Making Manufacturing Work for Women

Summary of research findings

Contents

1. Introduction

In Scotland the gender pay gap in average hourly earnings is 12 per cent for full-time workers and 32 per cent for part-time workers (Close the Gap 2015). The pay gap is caused by women's disadvantaged position within the labour market where women are clustered into undervalued, low-paid, stereotypically female occupations. Women are more likely to have primary caring responsibilities, and a lack of flexible and part-time work at supervisory and management levels means that they are under-represented in senior roles. Discrimination within pay systems means that many women are paid less for work that is the same or similar, or of the same value as male colleagues' work.

There are further gendered structural barriers which prevent women from progressing including: cultures of presenteeism; informal and biased recruitment practices; employer preferences based on gender-stereotyped attitudes and assumptions about women's skills, capabilities and interests; and direct unlawful discrimination.

Close the Gap commissioned University of Strathclyde to undertake a mapping of women's participation in the manufacturing sector in Scotland. The aim was to identify whether there are patterns of occupational segregation; conduct a gender analysis of skills and education; identify any gender differences in participation in manufacturing related Modern Apprenticeships; and identify whether there is gendered pay inequality. This report summarises the research findings.

2. Methodology

The research objectives were to:

- map women's participation within the manufacturing sector labour market in Scotland;
- identify whether gendered horizontal and vertical occupational segregation exists within the manufacturing sector and across the sub-sectors;
- identify any gender differences in pay within the manufacturing sector and across the sub-sectors; and
- identify any gender differences in the distribution of skills and qualifications, with a particular focus on Modern Apprenticeship frameworks.

The research methodology comprised secondary data and a literature review; analysis of existing national datasets and primary data collection; and analysis. Some qualitative data was generated from industry stakeholders to assess stakeholder perceptions of the research findings, and also to explore their perceptions and priorities for the manufacturing sub-sector.

Defining the manufacturing 'sector'

The manufacturing sector is defined in this report in relation to the UK Standard Industrial Classification of Economic Activities 2007 (SIC 2007). Manufacturing is therefore all those Scottish business establishments/units classified under Section C Manufacturing and its component divisions.

Modern Apprenticeship frameworks are not broken down by industrial sector in Scotland. This component of the research therefore used a Sector Skills Council based definition of the manufacturing sector (see ASSCS 2011). The range of Sector Skills Councils with a remit for manufacturing activity highlights the heterogeneity of the sector, in which a diverse range of businesses and activities are linked. Recognising this diversity is crucially important to understanding the different participation and experiences of women across the manufacturing sub-sector. Important aspects of this diversity are, however, difficult to gauge given data limitations, particularly at a Scotland level where small sample size hampers detailed analysis.

3. Manufacturing, employment and gender

Manufacturing gross value added (GVA) has undergone a prolonged period of decline as a result of industry restructuring through global competition, but in 2012 GVA was still 10.6 per cent of the UK economy (UKCES 2014a). In the UK the manufacturing sector is made up of a number of distinct sub-sectors where current and forecasted growth is variable. Some areas are expected to experience growth, such as transport equipment, food and drink, and specialist engineering products, whilst others are expected to experience decline, for example the machinery sector (UKCES 2014a).

