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AN INVESTIGATION INTO THE PARTICIPATION OF WOMEN IN INDUSTRIAL RESEARCH AND DEVELOPMENT (R&D) IN THE NORTH EAST OF ENGLAND

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An Investigation into the Participation of Women in Industrial Research and Development (R&D) in the North East of England

Abstract

This paper attempts to examine the level of participation of women in industrial research and development (R&D) in the North East of England, a region with low level of R&D intensity and innovation activities when compared with more prosperous regions such as the South East. Women in R&D is, relatively, a new topic of European Commission research and policy and, as a result, data on female participation in industrial R&D at a regional level is minimal. The empirical results presented in this paper, based on a sample of 60 scientific SMEs, demonstrate that the gender gap in R&D employment, particularly at senior levels, is stark in the North East.

Keywords: R&D, SMEs, Gender, Scientific Labour Market, North East of England

Introduction

This paper builds upon a research project funded by the 'Economic and Social Research Council (ESRC) Science in Society Programme' entitled 'The Impact of Gender Innovation on Regional Technology, Economy and Society', (www.sci-soc.net). The project investigates gender disparities in scientific activities in terms of research and development, innovation, invention and exploitation of IPR amongst employees working in the Science, Engineering and Technology (SET) communities in both the public and private sectors in the North East of England. It aims to identify the mechanisms by which female employees (including from the ethnic minority communities) in SET can go on to generate or actively participate in R&D, invention, innovation and the creation of IPR. The research is further supported by Higher Education European Social Fund National Programme in order to investigate gender inequality in the scientific labour market at a national level.

The paper is primarily concerned with the level of participation (or lack) of women in industrial R&D in the North East of England. It has been argued that in the 20th century technological advance became professionalized, (Freeman 1972). For many nations and companies the reliance for invention and innovation on individuals working alone or by random chance became unacceptable and a growing and more systematic investment in factors likely to produce inventions and innovations took place. This led to growing employment of qualified personnel whose job it was to generate and develop new ideas for commercial or other advantages and expenditure on R&D as, perhaps, the key factor in the innovation process, technological capability and global competitiveness, (DTI R&D Scoreboard 2005). Since the late part of the 20th century the small and medium sized enterprise (SME) sector is increasingly viewed as a key player in the production of new ideas and innovation. Over the same

period there has also been a relatively steady increase in the number of women in work, (LFS 2005).

Drawing on these themes and empirical survey of 60 Science, Engineering and Technology (SET) SMEs operating in the North East of England, this paper attempts to investigate the level of participation of women in industrial R&D. The paper will, empirically, compare and contrast between female and male employees:
- Composition of employment in terms of full time and part time;
- Composition of R&D employment in terms of full-time and part time;
- R&D employment as a percentage of total employment – as a key indication of R&D intensity and technological capacity; and
- Ownership and management structure and capacity (both scientific and non scientific positions).

This paper presents the first ever empirical investigation of the participation of women in industrial R&D in the North East of England. It clearly demonstrates that with regards to gender, there is very little data available at a UK level and even less at a regional or company level and little has been done to address the issue of gender imbalance in R&D at a policy level in the North East of England. The empirical results presented in this paper reveal that both trends, relating to lack of R&D expenditure and the gender imbalance in industrial R&D employment, are particularly stark in the North East. In a follow up paper, based on semi structured 'face-to-face' interview of 34 female employees of the surveyed firms, the authors aim to identify professional and personal barriers to participation of women in industrial research in the North East of England.

The paper consists of seven sections. Section one provides a brief outline of the R&D expenditure and employment in the UK followed by a section on R&D activities in different regions of the UK. Section three provides an overview of the SME sector in the UK and in the North East with a focus on R&D activities. Section four provides a brief overview of the participation of women in the labour market in the UK and in the North East. Section 5 presents some evidence on participation of women in industrial R&D. A description of the empirical data used, methods of analysis employed and empirical findings follow this. The key findings and policy implications discussed in the final section conclude the paper.

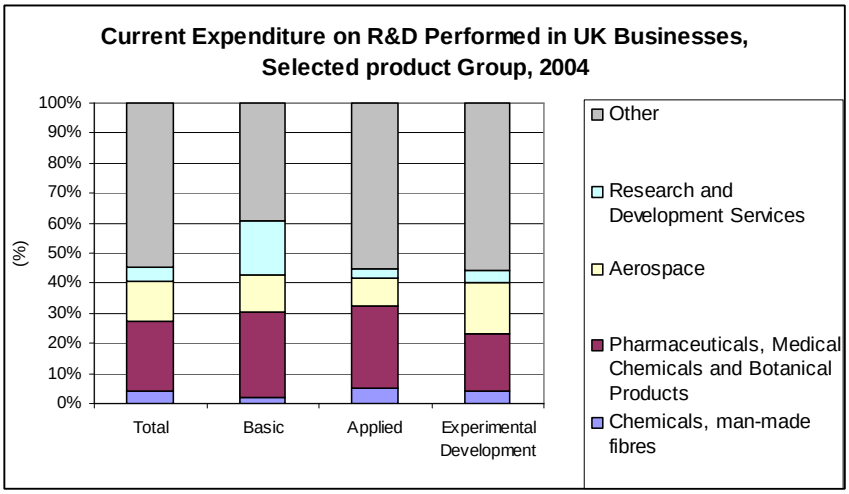
1. Business R&D Expenditure and Employment in the UK

