the retail sector.

The study was carried out on behalf of the Equal Opportunities Commission and was an attempt to identify the effects of the introduction of new technology upon female labour. Like the Boddy and

Buchanan study, Huws' analysis was not confined to the examination of any one technology within any particular sector. The technology investigated was dependent upon those who returned completed questionnaires. The sample was obtained through a trades union resource centre, the results may therefore be biased in favour of responses of people with a more active political interest than the average working female - the distribution of responses received reflected the extent of union organisation in that sector. Where union organisation was weak or non-existent, very few questionnaires were returned.

Although the restrictive nature of the responses precludes us reaching any firm conclusions, many of Huws' findings are significant.

The author shall examine the responses obtained by Huws regarding:

- jobs affected by new technology
- response of fellow workers
- stress
- individual responsibility
- control over the work process.

In the majority of cases more female jobs were affected by the introduction of new technology than males. Of the twenty-one respondents, only three gave a higher figure for men. Given that sixty percent of the organisations in the sample employed more men than women, this figure represents only seventeen percent. Indicating that in this sample women's jobs were proportionately more affected by new technology than men's. On the type of work affected by new technology, eighteen out of the twenty-nine who responded believed that only

clerical jobs were at risk; six thought only manual jobs would be affected and two suggested scientific and technical jobs were most at risk.

When asked to gauge the response of fellow workers to the introduction of new technology, most respondents believed that they were unconcerned, seventeen out of thirty-two. No one was opposed to new technology, six reported 'in favour' and two described fellow workers as 'pleased'. In fifteen of the cases, workers were 'worried'. Trades unionists were thought to be more concerned than non-trades unionists. Respondents were further asked if there had been a different response from people doing different jobs. Twenty-two responded. Seven believing there to be no difference, fifteen reported some difference. In general the people most affected were most concerned, although one exception was people who felt that boring jobs could be improved. In two cases, older workers were described as particularly worried. When questioned about how they felt technology had affected their promotion prospects, thirteen said they had deteriorated, seven felt they had remained the same and two thought they had improved (both were scientific and technical workers).

Most respondents felt that technology had increased the amount of stress connected with their job. In not a single case did the amount of stress decrease. Although the amount of stress had increased, individual responsibility appeared to be reduced by technology. Of nineteen responses, eight had less responsibility, five had more and five had no change. One respondent felt that senior staff would have more but others less. As individual responsibility was diminished,

so too was control over the work process. Of twenty-one respondents, five felt that they had more control four believed the situation unchanged, but twelve believed that they had less.

One obvious weakness of Huws study is that it is impossible to identify questionnaire responses with industrial sector, nor are we able to identify if the response is from a male or female. This, in effect, makes it difficult to reach firm conclusions regarding the differential impact that new technology has upon males and females, since some of the sample may have been male. Nevertheless, it may be appropriate to adopt a similar set of issues to be investigated in our analysis as those covered by Huws. We expect that those findings outlined above will be equally valid in an examination of the retail sector.

Huws research concluded that as a result of traditional patterns of job segregation, and inadequate education and training in scientific and technical subjects compared with men, women are disproportionately affected by the introduction of new technology. Not only are they more likely to lose their jobs, but they are also more likely to find that the quality of work has deteriorated in the jobs that remain. She also found a low level of awareness of these problems among employees, a situation not mitigated through collective bargaining in the majority of cases. But as suggested earlier, this could be due to the lack of unionisation within industrial sectors that traditionally are large female employers.

The author attempts to superimpose much of Huws analysis upon the

Boddy and Buchanan model - which contained no assumptions regarding the differential impact across occupational groups or between sexes - to determine the effect on the structure, number employed and the nature of work affected through the introduction of new technology.

3.10.5 Bird (1980)

Emma Bird conducted a study in 1980 to investigate the impact of information technology on women's jobs on behalf of the Equal Opportunities Commission. The study was focussed on the widespread fear that women's jobs will be lost as a result of the introduction of new technology. On the basis of case studies, expert opinions and a review of the existing literature, Bird analyses these consequences up to 1985, and sometimes 1990.

The methodology adopted involved using case studies of ten organisations operating new technology. Data was gathered by using interviews for management and self-completion questionnaires distributed to work-processor operators and clerical workers using office computer terminals.

Bird suggested that approximately two percent of the present workforce will be displaced by 1985, (21,000 jobs) mostly through natural wastage. This will be accompanied by a permanent shift in white-collar work from low-grade, low-paid jobs to more senior posts requiring higher educational qualifications and experience. The study also revealed an expected shift in the balance of opportunities for men and women. With a decrease in the availability of typing jobs (traditionally held by women) and an increase in sales jobs (predominantly male), mainly

because more of the new jobs will be skilled and at present more men than women have the required skills.

Bird predicts that this dual trend will have two consequences:

- fewer jobs for women and more for men
- need for extensive vocational training.

The study analyses in detail both the new jobs offered (description of content) and the training required.

3.10.6 Hacker (1979)

A study undertaken by Hacker (1979) examined technological displacement in an engineering company and how it affected workers differentially by sex. The methodology adopted was a longitudinal analysis of changes in the company's occupational structure during a period of significant technological change. Data was gathered through interviews, participant observation, technical reports and corporate publications.

The main findings generated were that technological displacement affected both management and non-management women. With women serving as a 'reserve labour army' during this period of technological change. Whilst earlier work had suggested that a transformation from mass to process-production technologies raises the skill level and reduces alienation among workers. In the case of the company investigated by Hacker, the higher skill level among workers reflected the displacement of women's work. One final conclusion was that Hacker recommended that technology be conceptualised as an intervening rather than an independent variable.

Her analysis demonstrated that in the period 1972-1975, due to the introduction of new methods of operation and ways of doing clerical work, over 36,000 jobs were lost. These new systems reduced the need for operators and lower level clericals and supervisors (level 4) on Table 3.21 below. Over 1,500 such positions were eliminated in this period.

Table 3.20 Occupational Distribution 1972 and 1975

Job Category	No of Jobs 1972	No of Jobs 1975	% Chance	% Chance
1 3rd Level mgt & above	15,780	16,610	+ 5.2	+ 8.30
2 2nd level	43,168	48,297	+11.9	+51.29
3 1st level	95,492	102,867	+ 7.7	+73.75
4 Administrative positions	32,716	31,181	- 4.7	- 1.535
5 Sales	5,813	6,541	+12.5	+ .728
6 Skilled craft, outside	65,107	65,553	+ 0.7	+ .445
7 Skilled craft, inside	76,542	78,047	+ 2.0	- 1.505
8 General Services	11,347	13,304	+17.2	+ 1.957
9 Semi skilled craft outside	66,104	63,549	- 3.9	- 2.555
10 Semi skilled craft inside	18,011	18,012	+ 0.0	+ 1.0
11 Clerical, skilled	82,392	97,336	+18.1	+14,944
12 Clerical, semi-skilled	74,689	70,006	- 6.3	- 4.683
13 Clerical, entry level	45,140	37,674	-16.5	- 7.466
14 Operators	148,622	124,431	-16.3	-24.191
15 Service Workers	12,365	11,374	- 8.0	- .991
TOTALS	793,288	784,752		

(Source, Hacker, 1979, p545)

Hacker identified fifteen separate job categories into which all workers at AT & T could be classified. The job categories can be further classified into management, skilled and unskilled. The Table 3.21 over, then demonstrates an overall job reduction with the introduction of technology as follows:

Table 3.21 Revised Occupation Distribution

Occupation Group	Job Increases	Job Decreases
Management (1,2,3)	13,334	
Skilled (5,6,7,11)	17,623	
Semi/Un-skilled (4,8,9,10,12,13,14,15)		39,463

(adapted from Hacker, 1979, p545)

These results suggest that over a three year period the introduction of new technology at AT & T led to the reduction of almost 40,000 unskilled and semi-skilled jobs. But expanded the number of skilled and management levels by over 30,000. Within the management category the largest increase was at middle management level with almost twelve percent, the second largest growth was at first level management with eight percent and then senior management growth at five percent.

Women's positions, management and non-management, were being displaced by new technology. During that same period 16,300 men acquired formerly women's work, due to 'affirmative' action or positive discrimination on the part of management. Management traditionally preferred women in jobs scheduled for reduction, because women had a higher turnover rate than men. Her data revealed that men as a group gained 13,767 jobs over their 1972 level while women lost over 22,000 during the same period. Direct action on the part of the company moderated the impact on middle management, but in non-management positions this action placed more men in traditionally women's work than it placed women in traditionally men's jobs. An example of which is that at the operator level there was a net job reduction of 24,000. Women had lost 29,000 jobs at this traditionally female level but there had been an increase of

five thousand jobs in this category performed by men.

Within her study Hacker suggested that the occupational structure was in different phases of technological development at the same time. With the automation of women's work and the disappearance of female workers and simultaneously, the degradation or simplification of men's craft work.

3.10.7 Form & McMillen (1982)

Eva Mueller (1967), had conducted a study of the impact of technological change on the US labour force. A probability sample of labour force participants in US households, 1,800 men and 855 women, were interviewed to determine how their work was affected by machines and changing technology. The data was cross-sectional, across all industries and occupations. Respondents were adults who had worked for twenty or more hours a week within the last five years. Workers were asked to describe

1. Their tools and equipment
2. Changes in them over a five year period
3. Their reaction to the changes.

Technology was analysed along two dimensions

1. The type of machinery
2. The level of automation.

Both sets of studies sought to examine the impact of technology on the labour force. But Form and McMillen took this analysis further to determine the differential impact upon women and men of the introduction of computerised equipment i.e. how women fit into the technological system designed by men.

Their research considered four areas of technological sex stratification in the workplace:

1. The assignment of men and women to different kinds of machines.
2. How machine assignments affect the amount of control that the sexes have over their work.
3. How technological change differentially alters the characteristics of men's and women's jobs.
4. How such changes affect the attitude that men and women have towards machinery.

Form and McMillen split Mueller's data into two groups. They used the entire sample to identify the technological environment and the effect of technology on work organisation. A subset of those who had experienced technological change was used to determine the change in job characteristics, satisfaction and attitudes towards machines.

Their findings revealed that a greater proportion of women than men (76% vs 69%) work with machines. Segregation by sex becomes more apparent when we consider the type of machinery operated and its level of automation. Their findings suggest that more than fifty percent of men and ten percent of women in the sample operate equipment that is manually controlled. Eighty-two percent of women and forty percent of men operate simple machines where the controls are mechanical or built-in. In fully automated equipment, men are more highly represented than women. Table 3.22

Table 3.22 Automation Level of Equipment Used by Sex (%)

Automation Level	Males	Females
Operator powered & controlled (e.g. hand tools)	2	1
Power single-system, manual control (drills)	20	10
Powered multi-systems, manual control (lathe, fork-lift)	31	2
Fixed Mechanical control (automatic drillers, welders)	40	82
Numerical tape or computer control (computers)	7	5
TOTALS (N)	100(1257)	100 (644)

(Source, Form & McMillen, 1982, p15)

Table 3.23 shows that manually or human controlled equipment is predominantly operated by males. Females tend to be concentrated in occupations that involve automated or fixed controls. The table classifies machines by the extent that their operators work with fixed - mechanical or human - manual controls. Most office equipment, computers and large scale production equipment has fixed - mechanical controls. The machines that are human or manually controlled (tools, vehicles, mobile equipment) tend to be operated by men. From the analysis of the data Form and McMillen conclude that the sexes are technologically segregated:

"Disproportionately more men than women operate machines that permit them to move about, machines that they can move, machines that perform multiple operations, and machines that can be humanly controlled. If work alienation results from machine restriction of work control then the image of the alienated workers should probably be a woman rather than a man."

They also found that regardless of the types of machines operated, the great majority of respondents worked in humanly controlled work situations (78%).

Table 3.23 Classification of Machine according to whether their operators used Fixed-Manual controls and the Sex Composition of their operators (%)

Type of Machine	Females Controls		N	Males Controls		N
	Fixed	Manual		Fixed	Manual	
Small scale office equipment	100	0	234	100	0	128
Computers, electronic equipment	82	18	53	100	0	40
Production equipment large scale	88	12	91	80	20	182
Professional, specialised equipment	78	22	47	57	43	35
Tools, small scale production	70	30	107	36	64	367
Transportation vehicles	0	100	2	8	91	134
Mobile Equipment	0	0	0	6	94	168

(Source: Form & McMillen, 1982)

Form and McMillen's analysis reinforces many of our earlier predictions regarding the effect of technology upon job characteristics:

"Where jobs are preserved, technological change may simultaneously improve some job characteristics and damage others. When workers change jobs, they may confront a technology that compares favourably or unfavourably to that of previous jobs. Finally, some jobs changes derive from technological changes in related and interdependent jobs."

(op cit p 162)

Their study also demonstrated that technological change affects twelve major job characteristics that can be grouped into three related areas of work:

Physical Dimensions in terms of the effect of technology on the environment, physical exertion to perform the job, work speed and job danger;

Skill Dimensions investigated included skill demands, the opportunity to learn new skills, the need to plan work, work interest and career opportunities;

Social Dimensions that were expected to change included the chance to talk, the amount of supervision and steadiness of employment.

See Table 3.24 over.

The data shows that more manual than white collar jobs were changed, and more men than women experienced change in the introduction of technology in their work in the past five years. This could be a consequence of the fact that during the late 1960's the bulk of technological innovation was in the manufacturing sector, a majority male employer. They analysed the changes in job characteristics by both sex and whether the job was white or blue collar. Generally, workers reported more positive than negative changes in the twelve job characteristics, and more negative in the two characteristics of work speed and the need for supervision.

Table 3.24 Changes in Job Characteristics Attending Technological
Change by Occupational Sector and Sex (%)

Changes in job characteristics N	White Collar		Blue Collar	
	Males 106	Females 72	Males 202	Females 49
Work Environment				
more pleasant	39	47	44	41
same	50	38	31	37
less pleasant	11	16	25	22
Physical Work				
increased	21	22	39	43
same	34	33	25	22
decreased	45	44	36	35
Speed of Work				
increased	43	44	37	43
same	41	33	38	35
decreased	16	23	25	22
Danger of Work				
increased	23	8	47	37
same	41	67	24	33
decreased	36	25	29	31
Skill Required				
increased	66	67	59	48
same	26	19	23	27
decreased	9	14	18	25
Chance to Learn				
increased	71	76	69	55
same	23	15	18	27
decreased	7	8	13	18
Need for Planning				
increased	69	67	59	37
same	22	23	28	47
decreased	9	10	13	16
Chance for Advancement				
increased	64	59	58	31
same	26	26	27	53
decreased	10	16	15	16
Interest of Job				
increased	73	79	73	57
same	18	14	12	22
decreased	9	7	15	20
Chance to Talk				
more	43	54	39	45
same	44	22	36	33
less	13	24	25	22
Need for Supervision				
increased	34	36	44	38
same	39	24	25	34
decreased	27	40	32	28
Steady Employment				
more	38	48	52	34
same	52	48	34	44
less	10	4	14	23

(Source, Form & McMillen, 1982)

Blue collar workers reported greater increases than decreases in job danger, work speed and supervision. In ten of the twelve job areas, more blue than white collar workers reported larger negative effects from technological change. Among blue collar workers, men were more advantaged than women in most areas, especially for the need to plan work, chance for advancement, job interest and steady employment.

Changes in the area of white collar work were less, and affected both sexes to similar degrees, while changes in blue collar work generally favoured men. Generally speaking, more males than females reported an increased demand for skill, while more of the females reported a more pleasant work environment. In the white collar area, more women than men indicated that equipment change decreases the need for supervision and increases the chance to converse. A further breakdown in the male/female stratum indicated that:

"Higher occupational status protects men from technological change more than it does women; technological change has more negative effects on women than men in all occupational strata, especially for the three areas of interesting work, steadiness of employment and opportunity for advancement."

(Hacker, 1979)

This protection of males from the effect of technology was also identified in the Hacker study. They found that for both sexes, those who experienced equipment changes reported more job satisfaction than those who did not. Even though female occupations suffered more from technological change than did men, sex differences in job satisfaction were negligible. As shown in the Table 3.25 over.

Table 3.25. Changes in Job Satisfaction

Change	Male		Female	
	Equipment Change		Change	
	Yes	No	Yes	No
Change in job satisfaction (%)				
- more satisfied	67	51	63	49
- equally satisfied	24	39	24	43
- less satisfied	9	10	13	8
TOTALS	100	100	100	100
Number	420	1315	142	615

(Source: Form & McMillen, 1983)
 Most workers of both sexes revealed positive attitudes towards

their machines, but Form and McMillen's original hypotheses that women would dislike their machines more than men, since these women were confined to more restrictive work, was not confirmed. Rather they found that most employees who experienced change responded to it as normal and can easily adjust, especially if their control over the work process is preserved. Changes in job characteristics induced by equipment changes almost have no effect on employees' feelings towards their machines.

"As most employees who work with machines and experience automation accept it as normal and adjust to it, especially if their control over work is preserved as it generally appears to be."

(op cit, p 174)

Despite being assigned to more technologically restrictive work, women's job satisfaction and machine liking differed little from men's. They also found that sex differences in occupational status, education, work experience, motivation to work, quality of working environment and many other factors did not explain the paradox. Concluding that as women have little opportunity to observe discrimination they therefore

do not feel it. Form and McMillen suggest that the technological isolation and subordination of women in the jobs they do insulates them from acquiring a sense of grievance that they might otherwise develop. This reinforces the point made by Huws whose respondents felt that both male and female jobs were affected equally by the introduction of new technology.

Contrary to Braverman's position that technological change degrades work, and that workers become hostile towards their machines, Form and McMillen's analysis suggests that workers accept technological change as normal and that they like their machines. Workers do not appear to be disenchanted by technological change, and women who are most adversely affected by it, are not dissatisfied or hostile towards their machines or equipment.

Their findings concluded that technological change generally improves the job characteristics of more men than women. The changes for men enlarge their job skills and improve their opportunities for promotion, while changes for women improve the physical and social environment of work. They also found, contrary to earlier studies, that both sexes who experienced equipment changes reported an increase in job satisfaction. One qualification must be mentioned with reference to the studies by both Mueller and Form and McMillen, i.e. that the data was gathered prior to the introduction of microprocessors on a large scale.

3.10.8 Interpretation of the Research Findings

The author extends many of the findings from the preceding analysis to

the investigation of the effect of new technology upon female employment in the retail sector. The analysis attempts to determine if the conclusions are equally valid in a one-industry situation, similarly if current technology is having a similar effect as previous technological developments on the nature of work and employee satisfaction, both between occupational groups and across sexes.

Preliminary analysis undertaken on the effects of new technology upon job characteristics would suggest that many of Form and McMillen's findings are still valid.

Table 3.26 over provides a summary of the studies investigated.

3.11 Conclusions

The overriding conclusion generated from the literature is the ambiguity surrounding the effects of the introduction of technology upon work.

Table 3.26 Summary of Research Findings

Variable	DIRECTION OF FINDING							Summary
	Mumford	Whisler	Huws	Bird	Form & McMillen	Boddy & Buchanan		
1. Demanding	inc	-	inc	inc	-	inc	agreement	
2. Anxiety Provoking	inc	-	inc	inc	-	inc	agreement	
3. Formalised	inc	-	inc	-	-	inc	agreement	
4. Productive	inc	-	inc	inc	-	inc	agreement	
5. Interdependent	-	less	-	-	-	less	agreement	
6. Autonomous	-	-	less	inc (responsibility)	inc	-	conflict	
7. Satisfaction	same	inc	-	inc	inc	less	conflict	
8. Specialised	dec	-	-	-	-	dec	agreement	
9. Variety	dec	-	-	inc	dec	dec	conflict	
10. Skill Level	dec	inc	-	-	inc	dec	conflict	

(Based on: Turner, 1980)

"Technology can affect jobs either positively or negatively depending on how it is applied to tasks and what the goal of its introduction is."

(Wernke, 1982)

In the literature two schools of thought have emerged: One view is that computerisation, including micro-electronics, can relieve clerical workers from boring and routine work, allowing their jobs to be upgraded and enriched; a second view is that the introduction of new technology fragments and deskills clerical jobs, leading to greater external control, and also decreased job satisfaction.

Many writers would suggest that secretaries enjoy using the word processor and are glad to be relieved of the time consuming tasks of retyping and corrections (Wernke, 1982). However, many researchers have found that the application of new technology has had an adverse effect on job content and the way office work is managed and has, in effect, widened the occupational gap between clerical and other office employees. Writing in the early 1960's Hoos (1961) observed that office automation brings about a 'redivision of labour' that has repercussions not only on the structure of the organisation and occupational profile of office workers, but also on interpersonal relations. Inherent in office automation is an increased specialisation of function. Jobs become more routine and less interesting and, for the worker, it becomes impossible to see how the work relates to the larger production process.

Many observers of technological developments point to an increasing tendency for jobs to become deskilled and degraded. Braverman (1978) suggests that deskilling and degradation have been the goals of

introducing new technology through 'the routinisation and simplification of work tasks'. Wernke (1982) cites a study undertaken by Feldberg and Glenn that sought to extend the Braverman perspective. They found that 'the impacts of technology vary for different segments of the labour force, particularly between male and female workers'. The latter are more negatively affected by the downgrading of the more skilled clerical jobs together with the creation of another higher occupational hierarchy - the computer related technical jobs comprised primarily of males. Feldberg and Glenn documented the changing occupational structure of the insurance industry. The fastest growing occupations were those professional and technical jobs - most of which were occupied by men. Traditional jobs such as record keeping, policy payments and assembling records were reduced. Most of these jobs had been held by women. At the same time a change in the sex composition of occupations was observed. The new computer related occupations went overwhelmingly to men. In contrast, 'most of the stable and shrinking positions which began mostly female became increasingly feminised'. Hence women became increasingly vulnerable to further automation of traditional clerical work because they were unable to move up to the new jobs at the technical level. With increased automation, the male/female stratification in the office became even more pronounced. The authors identified the ability of a job to change gender once technology is introduced. As the level of responsibility and discretion is reduced and activities are more closely monitored, jobs become increasingly feminised. In addition, Hacker (1979) found that men displaced from higher levels in the hierarchy were given the jobs of the females beneath them. Adding additional pressure to the organisational

squeeze. Several of the case studies illustrated in Boddy and Buchanan 1983, Barron and Curnow 1979, Mumford and Banks 1967, found evidence of the tendency of jobs to become more fragmented and deskilled when technology is introduced, so much so that office work has as a consequence of the introduction of new technology become as fragmented as factory work. Glenn and Feldberg's study of clerical workers in five companies found that work was increasingly organised around manual rather than mental tasks, that it became externally structured and controlled and that relationships were depersonalised as new technology was introduced. The author's preceding analysis would suggest that this was as a consequence of the way management subsequently organised work around it (Boddy and Buchanan, 1983). In the study undertaken by Form and McMillen, no similar conclusions were reached. Rather they suggested that office/Clerical work would, with the introduction of automation, give individuals more personal rather than machine controls. This conclusion may have seemed valid with the technological applications of 1967, but current information technology is fundamentally different in nature and is often, as explained above, accompanied by the need to increase management control and to make workers more accountable through machine pacing. In this respect, contrary to Boddy and Buchanan, the new information technology has a greater level of inherent 'determinism' than its predecessors.

At a large insurance company, extensive use was made of automation to such an extent that a large number of old skills were made redundant. New skills were found to be more mechanical and narrower in content. According to the interviews conducted, women clericals reported that the new skills they developed on the job rarely qualified them for better

positions in a new setting. As a result of this job simplification and the absence of mental activity, Glenn and Feldberg report that the jobs became more demanding as 'workers experienced pressures to perform work quickly, accurately and to maintain the pace set by machines'. (op cit.) At the same time, relations between workers changed. The authors found that the relationships between high and low level employees became more impersonal and filtered through several layers of supervisors. Separation was reinforced by physical location as different clerical units were located in separate parts of the building. This process of subdivision prevented workers from gaining an overview of the total work process and hence reduced personal identification with the work and, as Form and McMillen identified earlier, prevented them from developing a sense of grievance. Similar results were also found by Whisler (1970) and Boddy and Buchanan (1983) who found a significant reduction of skills at the lowest levels in the organisational hierarchy. The degree of interpersonal communication was also significantly reduced. Even when the use of new technology broadens the content of a job, it is by no means clear that the resulting work represents an improvement in the employees' position.

Many researchers (Boddy and Buchanan 1983, Barron and Curnow 1979) believe that the tendency for jobs to become poorer and more stressful when new technology is introduced is the result of a failure to take account of the social design of the work situation. The emphasis in applying technology has been on increasing efficiency and productivity and in cutting costs and labour requirements. Through a preoccupation with

efficiency in the workplace and the number of inputs required for a given level of performance, the human and social dimensions are neglected, which can decrease the effectiveness of the organisation.

Mumford suggests that systems designers tend to assume that all situations are understandable in terms that they have learned. The analysis undertaken by Form and McMillen suggests that those features that the systems designers are attempting to remove from the workplace, i.e. the social aspects of job characteristics, are those which female employees most value and generate the highest level of job satisfaction e.g. chance to talk, ability to move about etc. A specific example of where systems designers and management neglected the importance of these characteristics is given by Boddy and Buchanan (1983) with the introduction of word processing equipment. Typists' job satisfaction declined as did their efficiency, not as a result of the machines themselves but of the way management changed the work process to best suit the most efficient method of operating the equipment.

Driscoll found:

"the preponderance of evidence shows that people produce more and innovative more in organisations structured to allow workers to participate in decisions, to identify with the organisation's objectives and to share in the rewards of productivity and innovation. Where office workers participate in the design, selection and implementation of new office technology, productivity is likely to improve."

(Driscoll, 1981)

Most of the studies outline are concerned with technology as it affects high skill, extensive responsibility occupations, it is not demonstrated if the conclusions apply to low skill, non-responsible

occupations, nor if consultation with these groups will have the same consequences. Huws (1982) suggested that most workers were unconcerned with the introduction of new technology and Form and McMillen's survey reached a similar conclusion. This study hopes to determine if the attitudes demonstrated towards new technology are best explained by sex or the occupational/skill level of those affected.

Friedman (1955) has shown that machine domination of work increased from the top of authority and skill hierarchies to the bottom. Historically, technological innovations have been applied most at the bottom of the occupational hierarchy, where work is routine, and least at the top where authority and complex work are concentrated (Whisler, 1970). New technology differs significantly from these previous developments in that it has the potential to be applied at all levels in the organisational pyramid. Though, as Whisler (1970) has suggested, the greatest effect is within the lowest occupational level. However, throughout the occupational structure our analysis has shown that women disproportionately occupy positions of lesser authority than men (Kanter 1977), positions of less cognitive and manipulative, but more social skill (McLaughlin 1978) and positions of lower income. It is these positions that our analysis indicates are most at risk through the introduction of new technology. Further, women more than men are concentrated into fewer occupations of lower skill and authority (Friedman 1976 and Oppenheimer 1970).

Form and McMillen have shown that the type of equipment, automation level of machines and the pattern of work control together influence worker autonomy. This work rationalisation can have both positive

and negative effects on occupational skills and on the control that workers exercise over the work 'terrain'. Moreover, technological change can simultaneously improve some job characteristics and worsen others. The main job characteristics that automation alters are physical environment, job skills and social interaction (Form and McMillen). Although the physical environment is improved, this tends to be at the expense of reduced social interaction and increased supervision. In addition, there is also a demand for improved speed and accuracy of operation.

As suggested in the preceding chapter, some writers consider technology a device for controlling the workforce (Boddy and Buchanan), others see the computer as an opportunity for automating repetitive manual work and for creating more interesting and challenging forms of work organisation (Form and McMillen). But the technical features of a given innovation are not sufficient basis for predicting the human consequences of its application. The consequences depend on the goals, assumptions and values of those who make decisions about the use of technology in organisations (Boddy and Buchanan, 1983). Computing technologies make demands on human information processing and decision making skills, reduce the need for some manual effort and skill, and introduce new forms of work discipline and pacing. Boddy and Buchanan (1983) believe that control objectives are influential, leading to forms of work organisation that may interfere with the operator's ability to use the technology effectively. They further suggest that the frustration and distancing that may arise is due to the management pursuit of control objectives of reducing human intervention and tightening control over the work flow.

The case studies investigated show that the traditional skills of the clerical and manual workforce in many cases have been made redundant by machines, with the result that many jobs have been deskilled. Deskilling results not only in less satisfying jobs, but also has a serious impact on career progression as it eliminates traditional paths to promotion. Huws and Bird have suggested that the introduction of new technology in the clerical sector can also be used to increase the specialisation of the jobs and that, following the principles of scientific management, these jobs can be broken down into more readily measured tasks which are easier to monitor and control. This process of subdivision fragments jobs, preventing workers from gaining an overview of the total work process and hence reduces personal identification and satisfaction with work. Similar findings were reported by Form and McMillen. Job displacement theorists believe that this highly structured, controlled and depersonalised environment is likely to lead to discontent and even alienation that exists within the factory environment.

As outlined earlier, the retail occupational structure is characterised by a male dominated management and a predominately female workforce. The vulnerability of many female jobs within the retail sector is therefore more a function of the work that women do, rather than of the technology itself.

Form and McMillen's study found that technological change generally improves the job characteristics of more men than women. The changes for men enlarge their job skills and improve their opportunities for promotion, while changes for women improve the physical and social

environment of work. They also found, contrary to earlier studies, that both sexes who experienced equipment changes reported an increase in job satisfaction. Most workers of both sexes revealed positive attitudes towards their machines, but their original thesis that women would dislike their machines more than men was not confirmed. Rather, they found that most employees who experience change respond to it as normal and can easily adjust, especially if their control over work is preserved. Changes in job characteristics induced by equipment changes have almost no effect on employees' feelings towards their machines. Contrary to Braverman's position that technological change degrades work and that workers become hostile towards their machines, Form and McMillen suggest that workers accept technological change as normal and that they like their machines. Workers do not appear to be disenchanted by technological change and women, who are most adversely affected by it, are not dissatisfied or hostile towards their machines.

3.12 Strategy for Further Research

The author attempted to apply these findings to an analysis of the retail sector, and consider their significance on three levels. i.e. how the introduction of new technology in the retail sector will affect

- 1) the numbers employed
- 2) organisational structure
- 3) the nature of work.

Her earlier analysis has shown that, while many jobs have the potential to be substantially reduced, no evidence of direct displacement has been found. Rather, the efficiency gains arising from more extensive computerisation may be transferring redundant clerical staff into selling. Given our earlier analysis, these consequential effects could have quite a substantial impact on the structure of employment in retailing and would be particularly serious for female employment (Social Policy Research Unit, 1982).

The EDC for the distributive trades believes that technology will affect the way a business is run through changes in:

- a) Skill required
- b) Systems procedures
- c) Documentation processes

(NEDO, 1982, p17)

They predict that management structures and practices will have to change if the benefits from new technology are to be fully realised. The nature of many tasks will change and a number that were previously handled manually may now be carried out by the computer. They suggest that new technology has the potential to reduce the skill required in certain kinds of jobs, unless careful attention is given to the question of job design. The reason being, that new technology allows many tasks to be simplified. Therefore innovating companies need to construct jobs with a degree of variety and discretion in order to avoid job dissatisfaction and its associated stress for the individual and loss of efficiency for the business. As a consequence, some redesign of jobs may be necessary if benefits are to be optimised with computer installation. Technology will affect the skill requirement of retail employment, as when technology changes, the tasks that have to be performed change.

Traditionally, technological based tasks have been performed by men and unless steps are taken not only to train existing women workers, but also to encourage them to undergo training, employment opportunities for women will be seriously reduced. NEDO believes the number of jobs affected by technology will depend upon:

1. The pace at which the technology is introduced.
2. The rate of increase in real wages by comparison with equipment costs.
3. Changes in the working week, holiday arrangements etc.
4. The policies of companies with regard to service and staffing levels.

To identify the possible consequences that new technology may have upon the nature of work and organisational structures in the retail sector, the author develops a conceptual framework based on the preceding analysis. The discussion of the appropriate methodology to pursue this framework is left until Chapter 5.

To determine the changes in organisational structure that may arise, we shall use the model developed by Boddy and Buchanan. The model was originally developed to explain the introduction of new technology within the manufacturing and office sectors, but given that both authors believe all applications of new technologies to be similar in nature and to have similar consequential effects, it may prove useful to determine if their model still holds when tested in the retail sector. We can also hypothesise that the retail organisational pyramid be changed in structure, as has happened within the manufacturing and office sectors. i.e. The nature in the change of jobs that the author expects can be explained through an analysis of the twelve job characteristics identified by Form and McMillen. It is expected that significant differences will emerge between males and females and across occupations. Therefore, whatever the status level of male and female occupations, wherever new machines or new technology is introduced it can be hypothesised that women:

- * will undergo a substantial change in the nature of their work, whatever the position in the occupational structure, with respect to the twelve job characteristics identified earlier
- * this change in the job characteristics will substantially reduce job satisfaction more than that of men
- * will have reduced employment opportunities.

Subsequent hypotheses for testing are developed in more detail in Chapter 4.

The previous critique suggests that further research in this area should be based on the following strategy:

1. A model representing the way new technology is likely to impact retail workers.
2. Hypotheses that examine the changes that take place when computers are used in retail work environments.
3. A research design that measures these variables and has a sufficient number of cases for statistical analysis.
4. Measurement of workers' attitudes towards new technology and how it affects different work-related variables.

The following chapter will develop a model based on the organisational and behavioural literature, identify variables, and develop hypotheses. The object is to not only investigate the impacts of technology on retail workers, but to also explain how and why these impacts may be occurring.

Chapter 4 Theoretical Framework

The preceding chapter identified a number of recent major studies that attempted to assess the effect that new technology will have upon the nature of work. Whilst these studies are extremely important to any analysis of how the nature of work changes with new technology, they are not strictly reproducible in the retail sector. This is due partly to the unique nature of retail work, which differs not only in the amount of social contact of work when compared to both the manufacturing and office sector, but also in terms of the task performed. Retail work requires not only the manual dexterity of manufacturing and office work but also incorporates greater use of social and communication skills. The cited studies examined manufacturing and service occupations in sectors such as banking and insurance - a sector involving daily transactions of a 'paper' or 'physical' content. The retail sector involves transactions that are principally 'people' based. The people part of the equation is very important in the retail sector.

Turner (1980) considers that a model or paradigm plays an important role in helping researchers to organise their thoughts. Although many of the studies cited in the preceding chapter do not explicitly develop a model, it is possible to infer one interpretation of the results. Turner believes that the use of computer based systems alter the job characteristics and the perceptions that individuals hold about their work.

4.1. The Development of the Research Model

This chapter presents the framework of information needs required to investigate the effect that the introduction of new technology will have on the retail environment. As Mumford (1978) notes, this is a necessary

requirement in conducting systematic research.

"Any useful and meaningful interpretation of research data requires a framework for analysis which will assist the description and understanding of the research situation."

(Mumford 1978)

The shortage of related research work in the retail sector concerning the effect of the introduction of new technology has meant that the author has not been constrained by the adoption of 'a priori' assumptions in her work, since the effect of new technology on most variables identified in other sectors as significant is as yet undetermined in the retail sector.

Turner in his analysis examined a variable only if it was mentioned in more than three previous studies on office work. The author made a decision to examine all variables that had been mentioned as significant in previous studies investigated, concerning both the office and manufacturing sector. Regardless of whether the variable was thought significant in only one or was included in all of the studies considered. Therefore all job facets and organisational variables that were thought likely to change were given equal weighting in this particular investigation.

The only assumption made 'a priori' was a prediction as to the direction of the change of the variable.

From investigations into the introduction of computer technology into several bank and insurance companies, Mumford and her colleagues have developed a model of attitudes towards change. (Mumford & Banks 1967 Mumford & Ward 1968). This predictive model examines the extent to which the personal characteristics, motivation, goals and job attitudes of the

individual shop worker may affect the degree to which he/she accepts or rejects change. Major changes in technology within an organisation will evoke different reactions in the individuals affected, depending on the nature of the variables influencing the behaviour and attitudes of those individuals. (Mumford & Banks, 1967).

As a consequence of this complex interaction process, the social consequences of a technological innovation can only be accurately predicted up to a point, on the basis of other people's experience. Variables that condition attitudes lie both inside and outside the firm. Internal variables may involve the kinds of satisfaction an employee wishes to obtain from his job and his degree of identification with the company. External influences include family responsibilities, comments of friends and relations or the press or television.

The model developed by Mumford et al identifies the variables most likely to affect staff reactions to technology as:

- (1) The consequence of the change itself. i.e. what actually happens to the work situation and the tasks of individuals involved in it.

