

AMSTERDAM INSTITUTE FOR ADVANCED LABOUR STUDIES UNIVERSITY OF AMSTERDAM

ROETERSSTRAAT 11, 1018 WB AMSTERDAM

SUBSTITUTION OR SEGREGATION: EXPLAINING THE GENDER COMPOSITION IN DUTCH MANUFACTURING INDUSTRY

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Summary

This paper focuses on the role of substitution or segregation in the demand for female labour. Based on an extensive overview of detailed studies, fluctuations in the gender composition of the labour force in four major sectors of Dutch manufacturing industry have been examined over the past hundred years. Women's share in employment has been stable in clothing industry, fluctuated in textiles, increased in food production and decreased in Philips Electronics. Changes in the share of women were primarily explained by segregation that is by fluctuations in employment in the male respectively female domains. Only few examples of substitution were traced, primarily driven by labour market shortages, but the numbers of workers involved were small. Overwhelmingly, employers preferred to act within gender boundaries.

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1 INTRODUCTION

Knowledge about the extent of substitution among various groups of workers is not well developed in economics.¹ In particular the substitutability of workers by sex has not been analysed into great detail. A few studies of local and immigrant workers, where substitutability was found to be small, may suggest that substitutability between male and female workers is also small. Findings on the persistence of occupational segregation by gender support this assumption. It has also been argued that it would be costly for employers to break down the sexual division of labour, because this would undermine existing labour relations.²

This paper focuses on the role of substitution and segregation in the demand for female labour. We have examined fluctuations in the gender composition of the labour force in the manufacturing industry of the Netherlands in exactly one century, from 1899 to 1999. In explaining these fluctuations, we will follow two lines of reasoning. Do these fluctuations reflect changes in the gender-specific demand for labour along existing lines of gender segregation? Then, the fluctuations must be explained by aggregate changes in the demand for labour caused by changing products, changing production processes or general productivity increases. The alternative is that these fluctuations reflect changes in real or perceived differences in productivity of men and women, and changing preferences of employers, thus substituting men's work by women or women's work by men. We particularly focus upon changes in the gender-specific demand for labour when economic conditions make such changes most likely: when labour is in short supply, when unemployment rates are substantial, and when productivity increases rapidly because of mechanisation and computerization. We also take into account outside pressure from either the state, trade unions or the clergy aiming at breaking down or reinforcing the sexual division of labour.

We have examined four sectors of Dutch manufacturing industry: the clothing industry, the textile industry, the food industry and the electrical engineering industry, especially Philips Electronics³ -- each producing consumer goods. Over the 1899 to 1999 period, these are the four single manufacturing sectors in which most women have been employed⁴. The last sixty years, these sectors jointly made up at least half of women's employment in manufacturing industry: in 1899 72 percent, and still 57 percent in 1960. In later years, their joint share diminished rapidly, to about 31 percent in 1999. The four sectors that have been most important for male employment during the twentieth century were, in this order: metals and shipbuilding, the food industry, the textiles industry, and the chemical industry.

¹ Hamermesh, *The Demand for Labour*, pp. 105-27.

² Bergmann, "Does the market", pp. 43-60.

³ Of course, Philips Electronics is not really a 'sector'. Unfortunately, the relevant sector, metal industry and shipbuilding, that can be traced in the official statistics during the 20th century is large and heterogeneous. The share of Philips' female labour force in women's employment of this sector developed as follows: 1899 33%, 1909 40%, 1920 25%, 1930 45%, 1960 44%, 1975 38%, 1990 14% and 1996 11%. Within this large sector, electrical engineering has been distinguished in official statistics since 1947. The shares of Philips' female labour force in the female labour force of that subsector were: in 1947 82%, 1960 78%, 1971 57%, 1981 55%, 1990 40%, 1996 30%. Sources: CBS, *Beroepstelling (Occupational Census)*, 1899, 1909, 1920, 1930, 1947; CBS, *Volkstelling (Census)*, 1960, 1971, 1981; CBS, *Enquete Beroepsbevolking (EBB)*, 1990, 1999; and references concerning Philips mentioned later.

⁴ Reference years were: 1899, 1910, 1920, 1930, 1947, 1960, 1975, 1990, 1999.

These branches employed 65 percent of the male industrial labour force in 1899, a share that remained rather stable during the century and was 64 percent in 1999⁵.

This paper is based on an explorative examination of the issues raised above. Lack of detailed long-term data forced us to base our study on a thorough review of as much empirical research findings as we could trace. We have divided the hundred years into four periods: from 1899 to 1920, 1920 - 1945, 1945 - 1975, and 1975 - 1999. These periods partly correspond with census years (the first reliable census⁶ was held in 1899, the third in 1920), partly with major socio-political changes in the Netherlands: major social legislation (1919/20), and the end of the German occupation (1945). In the absence of such events in the post-war period, the year of the first labour force survey has been chosen (1975).