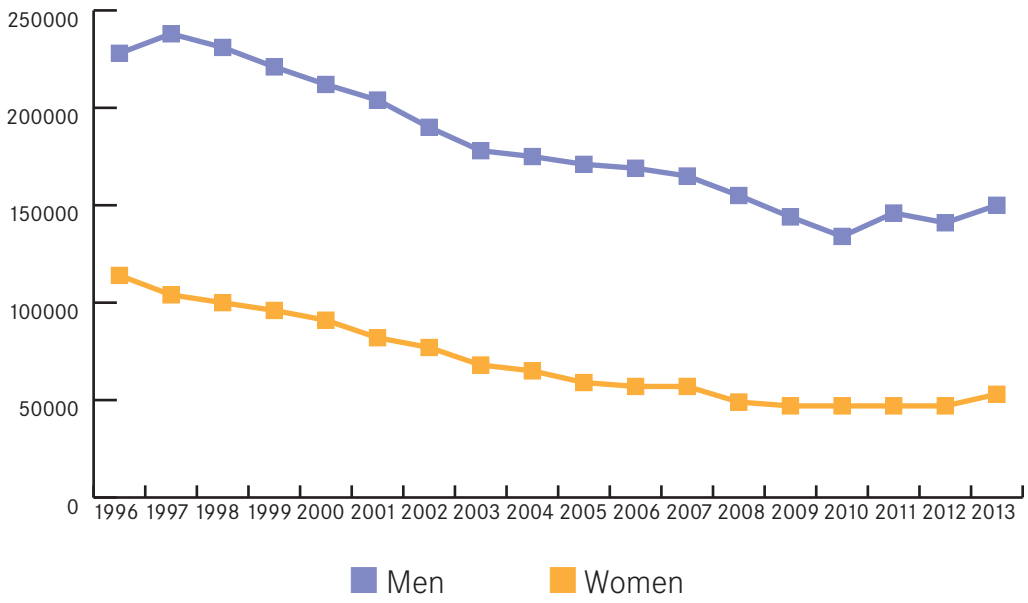
Employment in the manufacturing sector

The UK manufacturing sector workforce comprises managerial staff, skilled tradespeople, and production operatives, with significant numbers of professionals and fewer associate professionals. This overarching profile varies by sub-sector. Higher proportions of management, professional and associate professionals are employed in manufacturing chemicals, pharmaceuticals, electronic products, beverages and scientific research and development, and higher proportions of operator and elementary occupations are employed in the manufacture of food, clothes, paper, textiles, rubber and plastics. There is strong demand for higher-level skills with a STEM [science, technology, engineering and maths] element and for lower-level, often labour-intensive, operative skills (UKCES 2012).

Scottish and UK manufacturing workforces have declined in recent decades. Replacement demand will continue to be an important feature for the sector, particularly given the relatively ageing workforce (UKCES 2012).

Figure 1 shows the total manufacturing workforce numbers in Scotland, by gender, in the period 1996 to 2013, and highlights that in 2013 there were 150,000 men and 53,000 women working in the sector.

Figure 1: Scottish manufacturing workforce, by gender



Source: Workforce Jobs by Industry (SIC2007) and Sex (unadjusted) - NOMIS 17 April 2014

4. Key findings

Manufacturing is the fourth most significant industry in Scotland after public administration, education and health; distribution, hotels and restaurants; and banking and finance. 98.8 per cent of manufacturing employment is located in the private sector, where men are significantly more likely to work than women. Women account for just over 26 per cent of the total workforce. Only 4.7 per cent of women in Scotland are employed in manufacturing compared with 12.8 per cent of men and almost all men and women (96.1 per cent) work in permanent jobs. Women are more likely than men to be employed in manufacturing workplaces with fewer than 20 employees (21.5 compared with 17.4 per cent). There is no clear gendered pattern in employment tenure, and no gender difference in employment tenure of five years or more.