Actual

VS

Perceived

What really
does happen

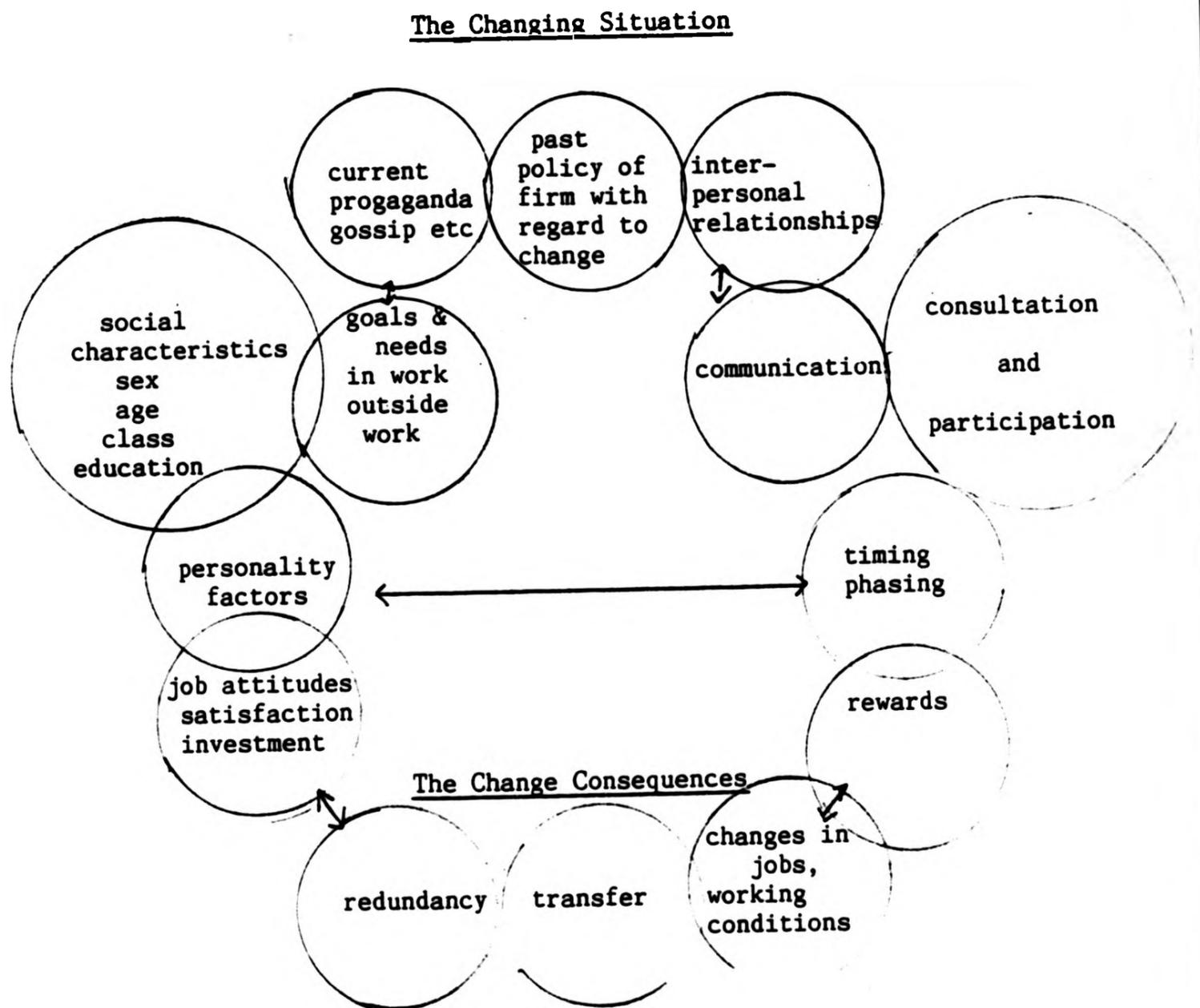
what people think
has happened

- (2) The staff themselves, their characteristics, their pre-conceived ideas, their goals and aspirations, and how the change is seen as helping/hindering the achievement of these.
- (3) The situation in which the change takes place
- the relationship between staff/supervision
 - within/between occupational and work groups
- (4) The way change is handled by management

- strategy and techniques for introducing the change and inducing staff to accept it.

Diagram 4.1. below illustrates this complex situation.

An Interaction model of variables affecting attitudes to change



Mumford developed a model which she suggested demonstrated the way people react to change. She proposed that this reaction was a product of the combination of many different variables internal to the person concerned and also within the situation in which the change takes place.

The model can be considered through examination of its component parts.

1. Variables lying within the individual:

Social characteristics
 Personality
 Goals
 Job Attitudes

2. The situation in which the change takes place:

Past Policy
 Propaganda
 Relationships

3. Variables in the policy adopted by management for introducing the change:

Communication
 Consultation & Participation
 Timing
 Rewards

4. The objective and consequence of change:

Redundancy
 Displacement & Transfer
 Job Change

These factors can be further classified into those providing positive or negative effects. (Mumford & Banks, 1967)

These predictions can be applied to the research situation to predict the likely attitude to change to be expected from retail workers. The relevance of the model can then be tested to determine how accurate its predictions are.

Turner (op cit) from his investigations into the effects of technology upon bank clerical functions constructed an implied model from a similar literature review. His model had one independent variable, technology, and many dependent variables.

Diagram 4.2 below outlines this model.

The Implied Model

Independent Variable

Dependent Variables

Use of
Computer Based
Systems



Work Load (demand) Control over Place Sequence - Timing (autonomy) Interdependence Task Specialisation Task Variety Structure of Activities (formalisation) Skill Level	Task Variables
Anxiety Satisfaction	Attitude variables
Productivity	Performance Variables

(Source: Turner, 1980)

The fourteen aspects (Task Variables) that Mumford's study (op cit 1967) identified as being the most likely to be affected by the introduction of new technology are:

the amount of work variety
 amount of work
 degree of work accuracy
 control over the pace of work
 importance of work for the firm
 amount of supervision received
 amount of skill required
 amount of responsibility
 amount of planning involved
 amount of judgement
 interest of work
 job security
 promotion chances/employment opportunities
 pay

To this list we can also add the additional job characteristics that are likely to change particularly the quality of working life, social interaction and job satisfaction.

Such an approach also utilises the theoretical framework developed by Form and McMillan (1983) who suggest that technological change can affect twelve major job characteristics. These job characteristics can be divided into three main areas:

Firstly, the Physical Characteristics: equipment change may alter the physical environment of the work pace, the physical exertion required to perform the job, work speed and job danger.

Secondly, the Skill Area: changes may occur in skill demands, the change to learn new skills, the need to plan work, work interest, and opportunity for advancement.

Thirdly, the Social Dimensions: may be affected in the chance to converse, amount of supervision and steadiness of employment.

These factors have been combined within the research framework.

The Attitude Variables that are likely to be affected have been identified above from the work of Mumford et al. Attitudes describe a person's complex set of beliefs, feelings and behavioural tendencies about another person or object (Dunham & Smith, 1979). Attitudes can be learned in three ways. Firstly, through experience with the object; secondly, acquired through association with some object for which an attitude was already formed; or, thirdly, through the social learning process. In most organisations attitudes are influenced by all three.

Performance Variables are much more difficult to measure, given the newness of the technology and the small numbers of installations, most companies were unwilling to divulge confidential operating information that would have enabled the author to determine the effect of new technology upon retail productivity. This issue is developed in Chapter 7 recommendations as an issue for future research. It may, however, at this stage be possible to predict the consequences of technology upon retail performance indirectly through an examination of its effects upon other variables.

A variety of measures can be used to evaluate the effect of technology on performance. Boddy & Buchanan (1983) believe that the outcome on performance depends on how and why the technology is used and upon the organisation of work around it. Different types and levels of measurement give different and conflicting indications of the effects of change.

"Generalisations about the performance effects of computing technologies should be regarded with caution."

(Boddy & Buchanan, 1983, pp 250)

They list seven main reasons why they consider it difficult to relate productivity data and technology.

1. 'Productivity' is a difficult concept to define and measure.
2. Usually, there are several different measures that could be used, and their indications could conflict.
3. In organising work around the technology, management pursue control objectives that are not directly related to performance improvement in financial or technical terms.
4. The organisation of work around the technology affects overall performance making the causal link between technology and performance difficult to specify.
5. The time span of implementation varies.
6. New technologies perform different functions in ways different from the technologies they replaced - difficult to make comparisons.
7. Broad measures of performance are difficult to relate to specific innovations.

Boddy & Buchanan suggested that all seven restrictions would hold in consideration of most service sectors.

The confidential nature of much of the data concerning the use of scanning equipment within the supermarket industry, and the highly competitive nature of the sector precluded an analysis of productivity or performance data on which to quantify the ability of an operation to obtain the 'hard' or 'soft' benefits. Similarly, information was unavailable on

which to judge performance of non-scanning stores. Therefore, predictions of the effect of scanner based equipment upon performance had to be taken from its measured effect on job satisfaction, identified from the questionnaire.

However, Turner (op cit) has identified some implicit weakness in this model. Firstly it is expected there would be relationships among variable clusters, this model doesn't represent second level causal structures. Secondly, there is only one independent variable. The single variable doesn't seem sufficient to explain the likely complex interactions in the situation. Nevertheless, the model does provide insight into how various impacts might take place.

Second and Blackman (1974) point out that task activity, group interaction and supervision style appear to be important determinants of both satisfaction and performance. The interaction between satisfaction and performance has been discussed earlier. If task variables are determinants of satisfaction and if satisfaction is related to performance, then the two stage model with one independent variable implied from the previous studies, is an inadequate representation of the situation's complexity. (Turner, 1980) Furthermore, the above model implies a certain amount of technological determinism, which as Boddy and Buchanan demonstrate is not implicit in the new technology, rather the impact of automation is mediated through formal structure. This theoretical framework closely follows the model developed by Boddy and Buchanan (op cit) and developed in detail in Chapter 3. Both authors believed that the technical features of a given innovation were not sufficient basis for predicting the human, organisational and economic

consequences of its application. Rather they suggest that the consequences depend on the goals, assumptions and values of those who make decisions about the use of technology in organisations. (op cit, pp 254).

Redding (1974) investigated the goals and values held by supermarket managers and the link between these beliefs and the organisational climate. Within his analysis Redding also identified a number of external factors that affect the operating environment within the store, particularly the local labour market situation, the state of local competition, the size of the store and the local cultural work ethic.

He has hypothesised the effect of these factors on the retail outlet and his findings suggest the following characteristics be considered when retail outlets are investigated. The state of the local labour market is likely to affect the 'value' placed on a job by staff and consequently their attitude towards losing it. Likewise, if managers and supervisors know that it will be difficult to replace staff, they will as a consequence adopt a 'softer' approach. The degree of local competition (in terms of location and market power of other supermarkets) will affect the amount of pressure on the manager to perform. This in turn is likely to result in some variations in his behaviour towards subordinates, such that if competition is fierce, he is likely to take a less relaxed view of his job and vice versa. Additional pressure may be placed on the manager from his superiors depending on the store's success. Redding also suggests that the size of the store affects human relations within it. Small stores often have 'family' atmospheres and the manager is likely to know everyone personally. Large

stores may be more 'impersonal' with the number of staff rising to about two hundred. Such large staff numbers prevent the manager from knowing his staff well and may lead to the creation of subgroups among the staff.

The work ethic existing in the local culture is defined by Redding as 'Town' vs 'City'. Workers who come from rural or small town areas are held to react positively to work which requires the exercise of greater skill and the acceptance of more responsibility. Workers in large cities react negatively to this kind of work, but positively to simpler tasks with less responsibility. Redding's research further suggested that staff in 'city' supermarkets would need more supervision than those in 'town' supermarkets.

In addition account has to be taken of staff turnover rates, as high turnover rates may be an indication of staff dissatisfaction as well as related to the prospects of obtaining alternative employment. Staff leave more frequently in 'city' than 'town' supermarkets, this may be related to management attitude as well as the local work ethic.

The model adopted by the author addresses many of these research issues raised by Redding regarding supermarket operations. The extent to which this external environment affects the author's research setting is assessed in Chapter 7 and is detailed in diagram 4.8 over.

However, from initial analysis of the pilot data, see Section 4.2, the data suggests that indeed some difference does exist in the attitudes of staff towards work and of management practice which is related to

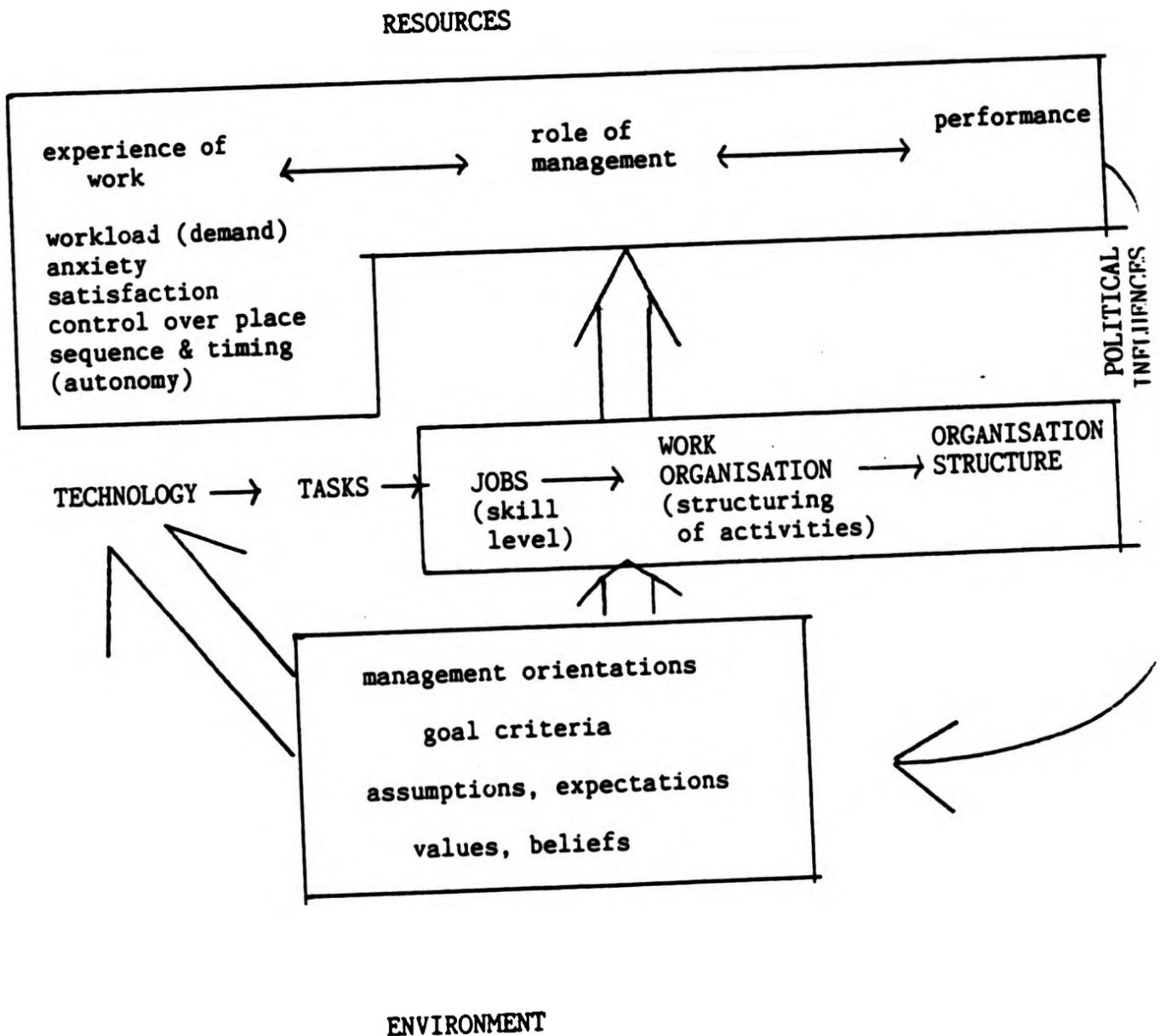
outlet size. The larger outlets do appear 'impersonal' both in terms of management style and operating environment, this appears to manifest itself in terms of higher staff turnover.

As a consequence of our analysis, given the many levels of complexity involved in determining the effect that new technology will have upon retail work, we can extrapolate this complex real-life situation to a representation constructed from our preceding literature analysis. This model allows us to not only examine the effects that the introduction of new technology will have upon job content at all organisational levels, but also to extend this analysis to determine the effects of the changes in the nature of jobs upon retail outlet performance.

Investigations suggest that although the technology has the potential, in itself, to improve retail staff productivity and performance - this outcome may be prevented by the reduction in staff job satisfaction and, hence performance, as a consequence of the change in the nature of retail work that tends to accompany the introduction of new technology. The resulting implication is that there may be no direct benefits to the innovating firm unless compensating action is taken to ensure that job satisfaction is not reduced with the introduction of new technology. In addition to our analysis on how the nature of retail work changes with new technology, we can also examine the effect on different organisational levels and attempt to analyse if changes in the organisational pyramid occur and, if so, consider the implications for the structure of the retail outlet.

Diagram 4.3

Research Model



(Source: Boddy & Buchanan, 1983)

4.2. The Pilot Studies

The author conducted three separate pilot studies in order to test not only the appropriateness of the research strategy, but also to evaluate the usefulness of the model identified earlier in predicting the response to technology.

4.2.1 The Observation Study: Pilot 1

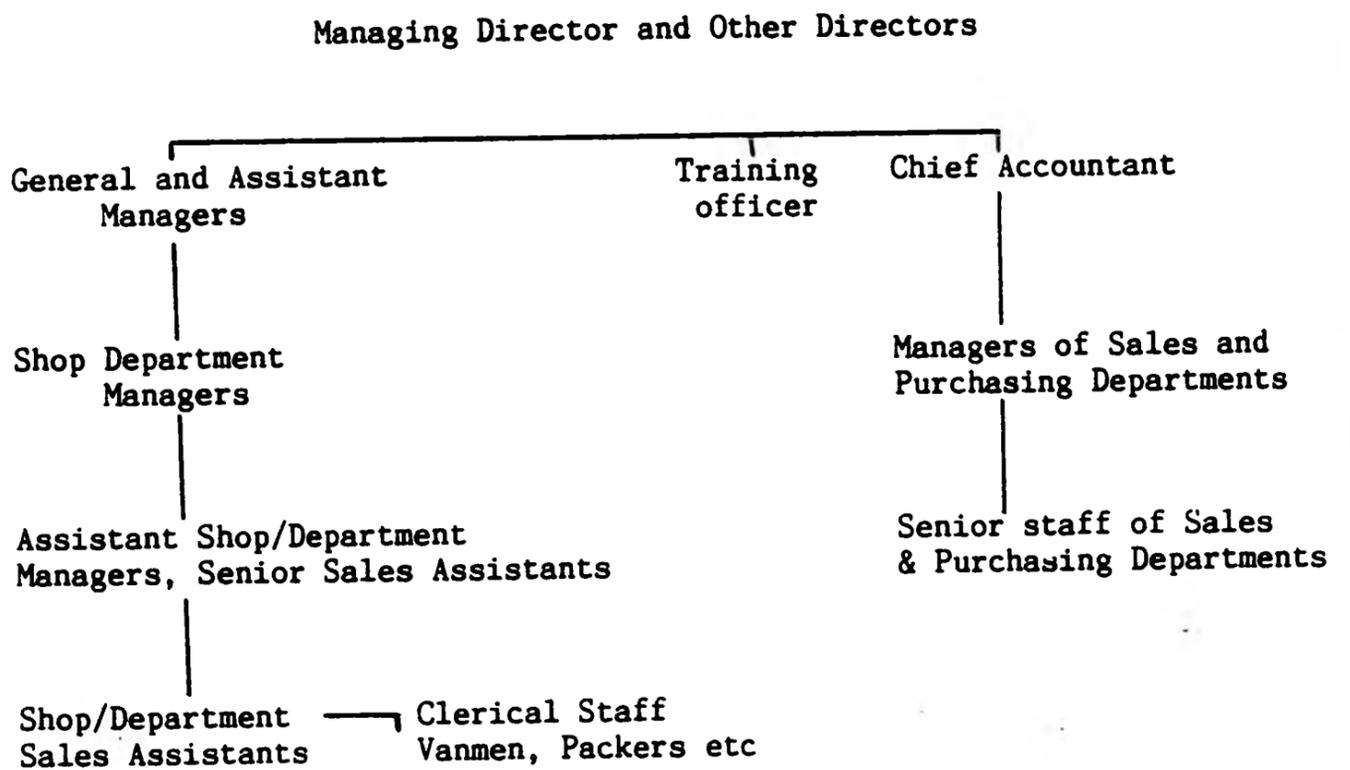
In order to evaluate these effects and the validity of the model, preliminary survey work was undertaken by the author in Company X which is a private company and Managing Director and Board of Directors. It operates eight retail outlets with all administration for the company and its branches performed at its head office. (Sawers, 1983)

In the initial study, data was collected from eight retail outlets using observation techniques over a three week period. A diary of observations of those operating or directly affected by the technology was kept during this period and provided the key source of information. This was complemented by a small number of in-depth interviews and the analysis of company reports.

The company employed one hundred and eighty people, comprising:

Administration:	male full-time	20
	female full-time	30
	female part-time	<u>10</u>
		60
Elsewhere:	male full-time	30
	female full-time	40
	female part-time	20
	male part-time	<u>10</u>
		100
Saturday staff:		20

An organisation chart is given in diagram 4.4

Diagram 4.4 Company Structure

Each department has its own manager and inner hierarchy.

Department/branch managers are responsible for the running of their own department/branch, and have a certain number of staff below them whose own seniority within the department is usually determined by length of service to the company. Each member of staff is responsible for certain sections within their department. Department/branch managers usually do all the necessary buying and ordering, with the administrative centre playing an important part in organising and co-ordinating the activities of the different branches and departments. One important reason for introducing the computer was an attempt to rationalise this de-centralised decision-making by different branches, and routinise department operations in order to give greater accountability and control to management.

Stock control is of vital importance to the retail trade where a considerable amount of capital is tied up in stocks. Too low stocks leads to loss of business, whereas a stock level that is too high results in capital being tied up unnecessarily. In Company X's business, there are well over 400,000 items, and approximately 30,000 new products appear each year, which is equivalent to 500 each week or about 100 per working day. This situation is not unique, and many retailers face similar problems. A good stock control system is therefore essential, and will aid management in the decision-making process.

Certain information is required by management in its evaluation of stock control systems. The manual stock control system of Company X is well established. Traditionally in the company's trade ordering relied on the buyer's knowledge and experience and his ability to detect gaps on the shelf. As a stock control system, this proved unsatisfactory. Shops need a method of controlling stock which provides a 'memory' and could be operated by the most junior members of staff.

Previously, Company X employed a very basic card system. Each product in stock was supplemented with a 'master' card kept separately in a file. The purpose of this system was to provide an accurate record of sales over a period of time, which in turn could be used to maintain stock at the required level. In addition, the manual system was intended to provide product details, provide a record of orders placed, and act as an aid to buying and supply information on stock to all members of staff.

The returning of goods is a necessary function of any good stock control

system. Stock represents capital investment, and thus the opportunity cost of retaining unsold stock is very high. The firm had devised a system whereby each product or item is coded when it arrives at the warehouse. The code consists of a letter denoting the year when the goods were received, and a number denoting the quarter. The stock was checked systematically and, in general, if it remained unsold for more than six months, it was returned to the manufacturer. The stock card system of Company X traces the sales history of a product and was intended to aid the manager acting in his role as buyer in the decision-making process. Operated correctly, the manual system should have ensured that each shop would never run out of fast-moving lines. In operating terms, this was never achieved.

The two main disadvantages of such a system that have become apparent over the years were:

1. the human factor: e.g. sales assistants forgetting to write up cards, misfiling cards etc. Therefore the stock system often had incomplete information.
2. the physical storage problems of such a system. Since the card system had been in operation for a number of years. The volume of stock card records that had been accumulated in different departments was creating physical storage problems.

Other disadvantages listed included a sales administration and accountancy procedure that was both laborious and time-consuming (involving lengthy manual operations to record department/branch ordering and stock levels; no systematic stock checks could be taken; lengthy customer waiting time for any product requested, since orders had to be physically circulated throughout other branches as current stock holdings of

company branches were not known; no centralised merchandise display policy or marketing practice followed; and a growing inability to detect and control shrinkage.)

The advantages offered by a computerised system were enormous. By 1980 the company already had experience of computers, having used the services of a computer bureau for a large part of its administrative functions for a number of years. In addition, in an effort to gain greater control over the ordering process, a tele-ordering machine had been installed, giving direct ordering facilities with several manufacturers. The order process had become more centralised as a result.

There were two principal reasons that prompted management to consider the installation of their own computerised equipment.

- a) The increasing volumes of data handled in all aspects of company operation.
- b) The problems caused by conventional data collection methods and stock management particularly losses, errors in data, shortcomings in customer service and the high clerical workload.

The decision to install a micro-processing system took six years from its point of inception to installation.

The project stages consisted of:

- 1) A feasibility Study
- 2) Equipment Selection
- 3) Pilot Implementation
- 4) Pilot Review
- 5) Full Implementation

Altogether, eight suppliers were consulted. The over-riding criteria for selection were the compatibility of the new system with existing manual operations and the size of the capital outlay required. As suggested earlier, the company sought new technology at an acceptable price and without massive dislocation. The company installed an On-Line Real Time system with the micro-processing unit housed in an external unit. The pilot study was useful in that it provided an initial overview of the research situation. It enabled the author to experience market research in a real-life setting, so that the strengths and weaknesses of alternative approaches that may have been adopted could be better understood. By observing staff reactions towards new technology in the retail sector, it was possible not only to substantiate many of the findings from the literature, but also to highlight areas for further investigation. The data generated from the pilot study also provided a useful base from which to commence subsequent research.

The operational impact of the new equipment was considered on two levels. Those affecting firstly, the outlet and secondly those affecting the decision making process.

1. The Outlet

The introduction of a computerised stock system removed the difficulties identified earlier as:

- a) the storage problem is eliminated both at branch and head office level
- b) the ordering process is less time-consuming
- c) stock levels are obtainable when required.

With the new system, stock is delivered to the warehouse, where it is physically checked against the invoice as before, except now it is listed on the computer, a computerised sales slip made, then despatched to the appropriate branch. The computer maintains a complete stock listing for each branch, containing all the details previously listed on the stock card, and an automatic re-ordering facility, to ensure that the shops never run out of fast-selling lines. When the stock arrives at the branch, it has only to be shelved by the staff. In addition, other branches can determine what branch holds certain products. Floor staff also have less responsibility with respect to stock record cards, as all new entries are now done at the warehouse.

Members of staff in the firm, as expected, generally welcomed the new developments. They felt that the new technology enhanced their position as sales assistants, and made the company appear more progressive to the general public. No concern was expressed that the ability of the new system to improve stock control and remove many tasks previously done manually would lead to redundancies or labour re-scheduling. Rather, the computerised system was seen as assisting and alleviating many of the more routine and boring tasks. As a result of the introduction of the micro-processing equipment, more detailed and accurate information was generated. This enabled management to obtain reports on all essential areas of operation: sales analysis, inventory levels, and trading position at both the department, outlet and company level. Stock auditing, sales, purchase, nominal ledger and general accounting procedures were also greatly improved. The effect of the introduction of a computer in Company X has resulted in responsibility for the stock being removed from the shop floor. This forms part of the company's long-

term aim of reducing operating costs through tighter stock control and staff savings.

Company X believed the main advantages behind the introduction of micro-processing would be:

- "(1) Dealing with customers enquiries quickly and accurately.
- (2) Finding stock held elsewhere.
- (3) Raising invoices quickly and accurately.
- (4) Better stock control leading to higher stock turn rate.
- (5) Added confidence in staff who feel firm is progressive and who can feel that they are capable of using sophisticated equipment and are seen to be capable by customers.
- (6) Having nominal ledger on computer with benefits of speed of entry and control."

Most of these have been achieved, except perhaps the increased confidence of staff. The shift in control to higher levels in the management hierarchy and a tightening of procedures has the effect of distancing the operators of the new technology from management.

Management Computerisation has resulted in an amount of de-skilling of staff on the shop floor; concomitant to this de-skilling of staff is a reduction in the degree of knowledge or specialisation required, the number of errors made, and a noticeable increase in the speed of operations. The introduction of the micro-processing has also resulted in the need for a formalised training programme. Company X did not follow many of the recommendations concerning the introduction of new technology. Rather, the new system was presented as a 'fait accompli',

not subject to negotiation or consultation with the staff on the shop floor or those required to operate it. For some members of staff, this resulted in a lack of confidence and understanding of the technology, which becomes apparent through their unwillingness to operate the computer and preference to consult the manual system.

2. The Decision - Making Process

There was no 'technological imperative' with the introduction of the computer that necessitated the work of the department be changed. Rather, the decision to remove the ordering and discretion to decide what stock to return from the department was made by senior management in an effort to gain greater control over operations. This observation reinforces the 'two rules of thumb' identified by Boddy and Buchanan (1982) as used by management in organising work around information technologies.

- (i) where possible replace people with machines
- (ii) improve management control over the workforce to make it more consistent and predictable.

These informal guidelines are compounded by the fact that senior management is so often removed from shop floor practice that they lose insight into day-to-day operations and as a result fail to correctly identify the response and all that it encompasses from within the shop floor. This point can be illustrated through consideration of Antony's Model (Jones 1977) as shown in Table 4.1

Table 4.1: Management and Decision Types

Decision Type	MANAGEMENT LEVELS		
	Top (eg Board directors)	Middle (eg Office Manager)	Lower (eg Shop/Department Manager)
Strategic	*	X	
Managerial	X	*	
Operational		X	X

*main involvement X some inducement

(Source: Jones, 1977)

The introduction of the computer is seen by senior management as a decision of strategic importance to the company as it forms part of a long-term objective to reduce operating costs and thus improve the company's competitive position. All other outcomes are secondary in importance to that objective. Senior management grant confirmation for the introduction of the computer but leave its operational aspects to middle-management.

Micro-computers offer middle management the opportunity to increase their control over company operations, and middle-management consider the ultimate aim of the new technology is to remove all decision-making and initiative from the shop floor, i.e. to routinise operations. Lower Management consider the new technology as an operational tool to smooth the work-flow, alleviate shop floor difficulties and generally as an assistance in pursuing other company objectives. Their main

involvement is in the day-to-day operations of the system. However, operational criteria are now the preserve of the computer which provides the information upon which middle-management can make decisions. The authority is no longer vested in lower management. This observable shift in control to higher levels in the organisational hierarchy leads to a widening of the gap between unskilled workers and lower management and the higher qualified skilled managerial level. The study also suggests that the different levels and functions in management accept and use the new information technology for different reasons.

Senior Management: Look for a return on investment and increased sales and productivity (Strategic Objectives).

Middle Management: Are concerned with consistency and predictability of output (Management Control).

Lower Management: Interested in smoother work flow, fewer problems and less pressure (Operational Objectives).

The introduction of New Technology within retailing provides the ability to compile, manipulate, retrieve and store information at an acceptable price and without massive dislocation. Different management levels use this information for different purposes. Many management objectives are never stated and are, therefore, difficult to define. However, the overriding aim generated from both the literature and this study was the concern to increase management control and, as a result, improve the company's existing operational performance. In the study this resulted in an upward shift of power in the organisational hierarchy. The resulting increase in control functions increased efficiency and speed of operations in many departments, but had the effect of distancing many operators from management. In addition, unlike the McKinsey study, an

increase in staff training time through the introduction of a formalised training programme was noted. No labour savings or re-scheduling was achieved.

The case study suggested that retail management with introduction of New Technology considers only the 'soft' to 'very soft' potential benefits that it will generate. No operational criteria or quantitative analyses were ever applied to assess the advantages or disadvantages. Rather, a qualitative assessment was used to consider operational impact.

The main benefits realised were of a 'soft' nature as identified by McKinsey, i.e. mainly of a management control nature, which were assumed by McKinsey to be essentially long-term in nature. The case study suggests the reverse. 'Hard' benefits may, in the case of the non-food retailers, be the most difficult to quantify and may therefore require many organisations to re-adjust management thinking and begin setting quantifiable objectives for retail departments similar to those techniques used by manufacturing industry. One important reason why the 'hard' benefits identified by McKinsey may not have been achieved is due to their dependence on the removal of manual pricing operations and the accompanying labour savings. The products sold by the company in the case study have traditionally been subject to Resale Price Maintenance and, as goods are priced at source, no similar work is required at the point of sale, and as a result many direct savings cannot be achieved.

The initial staff response was predicted from the literature - an acceptance of the technology as a relief from the boring and repetitive

tasks. The short-term consequences, however, indicate that the micro-processing equipment may have the effect of distancing its operator and branch managers from upper management levels, and as a result lead to a significant deterioration of communications within the company. Although improved management control procedures lead to better formulation of company policy and objectives, in operational terms these may never be achieved if lower organisation levels are isolated from the system. Other commentators suggest that this response is a consequence not of the technology itself, but rather of the way work has been re-organised around it.

Unlike the scanning stores mentioned in the literature, the technology of Company X did not require the removal of item pricing. As a result, many customers were not aware that a new computerised system was in operation. No significant reduction in queueing time was achieved, as no technical alteration had been made at the point of sale. The improvement in stock control was indirectly passed on to the consumer in:

1. Improved store layout by placing more popular items as a point of easy access.
2. Better stock rotation and stock turn rate, ensuring less out of stocks.
3. Increased product information available.
4. An increase in the level of service offered. The staff could offer more assistance with purchases, as the computer had reduced the time perviously required on manual operations.

Given that the company at the time of the study had been 'live' for less than one year and was still encountering many 'teething' problems, it may

be premature to make any judgements on the computer's impact on operations other than to say that little of the envisaged or expected 'hard' savings had been achieved.

The pilot study reinforced many of the findings considered by Mumford et al and Turner to be significant in conditioning staff reactions towards new technology. In particular, the importance of the individual herself and the opinions and values and goals that they held, was found to be of considerable importance in affecting how a particular individual will react. For example, some individuals would spend every available opportunity on the computer whilst others would go to extraordinary lengths to avoid any contact with the terminals. The specific reason for the evasive behaviour demonstrated by particular individuals was not clearly identified in this short study, although this behaviour was most frequently demonstrated by older female workers, the role of the individual in conditioning reaction was therefore considered significant. The different attitudes displayed by different department managers towards the new system was reflected in the attitudes of their staff. Negative attitudes towards the new system tended to be a consequence of lack of information about the function or capabilities of the computer. This in turn is largely a consequence of a lack of an appropriate management strategy in introducing the change.

In this particular study there appeared to be no mismatch between expectations surrounding the introduction of new technology and the individual's experience of it. Mumford's work had suggested that there would be a difference between what actually does happen and what individuals think happens.

This preliminary study helped establish the basis for future investigation. The model, although not directly tested at this stage, did in fact appear to hold in a real life research setting.

The Task and Attitude variables identified earlier were appropriate and as predicted performance proved difficult, if not impossible to measure directly.

A proper research strategy was therefore developed on the basis of these findings (see Chapter 5) to test the appropriateness of the theoretical model in predicting behavioural consequences.

4.2.2. Questionnaire Pilot 2

The initial pilot work undertaken by the author considered how technology affected behaviour through examination of the setting in which the change takes place, the policies adopted by management for introducing the change and the actual objectives and consequences of the change itself.

The second case study undertaken by the author was an attempt to measure attitudes towards technology of both actual and perceived effects as exhibited by the staff. The author also attempted to measure the variables that lie within the individual themselves and condition attitudes towards change, as outlined earlier.

The questionnaire developed by the author had many inherent weaknesses, which are discussed in detail in Chapter 5, and this prevented a thorough examination of the research within this particular setting. Whilst the author considered that significant differences would exist between the

perceived consequences of new technology and its actual effect in operation, it was not possible to collect this set of opinions through the use of this particular questionnaire structure. Also, there was no before/after research situation available to the author. It was therefore decided that it would be more appropriate to compare opinions between scanning vs non-scanning stores than to ask participants to remember previous methods of operation and compare them to current practice.

Despite the operational problems associated with this particular questionnaire, the author was still convinced of the appropriateness of the research model and the strategy developed to collect data.

4.2.3. Questionnaire Pilot 3

The third pilot study was undertaken in order to test the suitability of the final research method that had been chosen on the basis of the results of the two earlier investigations.

A self-completion questionnaire was considered the most appropriate data gathering technique, with responses collected at the branch. The survey was distributed to the staff with their wages and requested to be completed the same day in either their break or lunch hour. Generally, managers appeared unwilling to free staff from daily duties to complete the questionnaire. This was a problem that was also apparent in the major study.

The general findings of this particular study are as follows:

1. There appears to be no perceptible difference in opinion with respect to new technology or attitudes towards work by males and females. With the exception that male opinion appears more polarised.
2. Opinion appears to vary between occupational groups.
3. The introduction of new technology within a supermarket may not have as severe an impact as was originally expected.
4. Attitudes appear to be more a function of the work itself and the tasks done, rather than of the operating environment.

The results of the third pilot survey suggested that the effect of the introduction of new technology within the supermarket outlet may not be as severe as originally expected, in terms of the variables investigated.

The workers who participated in the survey - although unionised - did not feel threatened or apprehensive. Indeed, their attitude towards technology tended towards the other extreme bordering on apathy, they were not sufficiently interested or motivated. This confirmed the work of Redding (1980) whose study revealed a low level of job satisfaction for supermarket workers, but a high level of social satisfaction.

The sample consisted of twenty-eight responses out of thirty-four, giving an 83% response rate.