According the data provided by Business Monitor MA14 (2005), over the period 1996 to 2004, the expenditure on R&D performed in the UK businesses experienced a steady increase, from £9,297m in 1996 to £13,504m in 2004. In broad terms the greatest absolute sums are spent on R&D in chemicals, electrical machinery and services but the greatest growth in R&D in recent years has come from construction, transport, chemicals and service sectors, providing opportunities for new entrants to the research process. A number of other sectors such as IT hardware, software, mechanical engineering and the services have also exhibited growth over the past few years. At a more disaggregated level, the high growth sectors appear to be pharmaceuticals, shipbuilding, other transport, construction, post and telecoms and R&D services. However, the latest international comparisons of data on business R&D show the UK has much larger proportions of pharmaceuticals, aerospace, food producers and oil & gas R&D than the global average but much lower proportions of

automotive. However, UK generally lags well behind the US but roughly equal to the EU average in terms of overall R&D expenditure, (DTI R&D Scoreboard, 2005).

The type of R&D tends vary by its sectoral or organisational location with relatively little basic R&D undertaken in industry with the exception of pharmaceuticals, chemistry, aerospace and R&D services. As a result, industry tends to focus on applied (35%) and development work (58%), (MA14, 2005). These four product groups account for 45% of total current R&D expenditure by detailed product group, (Chart 1).

Chart 1: Current Expenditure on R&D Performed in UK Businesses, Selected Product Groups, 2004

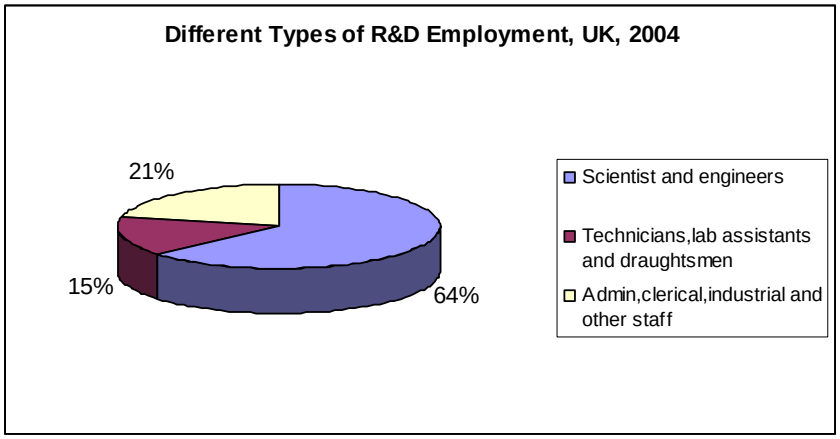


Source; MA14, 2005

Employment in R&D in the UK

In 2004, around 163,000 people were estimated to be employed in industrial R&D in the UK of whom the majority were employed as scientists and engineers (103k), technicians, laboratory assistants and draughtsmen (25k), and administration and other staff (34k). The level of employment tends to follow the level of R&D spend by industry. The percentage distribution of R&D employment in the UK is shown in Chart 2.

Chart 2: Industrial R&D Employment Distribution, UK, 2004



Source; MA14, 2005

More specifically, the highest number employed in R&D are found in pharmaceuticals, medical chemicals and botanical products (27K, 17%), computer and related activities (19K, 12%), machinery and equipment (16K, 10%), and aerospace (15K, 9%). The remaining product groups account for just over 50% of employment in R&D.

At a corporate level, in 2004, the highest number of R&D workers are found in businesses employing between 1000 and 4999 workers but with quite a significant number (28K) found in smaller companies (<99 workers).

2. A Regional Comparison of R&D Expenditure and Employment in the UK

A comparison of the UK regions, in terms of R&D expenditure and employment, clearly demonstrates the deficiencies in the North East region's R&D base, compared with more prosperous regions such as the South East. In 2004, the North East accounted for only 2% of UK total expenditure in business on R&D. In contrast, some 24% of the total UK R&D expenditure was attributed to the South East region. South East and Eastern regions accounted for nearly half of the UK R&D expenditure, (Table 1).