⁵ Sources: CBS, *Beroepstelling*, 1899, 1909, 1920, 1930, 1947; CBS, *Volkstelling*, 1960; CBS, *Arbeidskrachtentelling (Labour force surveys)* 1975; CBS, *EBB*, 1990, 1999.

⁶ Reliability does not apply to the extent of home work. There are indications that this type of labour, important for married women, has been largely underestimated, notably in the 1899, 1909, 1920 and 1930 Occupational Censuses. Cf. Leydesdorff, *Verborgen arbeid*, p. 107-10 (comparing the 1909 Census with the results of the 1909/10 Government Inquiry on Home Work).

2 WOMEN'S SHARE IN THE LABOUR FORCE IN MANUFACTURING INDUSTRY

Industrialization started late in the Netherlands. The Dutch industrial take-off, giving way to modern economic growth, just took place after 1865⁷. According to the 1899 census, Dutch manufacturing industry⁸ employed nearly 500,000 men and women, less than one quarter of the total labour force of 1.9 million. In 1999, just over 1 million Dutch people worked in manufacturing industry, nearly 16 percent of the workforce of 6.6 million: see Table 1.

Employment in manufacturing industry nowadays is clearly over its top. In the course of the twentieth century, Dutch industry caught up with its main European competitors and up till 1960, total employment grew at the cost of agriculture. In the first decade of our century, the number of women in manufacturing industry surpassed that of women working in agriculture. In the 1910s the same happened with men. Yet, already in 1947, employment in commercial services had surpassed that in manufacturing industry, both for men and for women⁹. The country changed from an agricultural society into an industrial one and then rapidly into a services society.

Employment in manufacturing industry has always been more important for men than for women. In 1899, 27 percent of the male labour force could be found here. The share of industrial workers in the male labour force showed a steady growth up till 33 percent in 1960. Then, it went down till 20.5 percent in 1999. The development of the female labour force showed the same pattern, although somewhat irregular, but the percentages were much lower. In 1899, 20.3 percent of the female labour force had an industrial job; in 1960, this was 22.1 percent. Since then, a sharp decline started, till 8.4 percent in 1999. The large influx of women in the labour force since the 1970s mainly took place in commercial services and in the public sector.

During the 20th century, male workers have heavily dominated manufacturing industry. In 1899, Dutch industry employed 410,000 men and 88,000 women, resulting in a women's share of 17.7 percent (table 1 and graph 1). In 1999, the comparative figures were 828,000 men and 220,000 women, leading to the record women's share of 21.0 percent. Within the four sectors under study, the proportion of women has fluctuated substantially. In 1899 and 1909, Philips' workforce showed a high proportion of female workers: 75 percent. In the 1990s, the company ranks lowest with 16 percent. The food industry revealed a nearly constant increase of the share of women, with acceleration after 1960. Textiles and clothing show fluctuations over time, with growing shares of women from 1975 to 1990 (textiles) and from 1990 on (clothing). Graph 2 and graph 3 show the relative annual employment growth for females and males. Particularly the food industry produces differential growth rates for female and male employment, indicating either significant substitution or substantial changes in employment within women's or men's domains.

⁷ Van Zanden & Van Riel, *Nederland*, pp. 343-61. Nevertheless, these authors explicitly trace the Dutch industrial take-off much earlier the 1890-1910 period defended by De Jonge (*De industrialisatie*, pp. 233-45, 340-58).

⁸ Excluding the building trade and gas and electricity production (classified under public utilities).

⁹ CBS, *Occupational Census 1947*. If we count the public and commercial service sectors jointly as the services sector, employment in the latter sector already surpassed employment in agriculture as well as in manufacturing industry between 1900 and 1910: Van Zanden & Van Riel, *Nederland*, p. 388.