This research setting was used solely to consider the variables lying within the individuals themselves i.e. sex, age, education etc. and how they affected attitudes towards technology. The other three variables

identified by Mumford as influencing attitudes were not considered. As their relevance for the research model had been investigated earlier. See Section 4.2.1.

The responses themselves proved to be unreliable measures of how much staff enjoyed their work, this was due mainly to the way the questionnaire itself was administered by the branch manager who insisted in giving out questionnaires individually to each staff member and reading their responses to certain questions upon return. The manager's office was itself visible to the shop floor staff, who, once aware that their responses were being checked by the manager and the company training officer, adjusted their answers accordingly. This error on survey distribution was not repeated in the major survey. Therefore all answers in the pilot survey must be regarded as doubtful.

Initially it was expected that response would vary depending on age and sex. From preliminary data analysis this does not appear to be the case. With respect to age, any analysis is meaningless as twenty-three staff are aged less than thirty-six, only five are over thirty-seven. The sample all fit in the one age band. The data was further analysed by sex to determine if this factor made any difference.

Most of the responses given by both groups were the same, except that female respondents appeared reluctant to use the extremes of answers, preferring to use 'agree' rather than 'strongly agree'. Some difference was demonstrated in the attitudes towards work, but this was due mainly to the fact the three management positions were filled by males and the

distinction was really an indication of the difference between occupational groups rather than between sexes.

Further analysis of attitudes between occupational work groups was also undertaken. Results suggested that the greatest variation in opinion exists between work groups.

The third pilot study generated two major conclusions.

Firstly, it suggests that the effect of new technology upon retail work, at the operator level, may not be as immediate or as severe as it has been in other service industries, and secondly it prompts an investigation of the nature of retail work particularly within the supermarket environment.

The study suggests that although women occupy those jobs most at risk with the introduction of new technology (i.e unskilled and part-time) they themselves are unaware of any threat to their livelihood. It is however, difficult to determine whether this is due to a lack of career commitment on the part of female employees themselves or it is due to the way that technology is introduced, and the management motives underpinning its introduction.

The findings from this study and earlier analysis would lead us to suggest that supermarket workers do not feel threatened or intimidated by new technology - as they believe they have nothing to lose. They consider that there is no job that they currently perform or enjoy that new technology can replace. The opinion was even voiced by supermarket checkout operators that they do not like dealing with customers.

Anything that helps them to deal with each customer faster is generally welcomed. Most did not like pricing goods, stock maintenance or the necessity that operators remember a large number of velocity codes for fast selling items. It appears that they welcome any reduction in service or traditional retail skills that new technology can offer. New technology may provide management with an answer to this problem.

The preliminary survey suggests that the supermarket industry has a staff motivation problem, demonstrated by the attitudes held by employees towards their work and the high labour turnover rate throughout the industry - in certain Lanes stores over sixty percent of the staff leave every six weeks. In Gilmerton this figure is considerably lower due to the high local unemployment rate and the distance from the nearest large city that could offer alternative employment.

Initial analysis on how the introduction of new technology will affect this environment would suggest that the original parallel with the office sector may not be as appropriate as had been expected. Rather than decreasing the levels of job satisfaction of the female workers, the introduction of new technology into supermarkets appears to actually increase job satisfaction levels. Despite the fact that the technology does lead to a reduction in job skills.

The preliminary investigations allowed the author a practical insight into the research situation, which could be used to ensure that an appropriate research strategy was developed that could be understood by the respondents. The research strategy developed is discussed in detail in Chapter 5.

4.3 Research Objectives

For the purposes of this study it is assumed that prior to the introduction of new technology the performance model of each individual within that retail outlet was in equilibrium. It is probable that the distribution or weight of each variable within each particular model varies from one individual to the next, depending on the task performed, individual characteristics, social background etc. If the individual's model is not in equilibrium then we may assume that the individual would leave or that dissatisfaction with the job would be expressed through some performance criteria, such as absenteeism or bad time keeping. The real life situation is, however, more complex. The apathy displayed by the staff and discussed in Section 3.2.3 appears to be indicative of the retail grocery industry as a whole. Staff turnover rates are high (in some cases as high as thirty percent per month) and this may be representative of low levels of satisfaction with their jobs.

For the purposes of this study it is assumed that the variables that make up an individual's 'Attitude Profile' are in some sort of balance or equilibrium. As Mumford suggests, for certain groups and individuals some of these variables will be more important than others:

"..... at particular periods of an individual's life span one or more variables will exert especial influence e.g. work-centred goals, such as a desire for promotion and for higher earnings, may have their greatest impact when a young man is in his late twenties and early thirties. It is at this time that he is assuming family responsibilities. Some of the variables identified earlier will be readily manipulable, others less so, and a few - such as personality factors - not at all."

(Mumford & Banks, 1967, pp 226)

This study also hopes to determine how the relative weights attached

to each variable by the individual changes with the introduction of new technology. From this analysis it will also be determined if this affects the quality of working life and work performance of that individual. From our model outlined earlier, any differences that emerge will have a 'knock-on' effect throughout the organisation and ultimately affect company performance. Data will be generated at the individual and outlet level. Initially, however, for statistical purposes, data will be collected along three occupational levels from:

Shop assistants/cashiers

Supervisors and

Managers

in both scanning and non-scanning stores.

This will allow a work/job performance profile for each group and between outlets to be established. Since it is hypothesised that the importance attached to each variable should roughly correspond both within and across groups. The study therefore examines these changes in a group of companies within one type of organisation, in one sector of retailing - supermarkets in the grocery sector, using one technology - scanners.

This approach has both advantages and disadvantages. It has the advantage of being able to confirm an empirical study to one industry. It also allows inter-industry differences to be ignored in explaining differences in the experience with new technology and lastly, a better measure of the effect of such things as organisational size, length of time or computer use, management style etc. can be achieved when industry variation is eliminated.

few studies provided information on how the task or attitudinal dimensions were defined or measured.

7. No distinction was made between long-term and short-term effects. To Turner, the studies demonstrated a distortion due to the newness of the technology and lack of familiarity about methods of application and introduction.
8. No studies, to date, investigated whether the associations found altered when controlled for the effects of other variables.

Where possible the author has attempted to control for these criticisms. But given the uniqueness of the retail setting, the relative 'newness' of the applications and the lack of previous research in this field, two points of weakness still emerge. Firstly, it was not possible, given the restricted nature of the sample and the time available, to construct a measure of computer use for retail outlets. Turner's own model proved inappropriate in a retail setting, his model was specifically task related and his analysis was conducted on bank clerical functions. Secondly, variance in computer use was introduced through comparison of jobs. This was considered by the author as a valid approach in the retail setting due to the relatively narrow nature of retail job specifications.

The other weaknesses of earlier studies were all taken into consideration both in the construction of the theoretical framework and in the research design, outlined in Chapter 5.

This chapter has attempted to identify a framework upon which to analyse organisational and individual changes when new technology is

The main disadvantage is the uncertainty of the relevance of the findings for other industries. (Whisler, 1970)

Turner (1980) believes that much of the controversy surrounding the literature findings is due to the authors' methodological weakness of using only one organisation in their studies. He lists eight major criticisms common to all or most of the earlier studies investigated in the previous chapter.

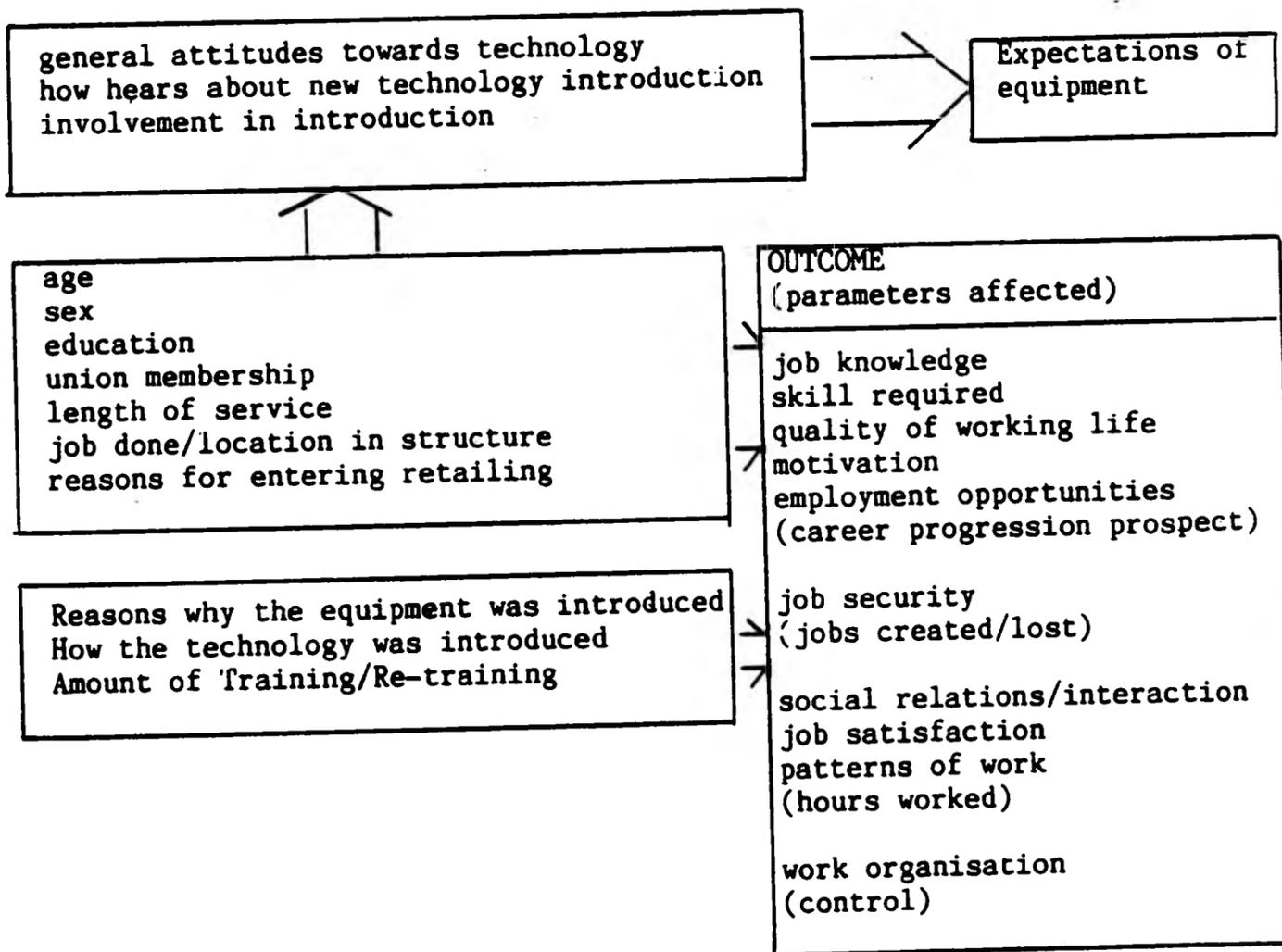
1. No measure is made of workers' computer useage. i.e. they tend to consider the issue as either using technology or not, rather than of the degree of useage.
2. The studies did not ensure that the individual reporting the change was either the person that used the computer based system of work or experienced the changed environment. i.e. the use of computers anywhere in the organisation was considered a sufficient reason for attitude change in another part of the organisation.
3. Variance in computer use was introduced through comparison of different jobs. The attitudinal differences found could have been related to differences in job content as much as to differences in computer use.
4. No distinction was made between an individual's use of computers, the work groups or the organisations. Turner believed that these would be different for different organisational levels.
5. The characteristics of a computer system play an important part in how the system will be perceived by its users. Yet most studies did not consider or measure these characteristics.
6. In almost all the studies workers were asked, retrospectively, how the work had changed after the switch to computer based systems. Very

introduced in a retail environment. It draws heavily upon the work of Mumford, From and McMillen and Boddy and Buchanan. The following chapter outlines the research strategy adopted to pursue this model which takes account of the methodological weaknesses identified by Turner (op cit).

This model translates into a 'Framework of Information Needs' that can be taken into the research setting.

This framework is illustrated below.

Diagram 4.5 Framework of Information Needs



(Source: Authors own Model)

4. 4 Research Hypotheses. General Level

Within this framework we can present hypothesis for further study, but as Redding (1980) found, because of the existing gap in knowledge, the rigorous testing of precisely defined hypothesis is not central to the thesis. Rather the hypothesis below can be considered as a means of organising the data which allows the author to 'illuminate specific patterns of behaviour'. (Redding, op cit)

1. Determine if there is a differential impact of new technology upon males and females. i.e. do males perceive new technology differently from females?
2. Identify those groups/individuals most at risk.
3. Identify the changes on work/job content/organisation structure that takes place with the introduction of technology.
4. Examine the effect upon different organisational levels, across occupations and between groups and sexes.
5. Assess staff reaction towards new technology.
6. Predict the outcome on retail performance of using scanner-based technology.

These operational objectives can be expressed as hypotheses and are outlined in Table 4.2.

The expected outcomes are examined in detail in Diagram 4.8 over which demonstrates that females in the retail sector will be more adversely affected by the introduction of new technology than males. The actual research data analysis is outlined in Chapter 6.

Table 4.2 Statement of the Research Hypotheses

Hypothesis 1:

NEW TECHNOLOGY CHANGES THE NATURE AND CONTENT OF WORK

- 1.A New Technology changes the characteristics of retail jobs
in terms of
- skill demands
 - work interest
 - opportunity for advancement
- 1.B New Technology changes the social characteristics of retail jobs
in terms of
- quality of working life
 - status
 - amount of supervision (control)
 - steadiness of employment
 - social interaction
 - chance to converse

Hypothesis 2:

DIFFERENT GROUPS REACT DIFFERENTLY TOWARDS NEW TECHNOLOGY

- 2A women will be more adversely affected than men
2B Older workers will be more resistant to change
2C Older women will be more anxious than men
2D Workers who have done the same job for a long time will not welcome
change
2E Less educated people are more resistant to change
2F Those lower in the organisational hierarchy are less resistant
to change

Hypothesis 3:

NEW TECHNOLOGY AFFECTS JOB SATISFACTION

- 3A Women will experience increased job satisfaction in areas
related to the social characteristics of jobs
3B Women will experience decreased job satisfaction in areas
related to the social characteristics of jobs
- women's jobs will be adversely affected by a faster work
pace and increased supervision
 - social interaction will be reduced for women
 - stress will be increased

Hypothesis 4:

EMPLOYMENT OPPORTUNITIES WILL BE REDUCED FOR WOMEN

Table 4.3 Expected Research Results

<u>INDIVIDUAL CHARACTERISTICS</u>	<u>PREDICTIONS</u>	<u>POSITIVE/NEGATIVE EFFECT</u>	
		<u>WOMEN</u>	<u>MEN</u>
SEX	Young women and men show little anxiety.	+	+
	Women will be more anxious than men	-	
AGE	Older workers more resistant to change Do not like change	-	-
LENGTH OF SERVICE	Workers who have done the same job for a long time, will not like change	-	-
CLASS	Working-class people less responsive to change than middle class	-	-
EDUCATION	Less educated people are more resistant to change. Men with trade qualifications object to work which they believe to be inappropriate for their qualifications. Women expect this to happen, men do not know	-	-
UNION MEMBERSHIP	Union members more resistant to change than non-union workers. Union will exert some influence on attitudes.	-	-
JOB DONE	Those lower in the hierarchy are less resistant to change, as have nothing to lose, new technology may reduce boredom.	+	+

<u>INDIVIDUAL</u> <u>CHARACTERISTICS</u>	<u>PREDICTIONS</u>	<u>POSITIVE/NEGATIVE EFFECT</u>	
		<u>WOMEN</u>	<u>MEN</u>
REASONS FOR ENTERING RETAIL EMPLOYMENT	New technology may reduce social inter- action, women value this job aspect	-	0
2.			
<u>ATTITUDES TO</u> <u>WORK</u>	<u>PREDICTIONS</u>		
Men - favourable	Men tend to support company policy		+
Women - doubtful, complain of boredom (particular true of checkout operators)	Women will resist a new system which they believe is going to make work more boring	-	0
PERSONALITY No special personal- ity types	Personality will exert no special influence	0	0
2.A			
<u>GROUP RELATIONSHIPS</u>			
Sales/checkout operators - branch management good (based on Redding's analysis of small shops)	Branch managers will be able to influence the attitudes of their staff	+	+
All staff/company - neither fastidious nor goodwill exists	Indeterminate, staff not particularly interested, apathetic	0	0
2.B			
<u>GROUP ATTITUDES TO</u> <u>CHANGE</u>			
Branch managers - enthusiastic, inter- ested, keen to be involved in new retail- ing trend towards automation	Managers can influence staff attitudes in a positive direction (no female managers in sample)		+

GROUP ATTITUDES TO
CHANGE

Female staff concerned This will increase
about possible increase unless checked
in work load or redun-
dancies, loss of job
interest

Male staff - no fears,
no anxiety, do not
feel as if directly
involved or affected

POSITIVE/NEGATIVE EFFECT

WOMEN

MEN

-

-

3.

THE ENVIRONMENT

PREDICTIONS

POSITIVE/NEGATIVE EFFECT

WOMEN

MEN

Human relations
climate - good,
little conflict

The change will not be
impeded by existing
inter-group conflict

+

+

Technical change -
no previous experience
of major technical
change in the shop

No preconceived ideas on
how management will behave
when introducing a new
system

0

0

Current propaganda -
staff appeared un-
concerned

Great deal of TV and
Press reports concerned
with the introduction of
new technology. Boom in
home computing

0

0

ANTICIPATED
CONSEQUENCES OF
CHANGE

SHORT-TERM

Redundancy - both
direct and indirect
job losses, may also
involve as changeover
to part-time working

Staff losses expected -
particularly in those
jobs directly replaced
by the computer

-

-

Transfer of staff -
none expected

Transfer between outlets
in the supermarket
industry is not usual

0

0

<u>JOB CHANGES</u>	<u>PREDICTIONS</u>	<u>POSITIVE/NEGATIVE</u>	
		<u>WOMEN</u>	<u>MEN</u>
Some managers will lose autonomy	They will see this as reducing their status and control		-
Some sales assistants will become merely operators	Their work will become less interesting, more tightly controlled. They expect this to happen	-	
Male workers - some job functions will go	Their work will change but they are not yet aware of this		0
<u>LONG-TERM</u>			
Not yet known			
		<hr/>	
		-7	0

Chapter 5 Research Methodology

The purpose of this chapter is to discuss the development of the research strategy employed in this study. Consideration is given to general research issues in terms of both design and bias that may arise when conducting a survey. A more detailed examination of these particular issues is undertaken in relation to the author's own work. The appropriateness of the research design in testing the identified hypothesis is also discussed.

5.1 Introduction and Background to the Study

The first stage in this research project was to develop a research design that would guide the researcher through the process of collecting, analysing and interpreting data. Redding (1974) has summarised this process as building a theoretical framework in which to picture what is going on. It is then necessary to look at a real life situation and see whether the theory is matched by observations from it and to then engage in a continuous process of refinement and adjustment of the basic idea.

The research began with an observation study. The aim of this preliminary investigation was: firstly, to give the researcher a practical insight into the issues likely to emerge and secondly to investigate the means of gathering information. The pilot study proved valuable. It contributed materially to the development of a questionnaire which supermarket staff could understand. Chisnall (1981) has noted the importance of a questionnaire designed so that respondents can easily complete it; in particular the instructions on the style of response and the sequence of questions should be clearly stated. Self administered questionnaires have been shown not to be an entirely suitable

method of research for populations of low intelligence or poor education. Respondents of either low socio-economic status or education have been observed to prefer closed questions to open questions because they are able to respond to questions which they may not fully understand without revealing their ignorance. Chisnall (op.cit) suggests that this factor should be considered when designing self-completion questionnaires. Given that the use of self-completion questionnaires was one potential method of data gathering that might have been employed in the survey, it was essential that all areas of potential bias be considered.

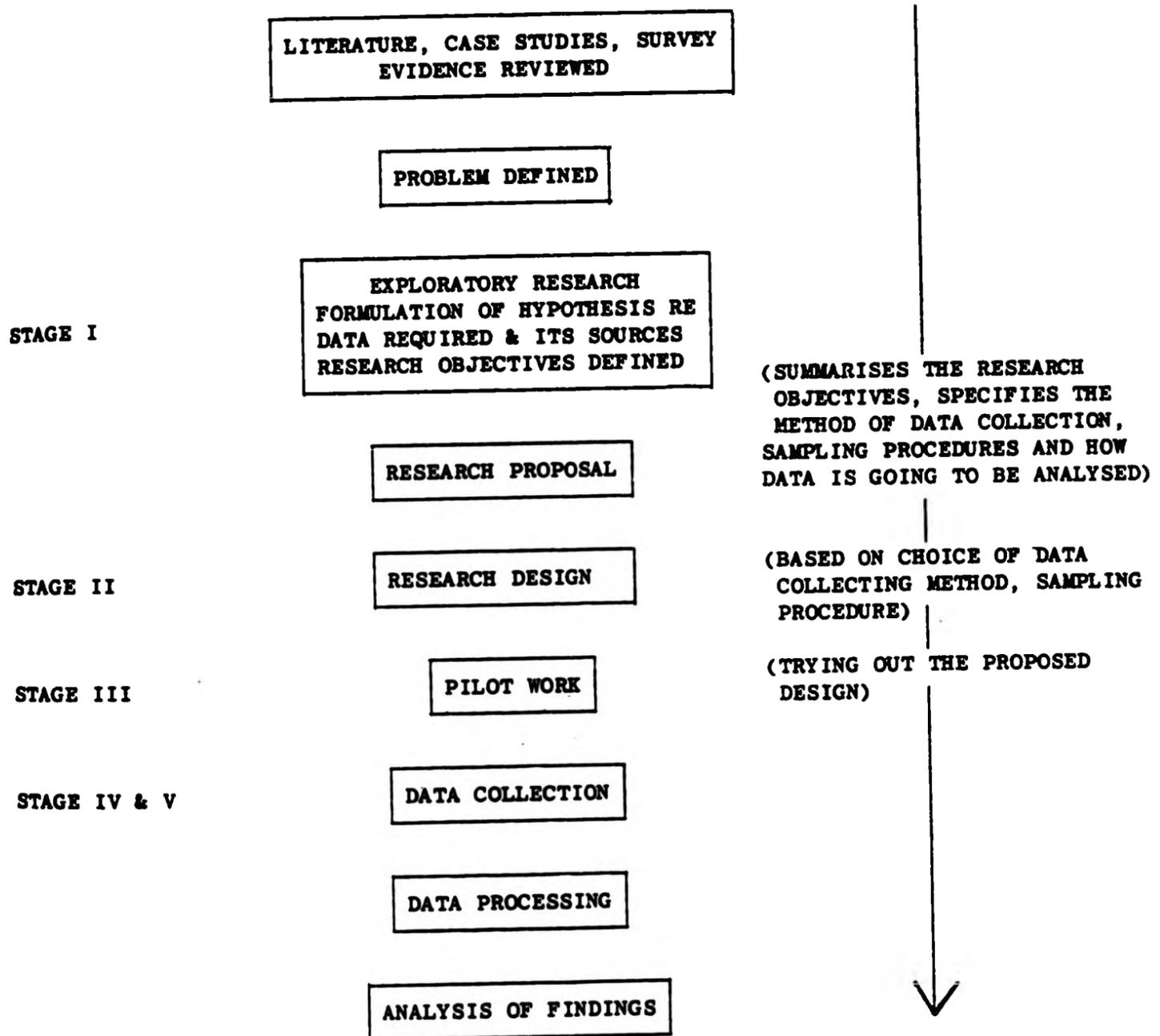
At the end of the pilot study it was possible to combine the information gathered with ideas from the literature and to develop a framework of issues for further study and a method by which to test them. The general aim of this study was established in Chapter 1 as being an analysis of the way new technology affects female labour in the retail sector. This general aim was to be met through a study of medium-sized independent grocers in the North of England and Scotland.

Specific operational hypothesis were developed through a detailed study of the existing literature, case material and survey evidence which was presented in Chapter 3 and 4. These operational objectives and hypothesis are summarised below.

5.1.2 Research Strategy

The research strategy finally adopted consisted of five stages; illustrated in Diagram 5.1 over. The stages in the research strategy are summarised below.

Diagram 5.1

STAGES IN RESEARCH STRATEGY

(Based on M. Crimp, 1981. pp27)

- Stage 1 : A preliminary qualitative study designed to explore attitudes and behaviour within a retail outlet when new technology is introduced, and help guide the design of a subsequent quantitative survey.
- Stage 2 : A quantitative survey designed to produce reliable data about behaviour/attitudes/expectations and reactions towards new technology by retail workers.
- Stage 3 : Data was gathered through the use of self-completion questionnaires. Including Pilot 1 and Pilot 2.
- Stage 4 : A qualitative study to expand on points observed in Stages 2 and 3 using interview techniques.
- Stage 5 : Additional qualitative study to relate findings generated in steps 3 and 4 to objective reality.

5.1.3 Specific Operational Objectives

The theoretical framework that generated the following research objectives was examined in detail in Chapter 3 and 4. This section attempts to outline the research framework developed to test the hypothesis. The hypothesis has a dual role within any study; Firstly to serve as a guide to the kind of data that must be collected in order to answer the research questions. Secondly to guide the way in which the data can be organised most efficiently in the analysis (Cohen & Nagel, 1934).

Within this study 4 general hypothesis exist; Each of which has been returned in operational terms and subdivided so as to enable it to be tested.

1. New Technology changes the nature and content of work

Operational Objectives : New Technology changes the characteristics of retail jobs in terms of skill, interest and promotion prospects.

New Technology changes the social characteristics of retail jobs in terms of the quality of working life, status, control, steadiness of employment, social interaction and chance to converse.

2. Different groups react differently towards New Technology

Operational Objectives : Women will be adversely affected.

Older workers will be more resistant to change.

Older women will be more anxious than men.

Workers who have done the same job for a long time will not welcome change.

Less educated people are more resistant to change.

Those lower in the organisational hierarchy are less resistant to change.

3. New Technology effects job satisfaction

Operational Objectives : Women will experience increased job satisfaction in areas related to the skill characteristics of jobs.

Women will experience a decrease in satisfaction in areas related to social characteristics.

Female work will be affected by a faster work pace and more supervision.

Social interaction will be reduced for women.

Stress will be increased.

4. New Technology will reduce employment opportunities.

for the purpose of description or prediction as a guide to action or for the purpose of analysing the relationships between certain variables. Diag. 5.1 illustrates the complexity of conducting a survey, which suggests that the first requirement of all research is the development of a good plan or over-all design. This section examines the development of the research design employed in this study.

5.2.1 Research Techniques

There are two main categories of research techniques that can be used in the collection of data in social surveys (Chisnall, 1981)

1. Reactive Techniques : which relates to survey situations where data originates from interaction between investigators and respondents as in interviews, questionnaires or experiments.

2. Normative Techniques : which relates to surveys where there is no dependence on respondents directly to give information, such as observation or library research.
 (Non-Reactive)

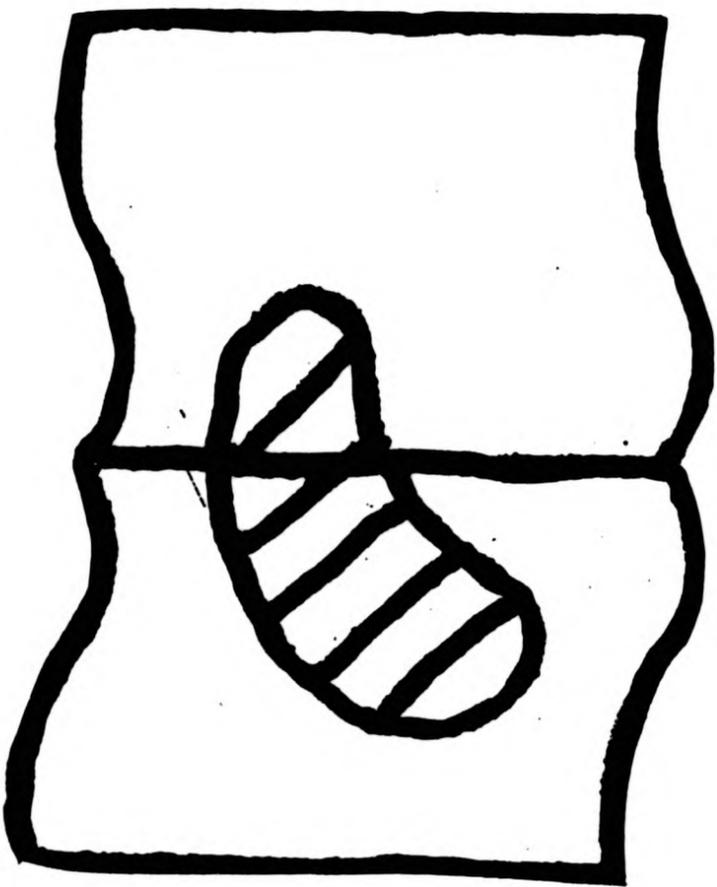
The essential decision in developing a research strategy is whether to employ communication or observation. i.e. whether to use reactive or normative techniques. Communication involves questioning respondents, either verbally or in writing. Observation does not involve questioning. Instead, a situation of interest is checked and the relevant facts, actions, or behaviour recorded. (Churchill, 1979).

The alternative approaches available are best considered through examination of Diag. 5.2.

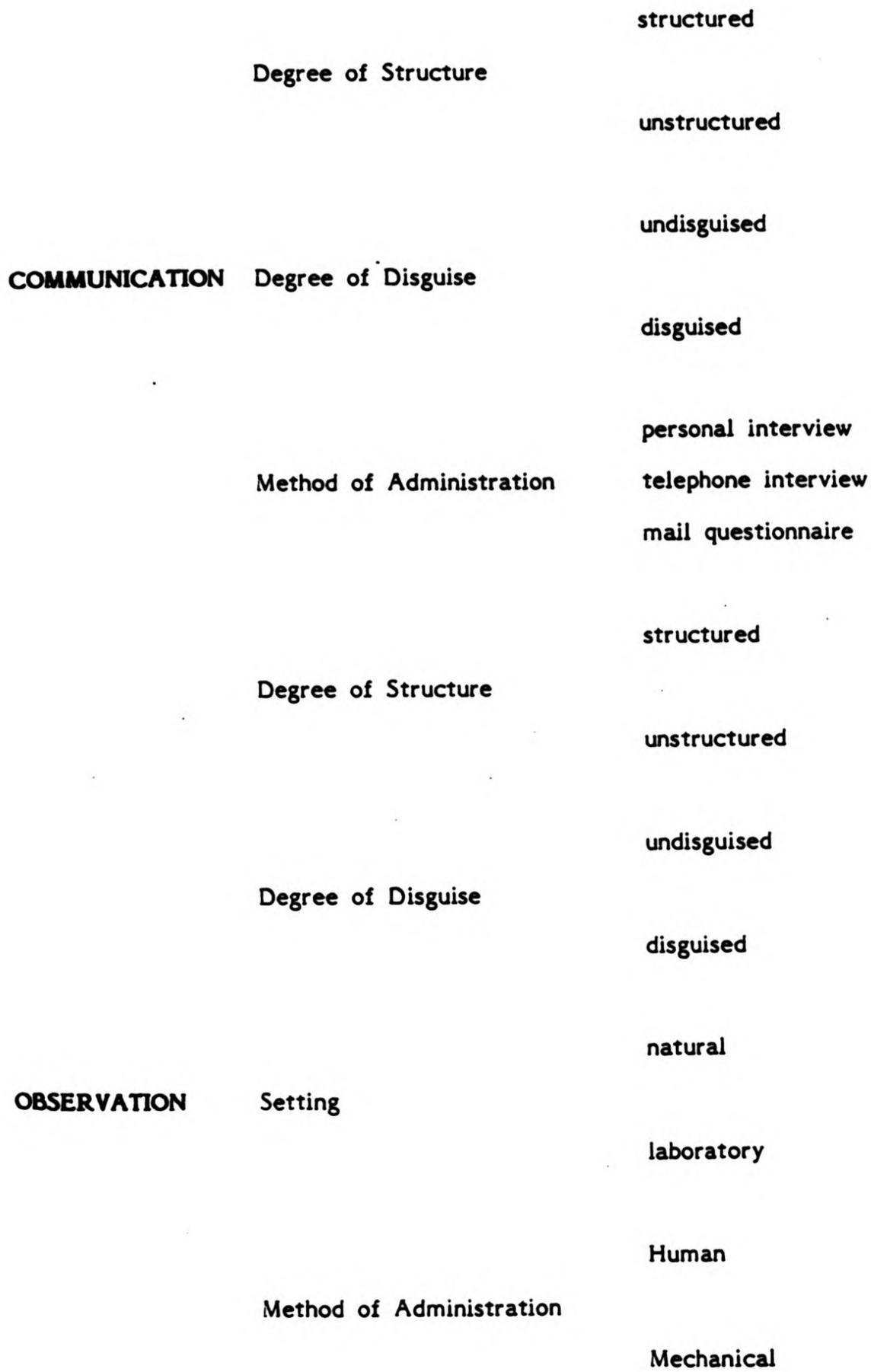
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Diag. 5.2 Basic Choices Among Means For Collecting Primary Data.



(Churchill 1979 pp162)

The diagram illustrates the choices involved in collecting data in each of the two major methods. Both methods have choices of technique available under three major composite parts. In terms of structure, both questionnaires and observations can be either loosely structured or very tightly controlled where a pre-determined sequence of data collection must be followed. Similar choice exists in both methods with regard to the concealment of the data gathering, which can either be disguised or undisguised i.e. whether respondents are made aware of the purposes of the research or indeed that data collection is in fact taking place. Likewise there are different methods that can be employed to actually collect the data.

The generation of data through asking questions can be achieved by using telephones, post, computers, or by asking personally. The questionnaire may be structured with a well defined sequence and standardised response categories. This particular format is best used for testing specific hypothesis such as occurs in descriptive or casual research. Where the response categories are not predetermined the questionnaire is unstructured, appropriate mostly to exploratory work. Similarly, the purpose of the research may be hidden from the respondent through the use of disguised questionnaires. This is most suitable where the issue under investigation is particularly sensitive.

Observation findings are usually generated by using diaries, personal involvement or through the use of instruments such as video recorders. These methods may be further classified on the nature of the research setting. The results can be obtained in a laboratory using electro-mechanical measuring instruments or the research can be conducted in a completely natural setting.

5.2.2 Research Strategy

Whatever the method used to collect data the methodological problems of surveys can be classified into 3 broad groups.

1. From whom to collect the information
ie the coverage/sample.
2. What methods to use collecting it
ie the research design.
3. How to process, analyse and interpret the data.

(Moser & Kalton, 1971)

Of the two main methods of data collection identified above: The amount of information obtainable from observation is limited, whereas questioning is flexible and capable of yielding a very wide range of valuable new data. (Churchill, 1979). The communication method of data collection possesses the general advantages of versatility, speed and cost. Whereas the observational method yields data more objective and accurate. Although questionnaires and interviews are the most flexible and useful devices in gathering information a more creative approach, using multi-measurement techniques, reduces the dangers of reactive effects and is often advocated by researchers (Chisnall, 1981; Churchill, 1979; Hornville, 1980)

" The multi-technique approach to research underlines the desirability of using several different methods, which make up a sound research strategy "

(Chisnall, 1981, pp26)

Most studies acknowledge that the sources of errors and bias generated from an individual's awareness of being tested must be compensated by using some other type of measurement than the "verbal self report".

" A series of linked research operations can be helpful in revealing errors in measurement, the weaknesses of one survey method being compensated for by the particular strengths of an alternative method of investigation "

(Chisnall, 1981, pp27)

Given the potential weakness in employing only one data collection method, the research strategy decided upon was to collect data by asking questions and supplement the data generated with interviews and an observational study. This was also the most appropriate method available given the subject matter, unit of enquiry and the scale of the survey.

From the experience of the research setting that had been generated from the pilot study, in terms of the large number of part-time workers, high labour turnover and "suspicious" employees - a combination approach was considered most appropriate. By employing a number of methods potential bias could be reduced. A detailed discussion of the "triangular approach" used is provided in a later section. It was expected that a combination of approaches would produce greater validity. The questionnaire would provide a description of conditions and the interviews and observation study the reasoning behind their development.

Crimp (op. cit) notes that the use of the "descriptive function", or qualitative technique, is far reaching. It can be used to assess not only behaviour, but also helps predict awareness and attitudes. From this future behaviour may be anticipated.

The research design in this study lacks trend data. Nevertheless, it is possible to predict future behaviour by

- (1) asking questions about present experience.
- (2) asking questions about past experience.
- (3) analysing answers to awareness and attitude questions together with responses from behavioural questions, allows a prediction on the respondents future behaviour to be made.

(Crimp, 1981)

The major assumption in making such predictions regarding future behaviour is that the data on which the prediction is made is correct. This ignores all the potential errors and bias that may be included in responses. Nor is a measure of past behaviour a satisfactory indication of likely future behaviour. Attitudes, motivations and other influencing factors all change over time so that actual responses may differ from those predicted. Nevertheless, in the absence of an entirely satisfactory method of predicting future behaviour, the three stages outlined do provide some indication of likely outcomes.