Table 1: UK R&D Expenditure Performed by UK Government Office Regions, Percentage, 2004

	%
East Midlands	7.2
Eastern	**22**
London	6.2
North East	**2**
North West	12.5
South East	**24.2**
South West	10.1
West Midlands	5.9
Yorkshire and Humber	2.8
Northern Ireland	0.9
Scotland	4.6
Wales	1.7

Source MA14, 2005

In the North East, R&D expenditure also has a different pattern from that of the UK as a whole. In the North East region the R&D effort is concentrated in chemicals, around 62% compared with the UK average of 28%, mechanical engineering (7.8% vs. 8.2%), and electrical machinery (3.7% vs. 9.5%), perhaps reflecting the traditional industrial structure of the region. In the growing service sector 7.1% of total R&D spend is expended in the North East while 21.1% is devoted to R&D in this sector in the UK when taken as a whole, (MA14, 2005). (Table 2).

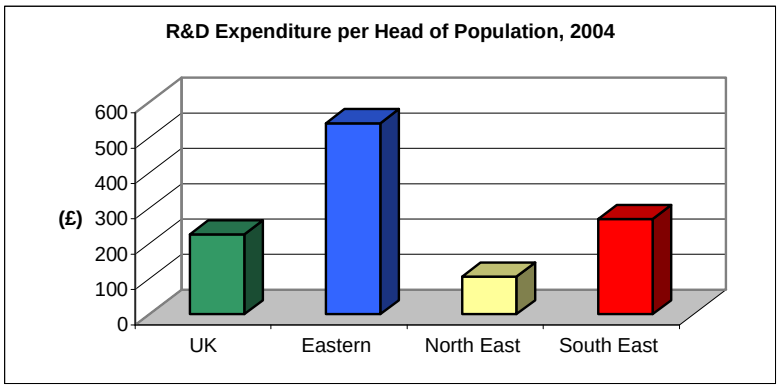
Table 2: Expenditure on R&D Performed in UK Businesses by Government Office Region: Selected Product Groups, 2004

	UK	North East	East of England	South East
Chemicals	28.2	62.5	37.0	32.6
Mechanical Engineering	8.2	7.8	12.5	6.0
Electrical Machinery	9.5	3.7	7.6	16.1
Services	21.1	7.1	25.7	24.7

Source (MA14, 2005)

In terms of R&D expenditure per head of population, compared with other UK regions, the North East had one of the lowest expenditure per head of population in 2004, with £106 per head spent on R&D compared with the national average of £226 per head of population. The largest expenditure per head was the Eastern region (£541) followed by the South East and South West regions, both with £270 per head, (Chart 3).

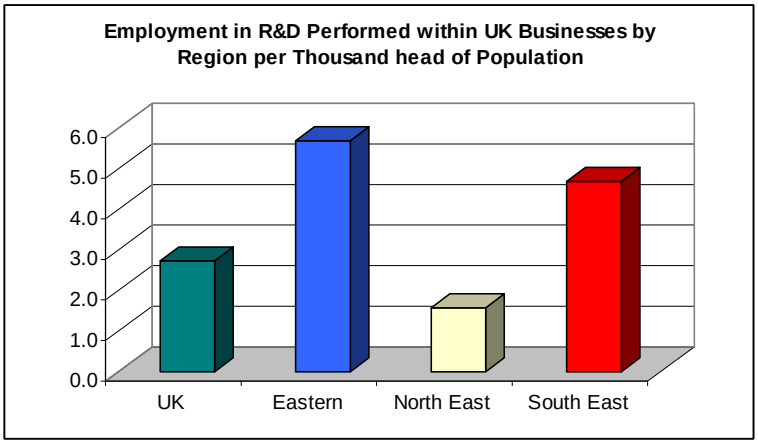
Chart 3: R&D Expenditure per Head of Population



Source (MA14, 2005)

In 2004, the R&D employment per head of thousand population in the North East was also significantly lower than the South East and Eastern regions, (Chart 4).

Chart 4 – Employment in R&D, by Region, 2004

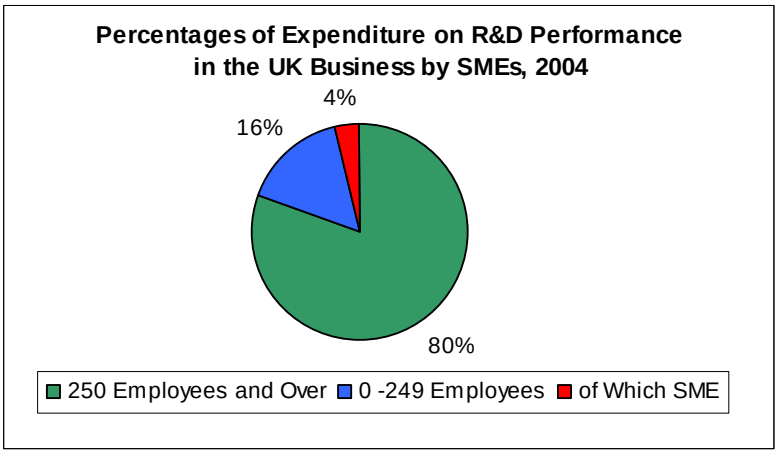


Source (MA14, 2005)