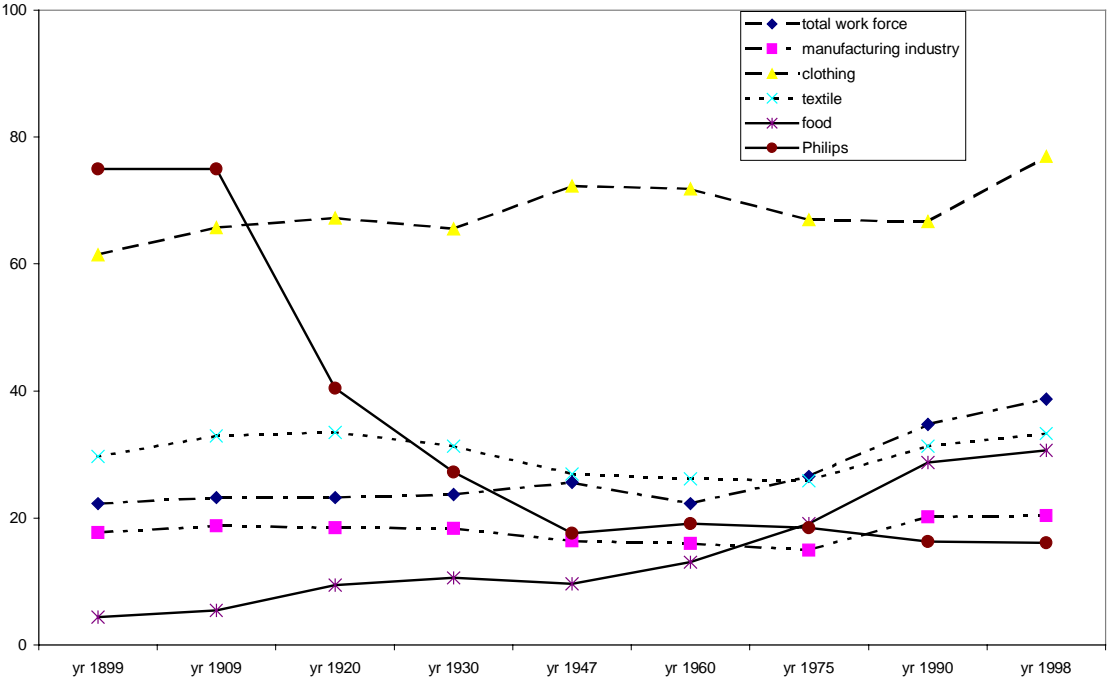
Table 1 *Employment in total labour force, in manufacturing industry, and in four selected manufacturing sectors in the Netherlands, 1988-1999*

	1899	1909	1920	1930	1947	1960	1975	1990	1999
total labour force									
total employment (in 1,000)	1934,0	2244,0	2721,0	3171,0	3612,0	4169,0	4683,0	5644,0	6665,0
female empl. (in 1,000)	432,0	521,0	630,0	753,0	925,0	928,0	1240,0	1958,0	2623,0
male employment (in 1,000)	1502,0	1723,0	2091,0	2418,0	2687,0	3241,0	3443,0	3686,0	4042,0
women (in %)	22.3%	23.2%	23.2%	23.7%	25.6%	22.3%	26.5%	34.7%	39.4%
manufacturing industry									
total employment (in 1,000)	498,0	593,0	767,0	897,0	1105,0	1279,0	1213,0	1192,0	1047,0
female empl. (in 1,000)	88,0	111,0	142,0	165,0	181,0	205,0	181,0	241,0	220,0
male employment (in 1,000)	410,0	482,0	625,0	732,0	924,0	1074,0	1032,0	951,0	828,0
women (in %)	17.7%	18.7%	18.5%	18.4%	16.4%	16.0%	14.9%	20.2%	21.0%
clothing									
total employment (in 1,000)	71,0	70,9	82,5	87,1	102,0	95,3	39,4	15,0	8,0
female empl. (in 1,000)	43,7	46,6	55,5	57,1	73,7	68,4	26,4	10,0	6,0
male employment (in 1,000)	27,3	24,3	27,0	30,0	28,3	26,9	13,0	5,0	2,0
women (in %)	61.5%	65.7%	67.3%	65.6%	72.3%	71.8%	67.0%	66.7%	75.0%
textile									
total employment (in 1,000)	49,2	60,5	66,5	81,5	80,9	103,7	52,5	22,4	23,0
female empl. (in 1,000)	14,6	19,9	22,3	25,5	21,8	27,2	13,6	7,0	7,0
male employment (in 1,000)	34,6	40,6	44,2	56,0	59,1	76,5	38,9	15,4	16,0
women (in %)	29.7%	32.9%	33.5%	31.3%	26.9%	26.2%	25.9%	31.3%	30.4%
food									
total employment (in 1,000)	117,2	136,1	177,5	217,7	186,7	199,2	179,2	174,0	160,0
female empl. (in 1,000)	5,1	7,3	16,7	23,1	18,0	25,8	34,2	50,0	49,0
male employment (in 1,000)	112,1	128,8	160,8	194,6	168,7	173,4	145,0	124,0	111,0
women (in %)	4.4%	5.4%	9.4%	10.6%	9.6%	13.0%	19.1%	28.7%	30.6%
Philips									
total employment (in 1,000)	0,4	1,2	4,7	22,4	34,0	75,0	80,0	54,5	38,6*
female empl. (in 1,000)	0,3	0,9	1,9	6,1	6,0	14,3	14,8	8,9	6,2*
male employment (in 1,000)	0,1	0,3	2,8	16,3	28,0	60,7	65,2	45,6	32,4*
women (in %)	75.0%	75.0%	40.4%	27.2%	17.6%	19.1%	18.5%	16.3%	16.1%*