Occupational segregation

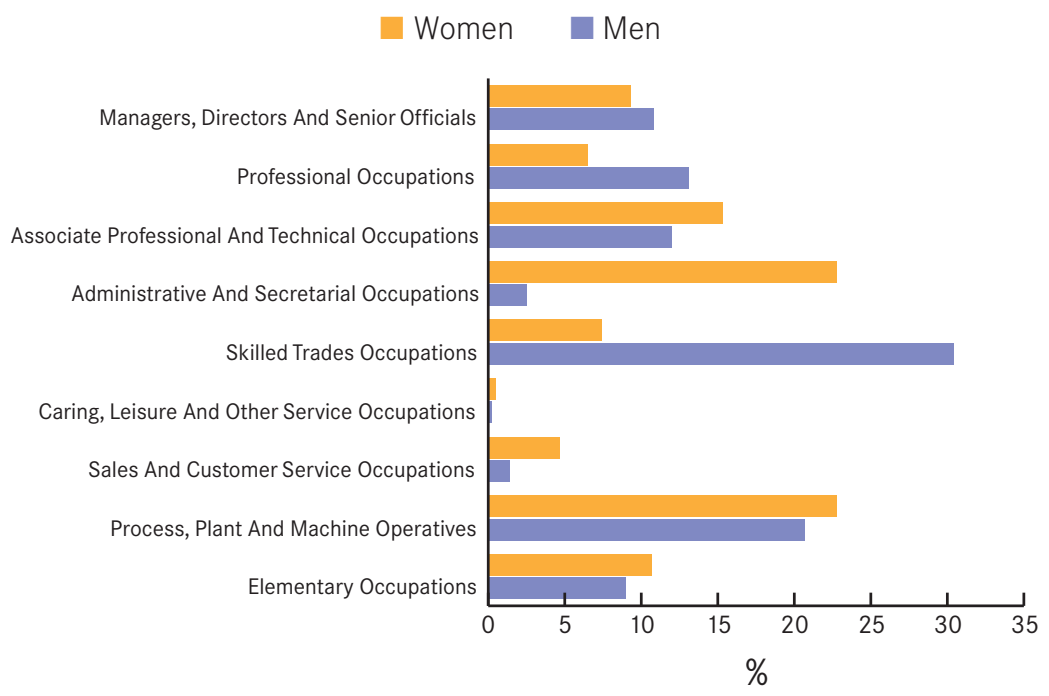
The manufacturing sector shows significant patterns of horizontal and vertical segregation. Table 1 shows the proportion of men and women working in the sector, by occupation and Table 2 shows the distribution of occupations by gender.

Table 1: Scottish manufacturing by SOC2010 Major Group and gender

SOC2010 Major Groups	Male	Female	Total
Managers, Directors and Senior Officials	76.0%	24.0%	100.0%
Professional Occupations	84.6%	15.4%	100.0%
Associate Professional and Technical Occupations	68.1%	31.9%	100.0%
Administrative and Secretarial Occupations	23.4%	76.6%	100.0%
Skilled Trades Occupations	91.8%	8.2%	100.0%
Caring, Leisure and Other Service Occupations	50.0%	50.0%	100.0%
Sales And Customer Service Occupations	44.4%	55.6%	100.0%
Process, Plant and Machine Operatives	71.3%	28.7%	100.0%
Elementary Occupations	69.7%	30.3%	100.0%

Source: The Annual Population Survey, July 2012 to June 2013 (Special Access)

Figure 2: Distribution of men and women across SOC2010 Major Group



Source: The Annual Population Survey, July 2012 to June 2013 (Special Access)

Senior and managerial roles

Women comprise 24 per cent of managerial, director and senior official jobs, and are present at the highest levels of manufacturing companies in greater proportions than in the Scottish economy as a whole. However, while small sample sizes restrict the usefulness of national data in delineating the precise managerial occupations of women in the industry, the gender balance at managerial/director level is more equal in generic business-related occupational areas (for example, financial managers and directors, marketing and sales directors, purchasing managers and directors) than in more industry specific technical roles.

Professional, associate professional and technical work

Women are significantly under-represented in professional work and are more likely to be working in non-manufacturing specific professional occupations such as accounting, finance and IT. Men are more likely to be working in manufacturing specific engineering professional occupations such as mechanical engineering, electrical engineering and production/process engineering.

Whilst women are slightly better represented in associate professional and technical work, there are similar patterns of occupational segregation to those

within professional occupations. Women are more likely to be working in non-manufacturing specific associate professional and technical roles, such as finance and accounting technicians, buyer and procurement officers, and marketing associate professionals, while men are more likely to be working in manufacturing specific associate professional and technical occupations, for instance, electrical and electronic technicians, quality assurance technicians, planning, process and production technicians. Women are however significantly better represented in some manufacturing specific non-engineering roles such as laboratory technician work.