3. An overview of the SME sector in the UK and the North East

There is increasing evidence that new or small firms play an important role in the production of innovation, which is not only considered crucial to the growth of output, productivity, competitive advantage, high quality employment and overall success of the economy, but also a fundamental driving force behind rising living standards, (DTI, 2003, Sheikh and Oberholzner, 2001, Lawson and Longhurst, 2006). Small Medium sized Enterprises (SMEs) represent over 90% of businesses worldwide, (WIPO, 2006). Recent research, however, clearly demonstrates that while it is evident that in aggregate terms small firms play an important role in local and national economic development, only a small proportion of enterprises from the total SME population are responsible for the majority of positive effects. Indeed, the EC's Enterprise Directorate-General (DG) has recognised that from the total population of European SMEs, only a fraction (2%) are responsible for the majority of competitive innovations and R&D and thus jobs created, (SME Update, 2006) and they are, as such, vital to regional and national economies insofar as they stimulate growth and diversity in the knowledge base. Over the past two and half decades, the UK has experienced a substantial increase in the number of enterprises, from some 2.4 million in 1979 to over 4 million in 2003, (SBS, 2004). The information provided from Europa, (2005) suggests that the percentage of organisations which are involved in innovation and R&D activities in the UK are directly correlated to the size. Independently owned SMEs only account for around 4% of the total business R&D in UK, (DTI, 2005). It has also been claimed that in the UK less than 40% of researchers in the business enterprise sector are employed in SMEs, (R&D Expenditure in Europe, 2006), (Chart 5).

Chart 5: Percentage of Expenditure on R&D Performed in the UK Business by SME, 2004



Source (MA14, 2005)

Continuing statistics also reveal that the rate of new firm formation varies between UK regions and to the disadvantage of less favoured regions such as the North East in which high business failure rates have also been observed. The economic diversification and growth in the North East is further "hampered by the lack of an entrepreneurial culture, with low levels of new business formation", (One NorthEast, 2003: p.44). The number of businesses per 10,000 of the population also emphasises the weak nature of the North East's business base. There were just 484 businesses per

10,000 resident adults at the start of 2003 in the North East compared to 846 in the UK as a whole and 1084 in the South East. This is over 40% fewer businesses per head of population than the UK as a whole and amounts to a 'significant enterprise deficit' in the North East, (SBS, 2004). The Business Monitor MA14 does not provide a regional breakdown of R&D expenditure in independently owned SMEs in the UK. However, the weaknesses of the North East in terms of these critical factors are also indications of low levels of R&D expenditure amongst SMEs and availability of a highly qualified and professional workforce and business researchers.

4. Women in the Labour Market in the UK

Evidently, over the past decade there has been a relatively steady increase in the number of women in work in the UK, (LFS 2005). However, women are still less likely to be in employment compared with men. In 2004, the employment activity rate for women stood at 70% compared with 79% for men. Women are also less likely to work as managers or senior official. In 2004, only around 11% of all women in employment held managerial positions compared with 18% of their male counterparts, (Equal Opportunities Commission, 2005). Women in the UK are particularly under-represented in senior positions in the areas of Science, Engineering and Technology (SET). Participation by women in the labour market in the North East of England has continued to remain below the national levels. In 2004, the overall female activity rate for the North East was around 68% compared with 73% at the GB level. Women in the North East are particularly under-represented in three of the highest paid occupations, namely managers and administrators, professional and associate professional and technical occupations. There are substantially fewer female managers and professionals, in proportionate terms, in the North East than nationally. In 2004, for example, only 8.9% of the female workforce were employed as managers and senior officials compared with 11% nationally, (LFS, 2005).