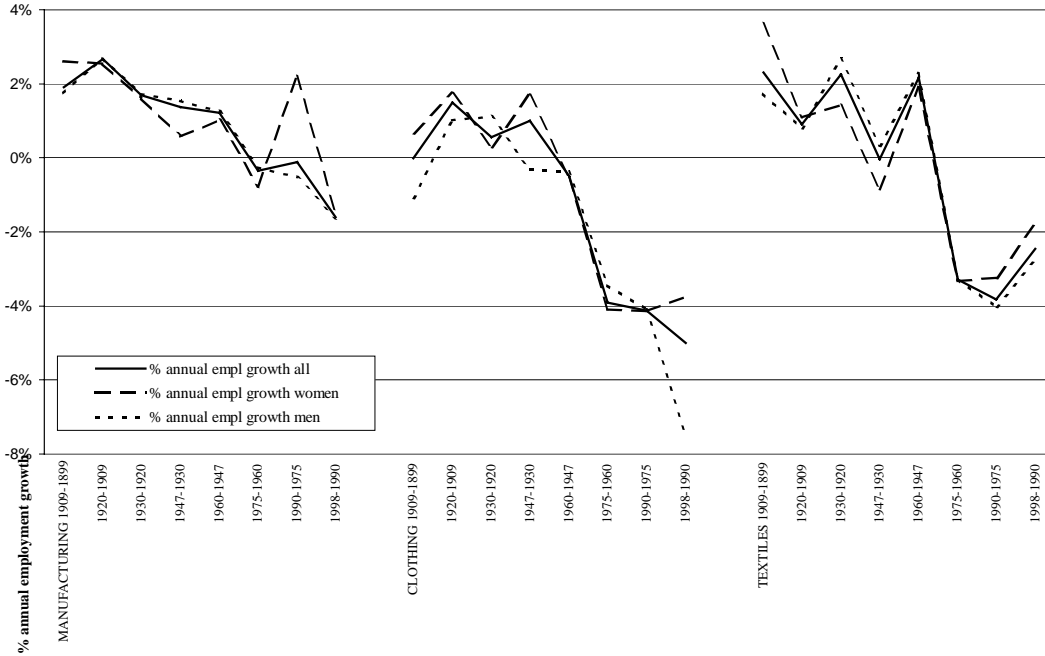
Sources: CBS, Beroepstelling (Occupational Census), 1899, 1909, 1920, 1930, 1947; CBS, Volkstelling (Census), 1960; CBS, Arbeidskrachtentelling (Labour force surveys) 1975; CBS, EBB 1990, 1999 (the LFS is a sample survey); concerning Philips: Van Drenth, De zorg; Van der Coelen, 100 jaar; company information. Excluded are persons working less than 13 hours (1990, 1999) and 15 hours respectively (1899-1975)

* = 1996

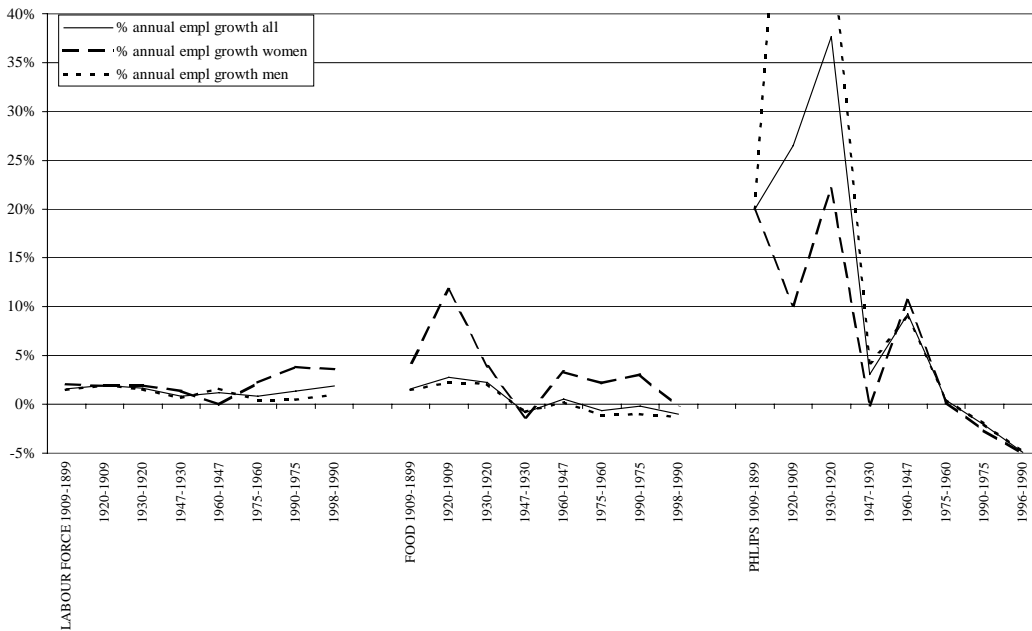
Graph 1 *Percentage of women in total labour force, in manufacturing industry, and in four selected manufacturing sectors in the Netherlands, 1899-1998*