The research design adopted was a three-fold or "Triangular Approach" (Webb et al, 1966) which attempts to overcome the disadvantages that may arise by using only one method of data collection. By using this research strategy the hypothesis identified in Chapter 4 were tested through an analysis of data generated.

1. Self-Completion Questionnaires
2. Depth Interviews
3. Observation study

This triangular approach was decided upon in an effort to overcome the disadvantages of using only the self-completion questionnaire method. In addition it was hoped to gain more accurate information than that employing only one approach. A more detailed discussion of the limitations of different methods is provided in Section 5.2.3.

5.2.3 Errors and Bias

A preliminary observation study had revealed the inadequacies of employing only an observation method of investigation. Specifically the lack of "hard" data upon which to base statistical analysis. However as Chisnall (op. cit) notes

" No research method is without bias"

(Chisnall, op. cit, pp27)

The difficulties anticipated with the use of the self-completion questionnaire were that; Answers to questionnaires usually have to be accepted as final and responses may be inappropriate where spontaneous answers are required. When the respondent fills in the questionnaire he may see all the questions before answering only one of them, therefore different answers cannot be treated as independent. This criticism is only valid for self-completion questionnaires.

Usually there is no opportunity to supplement the respondents answers by observational data, nor can it be guaranteed that the correct person completes the questionnaire. Lastly, there are problems in ensuring that adequate response rates are achieved. (Moser & Kalton, op. cit)

The triangular approach attempts to alleviate many of these difficulties by providing additional behavioural data to reinforce the measurements obtained through the questionnaire. Despite attempts to control variables to reduce the amount of errors that may be produced there are still a number of sources that must be allowed for. In particular, bias that may arise due to questionnaire design and question wording; varieties of interview bias, respondent unreliability, ignorance, misunderstanding, or bias, or bias in recording and coding the responses (Oppenheim, op. cit). Much of which only becomes apparent at the data analysis stage. Analysis of the data generated in this study, see Chapter 6, demonstrates that despite efforts to minimise the amount of errors and bias in the survey, some conditioning of responses was detected.

The content of the questionnaire was determined by:

- (a) research objectives
- (b) nature of the survey population
- (c) method chosen to convey the questions to the survey population.

The research objectives are contained in Section 5.1.3. The main objective is to determine how the introduction of new technology affects the nature of retail work, particularly for female employees. Within this major objective a number of subsidiary areas of investigation were developed. The effect on

skill, job satisfaction and the social characteristics of work were considered. The personal nature of the investigation and its relative uniqueness coupled with the nature of the retail workforce, in terms of education, age and hours worked, affected the choice of research design. A triangular approach was chosen that utilised questionnaire, interviews and observation. This attempted to overcome any difficulties that would arise in employing only one approach.

5.2.4. Validity

There are 2 important factors relating to the measurement of attitudes, such as those covered in the questionnaire. Firstly, reliability or consistency of method of measurement and secondly, validity or the extent to which the scale measurement is measuring what it is supposed to measure or what it is believed to be capable of measuring. (Chisnall, op.cit)

3 methods exist to test the reliability of a scale:

1. Test - Re-test : repeating a test and comparing the two measurements, by calculating the correlation between the results of the replicated and the original test.
2. Equivalent Forms : comparing measurements on two comparable forms of the same test.
3. Split - Half : method of comparing measurements on half of the test with those noted on the other, the result is expressed as a coefficient of correlation.

The author employed the Equivalent Form method to test the reliability of the scale of measurement of the questionnaire.

The validity of a particular test rests on suitable external criteria being available. Test validity can be determined by one of three approaches: By establishing Content Validity through the personal judgements of experts in the particular field; by using Predictive Validity to match results with some external criteria or through Construct Validity, which is achieved by testing "known" groups or types of respondents who could reasonably be expected to hold certain attitudes which differ towards some defined object. The survey undertaken had both content and construct validity, since it was developed only after careful consideration of existing research and different methodologies used in this field. The predictive validity of the survey can only be established when the findings or research design are applied to new research situations.

Buchanan (1979) has identified 4 main factors that must be considered when selecting an appropriate research design. These are:

- (a) Comparison - some form of comparison is necessary to establish association or covariation between variables.
- (b) Manipulation - to establish causality the time sequence of events must be clear.
- (c) Control - to establish casual relationships between variables, factors that could provide alternative explanations must be identified and held constant.

- (d) Generalisation - research findings should be applicable to the population that the sample represents.

The issue of control in research design relates to the concept of Internal Validity, the problem of generalisation is one of External Validity.

Different research designs differ in their ability to handle these 2 types of problem. As Buchanan (op. cit) notes, research designs can be analysed in terms of how they cope with the problems of internal/external validity. As a general rule, designs that are strong on internal validity (control) are weak on external validity (generalisability) and vice versa. There is no one best type of research design; the appropriate choice depends on the kind of problem being studied and the constraints imposed upon the researcher in terms of time and money. If the main objective of the research is to establish casual relationships, a design with strong internal validity is preferred.

The research design developed attempts to overcome any inherent weaknesses in relying upon only one research tool by using a number of approaches. Whilst the questionnaire method has strong internal validity, in that it addresses the issues raised by Buchanan in itself it has low external validity. But when analysed in conjunction with the results of the interviews and the observation study the generalisation of the data is improved and so the external validity of the research approach is increased.

Oppenheim (op. cit) has suggested as part of the sequence of survey operations that initially it must be decided what conclusions we wish to draw, and then proceed to state what statistical tables and cross-tabulations of results are needed to reach these conclusions. It is from these tabulations that the type of questions, their qualification and the nature of the sample required will be generated.

5.4 Pre - Tests

Pilot surveys and pre-tests provide guidance on the adequacy of the sampling frame from which it is proposed to select the sample, the variability within the population to be surveyed, and the non-response rate to be expected. In addition, it also indicates the suitability of the method of collecting the data, the adequacy of the questionnaire and the codes chosen for analysis. Lastly it provides some indication as to the probable duration of the main survey.

The following section contains an examination of the pilot studies undertaken by the author, which were examined in detail in Chapter 4. The part played in helping construct an appropriate research strategy, questionnaire and interview schedule are also discussed.

Hunt et al (op. cit) believe that the importance of the pre-test is often understated in most research. The pre-test of a survey should be considered a "dry-run" of the entire research project. To ensure that the methods employed provide data of sufficient quality and quantity to satisfy the objectives of the research project. This was a paramount consideration in the use of pilot surveys in this study.

The first stage of the research conducted consisted of an exploratory observation study in the research setting, to evaluate the research situation and to identify those topics worth exploring in more detail. The findings, when combined with the literature, allowed the development of a research framework with which to design the questionnaire.

The author utilised the pre-test criteria suggested by Hunt et al with specific reference to

1. Items about the questionnaire itself
2. Items about specific questions
3. Items about data analysis

Two pre-tests of the questionnaire were conducted.

5.4.1 Pre - Test 1

Pre - test 1 identified problems relating to specific questions in the questionnaire, which provided difficulties in interpretation for the respondents. These difficulties were discussed in Chapter 4. As suggested in an earlier section, in a sample of lower educational ability questions should be closed and easily understood. The author in this preliminary survey had overestimated the ability of respondents to recall past experience, the questionnaire design was therefore proved to be inappropriate.

Initially the pilot test was undertaken to test and evaluate

- the length, layout, format, space for open-ended questions and sequencing of questions. It was also hoped to estimate the response rate for the questionnaire.
- identify problems and interpretation of individual questions.
- test data analysis procedures and the complete research design. In particular
 - coding and tabulation procedures should be pretested with dummy tables
 - open ended questions which may suggest new research hypothesis to be tested.

Each respondent was given a self completion questionnaire and a postage paid return envelope. The survey was administered by the company itself and was distributed with the weekly wage packets. Respondents were asked to complete the questionnaire and return it to the author in the post paid envelope. Enclosed with each questionnaire was a covering letter, which outlined the nature of the survey and invited respondents to participate by completing the questionnaire.

100 questionnaires were distributed to all employees, including management, 23 were returned over a 3 week period. Follow up steps were taken with a letter distributed with the wages in the third week, requesting those who had not already done so to return their completed questionnaire. Additional

questionnaires were also left in the staff room. The follow up yielded no additional replies. Staff did not seem particularly interested or motivated to respond.

The general problems that emerged with Pre-Test 1 were the length of the questionnaire itself, the general layout and the instructions supplied. All of which combined to result in almost all questionnaires being returned incomplete or not being returned at all. Some error types that were noted included ambiguous questions, missing alternatives and the use of inappropriate vocabulary. The poor response rate was significant in itself, and was partly representative of using a mail out questionnaire.

The author followed up Pre-Test 1 by visiting the store and asking employees about the difficulties they had encountered in completing the questionnaire. The main problems that emerged were attributable to poor questionnaire design rather than to problems associated with the issue under investigation. It was considered that the tabulating procedures and general research strategy would still hold.

The questionnaire was therefore redesigned in terms of layout, length and the sequencing of questions. The format of the questionnaire and the instructions given were also changed. In addition an alternative method of distribution for the proper survey was chosen. Since it was considered that collecting data by means of a questionnaire was still the best method available in this research situation, it was expected that an improved response rate could be achieved by employing a self-completion questionnaire administered by the author and

collected on the same day or upon completion as opposed to a mail survey. The number and location of respondents precluded the questionnaire being completed by the author on a question and answer basis.

Given that there had been substantial changes to the questionnaire, it was decided to conduct another pre-test of the questionnaire in a separate but a very similar outlet.

5.4.2 Pre - Test 2

The purpose of Pre-Test 2 was to test the appropriateness of the remodelled questionnaire and the new data collection method. Both proved satisfactory. Whilst the form of the questionnaire was still self completion by the respondent, the method of distribution was changed. The questionnaires were distributed personally and the author remained at the branch to answer any questions that the respondents might have. This method also helped to overcome staff fears that the answers would become available to the manager. The presence of the author also provided some additional incentive for the respondents to complete the survey. No difficulties were experienced by the staff in following the instructions contained in the questionnaire and the author was always present to explain any problems or difficulties that emerged.

This form of questionnaire and method of distribution led to an improvement in the response rate to over 83%. 34 questionnaires were distributed and 28 completed surveys returned.

This did however involve three separate visits to the pilot store, which was necessary to collect most of the responses from the part-time workers.

In the survey proper this method of questionnaire distribution had to be revised, as most supermarket managers would not allow staff to complete the questionnaire during working hours. The respondents therefore had to complete the survey during lunch hours and tea breaks. This may have reduced the response rate in the final survey slightly, since some staff were unwilling to devote their free time to participate in what they considered a "company" initiative. The effect is however difficult to quantify. In addition by completing the questionnaire during breaks staff were tempted to confer on certain questions, unsure of the anonymity guaranteed by the author and afraid that management would read the responses. As a consequence some completed questionnaires had to be excluded from the final sample. This was particularly true of the twilight/night shift workers, when the author was not always present.

One factor that did emerge from both the pilot tests was the need for a more detailed analysis, than had previously been thought necessary, on the nature of retail work in terms of content and structure. It was necessary to identify if it was the content of the work itself or the way that tasks were organised on the shop floor that generates the motivation levels and attitudes towards work demonstrated by the survey sample. It became important to determine the nature of retail work so that the effect of the introduction of new technology into the operating environment could be more fully understood.

The pilot analysis also suggested the need for a more comprehensive investigation of the development and organisation of retail work, so that attitudes towards work and experience or perception of new technology in the retail environment may be put into its proper perspective. It was apparent that some time should be spent working in a supermarket in order to gain a better understanding and greater insight into the research situation.

5.5 The Survey

The pilot project conducted in a medium sized book retailer in West Central Scotland and examined in detail in Chapter 4 demonstrated that the issue of the introduction of new technology within the retail environment, and its' effect on both the organisation and staff was worth pursuing in more depth.

The first requirement was therefore to identify a number of supermarket organisations which were users of scanner-based systems and which would be interested in participating in the research. Organisations that fell into two broad groups so as to enable research comparisons to be made, ie scanning VS non-scanning, were chosen.

The number of scanning stores in the UK grocery sector was broken down into

Multiples

Independents

Others

The number of non-scanning was restricted to outlets where direct comparisons could be made to scanning stores, particularly with respect to size and location. ie the universe of definition was not all grocery outlets in the UK, but was instead restricted to coverage of a sample equivalent in size to that of the scanning group.

Initially, it was hoped to construct a sample that involved organisations from all supermarket groups. This would allow a greater range of comparisons to be made from local to regional through to national level. Direct approaches were made to all the multiples who were scanning at that time. Initially a letter outlining the objectives and purposes of the research was sent to either the chief executive or head of data processing. This was followed up a week later by a personal phone call to those involved. In all cases permission to conduct the research was refused. A variety of reasons were given but the most common were that; Firstly, the data was confidential; Secondly, it was not company policy, or lastly, that it was only a pilot project.

Meetings with senior officials of two regional chains based in the North East and throughout Scotland, eventually enabled the participation of one group involving eight separate research sites.

6 For full participation in the study

1 Pilot

1 Observation study

Of the 6 sites chosen, 2 were scanning and 4 were non-scanning.

A similar approach to a large single - outlet independent who had been scanning for some time was also accepted. Representations to the Scottish Grocery Federation resulted in the sample being completed by the inclusion of another independent with 2 outlets, 1 of which was scanning.

The representativeness of the sample was far from ideal, since the largest group of scanning stores was excluded and the sample was also restricted geographically to Scotland and North East England. However, it was hoped that an examination of the regional VS independent situation would allow comparisons to be made between manual and computer based systems of work in the grocery sector. It was expected that these comparisons could then be extended to predict the outcome on the supermarket retail group as a whole, both in terms of operations and location.

The study therefore had 11 good research situations of scanning and non-scanning stores. 6 in a regional chain where it would be possible to compare manual VS computer based work systems and 2 groups of independents which would allow cross-section comparisons to be made.

On the basis of the preceding discussion, Section 5.2, and to spread restricted personal resources in the most advantageous way a combination research strategy was used:

- face to face interviewing

- observation
- informal discussion
- self-completion questionnaires

5.5.1 Informal Discussion

Informal talks were held at the early stages of the research with both academics who had done similar work and with executives of retail and computing organisations. Field visits were also made to scanning installations throughout the U.K. This early research work helped generate a firm research proposal for testing at a national level.

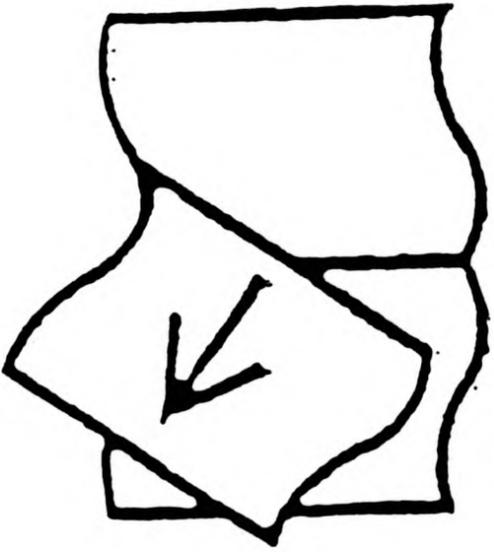
5.5.2 Self - Completion Questionnaires

The large number of sales assistants and shop workers and time and financial restrictions made face to face interviewing impossible therefore a compromise research approach was adopted.

All shop workers, including store management, were asked to complete questionnaires which were handed out and collected by the author with guarantees that on-one else in the organisation would have access. Management would receive only aggregate results and these would also be made available to the shop workers.

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The predominate aim in designing the questionnaire was to determine staff reactions and attitudes towards new technology in the workplace. An issue which emerged during the pre-test or pilot stage was that attitudes towards technology were inextricably linked to attitudes towards work. Therefore, in order to better understand this complex relationship and also in order to relate attitudes to the real world, the author spent at least 2 days in each outlet, talking informally with management supervisors and staff. Both on the shop floor and at Head Office level, closely observing, recording and discussing all the different jobs in the office and on the shop floor. In this way the author could later associate comments about a particular work function with her own experience of the job.

The questionnaire was devised to include all the major areas being tested and was divided into 2 main sections to yield the following information:

1. Obtain information on respondents

- social class
- educational background
- sex
- age
- marital status
- present job
- length of service
- union membership

2. Generate attitude data on

- skill levels
- amount of social interaction
- level of job satisfaction
- quality of working life
- amount of control
- working conditions
- the likely affects of technology as perceived by the respondent on his/her role and position

It was not possible to undertake a before/after analysis, which would have allowed comparison of perceived vs actual effects, in any of the outlets. The sample was therefore chosen to include stores which were as equivalent as possible in operating terms apart from the existence of scanning equipment.

Local economic conditons were also taken into account in the analysis of the data in Chapters 5 and 6.

5.5.3 Interviews

Detailed face to face interviews were carried out with the managers of all stores participating in the survey.

Interview appointments were made personally by the author. The researcher was identified as a doctoral candidate investigating the effects of the introduction of scanning equipment into supermarkets. No further background information was given and as in the questionnaires the personal nature of the investigation was emphasised in order to avoid bias in the answers.

The original plan called for one half day interview, which would allow time for visits to other company personnel, if necessary. In operation, interview time varied widely, ranging from one hour to several hours spread over between 1 and 3 visits.

The format of the interviews was not rigidly structured, but rather tended to follow a free format discussion with the author ensuring that several key points were covered.

A focused interview was decided as the best approach, since it not only allowed the respondent a good deal of freedom, but also ensured that coverage was given to a set of topics in a systematic way (Moser & Kalton, op. cit). There was no set questionnaire and all the questions asked were open so as to encourage respondents to talk freely around each topic. Since a questionnaire had already been completed by the branch managers, it was expected that the data generated from informal interviews would compliment the systematic data already available. This would allow a "richer understanding" of the research setting.

Some criticisms and weaknesses of employing such an informal method of investigation were recognised and taken into account when conducting the research and analysing the data. The three most important difficulties that arose included firstly, difficulties in comparing and aggregating the results as different items of data were obtained from different people. Secondly, the same item may have been asked in a different way, therefore the results were not strictly comparable. Thirdly, and most importantly, the results generated by descriptive interviewing do not lend themselves to statistical analysis.

As a first step, preliminary visits were made to each participating outlet to obtain information which would serve as a guide for further questioning.

On the second visit the main line of questioning was pursued according to the outline previously described. Tape recordings were taken during the interviews and later transcribed into a format designed for comparative classification of the information.

Like the questionnaires, the interview provides information about the attitudes, opinions and feelings that employees have toward their total work environment.

Essentially, the interviews covered 4 main areas:

Managers were asked how they considered new technology was or could effect

1. Individuals
The company/their branch
2. How they personally were responding and the nature of their response
3. Their perception of the staff response
4. Classification questions

A sample transcript is obtained in the Appendix

5.5.4 Observation

Many of the limitations and constraints identified in Section 5.2.3 relating to the use of interviews to generate research data apply to the application of observation studies.

In particular they may be subject to bias and prejudice on the part of the observer. They are impossible to classify statistically and may lead to the suggestion of incorrect inferences on the part of the observer. The author was aware of these weaknesses and where possible, attempts were made to control any prejudice or external interference. The author spent a week in a large supermarket, as a full-time employee. Data was recorded using a diary method. Time was spent in every department in the store.

The participant observation study was undertaken in order to determine the nature of supermarket work and the beliefs and values of the people who work in the industry. This data could not be sufficiently generated through the consideration solely of a questionnaire. But also required to be supplemented through personal interviews. By analysing the data gathered within the framework identified in the observation study a clearer understanding could be obtained of the attitudes and opinions expressed in the questionnaire.

Details of the findings are given in Chapter 6.

5.6 The Time Sequence

The time sequence of events was as follows:

5.6.1 Survey

The main survey was carried out in June - August 1984

The responses are shown in the Appendix, together with other details.

5.6.2 Fieldwork

The depth interviewing was carried out in September 1984

The observation study was undertaken in August 1984

5.6.3 Data Analysis

An analysis using the Minitab programme was tested in the Vax system on the pilot questionnaire in 1983. However, to produce the required frequency tabulations, cross-tabulations and statistics in the main survey it was decided to use SPSSX.

The results of the survey form the basis of Chapter 6 where the hypothesis discussed earlier are tested and discussed.

Some additional material from the survey is given in the Appendix

Chapter 6 Findings

This chapter tests the hypothesis identified in the preceding analysis. The type of individual making up the supermarket workforce and their attitude to work are considered. It is expected that personal characteristics will have some influence on conditioning staff reactions towards technology. Before investigating the effect of the introduction of new technology upon the retail environment, it is necessary to understand the nature of supermarket retail work. Initially, the author considered the responses from the non-scanning stores to build up an understanding of the nature of traditional supermarket work and the values and attitudes of employees. This was undertaken to build up a picture of the pre-change situation. It was believed that this would assist in comparison with scanning stores. It is suggested that the greatest variations in attitudes and opinion would be between sexes and between scanning and non-scanning stores. Analysis of these divisions was employed to explore the major hypothesis: that there were differences on the impact/effect of technology on males and females. In the absence of a formal pre and post introduction survey, it was anticipated that scanning stores could identify actual experience and non-scanning stores perceptions about what was likely to happen.

There was no opportunity to conduct a 'before' and 'after' study. Since there is little variation in tasks and operations between stores, the bulk of supermarket jobs are directly comparable across companies.

Nine supermarket outlets were chosen. They were matched in terms

of number of employees, operational size and demographic similarity of locations. The use of new technology was the only identifiable difference between the stores. This was done to permit a comparison of attitudes before and after the introduction of new technology.

The first section in this chapter restates the research hypothesis identical in the preceding chapters. These were tested by the survey work.

The second section outlines the background of the companies participating in the research.

The third section analyses the overall survey results to determine:

1. The nature of the sample
2. Social characteristics
3. Attitudes to work
4. Job satisfaction
5. Attitudes towards technology - expectations
6. Factors influencing these attitudes

This analysis enables the author to develop a profile of retail workers. This permits the construction of a profile of the attitudes of shop workers towards their work and new technology. In the fourth section the hypothesis identified in Chapters 3 and 4 are tested. Section 5 includes a discussion of the interviews held with the branch managers of the stores in question. In order to understand the responses generated in the survey and in the interviews, the author worked for a period in a supermarket. This gave an impression of the work handled by shop staff. A discussion of the findings

generated from the observation study is given in the sixth section. Section seven provides some discussion of the results and limitations of the study.

6.1 Research Statement

The preceding analysis has led to the development of 4 major research hypothesis. A formal statement of these research objectives is set out below. Testing is left to a later section.

Hypothesis 1 : NEW TECHNOLOGY CHANGES THE NATURE AND CONTENT OF WORK.

Hypothesis 1A: New technology changes the characteristics of retail jobs in terms of

- skill demands
- work interest
- opportunity for advancement

Hypothesis 1B: New technology changes the social characteristics of retail jobs in terms of

- the quality of working life
- status
- amount of supervision (control)
- steadiness of employment
- social interaction
- chance to converse

Hypothesis 2 : DIFFERENT GROUPS REACT DIFFERENTLY TOWARDS NEW TECHNOLOGY

Hypothesis 2A: Women will be more adversely affected than men

Hypothesis 2B: Older workers will be more resistant to change

Hypothesis 2C: Older women will be more anxious than men

Hypothesis 2D: Workers who have done the same job for a long time will not welcome change

Hypothesis 2E: Less educated people are more resistant to change

Hypothesis 2F: Those lower in the organisational hierarchy are less resistant to change

Hypothesis 3 : NEW TECHNOLOGY EFFECTS JOB SATISFACTION

Hypothesis 3A: Women will experience increased job satisfaction in areas related to the skill characteristics of jobs

Hypothesis 3B: Women will experience a decrease in job satisfaction in areas related to social characteristics

- womens' jobs will be affected by a faster work pace and more supervision

- social interaction will be reduced for women

- stress will be increased

Hypothesis 4 : EMPLOYMENT OPPORTUNITIES WILL BE REDUCED FOR WOMEN

With the exception of Hypothesis four, all the other hypotheses are tested in a later section. Hypothesis 4 was not directly tested as the data released by the participating companies did not permit any firm conclusions to be drawn in this area. The author discusses this research objective in a later section, but the discussion itself is subjective and is not based on any detailed evidence generated from the research.

The most important research objective is the belief that new technology changes the nature and content of jobs. All the other hypotheses are dependent upon and related to it.

6.2 Company Background

Three separate companies participated in the research. Two independent companies, one based in central and the other in the west of Scotland, and the other a regional supermarket chain with outlets throughout central Scotland and north east England. The study comprised of a total of 9 outlets, ranging in size from just over one thousand square feet to over ten thousand. All the companies at the time of the study, were family owned and controlled concerns, with annual turnovers ranging from £52,000 to over £1,000,000 per annum. Four of the nine outlets were operating scanning equipment. Two from the regional chain and one from each of the independents. Experience with the scanning system ranged from over 2 years with one of the independents to just a couple of weeks in one of the samples from the regional chain.

All staff working in the branch at the time of the survey were asked to complete a questionnaire. Management were included in this. The large number of part time workers in the retail industry required several visits to the same research location in order to include all the staff. Persuading supermarket staff to participate in the project proved more difficult than had first been anticipated. In almost all locations the staff were suspicious of both the author and the purpose of her research. This was despite the fact that all employees had received an individual letter explaining the nature of the research work, its purpose and a guarantee of confidentiality. In addition a general introductory letter was posted on the notice-board prior to the visit and a thank-you note upon completion. Despite these efforts participants in the survey verbalised their antipathy by such comments as:

"What's the point? It won't make any difference to my job".

"Who cares?"

"Waste of time, if you ask me".

This type of response was partly a function of the refusal of most branch managers to free staff from their shop duties to complete the survey. The staff had to complete the questionnaire in either their tea-break or lunch hour. Some part timers who do not have any breaks had to take the survey home. The completion of some surveys off the premises could not be avoided.

6.3 The Survey

Given the restrictions on the possible methods of generating research data, in terms of limited access to company information and personnel, it was decided that the best way of generating the most useful and meaningful information from the sample was to conduct a self-completion questionnaire survey, reinforced by information from personnel interviews and an observation study. The reasoning behind this choice of approach was discussed in Chapter 5.

6.3.1. The Nature of the Sample

This section outlines the results of the survey to assess employee perceptions and attitudes towards their work and technology. The method selected to obtain an understanding of the beliefs and attitudes of supermarket employees was that of a supervised self completion questionnaire.

The occupational breakdown of the sample is given in Table 6.1. For much of the detailed analysis that was required in the research, this large number of categories had to be combined so that more meaningful conclusions could be generated. The results indicate that

Table 6.1 Sample Breakdown by Sex and Occupation

OCCUPATION	MALE	FEMALE	TOTAL %
Shop Assistant	18	86	104 46.2
Shelf Fillers	7	18	25 11.1
Check-Out Operators	1	29	30 13.3
Department Head	4	12	16 7.1
Warehouse	7	3	10 4.4
Tradesmen	14	-	14 6.2
Trainee Manager	4	-	4 1.8
Assistant Manager	3	1	4 1.8
Manager	6	1	7 3.1
YTS/Youth Training	1	3	4 1.8
Office Worker	-	5	5 2.2
Canteen	-	1	1 0.4
Area Manager	-	1	1 0.4
TOTAL	65	160	225
%	28.9	71.1	100

71% of the sample was comprised of female shop floor staff and also 71% of the sample performed front shop duties at the lowest occupational levels.

The age and sex structure of the sample are given in Table 6.2 and Table 6.3

6.3.2 Age

The data outlined in Table 6.2 suggests that the sample is characterised by a relatively young labour force, 45% (102) of respondents are under 21 years old, 68% (154) are under 30. This, as demonstrated in Chapter 2, is characteristic of the retail sector, i.e. a relatively young labour force. Similarly, 71% (160) respondents are female and 29% (65) are male.

6.3.3 Occupation

Table 6.1 suggests that the majority of women occupy the lowest positions in the occupational hierarchy. 83% (86) of shop assistants are women, 96% (29) of check-out operators are female as are 72% (18) of shelf-fillers. At the higher levels in the occupational structure, there was only one female manager in the sample. This represents 14%. Again this figure appears characteristic of British supermarket retailing as a whole.

The trade or craft occupations in the sample were occupied entirely by men. Similar sex segregation was found in the warehouse and distribution functions. Of the respondents doing these jobs, men accounted for 70% and women for 30%.

Table 6. 2 Sample Breakdown by Age and Occupation

OCCUPATION	AGE				TOTAL %
	16-20	21-30	31-44	45-65	
Shop Assistant	52	19	16	16	103 45.8
Shelf Filler	18	2	4	1	25 11.1
Check-Out Operator	11	5	9	5	30 13.3
Department Head	3	4	3	6	16 17.1
Warehouse	6	2	-	2	10 4.4
Tradesmen	3	10	-	1	14 6.2
Trainee Manager	3	1	-	-	4 1.8
Assistant Manager	-	3	-	1	4 1.8
Manager	1	4	1	2	8 3.6
YTS/Youth Training	4	-	-	-	4 1.8
Office Worker	1	2	1	1	5 2.2
Canteen	-	-	-	1	1 0.4
Area Manager	-	-	-	1	1 0.4
TOTAL	102	52	34	37	225
%	45.3	23.1	15.1	16.4	100

Table 6. 3 Sample Breakdown by Sex

SEX	OUTLET		TOTAL
	SCANNING	NON-SCANNING	%
Male	38	29	67 29.1
Female	73	90	163 70.9
TOTAL	111	119	230
%	48.3	51.7	100

Numbers of missing observations = 9

6.3.4 Hours Worked

With regard to the number of hours worked by the sample, the majority of respondents, 126 or 55% worked over 30 hours a week. 45% (102) worked less than 30 hours and were part-time workers. Of those who worked full time, 62% (78) were female. Similarly, the majority of those who worked part-time, 81% (83), were female. The proportion of part-time workers in the sample is that of the retail trades generally. As suggested earlier, women tend to be concentrated into part-time work in the retail trades. These figures from the survey are given in Table 6.4.

6.3.5 Length of Service

The sample also highlights the relatively high labour turnover rate that characterises the retail trades. In the survey, 64% (147) of respondents had been in their job for less than 2 years. 18% (42) had service of between 3 - 5 years, another 18% (40) had worked for the company for over 6 years.

If these figures are further broken down by sex, they show that females have a shorter length of service than males and as a consequence would be expected to have a faster labour turnover rate. This pattern would reflect national industry tendencies, which suggests that the reason for women having relatively shorter service is a function of the jobs that they perform. They tend to be concentrated into jobs that are low in the organisational hierarchy, which involve little training or ability and as a consequence can be changed relatively frequently. This is particularly true of part-time work.

Table 6. 4 Sample Breakdown by Hours Worked

SEX	HOURS WORKED					TOTAL %
	Under 8 hrs	8-16 hrs	16-30 hrs	Over 30 hrs	Over 40 hrs	
MALE	2	12	5	18	30	67 29.4
FEMALE	3	35	45	69	9	161 70.6
TOTAL	5	47	50	87	39	228
%	2.2	20.6	21.9	38.2	17.1	100

Numbers of missing observations = 11

In the data collected from the survey this expectation was not matched by the results. Female respondents tended to stay in the same outlet and as a consequence have longer service. Males moved from company to company as they progressed up the career path, they therefore in the sample had shorter service. 38% of females in the sample had service over 3 years, this compared with 24% of males. The author believes that this particular finding is relevant to only this research sample and would not hold if analysis was undertaken of the entire retail sector. The reason for this discrepancy is believed to be the geographical location of the outlets. All were located in the north east of England and central Scotland, both areas which have relatively high local unemployment rates. Therefore, particularly at unskilled levels, there is little movement in and out of jobs.

Most of the sample had chosen retailing as a first career choice. With 76% (173) of respondents entering retailing between the ages of 16 and 20. 6% (14) had entered between the ages of 21 and 30 years old. 15% (33) had joined retailing between the ages of 31 and 44. When these figures are further analysed by sex, they suggest that males tend to enter retailing at a younger age than females, with 77% entering below the age of 30. This compares with 71% of females. Subsequent data generated from the interviews with branch managers suggests that for most males, retailing is a primary career choice, for females 48% chose it as it was the only job available.

6.3.6 Union Membership

63% (145) of the sample were trade union members. These were all

employees of the regional chain which operated a closed shop agreement with the retail union USDAW. Employees of the two other companies which participated in the survey were not union members. As a consequence the role of the trade union is not prominently featured in the research. This decision was made as it was felt that the number of responses gained from the regional chain would bias the sample. In addition, observations from the participating outlets had suggested that although the majority of the sample were union members, it did not appear to interfere with their appraisal of the work situation. This non-involvement of the union is probably a consequence of its relative weakness in operating terms within the retail industry.

6.3.7 Education

In the sample 33% (71) had no formal qualifications. 50% (110) had either 'O' Levels or Highers. The remaining 17% (37) had either trade or further education qualifications. This reinforces the findings of Chapter 2, which suggested that the relatively low skill of retail work allowed respondents to enter with little or no qualifications.

6.3.8 Reasons for Choosing Retailing as a Career

As suggested earlier, most respondents had entered retailing upon leaving school. 44% had chosen retailing as a career because it was the only job available. The second most important reason given was the suitability of the hours of work, or the convenient location, both with 16% or 36 responses. The attractiveness of the work itself was considered the third most important reason for choosing a job

in retailing, with 13%. A more detailed analysis of responses is given in Table 6.6.

6.3.9 Conclusions

The sample appears to be representative of the retail workforce as a whole. With the exception of trade union membership which is, as discussed in an earlier chapter, very low on an industry wide basis but high in the sample (63%), due to the closed shop agreement of the regional chain.

The sample itself is mostly female, relatively young and concentrated into the lower level occupations in the retail sector. The majority of respondents in the survey (45%) worked over 30 hours per week. This is representative of the retail sector which on average has 50% of the total retail labour force working on a part-time basis.

This smaller than average number of part-time workers included in the survey may have been due to the difficulties in ensuring that all employees returned a completed survey form. Geographical distance and the time devoted to each particular outlet made it difficult to guarantee that every employee returned the questionnaire, which most part-timers had to complete off the premises. Yet despite this limitation on the representativeness of the sample, many of the findings generated in the research may still be directly applicable to the wider retail environment.

An analysis of the responses given in the survey forms the basis of the following section.

Table 6.6 'Why Did You Choose A Job In Retailing?'

Reason Given	%	Total
Safe and Secure	9	20
Better Paid	3	9
Better Prospects	7	19
Work Was Attractive	13	29
Education/Training	3	6
Only Job Available	44	101
Working Conditions	5	11
Other (hours, near home)	16	36
TOTALS	<u>100</u>	<u>231</u>

Numbers of non-responses = 8

Table 6.5 Occupation Breakdown by Scanning/Non-Scanning Store

Occupation	Scanning	Non-Scanning	Total %
Shop Assistant	52	55	107 45.7
Shelf-Filler	13	13	26 11.1
Check-Out Operator	11	21	32 13.7
Department Head	8	8	16 6.8
Warehouse	8	2	10 4.3
Tradesmen	8	6	14 6.0
Trainee Manager	1	3	4 1.7
Assistant Manager	2	3	5 2.1
Manager	4	4	8 3.4
YTS/Youth Training	1	3	4 1.7
Office Worker	5	1	6 2.6
Canteen	-	1	1 0.4
Area Manager	1	-	1 0.4
TOTAL	114	120	234
%	48.7	51.3	100

6.3.10 Attitudes to Work

This analysis considers only the non scanning stores in the sample: This is designed to establish the attitudes towards work, the level of job satisfaction and attitudes towards technology held by supermarket workers generally. It was expected that the attitudes demonstrated by supermarket workers who do not operate technology will be most representative of those held by the industry generally, and will also represent a pre introduction of technology research situation. This two tier method of analysis is expected to facilitate a comparison of pre/post change reactions to retail automation.

As with the sample generally, in all five of the non scanning store there was a clear cut division of work between the sexes, with men usually occupying the higher status and more responsible jobs and the women on tasks that were much simpler and more routine. A breakdown of the jobs held by males and females was given in Table 6.1.

Supermarket workers were questioned as to how much they enjoyed their job. This question addressed two separate but related issues. Firstly, to determine which tasks the staff enjoyed and which they disliked. Secondly, to determine how certain features of work changed with the introduction of new technology. Twelve major tasks that included the job specifications of all staff and tasks undertaken in a supermarket had been identified. Respondents were asked to grade their liking/dislike for particular tasks. Additional categories were included to cover specific tasks that may have been done by individuals in certain stores but which were not included in the job specifications at a general level.

There was almost complete unanimity in the responses given to all twelve job categories. Respondents enjoyed doing every job.

Initial analysis of the results would suggest that supermarket workers demonstrated a very positive approach to their work. However, an important qualification should be placed on the results generated from this question, particularly in view of the overriding positive responses to all jobs at all levels. It is suspected that this question was not honestly answered by all individuals who, despite assurances, felt that management would be able to identify their responses. Such individuals preferred to give an inaccurate reply. This belief that inaccurate information had been given was subsequently reinforced by the findings from the observation study which suggested that most shopfloor workers dislike the tasks that comprise the bulk of their duties.