5. Women in Industrial R&D

It might be assumed, all other things being equal, that women would play their full role in the research work throughout the country but we know very little about their participation in industrial R&D in the UK, let alone at regional levels. In general, there is only limited data available at the firm, regional or even national level in relation to women's engagement in technological change and there are no published figures on women's employment or contribution to the various facets of industrial R&D in the UK. This appears to result largely from the issue not being addressed by national or regional policies and a general lack of research from elsewhere, notably academia. As stated in 'Women in Industrial Research, A Wake up Call for European Industry', *'understanding the positions of women and men in industrial research in Europe is hampered by the lack of reliable, harmonised sex-disaggregated statistics', (2003, p14).* However, limited data clearly demonstrate the unacceptably low level of participation of women in industrial research in most Member States; *'Europe in general has not been successful in attracting women into industrial research'.* According to the first official data from ten EU Members States (excluding the UK as no data was available), presented in the above report, in 2003 women constituted less than 15% of industrial researchers in the EU. In France, in contrast to the UK, gender disaggregated data has been available since 1993 and in 1999 it was claimed that there were some 13,500 female researchers in industry representing 17.3% of all French

research workers. A relatively higher proportion of the industrial research and engineering workforce in the USA is also female (N=323,000, 19% of all researchers in industry, i.e. more than twice the total UK industrial R&D workforce). The opportunities for employment in R&D and invention and innovation are dependent on the region in which you are located and sadly these opportunities appear to be particularly low for women in regions with low R&D intensity such as the North East of England.

6. Women in Industrial Research in the North East of England: An Empirical Investigation

The focus of the empirical analysis reported below is on female employees working in SMEs engaged in Science, Engineering and Technology (SET) related sectors, operating in the North East of England. In the process of identifying these firms in the North East of England a questionnaire was sent out to over 600 SMEs operating in various SET related industrial and service sectors in the North East of England. In the process of identifying these firms various company directories and data sources were consulted, including, DTI SMART AWARD winners, FAME, AIM, Queens Award to Industry, North East Chamber of Commerce, companies located in the North East Business Incubators and business parks (e.g., North East Business and Innovation Centre/BIC). The questionnaire was specifically designed, covering several aspects of the business operations including an overview of the level and nature of innovation and R&D activities, technological characteristics, employment by gender, ownership and management structure by gender, human resources practices, skills and training policies, equal opportunity policies, flexible working practice, etc. The postal survey resulted in the creation of a unique database of over 200 SMEs. A number of experts from the North East Business and Innovation Centre were consulted to assist in the identification of SET SMEs from the database. As a result, 60 firms were identified and included in the analysis.

Furthermore, semi structured 'face-to-face' interviews were held with representatives of around 20 of these 60 enterprises to explore in more detail their equal opportunity policies, flexible work practices, skills and training, management structures, human resource development policies, R&D and innovation processes notably as they encourage the participation of women in R&D and other scientific activities. They were also encouraged to provide details of their key female employees involved in technical, scientific, R&D and innovation processes, as well as those involved in non-scientific activities such as sales, marketing and human resources. Around 70 member of staff were contacted and semi structured face-to-face interviews were conducted with 19 female employees engaged in industrial R&D and technological advance as well 15 female engaged in senior and managerial position but in non scientific areas. The purpose of this exercise was to identify the level of involvement in R&D and innovation activities, background, qualification, current and previous positions, tasks undertaken possible causes of inequalities, e.g., segregation, gender stereotyping, institutionalised discrimination on recruitment, pay gap, aspiration, access to skills and training, work-life balance, family commitment and childcare, personal and professional barriers to entry and progression, etc. The results of the postal survey and face-to-face interviews have provided a wide range of both quantitative and qualitative data. However due to the limitation of space, this paper focuses on size and distribution of total employment, R&D employment, R&D employment as percentage of total employment - a key indication of R&D intensity

and technological capacity - and management structure, between female and male employees. The results of the qualitative survey and face-to-face interviews with female employees will be presented in a follow up paper.

Employment Characteristics

The construction of total employment by gender is presented in Table 3. As the table clearly illustrates, around 3% of the firms had no employees and the largest surveyed firm had 87 employees. In fact over half of the surveyed firms had less than ten employees and only 3% had more than 50 employees. This is an interesting finding as previous studies on scientific/innovative SMEs in the North East had shown that these types of firms were more likely to be from the medium sized sector (i.e. those between 50 and 250 employees) than small (i.e. those between 10 to 49 employees) or micro firms (i.e., those with less than 10 employees), see for example, Wynarczyk and Thwaites, 2000.