Graph 2 *Percentage of annual employment growth for all, for men and for women in manufacturing industry, and in two selected manufacturing sectors in the Netherlands, 1899-1998*



Graph 3 *Percentage of annual employment growth for all, for men and for women in the labour force, and in two selected manufacturing sectors in the Netherlands, 1899-1998*



3 THE EMERGENCE OF MANUFACTURING INDUSTRY, 1899-1920

Some twenty years after the first signs of an industrial take-off, the Dutch manufacturing industry emerged more clearly. In the 1885-1920 period, a number of new industries started up, partly capital goods producers, partly consumer-oriented, mostly based on chemical, electrotechnical and machine-building innovations, growingly capital-intensive and with advantages of scale. Thus, a process of concentration followed suit. Some forerunners moved in the direction of Chandler's 'managerial enterprise', like the margarine company of Van den Bergh, that already started systematical raw-materials research and expensive advertising campaigns in order to create own brands names. Besides this predecessor of Unilever, the era witnessed the foundation of other multinational corporations: in 1890, KMEPNI, precursor of Royal Shell, started oil drilling in the Dutch East-Indies, a year later Gerard Philips begun his light bulb factory. In their footprints, industries like textiles and cigar production showed a rapid expansion as well, including concentration in middle- and large-sized firms¹⁰.

Between 1885 and 1920, major changes also took place at the labour market and in family life. The combination of rising real wages, a 'civilisation' offensive and the growing 'pillarization' of Dutch society led to the emphasizing of the breadwinner model. Analysis of the Dutch national accounts show that around 1890, Dutch married women went on search for paid work as soon as her children were old enough to contribute to family income. Yet, if twenty years later children generated a higher family income, women concentrated on household duties¹¹. Labour market statistics indicate the same phenomenon. Since 1889, the share of married women in the total female workforce in factories and workshops went down, from 35 percent in 1889 to 25 percent in 1899 and to under 20 percent in 1920¹². Over the next fifty years, married women's labour participation was to stay at this low level.

3.1 THE CLOTHING INDUSTRY

Until 1890, hardly any ready-to-wear clothing was produced in the Netherlands. Domestic clothing production was rather widespread. For example, around 1890, a large majority of the 4,000 to 5,000 Amsterdam tailors produced outer garments for the rich at home, with their wives and children partly in 'additional labour'¹³. After 1890, demand for ready-to-wear clothing soared and the larger towns witnessed the opening up of clothing *magasins*, mainly managed by merchants of German origin like the Brenninkmeyer brothers (C&A), Vroom & Dreesmann, and Peek & Cloppenburg. Their chain stores asked for clothing in stock, thus creating a local clothing industry. This industry and the related infrastructure (designers, fabrics traders, et cetera) concentrated in Amsterdam¹⁴.

Around 1900, the clothing industry showed various forms, from home seamstresses and small tailor workshops to clothing factories employing some hundred girls and women.

¹⁰ Van Zanden & Van Riel, *Nederland*, pp. 380-4, 388; De Jonge, *De industrialisatie*, pp. 63-4, 83.

¹¹ Van Zanden & Van Riel, *Nederland*, pp. 406-9.

¹² Schilstra, *Vrouwenarbeid*, p. 113; Van Klaveren, *Terugkeer*, p. 33.

¹³ Schilstra, *Vrouwenarbeid*, pp. 115-6.

¹⁴ De Jonge, *De industrialisatie*, pp. 82, 91, 121; Miellel, "Westfaalse ondernemers", pp. 136-155.