Subsequent work has also suggested that the layout of the question was particularly clumsy and may have precluded staff from answering honestly.

6.3.11 Job Satisfaction

Responses to the questions designed to measure job satisfaction suggested that some groups appear more satisfied with their work than others. Managers had higher ratings on the indices of job satisfaction than check-out operators. This was despite the fact that in response to earlier questions on how much they enjoyed their work, all shop-floor staff including the check-out operators, generated high levels of enjoyment. Yet these ratings did not translate to

job satisfaction. This finding further reinforced the belief that the earlier responses were not entirely truthful.

From the questions concerned with job satisfaction it was hoped to determine if the introduction of scanning equipment in the retail outlet changes the level of job satisfaction and if the change was specific to a particular sex or occupational group. The indices used included: whether respondents would recommend their job to a friend, how interesting they found their work and also by asking them how they thought their job compared with others. These alternative measures were chosen as the traditional measures of job satisfaction such as labour turnover or absenteeism could not be used in the research situation. Respondents who would recommend their job to a friend, who felt that their job compared favourably with alternative employment or who rated their job interest as high were considered to have a high level of job satisfaction and vice versa.

Table 6.8 A, B, C outlines the responses given to these three questions by both male and females in the non scanning stores. More detailed analysis by use of technology, occupation and sex is left until Section Four, which tests the hypothesis that new technology increases job satisfaction.

The results given suggest that the level of job satisfaction, as measured in the survey, is relatively high, or conversely the level of job dissatisfaction is low. The most accurate measure of job satisfaction was considered to be the job recommendation variable. 48% (55) of respondents stated that they would recommend their job to a friend, whilst 30% would not. 22% (25) respondents 'didn't know' which suggests some degree of dissatisfaction. This therefore

TABLE 6.8A
JOB SATISFACTION (NON SCANNING)

"Would you recommend your job to a friend?"

% (n)				
	YES	NO	DON'T KNOW	
Males	43 (12)	36 (10)	21 (6)	24 (28)
Females	49 (43)	29 (25)	22 (19)	76 (87)
	48 (55)	30 (35)	22 (25)	100 (115)

TABLE 6.8B
JOB SATISFACTION (NON SCANNING)

"Comparison with other Jobs"

% (n)							
	Much Better	Better	About the Same	Worse	Much Worse	Don't Know	
Males	6 (3)	21 (6)	39 (11)	11 (3)	4 (1)	14 (4)	24 (28)
Females	4 (4)	17 (15)	39 (34)	19 (17)	22 (7)	12 (11)	76 (88)
	6 (7)	18 (21)	39 (45)	17 (20)	7 (8)	13 (15)	100 (116)

TABLE 6.8C
JOB SATISFACTION

"How do you find your job? : Interest"

% (n)	Boring					Interesting	
						5	
	1	2	3	4			
Males	4 (1)	4 (1)	37 (9)	37 (9)	17 (4)	28 (24)	
Females	22 (14)	6 (4)	19 (12)	16 (10)	36 (23)	72 (63)	
	17 (15)	6 (5)	24 (21)	22 (19)	31 (27)	100 (87)	

suggests a figure of approximately 52% of respondents who have some job dissatisfaction.

In comparison with other jobs that the respondents could do, most 39% (of both males and females) suggested that retail work was about the same, 24% thought it much better/better and an equal number found it worse/much worse.

The responses given suggest that the level of job satisfaction within the supermarket outlet appears polarised. With almost as many respondents dissatisfied as those expressing job satisfaction. It is hypothesised that this polarisation is reflected in the occupation of respondents. With those at a more senior level or having more responsibility or decision making functions generating higher job satisfaction scores. Further analysis is detailed in Section Four.

This polarisation of opinion is further reinforced by an analysis of responses given to the question concerned with the level of job interest. Overall the responses suggest that the level of job interest of respondents is high, with 52% (46) giving it a rating of between 4 - 5. However, when the results are further classified by sex, 28% of the female respondents find their job boring. If those who find it neither boring or interesting are added, this suggests that 47% of female respondents do not find their job interesting. The comparable figure for males is 45%.

This lack of job interest for respondents when considered in relation to their replies to the other satisfaction measures suggests that

the level of job satisfaction is not as high as was first thought. This finding was reinforced by the observation study conducted by the author, which generated the conclusion that the level of job satisfaction within non scanning supermarket outlets is generally low.

6.3.12 Attitudes Towards Technology - Expectations

6.3.12.1 General

The pilot study had revealed that most supermarket workers were familiar with the use of new technology in the industry. This was true even when they have not seen specific examples of the scanning equipment in operation. All the workers had some opinion as to the capabilities of the technology. An attempt was made to identify these opinions and expectations. This permitted comparisons with actual experience. This section provides a brief outline of the expectations and beliefs held by supermarket workers not using the technology towards its use within the retail environment. A more detailed discussion is provided in Section Four in the testing of the hypothesis that new technology changes the nature and content of work.

Overall the results suggested that supermarket workers did not feel that their jobs would be changed very much with the introduction of new technology. Most check-out operators and sales assistants welcomed the prospect of scanning equipment as it would mean that they would have to spend less time with customers, and also it would make it possible to get the customers through the check-out quicker. This seemed to be a general opinion in the supermarket industry and was expressed by staff in all the supermarkets investigated in the survey.

The staff favoured any move towards depersonalising the self-service outlet further. When asked what they liked most about their job most replied that

"It's a good laugh" or

"The people are nice"

Valuing the work relationship with peers more than the customer/personal interaction aspects of their work.

Subsequent analysis suggests that it is in the area of work group interaction that the introduction of scanning equipment will have the greatest effect upon staff. It is expected that opportunities for conversation or interaction will be reduced and by a move towards the more efficient use of staff, interaction during breaks or lunches will also change. This is expected to reduce staff satisfaction further. Although, the reduction in customer contact may compensate by increasing task satisfaction. More detailed analysis of such changes is provided in Section Four.

6.3.12.2 Company

Respondents were also asked how they felt that scanning equipment would affect the company.

Almost all respondents expected that scanning equipment would have some effect on the company. There was general agreement on the direction of the effect, but there was significant differences on the strength of the effect. The majority of respondents believed that the company image would be enhanced by the introduction of technology and company profits would be increased.

Responses from both sexes lie in the same direction as the general findings. However, a significant difference that did emerge was in the strength of the reply given. Males, on average, tended to choose more extreme values of the scale than females. The reasons for this were not apparent from either an analysis of the questionnaire or from observations in the study. It is suggested that this factor separates the sexes in the general population. Males may be more confident in their opinions and beliefs than females. Or alternatively, males, particularly in retailing, hold positions of greater authority than females which may lead them to have a more forceful manner and consequently not be afraid to voice stronger opinions.

One general finding of the analysis is that supermarket workers believe that scanning equipment will have a positive effect upon their company. They expect it to improve both the company image and profit level.

Comparison of opinion on the differential impact of new technology at a company level and on the individual is discussed in a later section.

6.3.12.3 Individual

Discussion is provided in this section as to how the workers in the non scanning stores expect the introduction of technology to change their job. Consideration is given to both the skill and social aspects.

All respondents suggested that their job would be effected in some

way. Most suggested that their job was 'the main target' of the new equipment. Several believed that the aim of management with the introduction of scanning equipment was to make them do more work in the time available and also to reduce free time as much as possible. However, in terms of the expected effect on specific job attributes the outcome was less certain for the majority of respondents.

One qualifier should be added to an analysis of the results to this particular issue in the survey in terms of the sample size. The number of male respondents to almost all the statements was less than ten, this suggests that all results should be treated with caution and would require further confirmation in a larger sample before industry generalisations could be made.

When the responses are further classified by occupation, similar conclusions as were achieved through data analysis by sex are reached. This is due to the sex segregation of occupations within retailing. Overall managers tended to have more positive expectations of scanning equipment, and to generally feel less threatened by it. Lower level occupation categories tend to be less interested in the expected effects of new technology and therefore usually respond to statements by choosing the 'don't know' category.

By analysing individual responses to 14 effective statements designed to measure the social and skill aspects of work, the expected effect of technology upon work could be determined.

Overall, the majority of opinion believed that the social attributes of work would be reduced. But they did not think that as a

consequence their job would be less enjoyable. Most expected that the use of scanning equipment would reduce their free time, as although they would spend less time processing each individual customer, they could now perform additional tasks in the time available. As discussed earlier, staff generally welcomed the opportunity for reduced customer contact, even though they realised that as a consequence they would do more work.

Most did not agree that by using scanning equipment their image would be enhanced to both colleagues and superiors. It appears from the data generated that the staff were not entirely convinced of the outcome, and as a consequence expressed their uncertainty by choosing the 'don't know' response. In reply to almost all statements in the non scanning stores this is the most frequent reply. It is believed that in connection with the question, the 'don't know' response represents an honest opinion.

In terms of how technology could effect the skill level of jobs the respondents had more definite opinions. 46% (52) expected that scanning equipment would make their job easier. Similarly, 39% (42) believed that they would do more work. But with regard to control and the level of supervision opinion was less clear. Uncertainty was also expressed as to how technology would effect job security, but respondents felt that promotion prospects would certainly not be increased, 53% (57). Overall only 1% (1) of female respondents felt that technology would improve her promotion chances. The majority of males 43% (11) and females 55% (45) disagreed.

6.3.13 Conclusions

Almost all the respondents felt that retail work would be changed in some way with the introduction of scanning equipment, although most were not sure what the exact effect would be. The operation of new technology was expected to have a positive effect upon the company, the direction of the effect upon individuals and their jobs was less certain. Opinion was, however, unanimous that scanning equipment would certainly make some difference to retail work. Most of the staff believed that scanning would allow them to serve customers more quickly and this was generally welcomed. Female staff in particular appeared to welcome any opportunity for a reduction in contact with customers. Interaction with the general public was one aspect of their job which they did not appear to enjoy. This was contrary to original expectations that the supermarket staff would generally welcome the opportunity for increased personal contact with customers, or an increase in the service level provided by the shop. In reality, the staff believed that the amount of time spent with each customer would be reduced, but that this additional time would not be used to improve customer service in a direct way, but rather would be used to attend to other store duties, e.g. shelf filling, maintenance and cleaning. Many of the female staff also believed that the use of scanning equipment could eventually lead to a reduction in the numbers employed, as a consequence of a more efficient check-out system. The prospect of redundancy or a cut in hours of work was, however, not considered alarming by the majority of female respondents most at risk, but rather was perceived with resignation - as if they believed it was out of their hands, that there was nothing that could be done to avoid the inevitable. This fatalistic attitude was prevalent throughout the supermarkets visited. Although the majority of women who participated in the sample occupied relatively low

positions in the occupational hierarchy, none of them exhibited any desire to improve their status or demonstrated any ambitions for a career within the industry. As a consequence, they were not aware of the potential reduction in promotion prospects or job opportunities that could accompany the introduction of scanning equipment. This proved to be an overriding impression in the subsequent observation work undertaken in the supermarket industry and also one that emerged with subsequent conversations with those who work there. The apparent lack of motivation and commitment, particularly among female staff. The author had originally assumed that the staff would have been sufficiently interested in their work, that the prospect of the introduction of technology would have provoked some strength of feeling in either a positive or negative direction. In reality it appeared that the staff did not particularly care. Technology appeared to be outwith their immediate sphere of reference. Female supermarket workers demonstrated strong feelings of alienation from both the work environment and task. Each tended to use as reference a peer group, formed either socially or by occupation, which functioned independently of the company so that no corporate or general identity was ever developed. Such an isolating system was in operation in all the stores included in the authors survey.

As a measure of the 'conservatism' of supermarket workers, respondents were asked if they would prefer to work in a scanning or non scanning store. 57% (57) of people who worked in a non scanning store preferred to work in a shop that had scanning equipment, 34% (36) would rather work in the non scanning environment and 12% (13) expressed no preference. This result would suggest that as a group supermarket workers are not resistant to change.

The preceding analysis suggests that they are not fully aware of the consequences of it. One impression that did begin to form as the research progressed was that supermarket workers may generally welcome any change in the work situation, as it may increase the level of interest of their work. Fuller discussion of this point is provided in a later section.

The analysis undertaken into the attitudes towards change expressed by the non scanning stores proved useful for a number of reasons. It allowed a determination of retail workers' attitudes towards their jobs and their perceptions about technology. From this data it is possible to determine if these perceptions are matched by actual experience when the data is compared with that from scanning stores. Since all other intervening variables were controlled any difference in opinion or attitude that is identified will be due to the use of new technology.

6.4 Hypothesis Testing

This section provides an analysis and test of the hypothesis identified in Chapter 4. The hypotheses to be tested were stated as follows:

- Hypothesis One: New technology changes the nature and content of work
 - technology changes the skill content of jobs
 - technology changes the social characteristics of jobs
- Hypothesis Two: New technology effects different groups differently
- Hypothesis Three: New technology changes the level of job satisfaction
- Hypothesis Four: New technology will reduce employment opportunities

6.4.1 Hypothesis One

To test the hypothesis that new technology changes the nature and

content of jobs, the sub-hypothesis that technology changes both the skill level and social content of jobs was tested. Another sub-hypothesis that runs parallel to the belief that new technology changes the nature and content of work is the suggestion that there is some difference between scanning and non scanning stores and how much staff appear to enjoy their work.

It was expected that workers in scanning stores would enjoy their work more than those who did not use the new technology. Since it was expected that the introduction of technology would increase the level of interest, variety and reduce the level of routine. To test the relevance of this sub-hypothesis, 12 different store functions were listed and respondents asked to state firstly if they did the job and secondly how much they enjoyed/disliked it. Both scanning and non scanning stores were involved. The listed jobs involved mainly 'front shop' activities. This was due partly to the restriction upon space in the questionnaire and also because these were the tasks identified from the pilot studies. The decision was therefore made to include those jobs which were E.D.C. classifications and which were done by the majority of retail employees. See Table 6.7.

The data shows that there seems to be little difference between scanning and non scanning stores and how much the staff enjoy their work. The overriding response to all questions, from those who performed the job, was that they enjoyed their work. Subsequent study suggests that this was a particularly unsatisfactory method of asking respondents how much they enjoyed their job. This weakness was discussed earlier. The contradiction becomes more apparent when

Table 6-7 Job Specifications

Job Numbers

1. Recording Customer Purchases
2. Accepting Payment and Giving Change
3. Answering Customer Queries, Complaints and Exchanges
4. Wrapping Customer Purchases
5. Keeping Work Area Clean
6. Security
7. Stock Taking
8. Filling Shelves
9. Stock Maintenance
10. Arranging Displays and Promotions
11. Dealing With Representatives
12. Pricing Goods

responses are compared with those concerned with how staff found their job in terms of interest, challenge and variety.

Respondents who claimed to enjoy certain jobs, generally rated their work low in terms of interest, variety, skill and challenge. This difference emerged as the latter question did not ask respondents to rate tasks, rather it referred to jobs overall. Staff appeared to believe that managers would be able to identify individuals from responses to tasks, yet not from general responses.

This is one of the major weaknesses of using questionnaires to generate research data. From the results it was impossible to determine if almost all supermarket workers enjoyed their job or if this was an indication of inaccurate responses. The observation study, which is discussed in some depth later, concludes that most supermarket workers do not enjoy their work, particularly in the non-scanning stores. Given the responses generated in the survey, this factor should be investigated in greater depth.

Having outlined the limitations on the data generated from this particular question, an analysis of responses between scanning and non-scanning stores revealed little difference.

Both the scanning and non-scanning stores revealed similar levels of enjoyment in recording customer purchases. With 36% (21) of females in scanning stores and 46% (39) of females in the non-scanning store enjoying this task. Similar levels are revealed for each of the tasks considered. The data suggests that the introduction of

scanning equipment does not lead to an increase in the job enjoyment of the staff. Although given the small sample size and the nature of the responses it is difficult to reach any firm conclusions on this point. Similar results are revealed when the data is analysed by occupation. Of those who did the job the majority enjoyed it. Again, due to the sex segregation that exists in the retail industry, the occupational analysis revealed similar findings as that by sex.

6.4.1.1. New Technology Changes the Skill and Social Characteristics of Jobs

As a measure of the effect of new technology on the skill characteristics; the change in skill demands, work interest, variety and level of responsibility were considered. To determine if the social characteristics of work change; the quality of working life, job status, the amount of supervision, steadiness of employment and level of social interaction associated with each job were examined.

The question was designed primarily to elicit staff expectations concerning the introduction of new technology and also to determine how these expectations match reality. Any mismatch in expectations revealed in the study could be used by managers to construct a 'changeover' policy that would facilitate the introduction of technical change.

Respondents were asked how they found their job with respect to six variables: challenge, variety, difficulty, interest, skill and responsibility.

The responses given, analysed by sex, are outlined in Table 6.9.

TABLE 6.9

"How do you find your job?"

%(n)

SCANNING

	Not Challenging	2	3	4	Challenging	T
M	16 (6)	5 (2)	19 (7)	5 (2)	55 (20)	37
F	13 (7)	4 (2)	35 (19)	7 (4)	41 (23)	55
T						92
<hr/>						
	Varied				Routine	
M	29 (10)	6 (2)	29 (10)	15 (5)	21 (7)	34
F	21 (9)	14 (6)	28 (12)	9 (4)	28 (12)	43
T						77
<hr/>						
	Easy				Difficult	
M	26 (8)	16 (5)	39 (12)	6 (2)	13 (4)	31
F	46 (17)	19 (7)	35 (13)	0 (0)	0 (0)	37
T						68
<hr/>						
	Boring				Interesting	
M	11 (4)	11 (4)	20 (7)	3 (1)	54 (19)	35
F	14 (7)	2 (1)	28 (14)	8 (4)	47 (23)	49
T						84
<hr/>						
	Skilled				Unskilled	
M	42 (14)	12 (4)	9 (3)	6 (2)	30 (10)	33
F	26 (10)	11 (4)	26 (10)	3 (1)	34 (13)	38
T						71
<hr/>						
	No Responsibility				Responsibility	
M	9 (3)	6 (2)	6 (2)	6 (2)	73 (25)	34
F	7 (3)	0 (0)	7 (3)	9 (4)	77 (34)	44
T						78

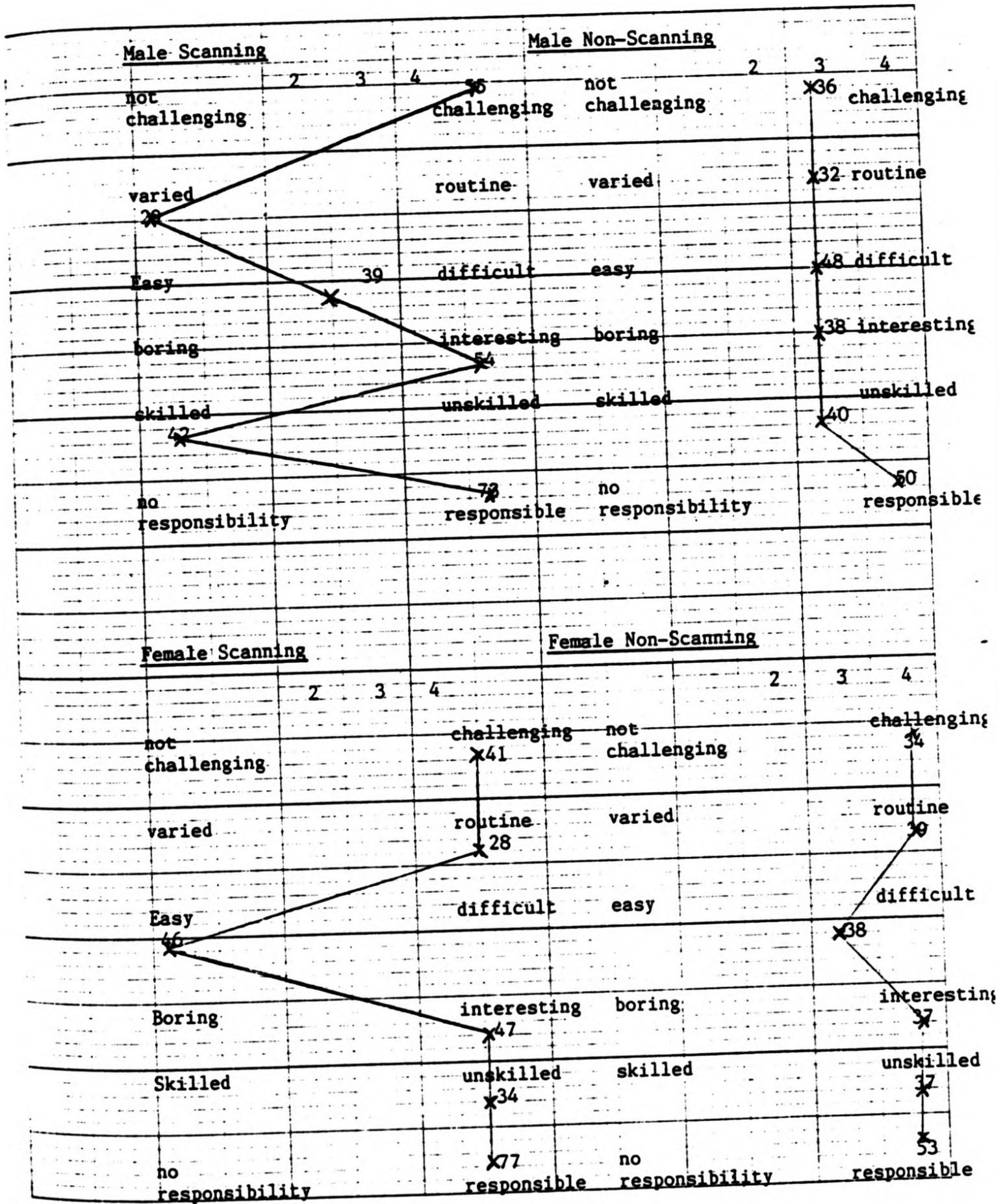
A graphical representation is given in Diagram 6.1 with an occupational profile of scanning and non scanning stores.

The figures show that between males, there does appear to be some difference between the two groups in scanning and non scanning stores. Males within scanning stores have a more positive opinion toward their work than do males in non scanning stores. The majority of males in the scanning stores found their job challenging and varied, neither easy nor difficult, interesting, skilled and responsible. The results were statistically significant, at 0.05 confidence interval, in terms of the amount of challenge, the level of interest and skill level (at 0.1 confidence interval).

Males in the stores that do not operate the new technology on the other hand, do not appear to have any strong opinions with respect to their job. Majority opinion of this group choose the medium value of each aspect except that they did consider that their work was responsible. Males and females in the scanning stores considered that their job was responsible. In both cases the figure was over 70%. This revealed a difference in comparison with the non scanning stores, at both a 0.05 and 0.1 level of significance. The workers in the scanning stores considered their work more responsible than those in non scanning outlets.

Females in both groups of stores had very similar job profiles, with the exception that females in the scanning stores considered that their job was easier and more skilled than those in non scanning stores. Both results were significant at a 0.1 confidence interval.

Diagram 6.1 How Do You Find Your Job? % Response



This at first would appear to suggest a contradiction in responses from female workers in the scanning stores, who felt that their work was easy (65%) and yet at the same time considered it skilled (37%). Conversely, the non scanning female workers thought their work unskilled (54%). Discussions with the staff however revealed that whilst they thought scanning equipment was easier to operate than conventional equipment, they also considered that they had acquired an additional skill through operating the scanning equipment. In their opinion this had increased the skill level of their work. The results did not, however, hold at 0.05 confidence interval. A larger sample would be needed before a firm conclusion could be made.

Females in the non scanning stores, as did the males, considered that their job was neither difficult or easy.

As suggested earlier, the choice of the medium value to most questions by both sexes in the non scanning stores, reflects their uncertainty regarding the effect of scanning equipment on their job.

In comparing both male and female responses to this question at a general level, in both types of outlets, two specific variables are given opposite ratings by each sex. Most of the others are equally weighted by either sex. Overall males tended to consider their work both varied (29% scanning and 20% non scanning) and skilled (42% scanning, 24% non scanning). Conversely females thought their work routine and unskilled (28%, 34% in the scanning and 39%, 37% in the non scanning). Although, as suggested above, females in the scanning stores considered their work more skilled than their non-scanning counterparts. Whether the difference in attitude between the sexes

was due to poor 'self-image' that female workers in the supermarket industry have of themselves, or whether it is a function of the work that women do within the supermarket was not evident from the data. Subsequent discussions with both sets of workers suggests that responses are conditioned by the work that women do.

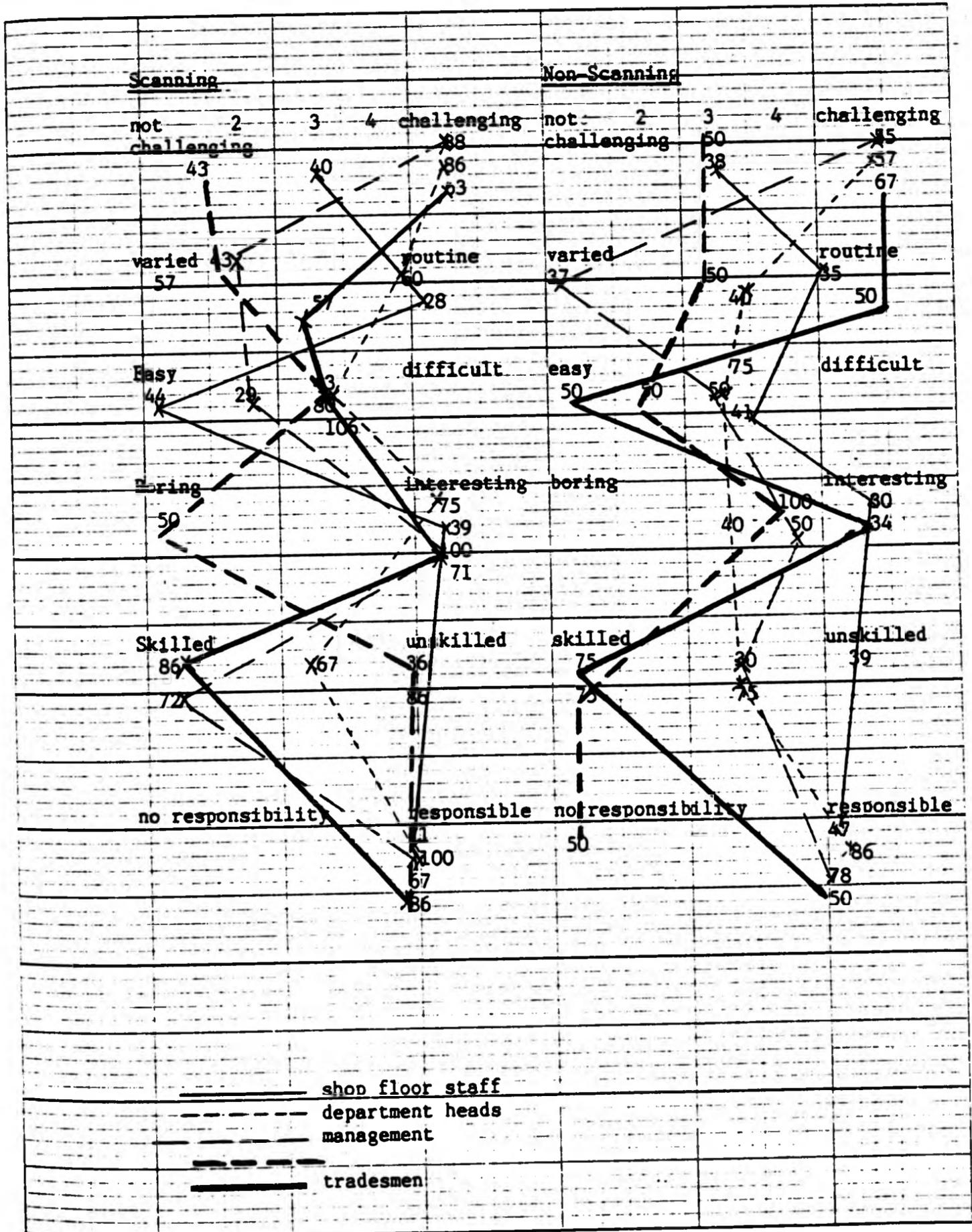
Job profile charts were constructed by occupation. See Diagram 6.2. The attitudes demonstrated suggest that there is little difference in the occupational profiles exhibited by each group in both the scanning and non scanning stores. The profiles of the occupational groups run parallel in both the scanning and non scanning stores, with the exception that the respondents in the scanning stores have chosen more extreme values than those of non scanning stores. Each employment group demonstrates the same opinion or attitude towards work.

The one occupational group where differences in attitude towards their job was apparent are those who work in the warehouse. The warehouse workers in the non scanning stores have a more positive approach to their work than those who work in the warehouse of scanning stores.

Given the small sample size involved in the study, any conclusions must be treated with caution. The warehouse workers in the scanning stores find their job not particularly challenging, varied but relatively easy, both boring and unskilled yet responsible. Workers in the non scanning stores do not find their job particularly challenging or varied. Although they considered work relatively easy and quite interesting. They consider it skilled although they feel they have no responsibility. These responses would suggest that the operation of scanning equipment appears to change the nature of ware-

Diagram 6.2. How Do You Find Your Job?
by selected occupations

z

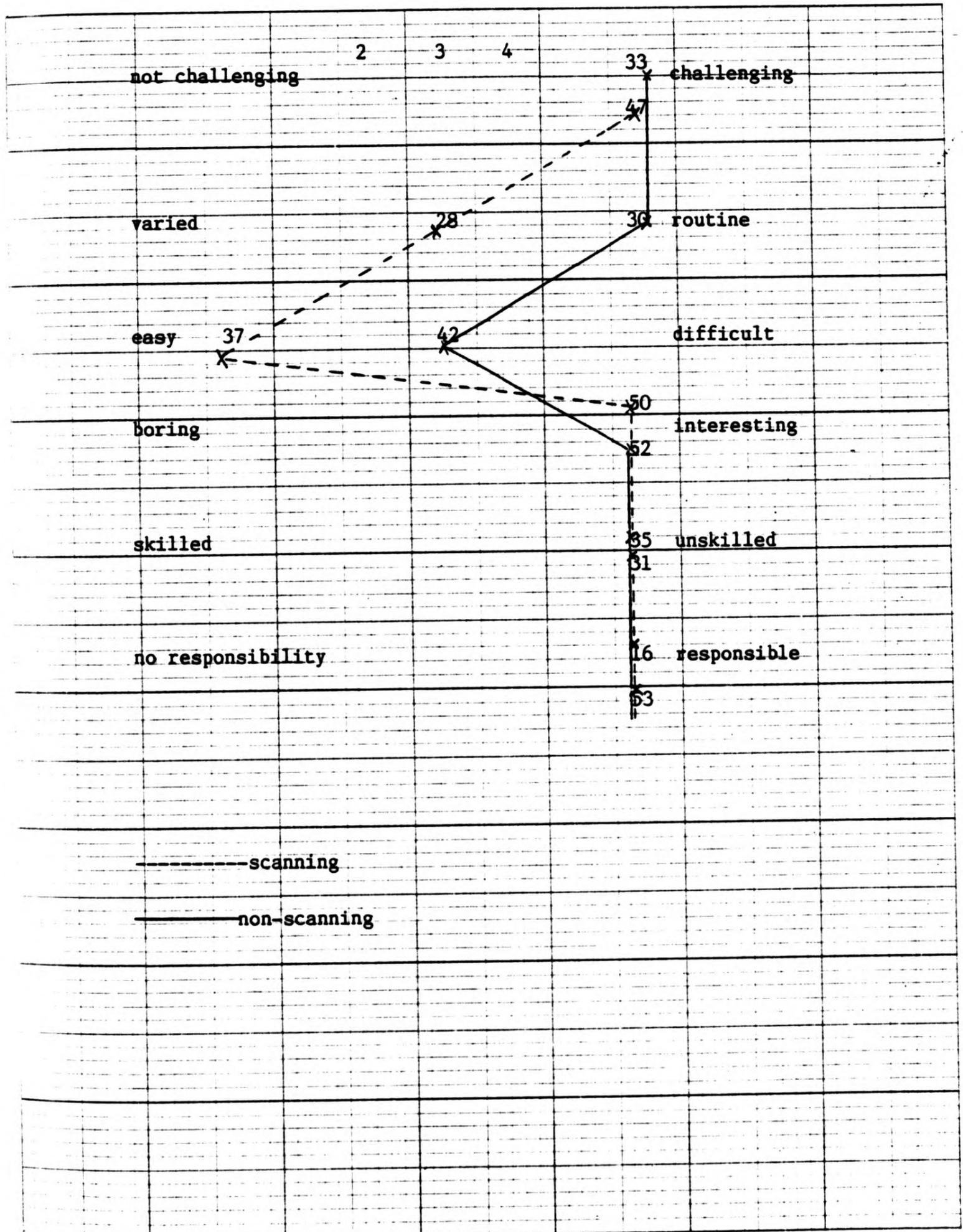


house work. However, it could not be determined from the data whether this difference was due entirely to the operation of scanning equipment or to different stock control procedures employed in the warehouse, or if it was characteristic of the individuals involved in the survey. Since warehouse functions were the same throughout the regional chain, any difference in attitude detected between the scanning and non scanning stores could be attributed to the operation of scanning equipment.

Diagram 6.9 does not indicate any substantial differences in attitude towards work exhibited by workers in scanning and non scanning stores. This is partly due to the small sample size, in a larger sample more conclusive evidence of differences may have emerged. Diagram 6.3 suggests that overall the introduction of scanning equipment makes work easier, but that it also raises the level of variety associated with each job. The skill level, amount of interest and responsibility remain unchanged.

Job profiles, constructed by sex, are outlined in Diagram 6.1. Analysis of female profiles parallels that of the outlet as a whole. This may be due to the large proportion of females in the sample. For females the major difference in job profiles with the introduction of technology appears to be that it becomes significantly easier. For males, the job changes are more pronounced. Not only does their work become more varied, but also more interesting and skilled. As suggested earlier this may be due to the work that males do within the outlet rather than as a direct consequence of the technology itself. Subsequent investigations suggest that workers in the scanning stores overall tend to have more positive opinions regarding

Diagram 6.3 How Do You Find Your Job? Comparison Between Scanning and Non-Scanning Stores



work than their non scanning counterparts. In the scanning outlets no males operated the equipment, therefore the differences recorded are expected to be attributable to personality differences. Again, more detailed analysis would be needed to substantiate this claim.

Initial analysis would suggest that new technology does not appear to change the nature of retail work, at least on the indices used in this study.

The organisational profiles discussed earlier shared little evidence of any difference between how much people enjoyed their work and how they rated their job on a variety of measures. Direct questioning was not used because it was believed that the staff would be aware of the purpose of the question and respond accordingly. Instead a number of effective statements were chosen to measure specific variables indirectly. The effective statements chosen to measure the factors above are given in Table 6.10.

The results suggest that the use of effective statements generates more reliable results than that of direct questioning, where it appeared from earlier responses that completely true answers were not being given. Due perhaps from fear of being identified, or as was suggested by many respondents, that management would somehow use the information to alter the work situation. The unanimous opinion appeared to be of 'give 'em what they want' in response to the survey. The use of effective statements proved an extremely useful form of investigation to combat this type of resistance.

The above factors refer primarily to the effect upon the individual.

Table 6.10 'What Difference would scanning equipment make to your job?'

<u>Effective Statements</u>	<u>Measures</u>
'scanning equipment would give me more free time'	quality of working life
'scanning equipment would make my job less enjoyable'	quality of working life
'scanning equipment would give me more time with each customer'	social interaction
'because I would have more time with each customer I would enjoy my job more'	social interaction
'with scanning equipment my job would be more supervised'	control
'scanning equipment would make my job more important to (a) superiors (b) colleagues'	status
'It will mean that I have less control over my work'	control
'scanning equipment will make my job easier'	skill required
'I would do less work with scanning equipment'	skill
'scanning equipment would let me do a greater variety of different jobs'	variety/interest
'scanning equipment would make my job less secure'	steadiness of employment
'it will improve my promotion prospects'	opportunity for advancement

A discussion of the expected/actual effect on the company is left until a later section.

Participants were asked if they felt that the introduction of scanning equipment had or would make any difference to their work. This question was used as a 'catch all' for respondents for whom the preceding statements had proved meaningless.

The responses are outlined in Tables 6.11 through to 6.17. Overall, there appeared to be little difference between how those in the non scanning stores considered that their job would be affected by equipment and actual experience. More detailed analysis of results suggests some significant differences in perceptions and experience of technology, both between sexes and across stores.