Skilled trades-level and administrative

Reflecting the labour market more widely, skilled trades work in manufacturing is male-dominated, while women are concentrated in administrative and secretarial, and sales and customer services occupations.

Modern Apprenticeships

There is also stark gendered occupational segregation in manufacturing related Modern Apprenticeships, with women comprising only 20 per cent of apprentices in these frameworks. Women are also much more likely to undertake a Modern Apprenticeship at a lower level. 36 per cent of Level 2 Modern Apprenticeships in the manufacturing sector are undertaken by women, compared with only 8 per cent of Level 3 frameworks (Skills Development Scotland 2012). Lower level frameworks are typically shorter in duration, have poorer labour market outcomes, and are associated with lower rates of pay.

Routine-level work

Women are over-represented in routine-level work, with over one-third (33.5 per cent) of all women in the manufacturing sector in Scotland working in process, plant and machine operative occupations or elementary occupations. The pathways into routine-level work are not always clearly mapped, and many of these roles require on-the-job training only.

Sub-sector variation

Women are employed across the manufacturing sub-sectors but are concentrated in four sub-sectors which account for 55.1 per cent of all female manufacturing employment. These are food and beverage manufacture; textile manufacture; machine and equipment manufacture; and chemicals and chemical products manufacture.

Table 3 shows the occupations in which women and men are present in the greatest number.

Table 3: Most common female and male occupations in Scottish manufacturing	
Most common female occupations	Most common male occupations
General office assistants/clerks	Metal working production and maintenance fitter
Packers, bottlers, canners, fillers	Production works and maintenance managers
Food, drink and tobacco process operators	Food, drink and tobacco process operators
Sewing machinists	Electricians, electrical fitters
Account wages clerk, book keeper	Other goods handing and storage occupations n.e.c.
Sales representatives	Marketing and sales managers
Production works and maintenance managers	Welding trades
Assemblers (electrical products)	Metal machine setter and setter-operator
Marketing and sales managers	Engineering technicians

Source: The Annual Population Survey, July 2012 to June 2013 (Special Access)

In some occupations, for example welding and machine setting, there are no women in Scotland represented in the dataset. Women are also scarcely represented in a range of other manufacturing occupations including maintenance works, engineering technicians, chemical and related storage activities, goods handling and storage. Similarly, there are few female electricians and electrical fitters.