'Sweatshops' were emerging too: home workers, 'sweaters', started their own workshops and contracted outworkers. Women made up for 90 percent of the sweatshop labour force¹⁵. The role of home hosiery and knitwear production, in the middle of the 19th century executed by thousands of (mostly single) women, was taken over by both sweatshops and larger factories. Only after 1910, the amount of home garment production diminished. Also afterwards, home garment production of mainly women was to stay, especially to cover seasonal peaks¹⁶. Here, like in other home production branches, labour and living conditions remained deplorable for a long time to come¹⁷.

In the last decade of the 19th century, employment in the clothing industry grew and so did the share of women, from 56 percent in 1889 to 63 percent in 1899. The new employers were likely to hire women, as they were cheaper than men and well qualified based on their domestic work. Indeed, male complaints about downward wage competition by women in this decade often concerned the clothing industry¹⁸. These complaints disappeared in the decades to follow. A major explanation may be that meanwhile the sexual division of labour had settled¹⁹. Wage differentials between segregated domains are mostly perceived as justified.

3.2 THE TEXTILE INDUSTRY

Between 1860 and 1910, the Dutch textile industry went through a process of geographical concentration. First, the Twente region in the east of the Netherlands grew into the centre of cotton spinning and weaving, somewhat later the Tilburg region in the south that of the woollen industry. Former textile centres like Leyden nearly disappeared²⁰. Compared to 1889, the Census figures of 1899 showed an influx of women in the textile industry, from 10,800 (24 percent) to 14,600 (30 percent). By 1920, women's employment had grown to 22,300 (34 percent).

In home textile production, the sexual division of labour had been strict: the men carried out handloom weaving, while the women concentrated on supporting activities like spinning, spooling and 'stopping', the repair of weaving faults. Yet, when the men went into the textile factories, the women took over home cotton weaving. Thus, the employers could also attract female weavers. At the turn of the century, male weavers and the Catholic clergy opposed the idea, but some employers did not care²¹. In the next decade, the use of the automatic loom, invented in 1896, spread widely and definitely changed weaving into a male domain. In 1911, Theo van der Waerden in his famous survey noted only men and boys working at automatic looms²². Automation in this male domain of weaving explains why the demand for male labour lagged behind that for women during two decades. This was only partly compensated by the expansion of support activities mainly carried out by

¹⁵ Maters, "Een steekje verder", pp. 60-1.

¹⁶ Schilstra, *Vrouwenarbeid*, pp. 32-3, 117; Maters, "Een steekje verder", pp. 61-2.

¹⁷ Schilstra, *Vrouwenarbeid*, pp. 135-8. In 1909, Dutch government promised to introduce a law regulating home industry. This law passed parliament in 1933. Harmsen et al, *Mensenwerk*, p. 64.

¹⁸ Schilstra, *Vrouwenarbeid*, p. 108; Outshoorn, "Loondruksters", p. 740.

¹⁹ Van Klaveren & Kooistra, *Internationalisation*, p. 9.

²⁰ De Jonge, *De industrialisatie*, pp. 85-110.

²¹ "Contrary to our competitors, we employ female weavers and no male weavers. (...) We are of the opinion that the women are at least as good as the men. Yet, we have to pay them less than the men. So, using female labour gives us direct and indirect advantages", Mutsaerts, an important Tilburg woollen manufacturer stated about 1900. Van der Veen, *Zij telt voor twee*, p. 66.

²² Van der Waerden, *Geschooldheid*, p. 138.

men: physically heavy activities like lugging and mixing wool and waste; qualified technical tasks like those of smiths and carpenters; and administrative tasks²³.

The argument that women were not allowed to perform tasks with longer learning times should be qualified. A description of learning processes in textile production around 1910 hardly shows any differences between male and female functions. Three to six months' learning times were noted for qualified male and female jobs, or even a year for both genders, as was the case for hand printers in cotton production. 'Qualification' grew into a sex-typed criterion when training on the job became insufficient. After 1900, craft schools were created, also inside textile companies. These schools, although small, admitted only boys²⁴.

3.3 THE FOOD INDUSTRY

At the turn of the century, Dutch food manufacturing was still in its infancy stage. Cigar production and alcohol processing were the two oldest and largest branches of the food industry, the first being important for women. Job segregation developed in both home and factory cigar production: men executed work that required some craftsmanship, like building up wrappers and sorting, while women moistened and stripped wrappers and did the packing. Yet, sometimes this segregation was broken down if men went to work in cigar factories and, like in weaving, women took over home production²⁵. A number of cigar producers preferred women because "*they show less inclination to take away tobacco and to drink, and are more economical in using raw material*"²⁶. Obviously because of this substitution strategy, women's share in cigar production went up from 7 percent in 1899 to 19 percent ten years later, while total employment grew only slowly.²⁷