6.4.1.2. Social Aspects of Work

A significant difference was recorded between scanning and non scanning stores and how much free time the staff believed the introduction of new technology would or had given them. Statistically significant at a confidence interval of 0.05 and 4 degrees of freedom. Stores that were scanning disagreed strongly that the introduction of scanning equipment gave them more free time, non scanning were less certain with 38% (41) giving a 'don't know' response. The scanning stores however, were more certain of the effect, 64% (63) disagreed to some extent with the statement. Most suggested that the introduction of scanning reduced staff free time. However, this reduction in free time did not mean that the staff enjoyed their job any less. In this respect expectations were matched by reality. The majority of responses disagreed with the statement. 62% (60)

TABLE 6.11
 What difference would scanning equipment make to your job? : Quality of working life
 % (n)

	SCANNING						NON SCANNING						χ^2	DF	EF	CI	Reject/Accept H ₀
	SA	A	DK	DA	SDA	T	SA	A	DK	DA	SDA	T					
More Free Time	M 9(3)	12(4)	12(4)	53(18)	15(5)	34	M 8(2)	23(6)	50(13)	19(5)	0(0)	26	16.94	4	50%	0.05	Reject
	F 5(3)	12(7)	19(11)	43(25)	21(12)	58	F 1(1)	21(17)	33(27)	35(29)	10(8)	82	9.15	4	20%	0.05	Accept
	*T 6(6)	13(13)	16(16)	46(45)	18(18)	98	T 3(3)	20(24)	38(41)	31(34)	7(8)	110	19.98	4	20%	0.05	Reject
Less Enjoyable	M 3(1)	0(0)	36(12)	42(14)	19(6)	33	M 0(0)	12(3)	42(11)	31(8)	15(4)	26	5.32	4	50%	0.05	Accept
	F 5(3)	7(4)	25(15)	53(31)	10(6)	59	F 1(1)	14(11)	33(26)	41(33)	11(9)	80	4.81	4	20%	0.05	Accept
	*T 5(4)	5(4)	31(30)	48(47)	13(13)	98	T 1(1)	13(14)	34(37)	40(43)	12(13)	108	7.79	4	20%	0.05	Accept

*Totals do not equate by sex, due to % of respondents in total category who did not give their sex.

of responses in the scanning store disagreed to some extent, the corresponding figure in the non scanning stores was 52% (56). The sub-hypothesis that the introduction of scanning equipment would effect the quality of working life of retail employees was therefore difficult to substantiate from the data generated in the survey. A larger sample would be more conclusive. The data from the study indicates that new technology does not appear to improve the quality of working life of retail employees.

In the statements related to the amount of social interaction involved in their work and the effect of scanning equipment, the results differ between stores and by sex. To determine if the level of social interaction differed from that expected two inter-related questions were asked. Firstly, if scanning equipment would give them more time with each customer and secondly, if as a consequence they would enjoy their job more. The responses given are outlined in Table 6.11.

Much of the earlier analysis concerned primarily with the non scanning respondents replies to this issue are also relevant to the scanning stores. Males in both the scanning and non scanning stores tended to give similar responses to both parts of the question. In the scanning stores 71% (26) 'didn't know' or disagreed with the statement that they would spend more time with the customer, in the non scanning stores the figure was 73% (19). Since the majority of male respondents did not believe that the operation of scanning equipment would give them more time with each customer, it followed that they would also disagree with the second part of the statement. Social interaction did therefore not appear to be reduced for male workers.

TABLE 6.12
 What difference would scanning equipment make to your job? : Social Interaction
 % (n)

	SCANNING						NON SCANNING						χ^2	DF	EF <5	CI	Accept/Reject H0
	SA	A	DK	DA	SDA	T	SA	A	DK	DA	SDA	T					
More time with each Customer	M 9(3)	12(4)	33(11)	21(7)	25(8)	33	M 4(1)	23(6)	42(11)	31(8)	0(0)	26	8.75	4	50%	0.05	Accept
	F 10(6)	28(16)	22(13)	31(18)	9(5)	58	F 1(1)	28(22)	42(33)	25(20)	4(3)	79	10.85	4	40%	0.05	Reject
	*T 10(16)	23(22)	25(24)	27(26)	15(15)	97	T 2(2)	28(30)	41(44)	26(28)	3(3)	107	20.07	4	None	0.05	Reject
Enjoy the Job More	M 9(3)	15(5)	34(11)	21(7)	21(7)	33	M 4(1)	23(6)	46(12)	23(6)	4(1)	26	4.95	4	50%	0.05	Accept
	F 12(7)	21(12)	24(14)	33(19)	10(6)	58	F 5(4)	21(17)	47(35)	22(18)	5(4)	81	9.64	4	20%	0.05	Reject
	*T 10(10)	21(20)	26(25)	29(28)	14(14)	97	T 5(6)	22(24)	46(50)	22(24)	5(5)	109	13.61	4	None	0.05	Reject

*Totals do not equate by sex, due to % of respondents in total category who did not give their sex.

Significant differences were found in female opinion in both sets of stores. Table 6.12 outlines the strength of disagreement of opinion from the scanning stores. In comparison, female respondents in the non scanning stores are less certain of the outcome.

A combination of results suggests a significant difference between the expected change in social interaction and actual experience, with a 0.05 confidence interval and 4 degrees of freedom. Overall supermarket workers did not enjoy serving the public. A similar finding was reached by Redding (1974). Although the operation of scanning equipment may reduce staff contact with customers, they may as a consequence actually enjoy their job more. The data generated from the survey would lead to the conclusion that a reduction in the level of social interaction with customers actually results in supermarket workers enjoying their job more.

The final social aspect of work investigated was concerned with how worker status would change with the introduction of technology. The results generated are given in Table 6.13. Overall it was felt that scanning equipment enhanced the image of workers to their superiors. In this respect, significant differences were established between the expectations of the non scanning stores and actual experience. The change in status from colleagues was uncertain from both groups.

Overall the results would lead to the suggestion that scanning equipment does effect the social aspects of work. Some significant differences in opinion were detected between expectations and reality. A larger sample would however prove more conclusive.

TABLE 6.13
What difference would scanning equipment make to your job? : Status

	NON SCANNING										T	χ ²	DF	EF	CI	Accept/Reject
	SCANNING					% (n)										
	SA	A	DK	DA	SDA	T	SA	A	DK	DA	SDA					
More Important	M 26(8)	16(5)	48(15)	10(3)	0(0)	31	M 0(0)	18(4)	59(13)	23(5)	0(0)	22	7.44	3.63%	0.05	Accept
To	F 16(9)	30(17)	34(19)	16(9)	4(2)	56	F 5(4)	23(17)	38(28)	31(23)	3(2)	74	7.42	4.20%	0.05	Accept
Superiors	*T 20(18)	26(24)	37(34)	14(13)	2(2)	91	T 4(4)	23(23)	42(41)	29(28)	2(2)	98	14.83	4.20%	0.05	Reject
More important	M 11(3)	7(2)	61(17)	14(4)	7(2)	28	M 0(0)	20(5)	56(14)	24(6)	0(0)	25	6.82	4.70%	0.05	Accept
To	F 6(3)	22(11)	45(23)	22(11)	6(3)	51	F 1(1)	19(14)	50(38)	25(19)	5(4)	76	2.50	4.40%	0.05	Accept
Colleagues	*T 7(6)	17(14)	49(41)	19(16)	7(6)	83	T 1(1)	19(20)	51(53)	24(25)	4(4)	103	6.46	4.30%	0.05	Accept

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*Totals do not equate by sex, due to % of respondents in total category who did not give their sex.

6.4.1.3. Skill Aspects of Work

Earlier analysis concerned with how workers found their job, suggested that the use of scanning equipment effected a number of skill attributes of retail work. Particularly in terms of the level of skill required, degree of difficulty and amount of responsibility. A more detailed analysis of the changes in skill aspects of work are provided in Table 6.14 through to Table 6.17, which details differences in expectation and reality in terms of the amount of control, skill, variety/interest and employment prospects.

Female workers in the scanning stores did not feel that they had less control over their work through using scanning equipment. This differed significantly (0.05 confidence interval, 4 degrees freedom) from what the non scanning workers had expected, most of whom believed that they would have less control over work. As a consequence it followed that their work was not more closely supervised than before, see Table 6.14.

The occupational profiles outlined earlier had suggested that the introduction of scanning equipment will make work easier. This finding is reinforced by the data given in Table 6.15. With the introduction of scanning equipment, work certainly appears to become easier but it does not mean as a consequence workers do less work. All groups expected that they would do more work in the time available. Females in the non scanning stores as a consequence expected that they would do a greater variety of jobs 34% (27), respondents from the scanning stores suggested the opposite 48% (27). Overall the introduction of new technology did not appear to increase the level of interest of respondents' jobs, a significant finding at 0.05 confidence interval and 4 degrees of freedom.

TABLE 6.14

What difference would scanning equipment make to your job? : Control
 $\bar{X}(n)$

	SCANNING						NON SCANNING						χ^2	DF	EF < 5	CI	Accept/Reject H ₀
	SA	A	DK	DA	SDA	T	SA	A	DK	DA	SDA	T					
More Supervised	M 16(5)	19(6)	41(13)	16(5)	9(3)	32	M 7(2)	25(6)	39(10)	27(7)	4(1)	26	2.41	4	40%	0.05	Accept
	F 9(5)	14(8)	39(22)	30(17)	7(4)	56	F 6(5)	30(24)	35(28)	26(21)	4(3)	81	4.88	4	30%	0.05	Accept
	T 13(12)	15(14)	38(36)	25(24)	8(8)	94	T 6(7)	28(31)	36(39)	26(28)	4(4)	109	8.43	4	None	0.05	Accept
Less Control Over Work	M 3(1)	9(3)	24(8)	35(12)	29(10)	34	M 0(0)	12(3)	40(10)	28(7)	20(5)	25	2.89	4	40%	0.05	Accept
	F 4(2)	11(6)	27(15)	48(27)	11(6)	56	F 2(2)	28(22)	35(28)	31(24)	4(3)	79	10.63	4	30%	0.05	Reject
	T 4(4)	9(9)	27(26)	43(41)	16(16)	96	T 2(2)	25(27)	36(38)	29(31)	7(8)	106	15.51	4	20%	0.05	Reject

TABLE 6.15
 What difference would scanning equipment make to your job? : Skill
 % (n)

	NON SCANNING										χ^2	DF	EF	CI	Accept/Reject H ₀				
	SA	A	DK	DA	SDA	T	SA	A	DK	DA						SDA	T		
Make Job Easier	M	21(7)	38(13)	12(4)	18(6)	12(4)	34	M	23(6)	31(8)	31(8)	15(4)	0(0)	26	6.04	4	30%	0.05	Accept
	F	20(11)	40(22)	11(16)	29(16)	0(0)	55	F	12(10)	32(27)	31(25)	19(16)	6(5)	83	12.01	4	20%	0.05	Reject
	*T	20(19)	39(37)	10(10)	25(24)	5(5)	95	T	14(16)	32(36)	30(33)	19(21)	5(5)	111	11.60	4	10%	0.05	Reject
Do Less Work	M	6(2)	9(3)	31(11)	26(9)	29(10)	35	M	8(2)	15(4)	35(9)	35(9)	8(2)	26	4.44	4	40%	0.05	Accept
	F	7(4)	18(10)	18(10)	48(27)	9(5)	56	F	2(2)	24(19)	37(30)	28(22)	9(7)	80	10.39	4	30%	0.05	Reject
	*T	6(6)	15(15)	23(22)	39(38)	16(16)	91	T	4(4)	21(23)	36(39)	31(33)	6(9)	108	8.56	4	10%	0.05	Accept

*Totals do not equate by sex, due to % of respondents in total category who did not give their sex

TABLE 6.16
 What difference would scanning equipment make to your job? : Variety/Interest

	SCANNING						NON SCANNING						χ^2	DF	EF	CI	Accept/Reject H ₀
	SA	A	DK	DA	SDA	T	SA	A	DK	DA	SDA	T					
Greater variety of Jobs	M 15(5)	26(9)	15(5)	29(10)	15(5)	34	M 8(2)	31(8)	35(9)	23(6)	4(1)	26	5.17	4	40%	0.05	Accept
	F 12(7)	18(10)	21(12)	41(23)	7(4)	56	F 2(2)	32(35)	34(27)	25(20)	6(5)	79	11.71	4	20%	0.05	Reject
	*T 12(12)	23(22)	18(17)	36(35)	10(10)	96	T 4(4)	31(33)	35(37)	25(27)	6(6)	107	15.08	4	None	0.05	REject

*Totals do not equate by sex, due to % of respondents in total category who did not give their sex

TABLE 6.17
 What difference would scanning equipment make to your job? : Employment Prospects
 % (n)

	SCANNING						NON SCANNING						χ^2	DF	CI	Accept/Reject H_0		
	SA	A	DK	DA	SDA	T	SA	A	DK	DA	SDA	T						
Improve promotion prospects	M	3(1)	14(5)	40(14)	29(10)	14(5)	35	M	0(0)	12(3)	46(12)	31(8)	11(3)	26	1.07	4	40% 0.05	Accept
	F	7(4)	2(1)	26(14)	54(29)	11(6)	54	F	0(0)	1(1)	43(34)	41(33)	15(12)	80	9.92	4	40% 0.05	Reject
	*T	5(5)	7(7)	32(36)	43(41)	13(12)	95	T	0(0)	5(5)	43(46)	39(42)	14(15)	100	8.24	4	20% 0.05	Accept
Less Secure	M	3(1)	0(0)	20(7)	43(15)	34(12)	35	M	12(3)	0(0)	31(8)	46(12)	11(3)	26	5.59	3	25% 0.05	Accept
	F	6(3)	6(3)	31(17)	47(26)	11(6)	55	F	6(5)	18(15)	39(31)	31(25)	6(5)	81	8.01	4	30% 0.05	Accept
	*T	4(4)	4(4)	26(25)	46(44)	20(19)	90	T	7(8)	15(16)	36(39)	35(38)	7(8)	109	15.75	4	None 0.05	Reject

*Totals do not equate by sex due to % of respondents in total category who did not give their sex

6.4.1.4. Conclusions

Overall, Table 6.18 suggests that Hypothesis 1, that new technology changes the nature and content of work, should be accepted. In 9 cases of the effective statements the null hypothesis could be rejected and only in 5 could it be accepted. From this it is concluded that Hypothesis One should be accepted. A larger sample may have made the acceptance of the hypothesis much more conclusive. When the data is analysed by sex the need for a larger sample size becomes more apparent. As Table 6.18 suggests, most of the male responses lead to the acceptance of the null hypothesis, female responses on the other hand tend to lead to the rejection of the null hypothesis. The direction of the response when they are combined to give the total response from both the scanning and non scanning stores tend to follow the direction of the female responses due to a disproportionate number of females in the sample, although the sample, as demonstrated earlier, was representative of the retail industry.

Much of the findings must be treated with caution due mainly to the small sample size. However, bearing this in mind, the data does lead the author to suggest that the introduction of scanning equipment does change the nature and content of work. One weakness of the Chi-Square Test is that whilst it can determine if an association does exist between two variables and also at what level that relationship is statistically significant. It does not identify the direction of the relationship, only that some evidence of association has been found. The exact nature of the relationship must be determined from previous investigation.

Table 6.18 What Difference Would Scanning Equipment Make To Your Job? Hypothesis Summary

Effective Statement	<u>Reject/Accept H₀</u> Male	Female	Total
More free time (q of wl)	Reject	Accept	Reject
Less enjoyable (q of wl)	Accept	Accept	Accept
More time with each customer (social Inter- action)	Accept	Reject	Reject
Enjoy the job more (social interaction)	Accept	Reject	Reject
More Supervised (control)	Accept	Accept	Accept
More important to superiors (status)	Accept	Accept	Reject
More important to colleagues (status)	Accept	Accept	Accept
Less control over work (control)	Accept	Reject	Reject
Make job easier (skill)	Accept	Reject	Reject
Do less work (skill)	Accept	Reject	Accept
Do a greater variety of jobs (variety/interest)	Accept	Reject	Reject
Less secure (steadiness of employment)	Accept	Accept	Reject
Improve promotion prospects (opportunity for advancement)	Accept	Reject	Accept
Won't make any difference	Accept	Reject	Reject

The question related specifically to how much respondents enjoyed particular jobs revealed little difference between actual experience in the scanning stores and how respondents found their work in the non scanning stores. As outlined earlier most respondents appeared to enjoy most of the jobs that they did. No significant difference was found between the two sets of stores, or between males and females.

The question on how respondents found their job overall generated different results than the question concerned with specific jobs. Overall, little difference was found between the scanning and non scanning stores and the amount of challenge, amount of routine and the degree of difficulty that the respondents found in their work. The majority found their job challenging. However, opinion was divided on how varied their work was. Almost as many found it varied as those who felt it was routine. This was the case in both the scanning and non scanning stores. Similar responses were generated to the question on how easy or difficult workers found their job. With very little difference noted between the scanning and non scanning stores, with the exception that females in both types of stores tended to find their work easier than males. Significant differences were generated between the scanning and non scanning respondents in relation to the amount of interest, the skill level and the degree of responsibility that people found in their work. Workers in the scanning store tended to find their job slightly more interesting than workers in the non scanning stores. However, this rise in the level of interest may only be temporary, a 'Hawthorne Effect'. It was not possible from this survey to determine if this effect would be sustained in the long term. This rise in the interest level of work in the scanning store was accompanied by a belief that

the skill level of workers was also raised, this finding held for both males and females. However, this increase in the interest and skill level of work was accompanied by a belief that the amount of responsibility associated with the job was also reduced with the introduction of scanning equipment. Workers in the scanning stores therefore felt that their image as retail employees had been enhanced with the introduction of new technology.

Table 6.12 through to Table 6.17 demonstrates how the introduction of scanning equipment appears to effect specific job attributes. The exact effect upon the quality of working life is not obvious from the data. Overall both expectations and reality concerning the operation of scanning equipment does not suggest that workers will have more free time. This does now, however, lead the respondents to believe that they will therefore enjoy their work less. Again, a larger sample may have proved more conclusive. The introduction of scanning equipment does appear to effect the amount of social interaction that respondents have in their job. Whilst no difference was found between males in the scanning and non scanning stores, the majority of females did not agree that scanning equipment would let them spend more time with each customer, and neither would this let them enjoy their job more. On the contrary, it became apparent from the investigation that the majority of supermarket shop assistants did not enjoy serving the general public, so much so that they generally welcomed any changes that would reduce the amount of time that they had to spend with each customer. Both groups believed that the use of scanning equipment would increase the level of management control over their work. Responses to the direct statement that scanning equipment would result in less control over work generated a slight difference in opinion between the two sets of stores.

Respondents in the non scanning stores tended to expect that the introduction of scanning equipment would reduce the amount of control over work. Responses from the scanning store revealed that this was not actual experience. Worker control was not decreased with scanning equipment. This is one example of a mismatch between expectations and reality. With regard to job status, respondents in the scanning stores, both male and female, tended to agree that the introduction of scanning equipment increased their job image, both to superiors and colleagues. Respondents in the non scanning stores tended to disagree or not to know. In the question related to the fact that scanning equipment would make the job easier, most workers in the scanning store tended to agree than those from non scanning stores. Neither group, however, believed that as a consequence they would do less work. Rather data gathered from discussion with both groups suggested that although the job would be made easier, management would find alternative or additional things for the workers to do. This may have been why the level of interest in the scanning stores was higher. This however was not reflected in the responses to the statement that as a consequence of scanning equipment workers would do a variety of different jobs. The majority of respondents in the scanning stores tended to disagree with the statement. Workers in the non scanning stores thought that this would be a likely outcome with the introduction of scanning equipment. Non scanning respondents also expected that their job would be made less secure with the introduction of scanning equipment, this expectation was not reinforced by experience from the scanning stores. This belief seems to be related to the general apprehension by workers that surrounds the introduction of new technology in the workplace. Both sets of workers did not expect that the use of scanning equipment would improve

his/her promotion prospects. When respondents were asked if they felt that the introduction of scanning equipment would not make any difference to their job, most respondents from the scanning stores agreed with the statement. The majority of respondents from the non scanning stores expected that new technology would make some difference to their work, although they were not sure exactly what.

Again there appeared to be a mismatch between expectation and reality. This, as suggested above, appears to be related to general misgivings that workers have about technological change. In their experience change frequently is associated with redundancies.

As a consequence of the above data it was concluded that the hypothesis that new technology changes the nature and content of work in supermarkets could be accepted. Although a larger sample would prove more conclusive. The exact nature and direction of those changes would prove a useful field for further investigation.

Overall, workers expectations appeared to be matched by reality. At a general level males tended to have a more optimistic opinion than females. The effect on male jobs was expected to be indirect.

Both the skill level and social aspects of retail work were expected to change with the introduction of scanning equipment.

Social interaction for most groups was reduced. Originally the author had expected that staff would display a negative attitude towards technology if it affected the level of personal contact that they had with customers. The research data suggested the reverse. Staff generally welcomed any reduction in the amount of time taken to process customers. Subsequent investigations have suggested that

supermarket workers value relationships with peers in terms of social interaction, and are likely to resent attempts to reduce interaction at this level. This issue was not, however, included in the survey and would be an appropriate area for future investigations.

Skill levels were also affected by the introduction of scanning equipment. Unlike previous studies, the change in technology in the retail environment was perceived as increasing job skill levels by respondents. Technology in the retail environment does not lead to a deskilling of employees, but rather a re-skilling in terms of expertise and status, both of which are expected to increase.

6.4.2 Hypothesis Two: Different Groups Reaction Differently Towards New Technology

This section tests the second hypothesis, that there is a difference in the way certain individuals or groups of individuals react towards the introduction of new technology. As with the first hypothesis, the second hypothesis also has sub-sections for testing. These are outlined in Table 6.19 over.

The variables given principle consideration in this analysis are age, education, length of service and occupation. Within each of these groups, data is also analysed by both technological level and sex.

Initially, the data is considered overall, in order to identify any patterns in responses given. Then the specific hypothesis outlined in Table 6.19 are tested. The questions used for the data analysis concern how people find their job; how people think scanning equipment has or will affect their job or the company, and if they felt that with scanning equipment they would have to learn new skills. Analysis

Table 6.19 Statement of Hypothesis Two

HYPOTHESIS TWO DIFFERENT GROUPS REACT DIFFERENTLY TOWARDS
NEW TECHNOLOGY

- Hypothesis 2A: Women will be more adversely affected than men.
- Hypothesis 2B: Older workers will be more resistant to change.
- Hypothesis 2C: Older women will be more anxious than men.
- Hypothesis 2D: Workers who have done the same job for a long time will not like change.
- Hypothesis 2E: Less educated people are more resistant to change.
- Hypothesis 2F: Those lower in the organisational hierarchy are less resistant to change.

of responses to the question on how much respondents enjoyed their job is also considered.

From previous research and from analysis of the literature it was expected that women would react differently towards the new technology than men. Initially, it was expected that as women would be the group most severely affected by the operation of scanning equipment it could be expected that they as a group would be the strongest opponents of it. This belief was not substantiated by the results. Allied to this expectation was the belief that older workers would also resist the introduction of change in the work place, with older women being more anxious than older men. Length of service was also considered to be important, with those having the longest service being the most resistant to change. Less educated people and those who occupy higher positions in the occupational hierarchy, both male and female, were also thought to be more resistant to change than those who are better educated or who held positions of lesser responsibility in the organisation.

As in previous sections, the major hypothesis is tested through consideration of these subsidiary research objectives.

Hypothesis 2A

The subsidiary research objective that women would be more adversely affected by the introduction of scanning equipment than men was partly analysed in the responses generated in relation to the testing of Hypothesis One, that new technology changes the nature and content of jobs. The data suggested, see Section 6.4.1, that new technology does appear to alter both the skill and social characteristics of

retail jobs, and effects male and female jobs differently. This data does not lead the author to conclude, however, that women will be more adversely affected by these changes than males. Overall, little variation in effect was found. This, however, could have been due to the short time span of the sample and also to the relative newness of the technology within the operating environment. A longer research period or a repeat survey when the technology has had time to stabilise may prove more conclusive. The results did appear interesting if not conclusive. In almost all the research locations, female employees did not appear aware of the potential implications that scanning equipment could have upon their job. They did not seem particularly interested in giving much thought to the workplace change. It appeared that to them work did not merit that much consideration.

Hypothesis 2B

The second hypothesis is concerned with the expected reaction towards new technology by age. Older workers were thought to be more resistant to change than younger workers. It was expected that this would be demonstrated through a more negative attitude towards technology, in how they felt that their job had or could be affected.

(In testing the second hypothesis, a similar method of analysis as had been employed in the analysis of the first hypothesis was used. With the exception that in the analysis of the second hypothesis the data was further analysed by age, education, length of service and occupational status in order to identify any differences in attitude that may emerge).

Originally there were 7 response categories to the question on age.

Due to the small numbers in certain categories, and the difficulties this would create for statistical testing, the age categories were collapsed to generate more meaningful data. The 'collapsed' responses are generated by combining the two oldest groups. The distribution of ages between the scanning and non scanning store appears equal, with both the initial and the recoded values. The majority of respondents are in the youngest category. Analysis is undertaken by age on how respondents expected scanning equipment to effect both their own job and the company.

The data generated from the responses on how workers find their job when analysed by age suggests that overall age does not appear to make a significant difference in attitudes towards work. A significant finding that became apparent from the data, was that workers in the scanning stores, regardless of either sex or age, tended to hold more positive views towards the different aspects of their work. For example, workers in the scanning stores tended to find their work more challenging and interesting. This is particularly true of older workers. Perhaps due to the fact that older workers have more definite ideas or greater job experience with which to compare their current job. This was found to be true for both males and females.

Most had probably throughout their career undertaken a variety of different jobs. They were therefore most likely to be working in the supermarket industry out of choice. This was reflected in a higher level of job satisfaction displayed by older workers. Most tended to be content with their present job. This issue was

considered in Chapter 2. Younger respondents were more likely to be working in the supermarket because they 'couldn't find anything else'. The middle age group were most likely to be working for financial reasons, e.g. young families to support, whilst older workers were more likely to be there out of choice, i.e. not be working solely for financial reasons. This apparent satisfaction with their present job was not mirrored in an unwillingness to change. In almost all responses as to how the introduction of technology will effect retail work, those of the older age groups reflected those of the younger age categories. Although opinion tended to strengthen as age group increased. Similarly, opinion of the older groups was more polarised with the 'neither' or 'don't know' responses being reduced as age increased. This is believed to be due to the confidence in opinion that comes with age. Younger respondents tend not to choose the more extreme values of the scale, due to uncertainty and inexperience. In some instances the older women held more definite opinions than some of the male respondents..

The overall impression generated by the data concerning the effect of scanning equipment on the company, when analysed by age, suggests that there does not appear to be a significant difference in opinion between the different groups within the two types of store. The main difference in responses, as discussed earlier, lies between the scanning and non scanning stores. This may be due to the fact that respondents from the scanning store are answering from experience whereas those from the non scanning stores are basing responses on expectations. The data suggests that expectations differ from reality. The expectations surrounding scanning equipment tend to be more negative than experience. This finding holds for not only

the effect of technology upon the company but also upon the individual and the work situation.

Very little variation is found in either expectations or actual experience that could be attributable to age alone. The greatest division of opinion lies between the sexes and occupational categories. Opinion between the different age categories in both the scanning and non-scanning stores reveals little difference. The different age groups generally tended to follow the same or similar direction of opinion as males or females.

Hypothesis 2D, E, F

As suggested above, the greatest differences in opinion or attitude that were revealed in the data were by sex and technological level.

Subsequent analysis of the data by educational qualifications and length of service revealed no significant differences. Given the small size of the sample to further analyse data generated cell frequencies of often only one respondent, which was statistically meaningless. Consequently, to analyse the data by educational achievement provides little insight given the lack of formal qualifications of the sample. The majority of respondents fell into the 'no formal qualifications' category.

Hypothesis 2D suggested that length of service would also condition attitudes to change. No significant difference was found in the analysis as the majority of the sample, 64%, had worked in the outlet for less than three years.

Despite the fact that these hypotheses have not been tested in the survey, this does not preclude their relevance to the research situation. A larger sample would generate more conclusive results and would be an area worth further and more detailed investigation.

Hypothesis 2F, which suggested that differences in opinion and attitude would vary by occupational level, has already been tested in Section 6.4.1. It suggests that there is no difference in the levels of anxiety concerning the introduction of change, by occupational category.

6.4.3 Hypothesis Three: New Technology Effects Job Satisfaction

To test this hypothesis a number of sub-hypothesis were developed. By testing these smaller and more directly testable research objectives the overall effect of new technology upon job satisfaction could be determined. An examination of the literature and significant other research that had been conducted had suggested a number of effects that could be expected with the introduction of scanning equipment into the retail environment. It was believed that the introduction of new technology would lead to females experiencing an increase in job satisfaction in areas related to the skill characteristics of their job. This had been the general direction of the effect identified in the pilot work previously conducted in retail outlets and which was discussed in detail in Chapter Four.

This increase in the skill level of retail employees was expected to be accompanied by a decrease in job satisfaction in the areas of their work related to social characteristics. It was suggested that females value the social aspects of their work more than the skill

levels or physical attributes which were given more weighting by the males in the sample. The specific social characteristics that were expected to change included the belief that womens' jobs would be more adversely affected by a faster work pace and increased supervision. It was also expected that social interaction would be reduced and that stress would be increased for more women than men.

Many of these issues were investigated earlier in relation to hypothesis one. In this section consideration is given to the responses in connection with the effect upon job satisfaction. In addition to the data generated from consideration of earlier reserach objectives, analysis is also undertaken of a number of additional responses. Specifically, responses generated to the amount of stress that respondents felt that they had in their job, whether they would recommend their job to a friend and how often they got a sense of achievement from their work.

Discussion is provided on the general findings of the effect that new technology has upon retail worker satisfaction, before examination of the specific issues discussed above.

6.4.3.1 Stress

The data generated from both the scanning and non scanning stores and between males and females, suggested that there was no difference in the amount of stress that workers encountered in both the scanning and non scanning stores. See Table 6.20 . A significant number of individuals; 46% of males in the scanning stores, 55% of males in the non scanning stores, and 56% and 59% of females respectively, considered that there was hardly any stress at all in their work.

Table 6.20 'Would You Say The Amount of Stress in Your Job is.....?' χ^2_{Test}

	χ^2_{Test}					DF	EF \leq	Confidence Interval	Reject/ Accept H_0							
	A Lot	Hardly Any	None	Don't Know	T	A Lot	Hardly Any	None	DK	T	Calculated χ^2					
M	35(13)	46(17)	14(5)	5(2)	37	38(11)	55(16)	3(1)	3(1)	29	2.26	3	50%	0.05	Accept	
F	29(20)	56(39)	12(8)	3(2)	69	22(19)	59(52)	16(14)	3(3)	88	1.44	3	25%	0.05	Accept	
T					106					117						33 22

Scanning

Non-Scanning

Test

The calculated Chi Square values would lead to an acceptance of the null hypothesis that there is no difference between the scanning and non scanning stores and how much stress workers have in their job. As a consequence the initial belief that the introduction of scanning equipment would increase the amount of stress that women have in their job cannot be accepted. The data suggests the introduction of technology into the supermarket does not affect the stress level of workers in any way.

This question highlighted a weakness of using self-completion questionnaires in that respondents can only answer what the researcher specifies. Subsequent analysis has suggested that technology may in fact reduce the level of stress of operators, the question specification of self-completion questionnaires precludes any further development on each topic. Therefore the issue is lost to the analysis. The effect of technology and the level of stress would, however, be an appropriate issue to develop further.

6.3.4.2 Achievement

The second set of responses which were analysed were those connected with the question on how often respondents got a sense of achievement from their work. The data generated is given in Table 6.21. As with the question on stress, it was expected that this analysis would determine whether or not respondents from both the scanning and non scanning stores were satisfied with their work. The assumption underlying the question was that if respondents got a sense of achievement from their work, then they could also be considered to find their job satisfying.

Table 6.21 'How Often Do You Get a Sense of Achievement From Your Work?'

	% (N)				Calculated χ^2	DF	EF < 5	Confidence Interval	Reject/ Accept H0
	Hardly Ever	Often	Never	T					
Scanning	Non-Scanning								
	32(12)	63(24)	5(2)	38	29	2	33%	0.05	Accept H0
M					3.74				
F	37(27)	63(46)	0(0)	73	90	2	none	0.05	Reject H0
					10.50				
T				111	119	2	none	0.05	Reject H0
					7.72				

Initial analysis of the data suggests that there is some difference between the scanning and non scanning stores and how often people get a sense of achievement from their work. The data indicates that no significant difference exists between males in the scanning and in the non scanning stores, both of whom indicate that they often get a sense of achievement from their work. The figures given are 63% and 83% respectively. Female responses from the non scanning stores revealed that 14% of respondents never got a sense of achievement from their work, the comparable figure in the scanning store was 0%, indicating that at least all respondents in the stores that operated the new technology felt some sort of achievement from their work. The results would suggest that for females at least, the introduction of scanning equipment does appear to increase one aspect of job satisfaction. Although for males this measure is unchanged. They appear to get some degree of achievement from their work regardless of the level of technology employed. The fact that most males felt that they got some sense of achievement from their work may be a function of the jobs that the men do within both stores, rather than as a consequence of the operation of the technology itself. As the findings from Hypothesis 2 suggest, workers who occupy positions of higher authority tend to enjoy their job more. The responses from the question on how often workers get a sense of achievement from their work indicates that workers in positions of higher authority have a higher level of job satisfaction than those who occupy the lower levels. In the supermarket industry, as demonstrated earlier, these positions are divided by sex. With the majority of females concentrated into the lower staff levels and the higher positions almost predominantly a male preserve.

The final measure used to test the overall level of job satisfaction of males and females in both the scanning and non scanning store was to ask respondents if they would recommend their job to a relative or friend. If respondents were prepared to recommend their job to a friend then it would indicate a high level of job satisfaction, if not it could be concluded that there was some aspect of their work with which the respondent was not happy, and that this would represent a degree of job dissatisfaction. Details of the responses are given in Table 6.22. The results suggest that there is no difference in the level of job satisfaction in both the scanning and non scanning stores and between males and females using job recommendation as the measure. Yes responses ranged from 43% - 53%.

However, if the proportion of 'don't know' responses are added to the 'no' category, the figures suggest a relatively high amount of retail workers who are dissatisfied with some aspect of their work. The assumption being that to give a 'don't know' response suggests some degree of dissatisfaction.

For females, in both scanning and non scanning stores, this makes little difference as the majority of responses still remain in the 'yes' category. But for males, in both stores, it appears that the level of job satisfaction may not be as high as initially considered. Due to the restrictive nature of the survey this point could not be developed in the time available. The entire issue of retail worker satisfaction is an area worthy of detailed investigation. Overall the data suggests that whilst workers are not entirely satisfied with their work, neither are they completely dissatisfied.

Table 6.22 'Would You Recommend Your Job to a Friend or Relative?'

	Scanning				Non-Scanning				T	Calculated χ^2	DF	EF \leq	Confidence Interval	Accept/Reject H_0
	Yes	No	Don't know	T	Yes	No	Don't know	T						
M	45(17)	30(11)	26(10)	38	43(12)	36(10)	21(6)	28	0.40	2	none	0.05	Accept	
F	53(37)	30(21)	17(12)	70	49(43)	29(25)	22(19)	87	0.54	2	none	0.05	Accept	
T				108				115	0.17	2	none	0.05	Accept	

In both the scanning and non scanning stores, and also with both males and females, the majority of respondents all answered 'yes' to the question that they would recommend their job to a friend. The 'yes' figures corresponded to 45% and 53% for males and females respectively in the scanning stores and 43% and 49% in the non scanning stores. Although approximately one third of all respondents of both sexes and in both types of stores answered that they would not be willing to recommend their job to a friend, a significant proportion gave a 'don't know' response. From the responses given it appears that a certain amount of job dissatisfaction does exist within the supermarket branches involved in the research. However, the direct link between the use of scanning equipment and the dissatisfaction was not apparent - overall it appeared from subsequent investigation of the supermarket outlets that the introduction of scanning equipment appeared to increase the level of employee job satisfaction, although this effect may only be of a temporary 'Hawthorne' nature. The level of dissatisfaction that was identified may be a direct result of the nature of supermarket work itself, or attributable to more local effects such as the style of management in that company or branch or personal features of the individual involved. The analysis did not directly control for these effects, and as a consequence their contribution to staff dissatisfaction can only be hypothesised.

6.4.3.3 Skill and Social Characteristics

Analysis would suggest that new technology decreases an already relatively high level of dissatisfaction. Rather than creating disharmony in an already satisfied work environment. Workers in the scanning stores tended to demonstrate a higher level of job satis-

faction than their counterparts in the non scanning stores.

It was expected that women would experience increased job satisfaction in areas related to the skill characteristics, but a decrease in job satisfaction related to social characteristics. Specifically, it was expected that females would be adversely affected by a faster work pace, increase supervision and that the amount of social interaction in their work would be reduced. This was expected to have a significant impact upon how much women enjoyed their work. As the skill content of work did not appear to be as important a determinant as the social criteria.

The data upon which to base the analysis of Hypotheses 3A and 3B was presented in relation to the analysis of the first hypothesis, and is to be found in Table 6.9 By focusing on the data related to both the skill and social characteristics of work the third hypothesis can also be tested.