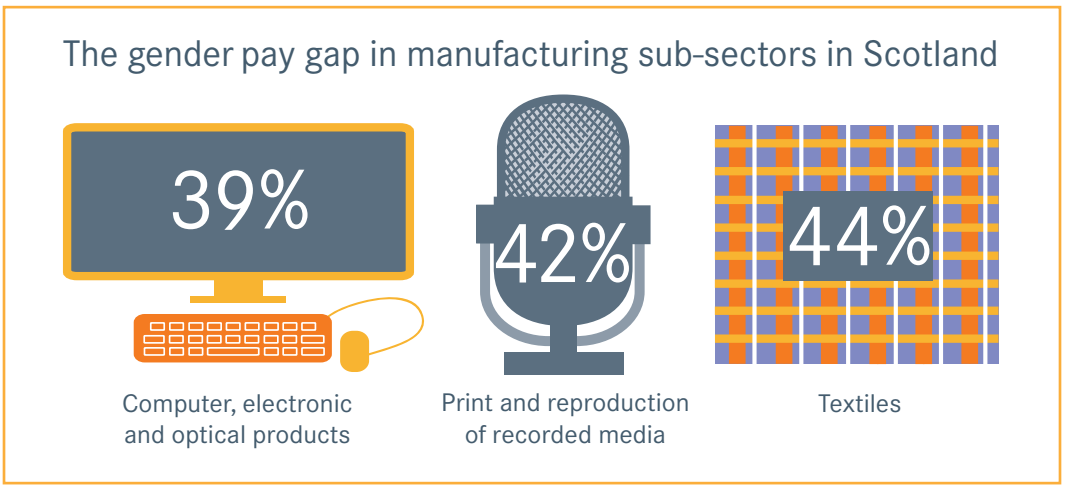
Gender and pay

Gendered pay inequality is a major issue for manufacturing employment in Scotland. Table 4 shows the median and mean gender pay gaps in manufacturing for Scotland and the UK. Although women are slightly better represented in Scottish manufacturing than elsewhere in the UK (see UKCES 2012), the median and mean gender pay gaps are also considerably higher in Scotland (26.5 per cent and 28.9 per cent respectively) than in the UK as a whole (20.8 per cent and 19.0 per cent). The mean and median pay gaps are also higher than in Scotland overall (13.3 per cent and 7.6 per cent respectively).

Table 4: Male and female full-time hourly pay (excluding overtime) in the Manufacturing sector (Scotland and the UK)						
	Median hourly pay (excluding overtime)			Mean hourly pay (excluding overtime)		
	Men (FT)	Women (FT)	Pay Gap	Men (FT)	Women (FT)	Pay Gap
Scotland	£13.95	£10.26	26.5%	£16.06	£11.42	28.9%
UK	£13.18	£10.44	20.8%	£15.47	£12.53	19.0%

Source: Annual Survey of Hours and Earnings (2013) - Work Region Industry SIC2007 (PROV) Table 5.6a

The pay gap across the sub-sectors varies but the mean gap is particularly high in the following sub-sectors: manufacture of textiles (43.8 per cent); printing and production of recorded media (42 per cent); and manufacture of computer, electronic and optical products (39.1 per cent).



A key factor around gendered pay inequality is the composition of pay in terms of earnings premia, allowances and bonuses, to which men and women may have differential access. Of those who reported bonus pay in their last pay 18 per cent were women and 92 per cent were men, showing that men are significantly more likely to receive bonus pay. Although the overall numbers were small, a higher proportion of women received shift allowances, bonuses and other additional payments whilst a higher proportion of men received overtime payments, payment for working unsociable hours, stand-by or on-call allowances, and profit related pay. A higher proportion of men (79.7 per cent) than women (72.7 per cent) are paid overtime above the normal basic rate for the job. Tables 5 and 6 show mean and median pay for the most common female and male occupations. This data relates to occupational groups across all labour market sectors, although some are primarily located within manufacturing.

Table 5: Mean and median full-time hourly pay (excluding overtime) for the most common female manufacturing occupations in Scotland, by 4-digit SOC code			
SOC2010 Code	Most common female occupations (SOC2000)	Mean	Median
4159	General office assistants or clerks	£10.25	£9.44
9134	Packers, bottlers, canners, fillers	£8.41	£7.06
8111	Food, drink and tobacco process operators	£7.80	£7.11
8137	Sewing machinists	£7.23	£6.62
4122	Account wages clerk, book keeper	£12.16	£11.29
3542	Sales representatives	£14.19	*
1121	Production works and maintenance managers	£19.48	£16.97
8131	Assemblers (electrical products)		
1132	Marketing and sales managers	£36.92	*

Source: Annual Survey of Hours and Earnings (2013) - Work Region Occupation SOC2010 4-Digit (PROV) Table 15.6a

Table 6: Mean and median full-time hourly pay (excluding overtime) for the most common male manufacturing occupations in Scotland, by 4-digit SOC code			
SOC2010 Code	Most common male occupations (SOC2000)	Mean	Median
5223	Metal working production and maintenance fitter	£14.62	£13.70
1121	Production works and maintenance managers	£27.31	£23.91
8111	Food, drink and tobacco process operators	£9.92	£8.25
5241	Electricians, electrical fitters	£13.80	£13.34
9260	Other goods handing and storage occupations n.e.c.	£9.36	£8.79
1132	Marketing and sales managers	£36.76	*
5215	Welding trades	£13.02	£12.44
5221	Metal machine setter and setter-operator	£12.75	*
3113	Engineering technicians	£17.25	£15.61

Source: Annual Survey of Hours and Earnings (2013) - Work Region Occupation SOC2010 4-Digit (PROV) Table 15.6a

An * is marked to indicate insufficient male and/or female data to present reliable pay information.