The Dutch food industry as a whole expanded rapidly. In 1920, it employed over 50 percent more workers than in 1899. Women's share grew from 4 to 9 percent, primarily because women's work grew quicker than men's work. New food industries developed. In the factories of Blooker, Van Houten, Droste and other chocolate confectionery producers, cocoa beans were burnt and grinded into cocoa powder. These processes were carried out nearly exclusively by men (although in the 1900s girls at Van Houten's performed quite some dragging and other heavy jobs²⁸). In further processing, where chocolates were poured and packed, many women were employed. "*Packing is mostly done by girls, supervised by a lady*", chocolate producer Driessen told Van der Waerden²⁹. Yet, packing jobs had not always been labelled female. In 1886, Ericus Verkade started his biscuit and bread factory in the old industrial Zaan region. In the first fifteen years, boys did the packing. Not until boys were in short supply, Verkade decided to hire girls for packing biscuits, cookies and chocolates³⁰. The same happened in the margarine factories of Van den Bergh and of the

²³ Van der Waerden, *Geschooldheid*, p. 152; Plantenga, *Afwijkend patroon*, p. 126.

²⁴ A typical statement by P.J. van Vlissingen & Co, the largest textile employer in the Southern town of Helmond: "*All male workers that we employ at about the age of 14, are obliged to follow secondary courses in the school connected with the factory*". Van der Waerden, *Geschooldheid*, p. 162.

²⁵ Schilstra, *Vrouwenarbeid*, p. 40.

²⁶ Van der Veen, *Zij telt voor twee*, p. 71.

²⁷ Van der Veen, *Zij telt voor twee*, p. 72.

²⁸ Schrover, *Het vette, het zoete*, pp. 194-8.

²⁹ Van der Waerden, *Geschooldheid*, p. 269.

³⁰ Hogema & Van der Padt, *Ruytermeisjes*, pp. 10-25.

Jurgens family, precursors of Unilever. When simple packing machines were introduced, girls were partly added to boys as machine operators and partly replaced them³¹.

3.4 THE ELECTRICAL ENGINEERING INDUSTRY

The history of the Dutch electrical engineering industry is mainly the history of Philips Electronics. In 1891, Gerard Philips started a light bulb factory in Eindhoven, in the Catholic South of the Netherlands, a location selected because of its high unemployment and low wages. The company grew quickly, soon outstripping its inland competitors. Already in 1900, Philips had a labour force of about 600; two thirds were women³². From the very beginning, the sexual division of labour within the Philips factories was strict. All bosses were men. They maintained a tight control regime by combining personal surveillance, a system of fines, and piece rates. Gerard Philips was very outspoken in preferring female workers, considering their dexterity to be a major advantage for bulb assembly. At 1910, all factory girls should be able to read and write, because the bosses gave their instructions on paper³³. The girls' wages were comparatively high: some earned more than their fathers as tobacco processors. However, 'only the worst of bad people' were said to accept jobs with the *Protestant* Philips family³⁴. In 1910, only 10 of 1,150 women at Philips were married. The Catholic trade union wanted them to quit totally, arguing that factory work destroyed their family lives³⁵.

In 1914, Philips had a labour force of nearly 2,400, of which 1,765 girls and women (74 percent)³⁶. During the First World War, the company started the production of semi-manufactured goods like glass balloons and packing carton. Philips recruited skilled male workers for these production lines, like German and Belgian glassblowers.³⁷ The composition of the labour force changed drastically. In 1920, its size had nearly doubled compared to that of 1914, but the number of women increased by just 125. Women's share fell to 40 percent, and Philips could no longer be characterized a 'women's company'³⁸. This was an effect of segregation; employment in men's domain had increased.

³¹ Schrover, *Het vette, het zoete*, p. 98.

³² Van Drenth, *De zorg*, pp. 58-9.

³³ Van der Waerden, *Geschooldheid*, pp. 205-15.

³⁴ Van der Coelen, *100 jaar*, p. 23; Van der Veen, *Zij telt voor twee*, pp. 78-9.

³⁵ Van Drenth, *De zorg*, pp. 60-8; Teulings, *Philips*, pp. 41-4.

³⁶ Van Drenth, *De zorg*, pp. 61; Van der Coelen, *100 jaar*, p. 15.

³⁷ Teulings, *Philips*, p. 61.

³⁸ Van der Coelen, *100 jaar*, p. 18.