The question which asked respondents what difference they felt scanning equipment would make to their job had specific effective statements which addressed the skill and social issues. If respondents felt that their job would become easier with the introduction of scanning equipment or that they would do less work, then this suggests that the skill level would have been reduced. Similarly, if the female respondents believed that they would have more time with each customer or that they would do a greater variety of different jobs then it was suggested that the amount of social interaction or the amount of variety or interest that female workers found in their work would have increased. These changes were expected to

be reflected in changes in job satisfaction levels. Earlier analysis suggested that the operation of scanning equipment does effect the skill level of work as perceived by employees. The data suggests that the skill level of work for female and male employees is increased. Although this does not appear to be accompanied by any increase in how enjoyable the supermarket workers find their job. On the issue of 'enjoyment' no significant difference was found between the scanning and the non scanning stores.

The data suggests that although the skill level of work did appear to be transformed by the introduction of new technology, the workers themselves did not appear to be aware of this fact, or at least they did not feel that this change in the work had or would change how much they enjoyed their work. Had the initial level of job satisfaction been higher then the effect of technology upon how much workers enjoyed their work may have been the reverse. As it happened, a change in working practice or pattern did not effect how workers perceived of their job.

Allied to this issue, respondents were asked if they felt that they would have to learn new skills with the introduction of scanning equipment. The responses, given in Table 6.23, demonstrate that both males and females in both the scanning and non scanning stores believed that they would not have to learn new skills with the introduction of scanning equipment. In this respect, expectations were matched by reality. The data shows that respondents were almost equally divided in agreement and disagreement. However, the weight of opinion lay in the 'no' response from all groups which suggests that there is no significant difference in how supermarket workers expect to

Table 6.23 'Do You Feel That You Would Have To Learn New Skills With The Introduction Of Scanning Equipment?'

% (n)

	Scanning		Non-Scanning		T	Calculated χ^2	DF	EF ≤ 5	Confidence Interval	Reject/ H_0
	Yes	No	Yes	No						
M	42(15)	58(21)	36	50(14)	50(14)	28	0.16	1	0.05	Accept
F	28(19)	72(48)	67	35(29)	65(54)	83	0.46	1	0.05	Accept
T			103		111	0.61	1	1	0.05	Accept

learn new skills with the introduction of new technology. So although the data suggests that skill levels will be increased, particularly for male workers, it is not expected or apparent from the data whether these will be new or different skills or an extension of existing skills. The research situation would suggest that new skills will be introduced to the workplace with the operation of scanning equipment and that overtime traditional retail skills, e.g. customer interaction, stock control, ordering, and checking will be made obsolete.

It is expected that the effect of changing skill levels on the level of job satisfaction will be a longer term issue.

Originally it was expected that a reduction in the amount of social interaction involved in a particular job would reduce the amount of job satisfaction that the individual had in his/her job. The data suggests that the opposite may in fact be the case.

The majority of staff in the sample, particularly females, generally welcomed the reduction in the amount of time that they would have to deal with the public. This is one important feature that separates supermarket workers from the majority of other retail workers, who, as earlier research suggested, generally enjoyed the personal contact aspects of retailing. Supermarket workers appear to be in a unique category in their attitude towards the public.

The data given in Table 6.11.-13 demonstrated that a significant difference does exist between the scanning and non-scanning stores and how they felt that the level of social interaction would be affected. The rejection of the null hypothesis using the Chi-squared

statistic was possible not because of any significant difference in attitude that existed between the two groups of workers, but rather because the majority of respondents were uncertain of the outcome of the effect. Respondents in the scanning stores, however, were more unanimous in the direction. They believed that social interaction was reduced.

The nature of control over work and how it was effected by the introduction of new technology was also examined. The data was analysed in the discussion earlier concerning the testing of the first hypothesis. The results suggest that no significant difference appears to be made to the amount of supervision that both males and females in both types of stores experience or expect with the introduction of new technology. With respect to the amount of control that individuals felt that they had over their work, the introduction of scanning equipment does appear to reduce this level. This was particularly true for female workers in the scanning stores of whom 59% disagreed with the statement. This compared with only a 35% disagreement level in the non scanning stores. This belief that the amount of control individuals had over their work would be reduced did not translate itself directly into greater job dissatisfaction. Workers generally accepted any changes to their work situation without any consideration to the effect upon them personally. In this respect the supermarket workers, particularly females, were fatalistic in their attitudes towards work or in the amount of control that they believed they personally operated over their work environment.

By testing to determine if new technology affected the amount of control that female employees had over their work, it was possible

to investigate the original research objective that the introduction of scanning equipment would change the work pace and the level of supervision that workers experienced over their work. The data suggests that workers in the scanning shops do have less control over their work environment than their non scanning colleagues. Although they do not feel that their work is or could become more closely supervised. They associated increased control with greater visibility. They believed that as a consequence they as individuals would become more accountable and their work would become more easily identified. As a consequence opportunities for 'slacking' would be reduced. This could be expected to lead to a reduction in job satisfaction.

6.3.4 Conclusions

From the above analysis it is not directly clear if the data leads the author to reject or accept the null hypothesis. Many of the differences identified in attitudes between females in both the scanning and non scanning stores could be partly attributed to the uncertainty displayed by the female staff responses in the non scanning stores. Which although significant in itself does not allow a direct comparison on a before/after basis to be a complete representation of reality. A significant finding from the investigation is that new technology does appear to affect the level of job satisfaction experienced by those individuals that work in the stores that introduce it. However, the direction of the effect was not as originally anticipated. Rather than reducing the level of job satisfaction, as had been the case in the manufacturing and office sectors, the introduction of scanning equipment in the supermarkets studied actually raised the level of job satisfaction of employees. Whether

this effect is temporary or more of a long term nature is an issue that is worth further investigation. The author therefore accepts Hypothesis 3A that new technology changes the level of job satisfaction related to the skill level of retail work. Hypothesis 3B was not as easily accepted or rejected, and requires more detailed research. The data suggests that new technology does affect the area of 'social characteristics' of work. However, it is not directly clear that this reduction in the amount of social interaction or the amount of control that employees feel that they have over their work leads directly to a reduction in job satisfaction. Although preliminary investigations suggest that this was the most likely outcome, the uniqueness of supermarket workers was not considered. Again, further research should be conducted on this issue. Allied to the testing of this particular hypothesis was the effect of work pace and control on the level of job satisfaction. As outlined above, the study demonstrated that the individuals control over his/her work is reduced by technology and the pace of operation is increased, yet this finding cannot be directly related to a decrease in job satisfaction as had been the case in other sectors. Social interaction is reduced for female workers, yet this is generally welcomed by employees. Significantly, although a large number of job characteristics are affected by the operation of scanning equipment workers do not feel that the amount of stress that they undergo in their daily work has been increased.

In conclusion the study suggests that the level of job satisfaction is affected by the introduction of new technology. However, the exact nature of the effect is difficult to determine from such a small sample and would require a fuller and specific investigation concerned

almost primarily with the issue of job satisfaction amongst supermarket employees and retail workers generally. This would be an appropriate area for future research.

6.5 Management Interviews

This section presents the findings that were generated from the discussions held with branch managers. The overriding purpose in conducting interviews with the managers of the participating outlets was primarily to obtain a backdrop upon which to view the subsequent data generated from the survey.

6.5.1 The Purpose of the Interviews

The analysis of the interviews conducted with the managers provided the answers to four separate research questions. Firstly, how managers felt that new technology would effect their own job. Secondly, how they expected new technology to effect the work of others. By analysing the responses from both the scanning and non-scanning stores it was expected that a comparison could be made between actual experience and expectations. Thirdly, it was hoped to determine how the introduction of scanning equipment would effect promotion prospects for the managers, or at least to determine how they expected the operation of scanning equipment would effect their work. Lastly, consideration is given as to how the individual companies had introduced the technology into the branches, particularly to determine if there had been consultation with the staff and if this was an important factor in conditioning attitudes towards change.

Given the small size of the sample of managers participating in the

survey (9), much of the results must be treated with caution. Statistical testing also has little significance at such low cell frequencies.

6.5.2 Methodology

Much of the interview data was collected simultaneously with the survey data, over a six to eight week period. Often the opportunity of collecting the survey data was used to have a discussion with the manager. Most welcomed the opportunity to talk about their work.

The interview format was informal, following a loosely structured schedule. The interviews were conducted in either the manager's office, or in private in the staff canteen, during shop hours. This was done at the suggestion of the participating companies. Suitable arrangements were made with the individual branch managers.

The format of most of the interviews consisted of a preliminary tour of the outlet, prior to the discussion, in order to 'break the ice' and to establish some rapport with the individual manager before the actual interview was started. Due to this loosely structured format, no two interviews are exactly the same, rather the interviews were allowed to take their own particular form, as long as the key issues, identified in the Appendix, were included. Direct comparison of responses was therefore not always possible.

The managers were also asked to participate in the survey - to allow a comparison of responses with those of the staff and also to generate hard, quantifiable data upon which more firm conclusions could be drawn. Detailed responses are discussed below.

Much of the information that was generated from the interviews was not directly relevant to the research. Nevertheless it allowed a detailed picture of the daily workings of a supermarket to become clearer and also allowed an insight into supermarket management.

6.5.3 General Findings

Much of the data generated from the interviews conducted with managers highlights the great deal of interest and enthusiasm generated by the introduction of new technology for this occupational group.

Most of the managers interviewed did not consider scanning equipment a threat to their job, in either the short or long term. Some expressed concern on the part of jobs currently done at lower levels, that could eventually be done by technology, e.g. no need for pricing, automatic stock ordering and reduced numbers of check-out operators. In most cases the scanning equipment was considered a 'career booster' by the managers. Many suggested that it gave them additional skills that could be traded in the market place at a later date. All the managers in the sample believed that there would be increasing technological penetration in the supermarket industry. Some suggested that

"It was the way supermarkets are going"

It was considered to improve status and increase prestige amongst peers, if the store had scanning equipment installed. This improvement in self image was never directly stated but rather was inferred from statements made by the managers. This improvement in self-image, the managers felt, would result in improved job prospects and increased opportunities for advancement. The managers, as a group, did not appear to be aware that their own job within the supermarket was threatened and could eventually be replaced.

One overriding impression gained from the visits to the various stores was the difference in both the attitude of the manager and store ambience between scanning and non scanning stores. In the scanning stores managers tended to be much more enthusiastic and interested in their work. This may have been related to age, since most managers in the scanning stores tended to be younger than non scanning management, particularly in the case of the regional chain. This may have been deliberately engineered by the Head Office - so that only those most interested and enthusiastic toward their work would be involved in the technology project. In the case of the independents, both managers were in the oldest age group, yet they displayed very similar attitudes as the managers in the scanning stores of the regional chain, despite the difference in ages. One weakness of the interview method was the failure to conduct a personality profile test of the supermarket managers to determine if similarities in attitude existed between the two groups toward their work. As a result it was not possible to determine how important personality was to the determination of attitudes. This would be an appropriate area for further investigation.

This positive attitude on the part of the branch manager was reflected in store operations. The environment within the stores with scanning equipment tended to be more enthusiastic, brighter and cheerful than those of the non scanning. This was despite the fact that some of the scanning stores were amongst the oldest in the group and had not been purpose-built for the project.

In all the stores studied, the author noted the ability of the manager's attitude and behaviour to effect the store environment.

This finding was confirmed in the subsequent analysis of the survey data. The positive attitude of the managers towards work was similarly reflected by the staff. The converse was also found to be true. In the scanning stores in the sample, all the managers exhibited an enthusiastic approach to work and to technical change, this was paralleled by the staff. The negative attitude of the non scanning staff towards work may in part have been attributable to the attitude of the branch manager, it was not possible from the data generated in the survey to test the relationship. It is, however, an area that should be investigated in greater depth.

An outline of the kind of people that supermarket managers are, their attitudes towards their work and their ambitions are described in an effort to establish if these personal characteristics influence management reactions towards new technology.

Much of the data generated from the management interviews, reinforced the findings of the questionnaire. Overall, the management group in the sample were males, the exception being one female manager in a non scanning store who was acting as a temporary relief whilst the male manager was on holiday. In the rest of the sample, the highest occupational position that females generally attained was that of supervisor.

The supermarket managers displayed a set of unique characteristics not exhibited in any of the other groups involved in the survey. The interviews suggested the same 'management type' as Redding (1974) had identified in his study. In terms of personality and how it would condition responses, the study suggests that the conservative, rationalistic and methodical characteristics of the managers is

reflected in their approach to work. However, in the absence of any firm psychological profile data it is difficult to reach any firm conclusions.

The observation on the personality of the managers suggested that, as a group, managers would be less welcoming towards the new technology than had originally been expected. The subsequent data generated found that this was not the case. Rather than adopting a negative attitude towards the scanning equipment, the managers in those branches where the technology was already operating exhibited positive responses. It was not possible to generalise this finding to the entire supermarket industry. This was partly due to the small number of managers in the sample, i.e. the small number who were actually working in a store employing the technology, but more importantly all the managers in the scanning stores were in the youngest age category. If the sample had been enlarged and included older managers from the scanning stores, the responses may not have been as positive as the conservatism of the sample appeared to increase with age.

There had been no prior consultation with staff regarding the introduction of new technology in any of the outlets involved in the study. In all instances the introduction of scanning equipment had been present as a 'fait accompli' with the staff informed only weeks before the arrival of the equipment.

This apparent lack of information and awareness concerning the equipment or company strategy towards technology did not appear to prejudice any of the managers towards technology. This unquestioning

support or acceptance of decisions made outwith the outlet was characteristic of the entire sample. In the outlets that were part of the regional chain, managers were used to centralised decision making, with all strategic or key decisions made at the Head Office. In the independents, it was accepted that all decision making was the preserve of the owner. Therefore not to have been involved in the decision to introduce technical change had been considered a normal procedure by the managers in the sample.

Overall the study suggested that there was a lack of communication in the supermarkets involved. As the managers had been neglected with regard to discussions concerning technical change, so too did the managers exclude their staff. Again, this was not primarily related to the introduction of technical change, but rather included strategic and operational decisions.

The most frequently used method of gathering information were the informal channels. This was the method by which most information was circulated around staff. As a consequence staff often received inaccurate or incorrect information. This, however, did not appear to lead to any prejudices or bias on the part of either employees or managers, although most admitted that they would like to receive more information with respect to operations and long term strategies. This would be a potential source of increasing staff job satisfaction almost immediately, at very little cost to the company.

6.5.4. Conclusion

The major conclusion generated from an analysis of the interviews held with the branch managers is the positive opinion that all have

towards technology with respect to their own occupation and career prospects. Supermarket managers do not feel threatened or intimidated by the alternative technological scenarios that have been presented. They accept that technical change will inevitably involve some job loss - they do not, however, expect it to be their own. Rather they suggest that the greatest impact of scanning equipment will be on the shop floor.

Most stressed the desire to have more information available regarding company objectives. This was not related specifically to the introduction of technology, but included wider issues such as the aims behind advertising strategies and the role of certain individuals at Head Office.

This opinion was subsequently validated some months after the completion of the author's investigation. The regional company involved in the survey was taken over by a national chain, to the surprise of all below board level.

6.6 The Observation Study

The observation study was undertaken over a two week period and followed the format used in the earlier investigation. During this stage of the research the author worked alongside the participants in the study, in order to gain a better understanding of the attitudes and opinions that supermarket workers of both sexes had toward their work. From this it was possible to determine what were the contributory factors that determined the attitudes that supermarket workers held, and which may possibly condition attitudes towards both technology and change. A store independent of the rest of the sample

was deliberately chosen. It was felt that the participants in the observation study should not have been influenced in any way by the survey. Their behaviour was to be observed as a control group. Redding (1974) had identified the necessity of conducting observation studies unbiased by the knowledge of the survey results, as one of the main purposes was to corroborate the measurement instrument.

6.6.1 Methodology

The observation study was conducted over a 14 day period. The only prior specifications on the location was that it should be large enough to include all supermarket departments and that the author's presence would not be prohibitive to either staff or customers.

An outlet of 9,500 sq. ft. and approximately 70 staff located in Edinburgh was eventually chosen. The location was a sufficient distance apart from the outlets involved in the survey that no 'knock-on' effects would have occurred. This time there was no prior introduction to the staff or notification of the purpose of the study. Whilst the manager was informed of the nature of the work, the staff were told only that a study of shop work was taking place. With explanations about not being paid by the company and contact with the manager being kept to a minimum, any hostility or suspicion from the staff was overcome.

Time was spent in each department working alongside the staff. As in the earlier observation study a diary of observations was kept. In this method the author chose to work alongside the supermarket workers actually performing their job with them. No direct note was kept of the workers attitudes or opinions. The diary was written

up either during lunch breaks or in the evening once work had finished. The staff were aware of the author's research purpose of working in a supermarket but this did not appear to inhibit their behaviour or willingness to talk, either about their job or how they felt about management or customers. This was helped by the fact that no overt notes or records were kept. By working alongside the workers, doing their work and generally joining in the lunchtime and breaks chit-chat the confidence of the workers was gained and the author therefore became part of the work group, or as much as was possible in the time spent in the supermarket. Within this particular supermarket chain seniority or status was determined by the wearing of an overall of a particular colour. The author deliberately chose to wear the overall of the lowest rank, which was bright orange in colour and was worn by all female shop assistants. Supervisory ranks wore blue overalls. Branch managers and management trainees wore suits. Through this scheme the workers could immediately identify the rank of particular individuals. It also made apparent the line of control in the various departments. By wearing the same colour of overall as the staff the author gained the confidence of those with whom she was working. The workers considered the author as being 'one of us', rather than equating her role with that of management. This position was reinforced by being put under the traineeship of some of the more senior assistants in the different departments. By appearing to be learning the job from the senior personnel, the author was not treated suspiciously, but rather was accepted and given the same treatment as all new trainees. The data generated from the study provided a valuable insight into supermarket operations at the shop floor level.

The following sections deal with the observations made during the period of study in the individual outlets. The identity of the individuals or the companies involved has been kept secret to preserve the anonymity of both parties. Nevertheless, by doing so nothing is lost in the findings or observations generated from the survey.

6.6.2 General Findings

The findings generated from the observation study show a deep entrenchment of attitudes and opinions held by the staff. The staff appeared to be engaged in a 'war' with both management and customers. This had created a 'them' and 'us' situation in the workplace. It is difficult to determine whether the attitude demonstrated by the staff was peculiar to the outlet, or was characteristic of the attitudes held by supermarket workers on an industry-wide basis. Subsequent investigations, and indeed the data generated from the survey, have suggested that some degree of distancing exists in most supermarket outlets, regardless of location. Alienation between different occupational levels appears to be a general characteristic of the supermarket industry, as this had already been witnessed in earlier investigations into different retail outlets.

A significant difference did, however, exist between staff opinion, as was subsequently observed, in the scanning and non-scanning outlets. The observation study was reinforced by the findings from the non scanning stores. However, in the scanning stores, whilst distancing still occurred, it was less obvious. It appeared that the alienation between the different occupational levels had somehow been 'mitigated' by the enthusiasm and positive attitude displayed by the branch managers.

However, in the non scanning store most of the staff appeared to feel that somehow they would be cheated unless they kept up their guard against infringements against what they perceived as accepted work practices or behaviour. There appeared to be a set of accepted norms of behaviour or conduct that was accepted and operated by both the management and the staff beyond which both groups would not cross. For example, during the staff breaks it was accepted that management would not use the staff canteen. Similar examples could be found in the distance operated by the staff in their behaviour towards management. There were boundaries beyond which the staff would not cross and which appeared to define the limits of either familiarity or acceptable behaviour. The store in effect operated a tight management style structure, where staff appeared to conform to management directives through the operation of informal control procedures rather than through direct management orders. The conformity to these indirect procedures did not lead to greater respect on the part of staff towards management. Rather, staff tended to adopt a rather sullen style of conformity; often grievances were voiced in the privacy of the staff room or outside working hours rather than directly to management. The attitude of staff towards management tended to be one of resentment rather than of co-operation. The atmosphere appeared to be one of quiet dissatisfaction on the part of the staff.

The author worked alongside most of the staff and therefore was privileged to be taken into their confidence. She became aware of the barriers that operated between the staff and the management in those shops where she worked. Although it was not possible from the investigation to determine whether this was unique to the supermarket industry or whether this was in fact typical of the entire worker/

management relationship. Staff management relationships in the supermarket industry would be an appropriate area for further study.

6.3 Work Groups and Work Situations

The bulk of supermarket work can be classified under four different groups. (Redding 1974).

1. Stockroom work: Handling stock by the case (or pallet) into and out of the stockroom
2. Shelf filling: The pricing and placing of goods on shelves on the selling floor
3. Processing: The transformation of the state of the goods, e.g. cheese cutting and pre-packing, butchery preparation, produce pre-pracking
4. Check-outs

The expected effect of the introduction of new technology upon retail tasks has been discussed in Chapter 3. The main areas of impact are expected to be on the check-outs and on the labelling and pricing of goods. Significant effects are also expected to occur in the stockroom or warehouse in terms of stock control.

The research was timetabled so that sufficient time was spent in the departments that constituted these four categories, which involved working in the warehouse; on the shop floor filling shelves and pricing goods; at the provisions, fruit and veg., bakery, butchery and dairy counters as well as the check-outs. By working as a full time staff member in each of the departments in the time allocated, which ranged from 1 - 2 days, an understanding of supermarket work and operations was obtained.

Whilst the actual tasks that were conducted in each department varied,

the overall operation varied little. Most involved either selecting, weighing, wrapping or taking payment for goods purchased. Most of the daily work of the supermarket workers is routine and devoid of responsibility. Staff tend to compensate for this boredom by using work time to develop personal relationships with work mates or uniting with fellow workers to develop some type of indirect forms of resistance to management. For example, they tended to work out work systems that allowed them more free time to go for a smoke, or, as they termed it, a 'skive'. If the manager gave them a particular job to do they would do it in their own way rather than the way suggested by management. This behaviour was never overtly stated but rather was observed by working alongside the staff. Similarly, they would use the author's presence in the department as an excuse to do other things.

The customer flow throughout the workday tends to be cyclical - following peaks and troughs. As a consequence it could be expected that work effort tends to vary rather than following any constant pattern, with pressure periods corresponding to high shopper visits. During the observation study, in almost all the departments visited, this was not found to be the case. Staff tended to work at the same pace regardless of the volume of customers or those waiting to be served. There was no haste on the part of staff to some customers.

Expressed as

"You get used to it" (reference to volume of work)

"Don't panic, it's not worth it" .

"Just let 'em wait - don't let them rush you" (reference to customers)

Staff tended not to interact a great deal with the public in the

course of their duties, other than when necessary at service counters. Unlike other retail workers, as had been evidenced in earlier investigations, they did not consider customer contact an important aspect of their work. There was, however, a great deal of interaction within work groups. This is where it is expected that the introduction of scanning equipment will have the greatest impact. The amount of social interaction with peers will be reduced. Not as originally expected with customers. The observations from the supermarket suggested that little customer contact takes place, and as reinforced from the survey, the staff would like to see this reduced still further. The staff would appear to welcome the introduction of scanning equipment in this respect. Although whether its introduction would compensate for the reduction in peer contact during working hours was not clear from the study.

Earlier investigations in Chapter 2 had suggested that married women who were working full time would probably be doing so out of economic necessity. Part-time workers had stressed the importance of non-financial factors. As a consequence, part-time workers tended to enjoy work more. This finding was reinforced in the observation study. In most of the 'front shop' departments that were included in the survey, i.e. fruit and vegetable, provisions, bakery and check-outs, the part-timers' displayed a more positive attitude and sense of enjoyment about their work. However, the majority of full time female employees tended to display a negative attitude to work, epitomised by

"I'm here because I have to be"

This was evidenced in all age groups and was reinforced in the findings from the survey.

The branch manager and the trainees in the department tended not to associate at any level with the staff. Communication between groups was concerned principally with the issuing of instructions regarding particular tasks needing to be done. Most communication or interaction was conducted within particular work groups as the physical layout of the store precluded any inter-group communication. Little transfer of staff took place between departments, therefore social groups had formed on the basis of work relationship. These groups tended to comprise either all males (warehouse) or all females (check-outs) who worked in the same department. This tended to alienate work groups further both from each other and from management, with each department operating as an autonomous unit.

6.6.4 Conclusions

Redding (op. cit) has noted that the main problem associated with observation studies is the researcher's tendency to project his own model of the situation onto the participants by asking questions or noting behaviour that matches his own assumptions. Within this study this weakness was overcome by using open ended questions and by restricting direct questioning of individuals. The author attempted to keep her own contribution within conversations to a minimum. The researcher's presence can also have some effect in conditioning observed behaviour. Redding (op. cit) further suggests that the sharing of a physical task with an individual appeared to develop a sense of trust that generated greater insight into the situation and valuable information. The potential restrictive effect of the author's presence was therefore reduced by working with individuals for lengthy periods on jobs such as shelf filling, checking in goods or serving customers.

Yet despite the limitations of the observation study, discussed earlier in Chapter 5, and the potential for bias, valuable information on the attitudes and opinions of retail workers was generated. This data provided a valuable insight into the subsequent findings obtained in the survey.

Table 6.24 outlines the major findings generated from the observation study.

As discussed earlier, one of the most significant conclusions reached in the observation study was the negative attitude held by the staff towards both customers and management. Generally the staff welcomed any opportunity not to serve customers. This negative attitude manifested itself in a distancing that existed between staff and management, with little communication. This alienation was expressed in such comments as

"Treat you like dirt here"

"Even the Pakis' treat you better"

This situation may have been perpetuated by management who considered it to their advantage to keep staff at a distance. Likewise, they tended to adopt a 'low profile' with respect to front shop duties.

Managers themselves have very little opportunity to exercise discretionary judgement. Stock ordering is done on a department basis with each department head deciding what and how much to order, and stock layout is undertaken according to a centralised plan. Most responsibility and discretion that branch managers do exercise is in terms of staffing. The construction of staff rotas and branch staffing levels is the responsibility of the individual manager, with

Table 6.24 Main Findings of Observation Study

Staff	Management	Work
<p>Negative attitude towards management and customers</p> <p>Importance of extra-work activities, little discussion of work activities</p> <p>Stress social rather than career aspects of work</p> <p>Career choice as they could not do anything else, did not like factories or the hours suited them</p> <p>Part-time workers demonstrate more positive attitude than full-timers</p> <p>Staff welcome any opportunity not to serve customers</p> <p>No decision making or responsibility</p>	<p>Lack of management visibility on the shop floor</p> <p>Management have little decision making responsibilities, or opportunity to use initiative</p> <p>Little communication between staff and management</p>	<p>Very structured, routine and often repetitive</p> <p>Tight management control procedures operated</p> <p>Alienation and distancing between management and staff</p>

some input from the area training manager. Most other branch decisions in terms of operation are made centrally, with the manager carrying the task out at each local level. The introduction of technology could have a significant effect upon supermarket work if it is introduced at the middle to lower management level. Their functions could effectively be undertaken by a computer, with centralised decision making and an area manager to ensure that each branch is operating according to schedule. In this study, branch management were conspicuous by their absence from the shop-floor. Not once during the study did the manager do any manual or physical work at either the warehouse or on the shop floor. A fact commented on by the staff.

More part time workers than full time employees demonstrated a more positive attitude towards their work. This could be related, as suggested earlier, to their lack of dependence on work. Whilst at work, most employees stressed the social aspects, rather than career or skill components.

"It's a good laugh"

"Not as much fun as it used to be"

To most of the employees, retailing was chosen as a career because most 'couldn't do anything else', or the hours suited them.

Many of the conclusions reached in the observation study were subsequently validated by the survey results. The effect of the introduction of new technology considered in the survey was as predicted from the observation study.

The observation study suggests that due to the routine and monotonous

tasks that constitute the bulk of supermarket work, staff will generally welcome new technology, even if just in terms of an increase in the 'interest' factor. The study also highlighted the potential vulnerabilities of management to new technology, the survey and the interviews conducted suggested that retail managers do not identify themselves as the group most at risk, but rather consider the shop floor level as the area where the greatest changes will take place. Both groups therefore, although for different reasons, generally welcomed the introduction of new technology. This general conclusion was subsequently validated in the analysis of the survey results.

6.7 Conclusions and Limitations

The preceding analysis has presented detailed analysis of the results generated from the survey, management interviews and observation. Each individual component of the research strategy has made a significant contribution to the determination of the overall research question, i.e. how new technology effects female workers in the retail sector.

This section provides a discussion of the limitations of the research design that became apparent during the study. Consideration is also given to the results of the hypothesis testing.

6.7.1 The Research Design

To test the research objectives identified as significant to this study, a 'Triangular Approach' was adopted. The reasons behind this approach are discussed in detail in Chapter 5, but it was expected that it would overcome any weaknesses involved in using only one method of data collection.

In operational terms, several weaknesses emerged in using a self-completion questionnaire. Firstly, it was impossible to ensure that all respondents returned a completed survey form. This situation was exacerbated by the large number of part time workers in the outlets, and was reflected in relatively low response rates. A second weakness that emerged was that of ensuring that questions were answered honestly. Despite attempts by the author to reinforce the anonymity of the questionnaire, some respondents chose not to reply or to give inaccurate responses.

A third issue that arose related to the question design and layout. Despite extensive piloting of the survey, some questions proved unsuccessful in generating the required information. Similarly, some questions created confusion on the part of respondents. Both factors could have contributed to a lower response rate.

The difficulties in relating responses generated from the different research methods was a fourth issue that arose. It is difficult to quantify qualitative research, therefore issues or opinions identified as significant from either the observation study or management interviews could not always be quantified. The qualitative research therefore provided a useful back-up to the questionnaire analysis.

Yet despite the difficulties and limitations identified, the research strategy did generate some significant and meaningful results.

6.7.2 The Research Findings

The research hypothesis identified as significant in Chapter 5 were operationalised to give research objectives that could be tested in

the field.

1. New Technology Changes the Nature and Content of Work
2. Different Groups React Differently Toward Technology
3. New Technology Affects Job Satisfaction

Each of the major research objectives had sub-hypothesis that could be tested.

Analysis of the results generated suggests that all the research hypothesis should be accepted. Although the direction of change of some was not as originally had been expected.

It was originally believed that scanning equipment would decrease both skill and social characteristics of retail jobs. In this respect the nature and content of work could be expected to change. The research data suggested that whereas the social interaction of work is reduced, the skill level actually increases. Allied to both these movements is an increase in job satisfaction. It was expected that job satisfaction would be reduced as the level of social interaction fell. A reverse relationship was in fact found to be true. As social interaction is decreased, the level of job satisfaction rises, at least in the short term.

Similarly, the hypothesis that different groups would react differently towards new technology was also substantiated. Although not all the associated sub-hypothesis could be tested. Significant differences were found by both sex and occupation level. The appropriateness of many of the findings to the theoretical framework is discussed in the following chapter. In addition, much of the analysis has highlighted areas for further investigation.

Chapter 7 Conclusions

In this chapter consideration is given to the research findings in the light of earlier investigations into the nature of retail work and the expected effect that the introduction of new technology is likely to have.

The first section outlines the findings of earlier research that has been conducted in this field. The main finding of this earlier research was that the introduction of technological change within the work environment has implications for those who work there. The exact nature and direction of the effect is dependent upon a number of separate and intervening variables that tend to change depending on the work situation and the method by which the change is initiated by management. This general finding held for both the manufacturing and the office sector.

Preliminary research suggested that the effect upon the retail workplace would not be unlike that experienced in other sectors of the economy and that the labour force within retailing would be subjected to similar alienation and boredom with a concomitant reduction in job-skills and satisfaction. In reality this did not turn out to be the case. In those locations where the new technology was introduced, the survey suggested that the workers' level of job satisfaction actually increased, as did the level of skill that they perceived was associated with their job. The findings therefore suggest that the introduction of new technology into the retail workplace will, as opposed to original expectations, actually enhance the work experience of female retail

employees. As a result, job satisfaction will be increased. Whether this increase in job satisfaction that was measured is a long term effect or whether it is of a temporary 'Hawthorne' nature was not evident from the study. The durability of this increase in job satisfaction would be an appropriate area for further study. To determine if this change is purely a result of a change in equipment used and attention being paid to the employees, that may cause a temporary increase that will subside when the 'novelty' wears off.

The second section in this chapter reiterates the findings from the study with reference to this body of knowledge. It considers how appropriate the methodology was in the light of subsequent findings and how further or future investigations could benefit from this research experience. In this section, parallels are drawn with previous studies to examine how earlier weaknesses or strengths have been incorporated or expelled from this investigation and the subsequent effect upon findings.

It is not suggested that this particular investigation has been exhaustive. The research revealed and suggested further areas of study that could be pursued and for which resources were not available. The entire retail sector is an area which is worthy of further and more detailed investigations than it was possible to give at this stage. The study has reinforced this point.

The third section in this chapter analyses the results of the findings chapter with respect to the effect that the introduction of new technology is likely to have upon female employees. Not only those

working in the outlets considered in the study, but also at a general level in the industry. Overall the research suggested, as has been outlined above, that the actual effects upon female retail employees had not been as severe or negative as had originally been expected. Rather the female workers, or at least those included in the sample, had demonstrated positive attitudes towards both change and the introduction of new technology. The implications are also considered at an industry and sector wide basis.

The fourth section provides a summary of the research and draws conclusions and parallels with earlier work done in this field. Within this section the author highlights both the strengths and weaknesses of her own research and the implications of that work for both the retail industry as a whole and female employees generally. Although much has been written about retail work in terms of outlets and merchandise policy this work suggests that a more detailed examination of the role of retail employees is an essential and necessary requirement.

The fifth section provides a retrospective examination of current and future developments in the application of technology within the retail environment and the likely implications for retail employees. This provides a scenario for future investigations in this field. Recommendations for management are also discussed. A fuller understanding of the role of retail workers would lead to a more satisfying work environment on the part of the employees and ultimately lead to a more productive sector. This study and that conducted by previous writers would lead to the suggestion that a 'happy' workforce is a productive workforce. This was indicated in Chapter 2 which outlined

the nature of retail work and the type of people who work there. The conclusions reached validate many of the findings of earlier studies i.e. that alienation and job dissatisfaction does exist to a large extent within the work environment. Females tend to be more likely to be concentrated in those jobs which are most repetitive and boring i.e. those jobs most likely to be conducive to the introduction of part time working, or to unskilled labour. The position of female workers in the retail occupational hierarchy is a reflection of female jobs on an industry wide basis.

7.1. The Theoretical Base

The literature review and the chapter upon the nature and content of retail work highlighted the need for a more in depth analysis of the role of female workers within the retail sector. Particularly in terms of the job that they do and their attitudes and perceptions towards work. The development of the retail sector as a source of employment and also in terms of its format evolution was revived. In particular, how the different retail formats have demanded different retail skills. Parallel to this analysis consideration was given to the growth of new technology and its application within, not only the retail sector, but also within the manufacturing and office sector. Analogies were drawn with both these sectors and retailing. From this type of analysis it was possible to extrapolate the expected impact of new technology upon the retail sector by consideration of what had happened in the other two sectors. Within the research framework, the experience of the office and manufacturing sector was directly relevant to retailing. However, the research setting considered was significantly different in response to the introduction of technology than had been previously recorded

in the other sectors. This difference was largely attributable to the significant differences that existed amongst not only different service occupations, but also in industry as a whole. The findings would lead to the suggestion that the attitudes held between different types of workers vary, not only between different industrial sectors, but also within them. Considerable differences in both attitudes towards work and new technology within, not only the same industry, but also amongst the same work groups, were also found. The retail sector itself seems very diverse in terms of not only those employed, but also with respect to the attitudes and values held. Within the literature review the author attempted to draw together the patterns of evolution that exist with the development and application of new technology or change in the workplace and the growth of the retail sector as a whole. The purpose of drawing parallels with both developments was to highlight the process of change and how different retail formats and different work groups in different sectors have reacted to change. From this it was hoped to identify similar features of the various groups that would allow a prediction of the likely outcome of such change upon the retail sector and on those who work there. This analysis drew heavily upon the work of previous authors in this field, in particular those of the social psychologists and sociologists who had done considerable research on the process of technical or industrial change in the workplace. Much of the earlier analysis dealt with the 'revolutionary' nature of new technology and the changes that it could initiate, not only within the retail sector, but also within the economy at large. Various other factors that have had a similar effect in initiating change were also outlined, such as the development of the steam engine.

The subsequent analysis into the changing needs of the retail sector, the numbers employed, and the type of work done substantiates earlier claims. Given the present industrial climate, it is difficult to separate the specific aspects of technology that have made the greatest impact on the numbers and types of jobs. The changing nature of the entire British economy and subsequent deindustrialisation may in part be due to factors other than the introduction of microelectronics. Such as the decline of the traditional manufacturing base and changes in international competition. The author therefore considers that many of the pessimistic forecasts in the numbers of jobs that would be made obsolete by the introduction of microelectronics have not turned out to be confirmed by the reality of the situation.

Within the retail sector the figures demonstrate a definite move within that sector towards the use of more part-time workers, at the cost of employing full-time workers. Whether this is a consequence entirely of the introduction of labour saving devices within the organisation or a consequence of responses from either the supply side of the economy on the part of the workers themselves, or was due to demand for labour, was not clearly identified in the analysis. Mainly due to the difficulty in gathering research information that would suggest that employers would somehow like to reduce the size of their full-time labour force. Although privately this was often the expressed opinion.