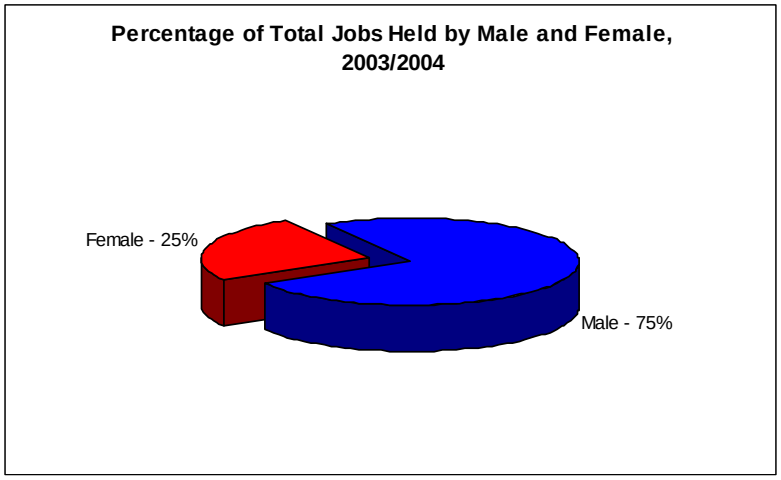
Further examination of the table reveals some significant gender imbalances in the employment structure of the surveyed firms. For example, the table shows some 28% of the firms had no female employees compared with only 6% of the surveyed firms with no male employee. Furthermore, as demonstrated by the averages and medians, women generally tended to hold a smaller share of the workforce compared with their male counterparts. The average firm had ten male employees compared with only 4 female employees. Only 3% of the firms had more than 20 female employees but 12% had more than 20 male employees. The range of female employees was 24 compared with 70 for male employees. It is interesting to note that one of the surveyed firms had no male employees but only two female staff, one proprietor who was also behind the development of new aromatherapy products and one female director responsible for marketing and sales. In short only 25% of all jobs were held by female compared with 75% of total jobs held by male staff, (Table 3, Chart 6).

Table 3: Employment Structure by Gender in 2003/2004

Size	Total Employed %	Total Employed FT%	Total Employed PT %	Total Employed Male %	Total Male FT %	Total Male PT %	Total Female%	Total Female FT %	Total Female PT %
0	3	3	47	6	6	78	28	37	56
1-9	53	56	50	53	56	22	59	53	41
10-19	28	25	3	28	25	0	10	7	3
20+	16	16	0	13	13	0	3	3	0
TOTAL	100	100	100	100	100	100	100	100	100
Mean	14.	12	1	10	10	1	3	2	1
Median	7	7	1	7	6	0	2	1	0
Range	87	87	11	70	70	3	24	22	11
Sum	445	399	46	334	323	11	111	76	35
% of Tem	100	90	10	75	72	3	25	17	8
		100			75			25	

Source: SERU SME Database

Chart 6: Percentage of Jobs Held by Men and Women 2003/2004



Source: SERU SME Database

R&D Employment

The construction of R&D employment by gender is presented in Table 4. As the table shows, 45% of the firms had no employees specifically responsible for R&D activities. The table clearly demonstrates that women are particularly under-represented in R&D positions within this highly important segment of the region's economy, i.e. SET related SMEs. As the table shows over 91% of the surveyed firms had no female R&D employees, over twice as many as without male employees. The remaining 9% of firms with female R&D employees recruited less than five female R&D employees. In contrast, over 10% of the firms recruited more than five male R&D employees.

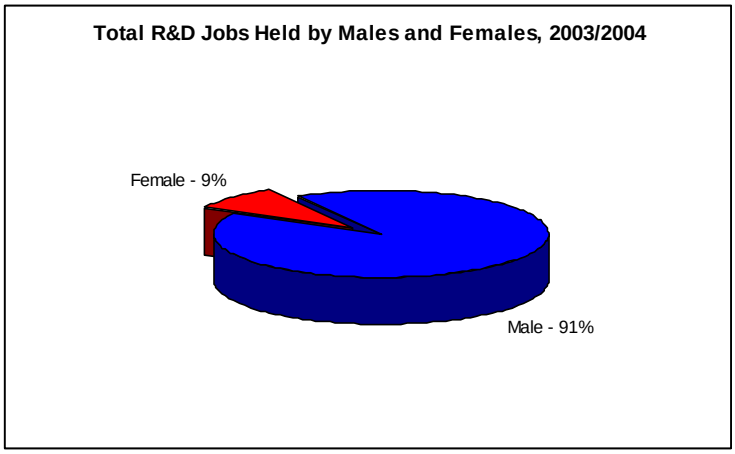
Table 4 – R&D Employment by Gender

Size	Total Employed %	Total Employed %	Total Employed PT %	Total Male %	Total Male FT %	Total Male PT %	Total Female %	Total Female FT %	Total Female PT %
0	44	44	81	44	44	81	91	94	94
1-4	44	50	19	47	50	19	9	6	6
5-9	6	0	0	3	0	0	0	0	0
10+	6	6	0	6	6	0	0	0	0
TOTAL	100	100	100	100	100	100	100	100	100
Mean	2.06	1.63	0.44	1.88	1.56	0.31	0.19	0.06	0.13
Median	1.00	1.00	0.00	1.00	1.00	0.00	0.00	0.00	0.00
Range	12.00	12.00	3.00	12.00	12.00	3.00	3.00	1.00	2.00
% of Tem	15	11	4	13	11	2	1	0.3	0.7
		15			13			2	

Source: SERU SME Database

Further examination of the results show that only 9% of the total R&D jobs were held by women and the remaining vast majority of 91% were held by male employees, (Chart 7).