These tables show that women tend to work in occupations that are lower paid. Four of the most common female occupations, for example, have median earnings of less than £10 per hour compared with only one of the most popular male occupations. Three of the most common female and male occupations are the same (food, drink and tobacco process operator, production works and maintenance managers, and marketing and sales managers) but median and mean full-time pay in two of these occupations (food, drink and tobacco operators, and production works and maintenance managers) are lower for women, with the exception of marketing and sales managers, where mean pay is slightly higher for women.

Working hours

The vast majority of men (80.8 per cent) and women (78.6 per cent) employed in manufacturing work between 31 and 40 hours per week. Men are more likely to work longer hours than women, with 16.7 per cent reporting basic usual hours of more than 40 hours per week compared to just 6.1 per cent of women. More men than women (39.6 per cent compared with 28.7 per cent) report that weekly hours tend to vary.

The majority of men (60.4 per cent) and women (65.9 per cent) did not undertake any hours of paid overtime. However, more men (25.3 per cent) than women (14.0 per cent) undertook six or more hours of paid overtime. The mean weekly overtime pay for women working full-time is much lower than for men (£9.50 and £41.70 respectively (ONS 2013). Women are also more likely (38 per cent) to work unpaid overtime than men (32.2 per cent).

Part-time working

Women are much more likely to work part-time hours than men in all sectors, including manufacturing. Women are only half as likely (23.0 per cent) to work part-time in manufacturing than in the private sector overall (47.1 per cent), and in all sectors in Scotland (44.4 per cent). For 25.8 per cent of women, basic usual hours are 30 hours or less per week compared to 5.3 per cent of men.

Female part-time working within the manufacturing sector varies across major occupational group. Part-time working is less common in professional occupations (4.8 per cent); managers, directors and senior officials occupations (13.1 per cent); and associate professional and technical occupations (16.9 per cent). Part-time working is more common in sales and customer service occupations (50 per cent) and administrative and secretarial occupations (32.2 per cent). Part-time working tends to be higher in non-manufacturing specific occupations, where women are concentrated.

Stakeholder interviews suggest that there is also a lack of flexible working generally, and where employers do have policies in place to support such arrangements, there is often a disconnect between policy and practice.

Education, skills and training

Slightly more women (17.5 per cent) than men (16.0 per cent) reported holding a degree-level qualification. More men (17.8 per cent) than women (10 per cent) employed in manufacturing held a doctorate as their highest qualification level, while a greater proportion of women (65.0 per cent compared with 62.2 per cent) held a Master's degree or other postgraduate qualification (25.0 per cent compared with 17.8 per cent). (Annual Population Survey, July 2012 to June 2013)

Skills gaps

Manufacturing employers in Scotland are slightly more likely to report skills gaps than employers in the rest of the economy (18 per cent compared with 15 per cent), with particular gaps in technical and practical skills (61 per cent), problem solving skills (55 per cent), and planning and organising skills (52 per cent). 64 per cent of employers report that these skills gaps have an impact on establishment performance (ASSCS 2011).

Manufacturing has the highest skills shortage density for professional occupations at 55 per cent. Skills shortage density for skilled trades occupations is relatively high across most sectors but particularly high within manufacturing (41 per cent) (UKCES 2014b). Two of the main skills pipelines into these occupations are through Modern Apprenticeships and, often STEM-related, degree programmes which are both male-dominated.