The research did validate to a certain extent the work of Baron and Curnow who suggested that the organisational pyramid will change in form with the introduction of new technology or microelectronics. Although this would be an appropriate area for further and more detailed

investigation. The use of scanning equipment will be expected to reduce the requirements at branch operations level, where much of the decision making will now be of a routine and systematic nature, removing the need for any individual decision making or creativity. The work on the nature of supermarket work and the type of controls and the nature of the decision making that exists would suggest that a reduction of staff at middle management or branch level could be expected. The use of the scanning equipment would preclude the need for any decision making personnel at this level. The skills of the middle management level would therefore be removed at this level. Conversely at the lower supermarket organisational levels, skill levels would be expanded and the responsibilities of these particular individuals increased. Within the scanning stores investigated this claim was substantiated. Much of the evidence is given in the previous chapter. Although no direct increase in the numbers employed at the lower levels was found, or any decrease in those in more senior management positions, it is suggested that actual changes in employment levels would be a long-term consequence. What was evidenced was the change in attitude by the different groups towards the technology. Those in the lower occupational levels appeared to recognise that the introduction of scanning equipment would give them the opportunity to improve their status relative to other groups. Similarly those in higher occupational positions seemed to recognise the possibility of much of their authority and control being removed ex-branch. As the work of Baron and Curnow led us to expect a change in the concept of factory and firm, so this study suggests a review of the notion of both the retail sector and in particular the supermarket. U Colombo and G Lanzavecchia identified three potential developments within

factory and firm with the introduction of microelectronics. The particular changes identified were external changes - involving the transfer of ancilliary functions to the place of production. Boundary changes - referring to changes in physical structures, and internal changes which refer to the possibility to remove all mechanical parts between controls and operators. This argument can be extended to the retail sector, and was witnessed in the companies involved in the study. Firstly, the external changes that were evidenced, in two of the companies studied took the form of a move towards a centralisation of branch functions with the head office becoming involved in more of the daily decision making of the branch. In the third company, the external changes that were introduced with the operation of scanning equipment led to a decentralisation of much of the decision functions of the branch.

Secondary or 'Boundary' changes were also evidenced in the investigations into scanning stores. With the actual changes in the physical layouts of all three scanning stores to accommodate the changes in shopping flows that accompanied the introduction of new technology. However, in two of the cases studied, the scanning system had been introduced into two entirely new locations. Although through its operation both groups of managers agreed that the scanning system necessitated changes in store layouts, in particular the allocation of shelf space now products were no longer priced. The internal changes that had been generated in each of the scanning stores were closely related to changes outlined previously. The most noticeable physical transformation occurred in the warehouse or distribution area, where the use of tighter stock control procedures with the introduction of

scanning equipment had reduced the volume of stock that it was necessary to hold at this level. In addition the additional 'front shop' changes such as the more efficient shelf allocation and merchandising in those stores which were operating a scanning system had been introduced. All three changes identified could also be considered as a realisation of the benefits identified by both McKinsey (1974) and French (1980). Although they were not directly measured.

7.2. The Research Findings

Much of the research has highlighted the need for more detailed analysis to be conducted within the retail sector. Particularly work that would examine the attitudes, behaviour and performance of retail employees. In most research, the retail sector has usually been analysed in terms of outlets, location and format, rather than in terms of organisational behaviour or personnel. It is suggested that this would be an appropriate area for future work. Overall, the research design adopted for the study proved appropriate in generating the information necessary to test the hypothesis. Some weaknesses had however become apparent, and should be considered in relation to the development of any future strategy. In particular, the relatively low response rate was partly attributable to the use of a self-completion questionnaire. The historical weaknesses of using self-completion questionnaires were discussed in detail in Chapter 5. Several of these points were found to be applicable to the difficulties in ensuring that all surveys were returned, the comparison of responses, and the problems in ensuring that the same person does not complete more than one survey. These factors were taken into consideration in the analysis of

the responses. The use of a 'Triangular Approach' did however mitigate these effects to some extent. The observation study and the interviews allowed the author to identify those areas where responses did not match the survey results. In this way the necessary adjustments could be made. Each part of the research design contributed valuable information to the testing of the hypothesis, but also generated some insight into the operation of the retail sector. The results have two sets of broad implications for the retail sector. Firstly, in terms of the effects that the introduction of new technology will have both in terms of the outlets operations and personnel; and secondly, the findings generated at a general level revealed data about supermarket workers and their attitudes and aspirations concerning their work. Both levels of information have implications for retailers as a whole. Particularly for those currently planning or operating scanning equipment and also for those who may not yet have considered it's introduction. The results are important for all retailers in terms of the data that was revealed concerning the attitudes towards work held by employees. Management may be able to use this information to help plan a more conducive environment both physically and mentally for the employees, and as a result increase productivity. This is an important research finding.

The study indicated that retail employees as a whole, particularly the females, tended to have a very negative attitude towards their work. This was suggested by the responses given in the questionnaire as to how much the workers enjoyed particular aspects of their work. This was suggested by the responses given in the questionnaire as to how much the workers enjoyed particular aspects of their work. The level of

enjoyment was considerably higher in those outlets which had already introduced scanning. Within these particular supermarkets the staff appeared to enjoy their work more and therefore demonstrated more positive attitudes towards their work. This result could not, however, be related to any improvement in retail productivity in those particular stores since the confidential nature of the scanning trials precluded access to such detailed information. Earlier analysis would lead to the hypothesis that this would in fact be the case. As secondary research had led to the conclusion that improvements in staff job satisfaction are linked to improvements in staff productivity.

At a general level the study highlighted the low job aspirations of many female retail employees. This as demonstrated earlier is evidenced throughout society as a whole, and is not as the study may suggest, peculiar to the retail sector. Most of the sample data collected suggested that most supermarket workers do not work for career reasons, rather they consider their job to be a necessity. In terms of job status only a little higher than factory work. Most of the sample appeared to have chosen to work in a supermarket either because the location was convenient or the hours suited them, most had young children at school. This preference on the part of the employees is also held by management and is reflected in part by the vast numbers of female part-time workers that comprise the retail labour force. The prevalence of part-time workers in the industry is as much a demand pull on the part of companies attempting to reduce costs, as it is supply push in terms of the numbers of working mothers looking for employment that will still allow them to spend considerable time at home. Only one female in the entire sample of 225 had attained the

level of branch management, and even this particular female acted only as a relief to the absent male branch manager. In addition the female was employed by one of the small private companies in the sample and not by one of the larger regional chains. The attitude towards employing female branch managers by the participating companies was one of ambivalence. Most companies suggested that they are willing to recruit females to management level but that the barrier to date has been on the part of the females wishing to make a career out of supermarket retailing and not due to an unwillingness on the part of management to give those opportunities. The females in the sample therefore were concentrated into the lower occupation levels, the highest grade held by any significant number was that of supervisory level. In contrast, the higher occupational levels, i.e. those above supervisor, were one hundred percent male dominated. In most of the outlets investigated, this situation tended to manifest itself in a 'them vs us' mentality. Where the majority of female employees tended to regard the work place as an area of confrontation. This point was considered in more detail in Chapter 4 on the findings from the pilot study. Management for their part remained at a distance from the female workforce, tending usually to use intermediaries to relay messages to the female staff. Usually this role was fulfilled by the supervisory group. This displacement of responsibility on the part of management tended to lead to an aggravation of the situation. This situation became apparent through direct observation whilst working in supermarkets participating in the survey. The staff in the supermarkets were not asked to complete questionnaires, as it was felt that the author's presence may have biased the responses. Female supermarket employees tended to have a low level of self actualisation. They had

formed generally low opinions of their occupation relative to others, and as a consequence, this was reflected in their work performance. This may be a generalisation for female employees throughout industry as a whole and not a situation that is unique to the retail sector. As a consequence, levels of motivation and performance tend to be considerably lower than they might have been had the staff a higher aspiration and attainment level.

Preliminary analysis given in earlier chapters would suggest that this may be due in part to social conditioning of females in their most formative years. Alternatively, it may be that the supermarket industry tends to attract a rather lower level of worker in terms of commitment and career aspirations than other industries. This particular aspect was not covered in the study. One observation that did emerge from the study was that the females themselves did not appear to be aware of this situation, or rather it was a subconscious reaction on their part to the entire work situation. They themselves did not consciously acknowledge their own lack of attainment within the work place, or with their being female. Rather they choose to believe that their level was determined by they themselves, and that they as an individual had no desire to pursue their career further. On the part of management a similar situation existed. The majority of managers in the interviews given, choose to believe that the lack of female attainment in their particular outlet was through personal choice of the individuals and the female employees' unwillingness to accept the responsibilities of management. The findings repudiate this claim. The low actualisation level of the female employees in the supermarket industry is a situation which is aggravated by both the traditions

of the industry i.e. predominantly male skilled and female unskilled, and the attitudes perpetuated by a predominantly male management and which are reinforced by the behaviour of the female employees themselves. Within this perspective the introduction of new technology appears to have been applied at the lower occupational levels and to have allowed the occupational distance between the different groups to have been widened, by removing most of the authority and responsibility from the female employees and placing it with the computer. Within the stores visited, the consequence of the introduction of the scanning equipment was a distancing between the operators of the technology and the staff. The result of much of this behaviour was that the staff felt that although their authority had been removed they enjoyed their job more, they appeared to be of the opinion that, by using technology in their work, their job status had been improved within the organisation, and also as perceived by their peers. Rather than the introduction of new technology being accompanied by a decrease in job dissatisfaction in the workplace, the workers experienced an increase in job satisfaction with the introduction of scanning equipment. This was particularly noticeable amongst the female employees. The male workers were not generally working alongside the technology, therefore they were not directly involved with either the introduction or operation of the equipment. This increase in job satisfaction that was evidence is best explained by reference to the questions on how much people enjoy their job. The data suggests that of the various groups, the lowest level of job satisfaction, pre-scanning, was amongst those workers who worked on the shop floor and at the checkouts. After the introduction of scanning equipment, there appears to have been a noticeable increase in job

satisfaction of the different groups, but particularly amongst the shop floor workers.

The literature has also predicted a significant effect of technology upon the nature and content of work. Historical analysis of technical change in both manufacturing and the office had suggested that there would be a deskilling of staff with the introduction of technology, that would result in the alienation and distancing of operators.

The results of the study suggest that the introduction of technology will affect the nature and content of retail work, but that the direction of the effect would be the reverse of what was originally hypothesised. Within the supermarket industry, the level of alienation and boredom was actually reduced for operators with the introduction of technology. Rather than distancing workers, the use of scanning equipment actually increased employee satisfaction with their job.

The earlier studies had also predicted that the introduction of new technology would have a differential impact on different groups, e.g. older workers would be more resistant to change, less educated people would have a different response than those with formal qualifications. These predictions were substantiated to some extent in the study. The greatest differential impact of technology was by sex, which due to the sex segregation of retail jobs was also reflected at the occupational level.

It was observed that female workers in the supermarket industry, largely as a function of the jobs that they do, were the group most

at risk. Although they themselves did not recognise their vulnerability to new technology. Male and female opinion tended to be very similar, with the exception that males tended to choose stronger response categories than females. Similar differences were also demonstrated by age. With older workers tending to choose response categories corresponding to the greatest strength of opinion.

7.3. The Effect Upon Female Employment

The analysis also outlined the relatively low occupational status held by the majority of retail employees. Particularly female status within the organisational hierarchy, this was related to some extent with the responses given by a number of female workers that they did not want a career, rather only a job that did not place too many demands upon either their time or which gave too high a level of responsibility. Much of the earlier analysis had led to the suggestion that many of the changes that had been experienced in the office sector and the subsequent responses to it were also likely to occur in the retail sector. The parallel development between the manufacturing sector and the experience of the office sector had already been developed. Their results given in Chapter 6 subsequently demonstrated that little similarity existed between the observations of researchers who investigated the introduction of technological change into the office sector and the response observed in the retail sector. Although both sectors are service occupations, the level of distancing that had been evidenced in the office sector was not apparent in the retail sector. Due mainly to the level of customer contact and interaction involved in the job and also due to the fact that the skill level of occupations in the different sectors was not strictly comparable.

Supermarket workers tended to have virtually little job related skills in comparison to clerical workers. As a consequence, with the introduction of scanning equipment, the skill level of their work actually increased. With clerical workers, new technology resulted in a reduction in the skills required to perform their job. This transformation in skill levels was also associated with a change in job satisfaction. Retail workers perceived that the skill level of their work had increased with the introduction of scanning equipment, they therefore experienced an increase in the level of their job satisfaction. The clerical workers by experiencing a reduction in the level of personal skill and judgement involved in their daily work, reported a reduction in their level of job satisfaction. The results from the work in supermarkets suggest that the supermarket workers felt that the status of their job had been improved with the introduction of new technology to such an extent that their occupation could now be associated with clerical as opposed to either manual or factory work which it had been regarded as previously. The reverse would be the case with the clerical workers.

At the more senior occupational levels within the supermarket, the similarities between the two groups become more apparent. There is a reduction in the level of skill and decision making involved at management level in organisations that introduce new technology. In the cases studied, this is expected to be a long term consequence of the introduction of new technology into the retail environment rather than in the short term. When it is expected that the most immediate impact is likely to be on the shop floor. This observation is reinforced by the present work.

The management, although not overtly stating their reservations regarding their position with the introduction of new technology, are certainly aware of its possible implications for their job. This tends to be considered a greater immediate threat. Some staff members also voiced their concerns at the job reduction potential of new technology, also again this tended not to be done directly, but rather through indirect comment or by relating to previous experience. Although many adopted a fatalistic attitude towards change. Expressing the opinion that they could only react to circumstances as the situation presented itself, that no discussion or negotiation would be involved. This was found to be a general finding throughout the retail outlets visited. No channels of negotiation or consultation were employed by management to communicate or be kept informed of staff attitudes or opinions. This was also partly responsible for the 'them vs us' situation that exists within most of the supermarket outlets visited. Much of the confusion highlighted in the work that had been done in the office sector, was also applicable to the retail sector. The different levels of service offered by the various companies precluded a direct comparison of the effect of new technology upon staff productivity and efficiency levels. Likewise the confidential nature of much of the data prevented access to information that might have allowed the data to repudiate or validate many of the findings from both the office and manufacturing sectors.

7.4 The Research Model

As stated in Chapter 3, the relationship between technology and employment is both complex and dynamic. Two factors need to be taken into account when estimating the effect that technological change will

have upon the retail sector. These are, firstly, the speed and pattern of the introduction of the technology into the retail environment, and secondly, the ability of that sector to absorb the structural changes that accompany its introduction.

The analysis suggests that the rate of technological penetration into the retail sector does not generate great cause for concern. That the process itself is more 'evolutionary' than 'revolutionary'. In addition the retail sector, as the analysis of the sector itself in Chapter 2 suggests, is relatively buoyant, and therefore in the short term could be expected to absorb excess labour capacity that may be released in the short term by the introduction of new technology. In the longer term, the situation may not be as elastic.

All the participating companies in the study reported an increase in operating efficiency, although no values were given to substantiate this claim. The most reported incidence of increases in efficiency were on the stock replenishment and stock control systems. All participating companies reported that the introduction of the scanning system enabled them to have a more accurate, up-to-date and complete picture of their stock holdings than had been possible using the traditional system. The application of the Rogers diffusion curve to the research situation suggested that in terms of the innovation cycle, the majority of the retailers in the sample were at the primary or 'initiation' stage. Both these companies had been operating the scanning equipment for only a matter of months and had only just completed the pilot stage of the implementation schedule. The exception was the one supermarket trader who had been amongst the first

in the country to introduce scanning equipment. This particular installation had progressed beyond the 'initiation' stage to the 'growth' section of the cycle. The application of the system had been extended downline to the warehouse, so that an automatic stock ordering and replenishment system was in operation between the shop and the warehouse. At the same time, an integrated 'in-house' accountancy package was also being introduced. The intense local competition faced by this particular trader, and yet his ability to remain operational and show increasing growth each year would lead the author to suggest that the use of scanning equipment does appear to give its operators a competitive advantage over less sophisticated rivals. The study suggests that this would be an appropriate area for further study. Preliminary analysis had led to the suggestion that the most likely position of the UK supermarket industry was at the initiation level. Practical research validates this claim. Similarly, the application of the technology within the outlets investigated is at the lower organisational levels. The introduction of the technology is designed to replace the most routine and structured jobs in the organisation. In the early stages of investigation the higher levels of the organisational hierarchy are virtually immune from its effect. This was evidenced in the sample in those companies that were at the 'initiation' stage of technological penetration. In the company who had progressed in the systems development to the second tier of useage, the investigations suggested that this company, experiencing the application of technology to upper organisational levels. The advances made in the systems development would specifically impact at management level. As has been stated above, the introduction of such a system gave this

particular retailer a competitive advantage over local rivals. Although the data was not given it is suggested that the greater economies and efficiencies attainable by such a system give its operator an upward shift in his/her competitive plane. Again, this would be an appropriate area for more detailed investigation. The study did suggest that the effect of scanning equipment upon the retail sector, at least in the supermarket industry, was as had been expected. i.e. the pattern of application and adoption was as had been experienced in the manufacturing and office sectors. There was initial application at the lowest organisational levels before applications proceeded up the management hierarchy.

The analogy used and described in Chapter 2 suggested that within the retail organisational hierarchy there would be a narrowing in the bottom to middle tiers, and a new sub-system would be created at the pinnacle, reflecting the development of more technical and scientific occupations. This, earlier writers suggested, would also be accompanied by a reduction in the jobs currently done at the base level, due to increasing levels of sophistication and technological penetration. As a consequence, the base of the pyramid is reduced and the middle to upper management tiers are expanded. The research into the supermarket sector did suggest that the introduction of scanning equipment could lead to a change in the organisational pyramid within retailing, but unlike the transformation that had occurred in the manufacturing or office sectors, the research has led to the conclusion that the retail organisational pyramid will undergo expansion at the base levels, partly to accommodate the increasing trend towards part-time employment within retailing, but mainly due to the expected expansion in the lower organisational ranks as the middle tiers are reduced or replaced

with technology. This reduction accompanied, as was the case within the manufacturing and office sectors, by a growth in the upper management levels to support the growing number of technical specialists. The expected organisational chart that would be appropriate to retailing would be of an 'hour glass' shape as opposed to a pyramid. This would reflect the mushrooming of the lower levels and the senior positions, with a reduction in the middle tiers. The present work was predominantly of a short-term nature, therefore it is not possible to specifically test this model, but preliminary analysis of the situation would lead to the suggestion that this would be a most likely outcome. In addition, the introduction of scanning equipment within the retail sector is a relatively new innovation, therefore the long-term effects of its application upon retail organisational structures is not yet easy to determine.

7.5 Conclusions and Recommendations

Much of the preceding analysis has considered the current research situation in comparison with earlier work in other sectors. In this section the analysis is used as a basis upon which to offer advice regarding the likely outcome of technology upon the retail sector and how the author's own research experience can be utilised to overcome any difficulties that the innovating companies may encounter.

The bulk of the research that has been outlined concentrated on the role of people within the organisation and the resulting implications for the introduction of technology. People are the key asset in any

retail business both in terms of costs and revenue. They account for some eighty percent of retail costs and, as has been demonstrated, in terms of value added are one of the most important contributory factors to retail business profits. They play a key role within the retail operation. It is into this scenario that the introduction of new technology will take place. The response that can be expected from the contributing parties is therefore of prime concern to retailers, for it is upon these particular key groups that the business depends. Successful retail management depends in part on personnel relations in order to operate both efficiently and effectively.

Within this scenario, the role of information technology would at first appear to be in contradiction to the personnel aspects of retail operators. The prime motivation or reason for most food retailers introducing new technology is often seen as a direct attempt to reduce the personnel or service aspect of their business. Both 'hard' and 'soft' cost savings that can be realised with the introduction of scanning equipment are often discussed in comparison with the savings in staff labour and increase in customer throughput that can be realised with the technology. Both methods are considered juxtaposed, with only one method of operation possible. Personnel service has to be sacrificed in the strive for greater operational efficiency. In reality the research suggested that this does not have to be the case. Many retailers were using the increase in mechanical efficiency of the checkouts to offer an improved service to their customers. Similarly, because they did not feel that the introduction of the scanning equipment was aimed primarily to reduce jobs, but rather could be considered a 'work tool' the staff tended to adopt a more positive

attitude towards the technological change than the earlier literature had led the author to hypothesise.

Much of the findings have immediate significance for retailers who are currently introducing new technology or who intend to in the future. But they also have relevance for all retailers in terms of the attitudes towards work that were demonstrated by participating individuals, who may utilise this knowledge to generate a fuller understanding of their employees and their values and beliefs. Significant numbers of respondents in the survey experienced little or no job satisfaction. This in turn was reflected in their motivation levels and, as witnessed, was often apparent on the shop floor in dealing with customers. The adage that 'a happy workforce is a productive workforce' was found to be true in terms of the staff attitude that was displayed to customers. Although restrictions on the time available to the study precluded any in depth analysis of this situation, it is suggested that it would certainly be an appropriate area for further research. In terms of relating staff attitudes and motivation levels to retail productivity.

In terms of operational efficiency, food retailers are constantly attempting to reduce their costs, any increase in staff motivation levels that may ultimately result in increased turnover is certainly worth investigating. The operations of most food retailers, suggested that the increase in staff motivation levels would be both a welcome and profitable method of increasing efficiency in a tight market. The introduction of new technology in the study provided the avenue for an increase in staff motivation levels, at least in the short term.

In the longer term the effects were not as apparent. The author believes that the increase in staff motivation levels could be sustained by management in the longer term through the use of more direct incentive measures. The study suggests that the main reason for the increase in staff job satisfaction levels was the fact that the employees felt that the company was more concerned with respect to how they felt about their job and this increase in the level of interest shown led to an increase in staff satisfaction levels.

This is believed to provide an important opportunity for retail management to stimulate both the work experience level of their employees, and also to generate interest in supermarket work as a career for school leavers. The advent of new technology has provided the opportunity for retailers to increase the aspirations of workers, and to raise the skill level of supermarket work to a level conducive to both the employee and the employer.

The constant development of technology in terms of capability and functions and the increasing rate of innovation in the workplace, suggests that the pace of introduction will continue to gather momentum in the future. This suggests that the study has provided only a 'snapshot' view of the state of technological penetration in the supermarket industry. It is, however, expected that some of the effects identified in the study will become more pronounced. e.g. the lack of communication between groups, and some may even not be sustained in the long term; the increase in job satisfaction. The development of a long term perspective to monitor these changes identified in the study is therefore essential.

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APPENDIX

The New Retail Technology

Technological developments within retailing can be considered as having two functions:

Applications which are directed to improving in-store operational productivity and applications which help/facilitate consumer purchase decisions (Management Horizons).

This study is concerned with only those applications designed to increase productivity.

Within this area there are four key areas of consideration:

- a) Electronic Point of Sale data capture systems.
- b) Scanning
- c) Electronic Data Interchange
- d) Decision Support Systems.

a) EPOS systems are essentially sophisticated electronic cash registers (ECR's) presenting a customised keyboard for specific tasks appropriate to different retail operations. Electronic cash registers range from single electronic cash registers, which record data on a cassette tape, to systems incorporating cash register terminals connected to computers, known as Point of Sale Equipment (POS). Electronic cash registers have no moving parts apart from the cash drawer and the customer receipt print-out; unlike electronic mechanical registers, no thumping of keys is necessary.

From the literature we can identify four distinguishing features of EPOS equipment that separate it from the more basic ECR's.

- 1) The ability of the system to record and store transaction data and print a till receipt that gives an abbreviated description of each item purchased.
- 2) The ability of the system to carry out data processing.
- 3) The ability of the system to communicate with component equipment.
- 4) The existence of a price look up (PLU) facility.

We can summarise the new equipment currently available to the retail sector as follows. (However, due to the constant introduction of new developments, the list is not exhaustive.)

Electronic Cash Registers

A device which serves as a cash register but because of its electronic components can be enhanced to perform calculations and price look up functions.

- * single till (basic)
- * multi till
- * Communicating ECR's.

Electronic Point of Sale (EPOS)

A general name for systems which record sales data at the point of payment on to cassette tape or computer file.

Electronic Funds Transfer (EFTS)

A system which communicates information about payments electronically instead of on paper, and as with cheque payments, minimises the physical handling of cash.

Electronic Pricing

Price information that is held on computer files and is communicated automatically to the cash register upon the manual or automatic entry of a product code.

Portable Data Entry Terminal (PDET)

A device similar to a calculator, acts as a small computer. Used by stock checker to record information for subsequent entry into a computer.

Price Look Up (PLU)

A facility for obtaining price information that is held on the computer and using it to record a sale through the cash register, usually by entering a product code.

Scanning systems are an extension of EPOS equipment to incorporate merchandise marking through either OCR (optical character recognition) or Bar-Codes. To allow an automatic reading and entry of item data by scanning.

There are a number of ways of inputting information into an EPOS system, but all depend upon the allocation of a code number to all or part of the product range. These code numbers are then manually or automatically entered at the point of sale.

There are three systems currently available:

- 1) OPTICAL systems
- 2) MAGNETIC systems
- 3) PUNCHED CARDS or TAGS.

1) Optical Systems

- Optical Mark Reading (OMR) uses a simple binary code.
- Optical Character Recognition (OCR) using a limited set of standard typewritten characters.
- Bar Codes - using a pattern of black bars of varying thickness to a

predetermined structure and standard, representing a thirteen digit unique article code number. The UK numbers start with fifty. This is followed by five digits representing the company responsible for marketing the product; these are allocated by the Article Numbering Association (ANA). The next five represent the company's identification of the product and are allocated by that company so that each variation of an item e.g. size and colour, has its own unique number. The final digit is a check digit to ensure that the preceding numbers are correct, if not the system will not register the item.

2) Standard International formats exist:

EAN: European Article Numbering, in Western Europe and Japan

UPC: Universal Product Code (USA).

It is 'read' either by a hand-held light pen or wand reader which is passed over it by the checkout assistant or by the assistant passing the item marked with a bar code over a window located in the checkout desk beneath which a low-powered laser scanner is situated.

b) Magnetic Systems

These are the most widely used alternative to bar-codes.

- Magnetic Ink Character Recognition (MICR)
- A magnetic strip on the sales ticket is encoded magnetically and is 'wiped' at the point of payment by a magnetic pen to read and record the stock code, price information etc.

c) Punched Cards or Tags

The two most widely used in retailing are:

- Kimball Tags
- Dennison Tags

where stock information is encoded on a computer data card.

3) Electronic Data Interchange consists of computer to computer communications between different establishments at different levels in the distribution channel i.e. between retailer, wholesaler and manufacturer. e.g. Exchanging orders and invoices electronically. One example of this procedure is the 'tele-ordering' facility offered by several leading publishing houses to book retailers.

4) Decision Support Systems consist primarily of improved reporting or accounting procedures which give management faster and more accurate data upon which to base their decisions. Alternatively these can be conceived as Management Information Systems or Office Support Systems.

Management Interview ScheduleA. General Questions

1. Individual

2. Branch

3. Company

(1) Employment history. Why choose retailing as career. General work related questions.

(2) Operating questions; location, turnover, profitability, operating difficulties.

(3) Perceptions of the company, length of service, general attitude and opinion towards work.

B. Technology

1. Identify technological awareness. (If scanning, how was system introduced.)

2. How they personally were responding and the nature of their response.

3. Their perception of staff reactions.

C. Classification

1. Age

2. Sex

3. Length of Service

Sample Management Interview

Researcher: Is it just recently that you have introduced scanning?

Manager: Well, we only introduced it when we decided to open this shop, this is a new shop.

Researcher: So it never was conventional tills, it's been scanning from the start?

Manager: That's right, it makes some of the questions difficult, some of the girls may not be able to answer them. Some have experience of working in the retail industry in other stores so they might well be able to answer. My own questionnaire, when I was asking was certainly much easier.

Researcher: So the staff were consulted on the introduction?

Manager: No, I wouldn't say they were consulted - no, but I did ask them how they felt - why not?

Researcher: That's interesting.

Manager: Well, to me it was the obvious thing to do, you want to know how your staff feel about it.

Researcher: Can you tell me why you decided to introduce the scanning equipment?

Manager: The answer to that is not just as easy. I wanted to have an 'interesting' last ten years. I've been in the trade all my days and you tend to get a bit bored and stale with yourself. We were running these other two stores reasonably successfully, so we thought let's have a go

doing something else. Well, what could we do that was different?

Researcher: Had you seen scanning in operation or were you influenced by the trade press?

Manager: Well, I visited Ian McKay's store, when he was just putting it in. At that stage he hadn't gone live or anything, he was just in the middle of building his item file. But then that's another problem..... I tell you what buying a file does do, it disciplines you in such a way that you weren't before. I mean we just used to buy stuff, if we wanted to know how much we paid for it we had to go in and look through files. Sometimes had to open another packet, we used to say 'God, how much was it?' And we were depending on whoever put the stuff on the shelves to have the right price on it... It's a lot of discipline when you're used to the old way. It was also a lot of hard work.

Researcher: So, does that mean that you run two separate systems for each type of store?

Manager: No, the store operations are the same. The cash terminals are obviously different. I mean we're scanning here and they're not.

Researcher: What about for stock ordering purposes?

Manager: Stock range - apart from scanning here and opening a new store, we also use this as a distribution centre for the other two stores.....That way we could do direct, so we get the whole stock range delivered from the manufacturer. That way we cut out the middlemen, and we had the space.

Researcher: Did this happen as a result of the scanning?

Manager: No, we did it all at once, god help us!

Researcher: How did you introduce the scanners to the staff?

Manager: Well, I've looked around at companies and wondered about all the paraphenalia about letting customer know, about pricing etc. And I was a wee bit worried, I must confess, to how people would take to not having a price on the tin. And I thought what will we do? But then decided to put it out with the shelf-edge and hope for the best. The customers say 'this is great' and when you ask don't they miss the price on the tin, they say 'no, you've got the price on the shelf, that's all you need'. What about receipt - 'No see that receipt, that's smashing.' In fact, do you know that the boys who put this in said, you won't have any more receipts lying around, and its true. While see in the other stores, you're knee deep in them. Most people here take their till slips home. In the other shops you practically have to employ someone to pick them up.

Researcher: Do you think that's because they don't really trust it?

Manager: I never really thought about that - I thought it was because the receipt was now more meaningful to them. That's a good question, I never really thought about it like that - I don't know.

Researcher: How long have you had the system?

Manager: We opened on the 20th of September with it, and that's without any advertising. And the initial sales were first class. Do you know on the first day we did £2,000 - which

I thought was pretty good, after that its been climbing. And that's from 1800 sq ft. So we just decided to go on from that, its surprised even me.

Researcher: And you created the file yourself?

Manager: Yes, well in conjunction with the company, Sweda. You see that was another huge difficulty, because before you can build the file you need the product or the bar code number. To gather all the bar code numbers and relate them to the product was out of the question. So we decided to wait until the produce arrived. Goods started to come in about three weeks before we opened, and were still coming in on the day we opened, in fact, they're still coming in. But the bulk of the product was in. So we built up a file, we got all these manufacturers' price lists and we decided what we would sell, so we built a physical file of the products to key into the computer file. When the product came in we put it into the memory. It was hard work, but we got there.

Researcher: How long did it take you?

Manager: About five weeks, but not full time, we were doing other things at the same time....It was good fun. So when we opened everything that was for sale and bar coded was in the terminal.

Researcher: So you never priced from the start.

Manager: Yes, it was scanning from day one.

Researcher: Had you had any problems?

Manager: No, there are products with no bar code but we just price them in the conventional way. No, everything else scans,

maybe some items - maybe eight, but certainly not more than twenty - that don't read in the scanner. But ask the girl she'll let you know off-hand what doesn't scan. But there's certainly not many.

Really, I've just let the girls sort that out for themselves. If it's got a bar code and it doesn't bleep they know it hasn't gone in, so they try it again. But I don't think they've had any problems. But then again, Avery I think is very good, no we don't seem to have any problems.

Researcher: What about in house coding, do you do that?

Manager: Oh yes, we do that. Why not? We went straight on. Along with that we decided that fruit and vegetables could be a problem, so we took it into the back shop to know what our costs were. So everything goes out with a bar coded ticket on it. And we also distribute to the other shops. Although the hassle we've had with that thing - that's about the third one we're on. It must be the environment, the dirt or something. Or maybe it's just too hard worked. Although they say it shouldn't make any difference... but it's a real nuisance.

Researcher: How many people do you employ?

Manager: Sometimes too many. At the last count it was thirty-six and of them, fifteen were full timers. Part timers vary from kids working three hours a night to girls that work seventeen hours a week. It just depends.

Researcher: How have you found the reactions of staff to the equipment?

Manager: Do you know, I don't know....All I know is that they seem

to enjoy working for me. Whether that's because I'm a soft mark, or whether they like working here I don't know. You'd have to ask them. But the other girls in the other shops seem to stay as well, do you know I've got a very low staff turnover, but then again that might be due to the employment situation. Nobody seems to leave me, I've never really asked them.

Researcher: How have the scanners matched your expectations?

Manager: Do you know I haven't had the time to stop and think about it. I'm too busy running the show. I'm aware that there's a whole load of information in there, that I can and will make use of. Up till now I haven't. I'm really just using them as conventional cash registers. But once I've got everything ticking smoothly, I will be able to use it, to improve the performance of the business. To maybe increase the gross margin or maybe even pay the staff more. But these things take time, there's a lot to do. It was a giant leap you know.

Researcher: So the cost justifications were not the prime motivator in introducing the equipment?

Manager: Oh, I think there was an element of that. It seemed to be an opportunity to introduce something that would save a boring job for somebody. And a boring job is sticking tickets on to tins, a boring, repetitive and unnecessary job. So really, scanning was an opportunity to get rid of that job. So if you don't need to employ somebody then you're saving a few hours. But it really was an attempt to get rid of a rubbish job.

Researcher: What about the customers?

Manager: Well, that's all part of it, that's the name of the game. There would be a 'novelty value' to customers, that they would appreciate it. Customer reaction so far has been.... you know, I haven't heard anyone complaining. The first few days, yes there were a lot of questions, whether that was mistakes by the girls or confusion from the customers with all the information, I don't know. Probably an element of both. But it's sorted itself out now.

Researcher: Technically? How have things been?

Manager: Technically, its been first class. Apart from the problems with these scales, but hopefully that should soon all be sorted out. Its a mess, the other scales are fine you know.

Researcher: Do you think that you have less queues at the checkout?

Manager: I don't know, they seem to. The girls can certainly handle more people. I'm pleased taking the money I'm taking over two tills, I don't know the productivity of operators, but then they're not at it full time - they can still do some merchandising. Again, I really don't know. It's difficult to measure performance. The thing about queues with laser scanning is that you can clear it quicker, you get them through quicker. The girl is usually quicker than the customer. Therefore at peak times, I get people to pack and keep things clear. So as long as you know your peak times you're all right.

Researcher: Do you use the tills for scheduling?

Manager: I suppose I do. The information's all there. What it does is reinforce your own feelings about things. It spells it out for you. It's reassuring. It tells you what you should be selling and what isn't worth a damn. Like the department breakdown let's you know how much shelf space you should be giving to things - before I foolishly thought I could do it myself. So now I look at the printout. There are questions that are being raised, answering them is more difficult, but now at least I know. It does raise all sorts of questions.

Researcher: Would you have thought about these issues before?

Manager: Oh yes, I was aware of them. It just makes you look more critically. Some with the operation, its becoming more streamlined, it just takes time. Do you know, that only 25% of items are being keyed. And they're mostly drinks - high value items. It's not a lot of getting keyed in. We're getting down to about one fifth key entries. I tell you another thing we did from day one, was sell fruit and vegetables by the kilo....A lot of people are frightened. But I thought I might as well do it all. And do you know what, people don't really seem to mind. The difficulty with asking these sorts of questions, is that you get a lot of information you don't really want. But to paint the picture I really had to fill you in on everything.... people seem to be afraid....but I'll tell anyone who'll listen.

LIST OF ABBREVIATIONS

CAD:	Computer Aided Design
CAM:	Computer Aided Manufacture
CIS:	Counter Information Services
CSS:	Council for Science and Society
DED:	Direct Employment Displacement
EAN:	European Article Numbering System
ECR:	Electronic Cash Register
EDC:	Economic Development Committee
EFTS:	Electronic Funds Transfer
EPOS:	Electronic Point of Sale
IGD:	Institute For Grocery Distribution
LSI:	Large Scale Integrated Circuit
MIS:	Management Information Systems
NCC:	National Computing Centre
NEDO:	National Economic Development Office
OCR:	Optical Character Recognition
OECD:	Organisation for Economic Co-operation and Development
OFT:	Office of Fair Trading
PDCU:	Portable Data Capture Units
PDET:	Portable Data Entry Terminal
POS:	Point of Sale
PSI:	Policy Studies Institute

RMDP: Retail Management Development Programme
SIC: Standard Industrial Classification
SPNS: Standard Product Numbering System
SPRU: Social Policy Research Unit
TS: Technological Scope
USDAW: Union of Shop, Distributive & Allied Workers