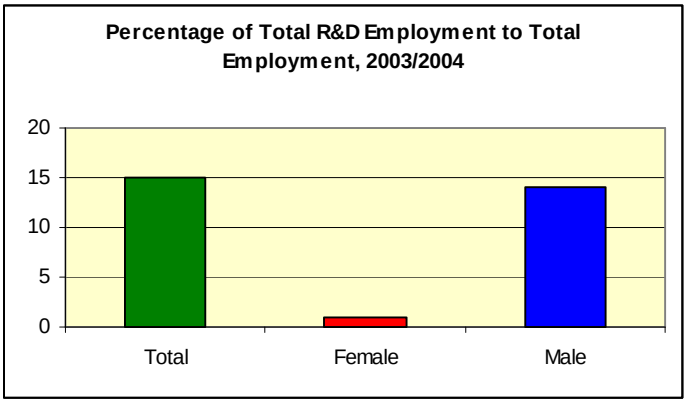
Chart 7: R&D Employment by Gender



Source: SERU SME Database

The proportion of R&D employees as a percentage of total employment is one indication of the level of R&D effort and intensity. Technological capability and innovativeness have been linked to the percentage of qualified scientists employed in R&D related positions, (see for example. Blackburn *et al* 2000). The results show 15% of the total workforce was engaged in industrial R&D. However, only 1% of these were female, (Chart 8).

Chart 8 – R&D Employment to Total Employment



Source: SERU SME Database

Management Structure

In terms of engagement in and holding specific roles at senior and managerial levels, the results show women are far more likely to hold managerial positions in the areas of HR and Marketing than R&D and other scientific and technological related posts, (Charts, 9 & 10). For example, a significantly higher proportion of female (26%) had HR managerial positions than their male (10%) counterparts. In contrast only 3% of female had R&D and other scientific positions compared with some 40% of male. In terms of Sales, Marketing, and Finance, although there appear to be a relatively higher proportion of female managers, their participation was 'relatively' and in relation to sales was, 'significantly', lower than their male counterparts

Table 5 – Managerial Roles, by Gender

Specific Manager for	All %	Female %	Male %	T-test
R&D	41	5	36	3.70**
Technical/Scientific	33	5	28	2.70**
Design	31	8	26	2.20*
Operations	49	13	39	2.52**
Production	52	17	41	2.30*
IT	49	18	39	2.06*
Data processing	29	18	13	0.62
Marketing	50	21	39	1.6
Finance	57	21	36	1.3
Purchasing	51	18	33	1.4
Exports	18	3	15	2.05*
Sales	44	13	36	2.5
Legal	26	10	18	0.9
Personnel/HR	36	26	10	1.64