Training opportunities

Scottish manufacturing employers were less likely to have a staff training plan than firms in all Scottish industries (ASSCS 2011), and there has been a significant reduction in the number of training and development days across UK manufacturing (UKCES 2014b). A higher proportion of men (23.1 per cent) than women (16.1 per cent) received job-related training or education in the last three months, although slightly more women received job-related education and training in the last four weeks (45.6 per cent compared with 41.9 per cent).

Modern Apprenticeships

There is slightly higher awareness amongst Scottish manufacturing employers of Modern Apprenticeships (58 per cent) compared with all employers (52 per cent). A higher proportion of manufacturing employers (9 per cent) have employees

undertaking Modern Apprenticeships than Scottish employers overall (5 per cent) (ASSCS 2011). The manufacturing sector has the highest proportion of non-participating employers who plan to offer an apprenticeship in the future (35 per cent) (Skills Development Scotland 2013).

Of those Scottish manufacturing workers who had completed an apprenticeship, 96 per cent were men and 4 per cent were women, highlighting acute gendered occupational segregation. In 2012/13, 20 per cent of Modern Apprentices were women and 80 per cent were men which reveals the starkly gendered nature of this major skills pipeline into the sector. The vast majority of these women (77 per cent) started a Modern Apprenticeship in Food and Drink Operations, which is also one of the lower-paid sub-sectors.

Occupational segregation is also pronounced for 16-19 year old new starts, where 93 per cent of apprentices are men and just 7 per cent women. The expansion of adult apprentices has resulted in a sharp fall in the number of 16-19 year old new starts. In 2008/2009, 74 per cent of all new start Modern Apprentices were aged 16-19 years while in 2012/13 this dropped to 44 per cent. The most recent quarterly figures show that just 33 per cent of new start apprentices were aged 16-19 years (SDS 2014).

The vast majority (79 per cent) of all female starts were undertaking a Level 2 qualification compared to 35 per cent of all male starts. Female apprentices were significantly under-represented at Level 3 where women comprise just 8 per cent of those undertaking a qualification. The majority of women are not only undertaking a lower-level qualification, and therefore undergoing a typically shorter period of training, but they are also in a vocational stream that leads to relatively low paid work, for instance in Food and Drink Operations. The majority of men, in contrast, are undertaking a higher-level qualification with a typically longer period of training in a vocation stream that is relatively high paid, such as engineering.

5. Conclusion

The research findings show that women are considerably under-represented in manufacturing employment in Scotland, and that those women working in the sector are concentrated in occupations that are associated with the lowest pay. This contributes to significant gender pay gaps of up to 43.8 per cent in some sub-sectors.

Pathways into manufacturing are acutely gendered whether it is through Modern Apprenticeships or through STEM-related education and training. While there is greater awareness of Modern Apprenticeships amongst manufacturing employers and a greater likelihood of staff undertaking them compared with other sectors, there are patterns of severe occupational segregation within manufacturing related frameworks. Women are also under-represented in Level 3 frameworks which are associated with higher levels of pay and better labour market outcomes.

Despite the shortage of female professionals in manufacturing, female STEM graduates are more likely to be economically inactive. The attrition rate for STEM graduates is also much higher for women: 73 per cent of women (compared with 52 per cent of men) with STEM qualifications do not work in STEM occupations (RSE 2012). The higher female attrition rate is also very likely to be influenced by the lack of flexible and quality part-time working in the sector.

The patterns of occupational segregation at professional level suggest that there are a range of routes into professional occupations within the sector and that many women are entering through non-manufacturing specific graduate pathways such as business, IT and non-engineering routes. Gendered subject choices at school partially explain women's better representation in manufacturing specific non-engineering roles. The pathways into professional occupations in the industry are influenced by the STEM subjects studied, where girls tend to study biology and boys are more likely to study physics.

Close the Gap's *Be What You Want* campaign and Equate Scotland's Careerwise project are currently the only initiatives in Scotland with a specific focus on gender stereotyping and occupational segregation in schools. *Be What You Want* was developed to ensure that children and young people are able to make informed

decisions around subject and career choices. *Be What You Want* has also developed a resource for teachers to support them in challenging gender stereotyping as part of their professional development, as well as part of the curriculum.

A robust gender analysis is essential to identify why girls and women detach at various points along the skills pipeline. Early intervention to challenge gender stereotyping and perceptions of the manufacturing sector are a necessary part of a wider strategy to ensure that future skills shortages and gaps are addressed, and that occupational segregation does not function as a drag on the sector's economic growth.

There are world leading manufacturing companies in Scotland that provide high quality employment, and there is scope for high earnings within many of the sub-sectors, but gendered structural barriers prevent women from participating and progressing in the sector equally. Industry is also missing out as it grapples with skills gaps and shortages. The ageing workforce will provide replacement job opportunities, and will require companies to grow and utilise women's skills. Employers that fail to harness the talent of women are missing out on the economic benefits that a diverse workforce can bring to the sector.

6. Recommendations

Close the Gap proposes that key manufacturing stakeholders consider the following recommendations:

Scottish Government, national enterprise and skills bodies

- Scottish Government raises awareness of the economic benefits of addressing occupational segregation in the manufacturing sector, and in other sectors where occupational segregation persists.
- Scottish Government uses public sector procurement, where possible, to lever better gender equalities practice in the manufacturing sector.
- Skills Development Scotland uses a gender analysis to inform the development of Skills Investment Plans.
- Skills Development Scotland proactively works with manufacturing employers to target the recruitment of women into non-traditional Modern Apprenticeships, with a particular focus on Level 3.
- Manufacturing Sector Skills Councils use a gender skills analysis to inform the development of manufacturing skills agreements, and skills acquisition and utilisation policy.
- Scottish Government, economic development agencies and Business Gateway services promote the value of women's networks and mentoring in the manufacturing sector as a means of addressing occupational segregation.
- Scottish Government and economic development agencies create seed funding solutions for women's professional networks in the manufacturing sector.
- Scottish Manufacturing Advisory Service raises awareness of the economic and business benefits of addressing occupational segregation with manufacturing employers.

Employers

- Monitor recruitment, retention and progression of male and female employees to identify gendered patterns.
- Monitor flexible working requests, by gender, to identify gendered patterns.
- Where possible, offer flexible and part-time working at all levels.

- Use gendered job design to better utilise the skills of female employees.
- Undertake an equal pay review.
- Support female employees to participate in women's networks to support their career progression.
- Work with Close the Gap to audit workplace policies and practices to ensure that female employees have a positive employment experience.

Trade unions

- Ensure gender equality is part of the collective bargaining process, particularly in relation to pay and remuneration, health and safety, and skills and learning.
- Union skills acquisition and utilisation policy has a gender analysis.
- Raise awareness of occupational segregation with workplace reps in the manufacturing sector, and in other sectors where occupational segregation persists.
- Support gendered learning programmes to ensure the skills of women members are effectively utilised.
- Ensure workplace learning agreements consider occupational segregation, and how it intersects with skills, learning and personal development.

7. Glossary

Horizontal segregation
Describes where men and women tend to do different types of work.

Vertical segregation
The under-representation of women in senior roles, and in the boardroom. More commonly referred to as the 'glass ceiling'.

Skills gap
The difference in the skills required for a job and the actual skills possessed by an employee.

Skills shortage
Occurs when the skills, qualifications and experience required for a role are not available and more people are required to be recruited into the industry.

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Close the Gap works in Scotland on women's participation in the labour market.

Partners include Scottish Government, Scottish Enterprise, Highlands and Islands Enterprise, Skills Development Scotland, Equality and Human Rights Commission, and Scottish Trades Union Congress.

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