Paired Sample Mean T-Test differences between female and male managers

* Significant at 10 per cent level

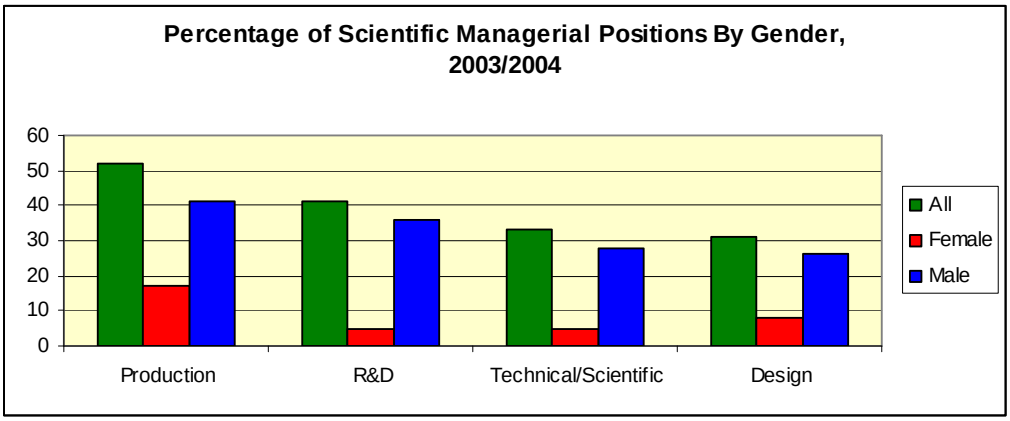
** Significant at 5 percent

Total number of companies - 60

Source: SERU SME Database

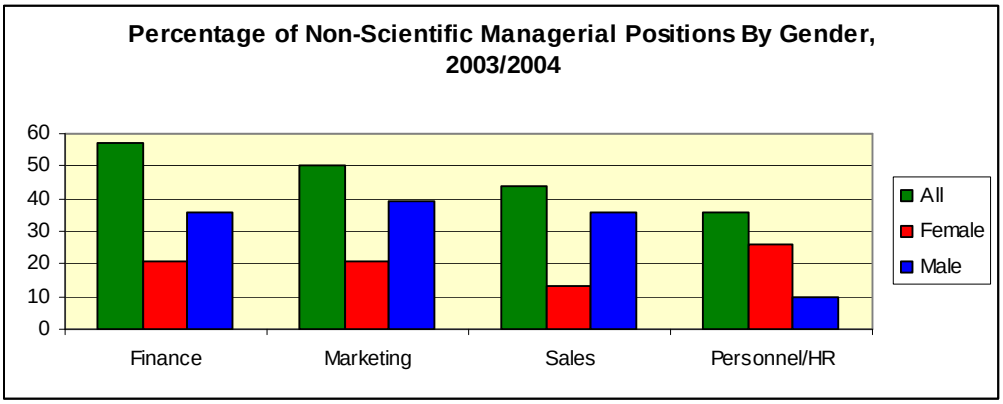
The results generally suggest that women are not participating in the scientific managerial labour market at equal levels to their male counterparts. However, the results presented here illustrate that they are making a reasonable contribution in the managerial labour market of the scientific enterprises in terms of, for example, marketing and sales and hold a stronger position in personnel than their male counterparts. Studies of innovative and high growth SMEs have demonstrated the importance of a well structured formal management team with complementary expertise both scientific and non scientific. Scientific enterprises are generally set up by directors with scientific and technical expertises. As the company grows unless the owner's expertise is supplemented by 'professional' management, performance is likely to stagnate or decline, (Wynarczyk and Thwaites, 2000). For a rapidly growing scientific small firm, the largely informal management style of the typical owner-manager will need to be supplemented by the recruitment of new managers with complementary skills, particularly in the areas of sales and marketing to develop a more formal managerial structure in order for growth to be successfully achieved, (Wynarczyk et al, 1993).

Chart 9 – Scientific Managerial Positions, by Gender



Source: SERU SME Database

Chart 10: Non-Scientific Managerial Positions, by Gender



Source: SERU SME Database

7. Concluding Remarks

This paper has examined the level of participation of women in industrial R&D in the North East of England. Although there is a lack of detailed data relating to R&D and innovation activities throughout the UK, it is relatively easier to identify regional differences than gender imbalances. North East underperforms compared to the rest of the country in terms of both expenditure and employment in industrial research and development in business and accounts for only around 2% of UK business expenditure on R&D in 2004. The exception to this appears to be the Chemicals sector where the North East performs well.

With regard to gender, there is very little data available at a UK level and even less at a regional or company level and little has been done to address the issue of gender imbalance in R&D at a policy level. Available data suggests that women make up as few as 15% of the industrial researchers in the EU according to official data from ten EU member states which, tellingly, did not include the UK due to insufficient data. France, in comparison, has been collecting disaggregated data on this topic since 1993 and in 1999 said that around 17.3% of its researchers were women. In the United States, where women represent 19% of R&D employees, the total number of women employed in industrial research is greater than that of the entire UK R&D workforce. Although the issue of women and science has featured in EU policies for some time, women in industrial research is a new topic of European Commission research. This

lack of data clearly has policy implications not only as a European level, but at a regional level too.

By extension, data on female participation in industrial R&D at a regional level is minimal. The empirical survey carried out for this paper suggests that both trends, relating to lack of R&D expenditure and the gender imbalance in R&D employment, are particularly strong in the North East. 45% of the SET firms surveyed had no employees with specific responsibility for R&D and over 91% had no female R&D employees at all. Confirming popular perceptions, women were far more likely to hold managerial positions in human resources and marketing than in R&D or science. It can be argued that as the R&D activities in the North East is low there is not demand for qualified scientists and R&D researchers. However, there is evidence that North-East manufacturers are hiring staff from Europe in a bid to tackle skills shortages as demonstrated by comments provided by one of the participating firms *' we may force to import skilled labour from Europe if North-East skill shortages continue to hamper our global expansion plans'*. It is essential to ensure that there is a sufficiently qualified workforce both in terms of number and skill level to meet these future demands by drawing on a wider pool of talent and ideas, including the participation of women who are currently so under-represented.

From the evidence provided above it appears that there is very little evidence of a gender-balanced scientific workforce in the R&D departments of North East companies. In a follow up paper, based on semi structured face-to-face interviews with 34 female employees of these firms, the authors attempt to explore some key issues surrounding the participation (or lack) in industrial R&D such as qualification, background, family commitment, as well as personal and professional barriers to entry and progression.

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