4 THE ECONOMIC CRISIS AND WOMEN'S LABOUR, 1920-1945

In the interbellum, concentration was a trend in most manufacturing branches in the Netherlands. The share of big firms in sales and profits grew rapidly from 1920 to 1935³⁹. In 1935, when the economic crisis had severely hurt manufacturing industry, a group of thirteen prominent Catholic intellectuals (all men), mainly from the South, declared “*being married and working in the factories cannot go together. The place of the married woman is in and around her home*”⁴⁰. Most employers and the Catholic unions followed this line. Moreover, the governing coalition, dominated by the Christian parties, tried to exclude married women from work in the public sector. According to the prevailing philosophy, employers had to employ bread winning male workers instead of married women. This philosophy was influential; in the 1930s, even a mighty Protestant employer like Philips could not ignore the pressure of the Catholic clergy and the *petite bourgeoisie* in the South of the Netherlands.

4.1 THE CLOTHING INDUSTRY

In the 1920s, women already made up for 67 percent of the labour force in the clothing industry. In ladies' outerwear production, this figure even was 90 percent. Although small firms, including tailor workshops concentrating on custom-made clothes, dominated, factories producing ready-to-wear clothing came up. In 1930, 11 of such firms counted more than 200 workers; four of them were located in Amsterdam⁴¹.

During the 1930s, the clothing industry expanded, mainly because of the replacement of custom-made by relatively cheap ready-to-wear clothing⁴². The larger employers tried to replace male workers by cheaper girls, solving the problem that these girls were less well-trained by rationalisation measures. The combination of mechanisation and substitution of men's work by women now penetrated clothing production. Along the lines laid down by F.W. Taylor, sewing was decomposed in simplified and routinised tasks. Specialized 'industrial' sewing machines were introduced⁴³. These measures had to be completed by flow production, using the conveyor belt, in order to be profitable. The Amsterdam clothing factories introduced conveyors between 1930 and 1933⁴⁴. Compared internationally, they were quite early in doing so⁴⁵.

The German occupation in the Second World War hit the Amsterdam clothing industry, with its large Jewish labour force, severely. First, the many German-Jewish tailor workshops had to close, then the larger factories became Nazi targets⁴⁶. As a consequence, women's share in clothing increased.

³⁹ Bloemen et al, *De top 100*, p. 13.

⁴⁰ Van der Veen, *Zij telt voor twee*, p. 11.

⁴¹ De Baar, “Verzetjes”, p. 198; *Statistical Yearbook 1940*.

⁴² De Jong, *Nederlandse industrie*, p. 226.

⁴³ In 1934 Alida de Jong, the only female paid official of the socialist clothing workers union, stated: “*It is already a long time ago that a ready-to-wear seamstress was able to make a whole jacket, or a winter coat. Vocational training and expert know-how do not count (...) any longer*” (cf. De Baar, “Verzetjes”, p. 200).

⁴⁴ De Baar, “Verzetjes”, p. 202.

⁴⁵ Earlier than the Leeds clothing industry in the UK: cf. Friedman, *Industry and Labour*, p. 98.

⁴⁶ At November 11, 1942, the largest clothing factory, Hollandia Kattenburg, was raided by the Grüne Polizei of the

4.2 THE TEXTILE INDUSTRY

In the 1920s the cotton industry grew rapidly, and concentrated as well: in the Twente region, in ownership and in size. The Twente industry accounted for nearly half of all textile employment. The largest cotton producers, like Van Heek and Nijverdal-ten Cate, became leading in Europe, employing 2,000 to 3,000 workers each⁴⁷. By 1930, employment in the textile industry had grown to 79,200, of which 32 percent women.

In Twente, over half of all women were younger of age than 21, against less than one quarter of the male workers. Another quarter of the men was over 50. This age structure gives a clue about the two strategic options that existed for textile producers. They could opt for hiring more girls, much cheaper than men, that did not receive any vocational training. From 1929 on, nearly all cotton producers chose this option. One of their rationalisation measures was to split off new support functions to be executed by women. Eventually, the expected high labour turnover would not cause organizational problems⁴⁸. The second option, hiring more boys and men, required a long-term perspective on age and skill structures, because these workers expected to stay with the firm for the next 40 or 50 years and if they were fired, resistance was likely. On the other hand, these trained workers could be prepared for the complex and capital-intensive production of the new woven fabrics if the firms developed adequate job ladders. Now, as it is, one has to conclude that only some woollen producers chose for this second option. In the 1930s, when sales collapsed, textile producers fired comparatively many men⁴⁹.

4.3 THE FOOD INDUSTRY

In the first years after World War I, the food industry benefited from the growth in purchasing power: especially sales of 'luxury goods' like cookies, chocolates and liquor boomed. The negative attitude of the Catholic Church towards women's labour was not able to stop the growth of a food industry in the Southern province of North Brabant employing many women. This growth included rather new activities like margarine and food preserving production, as well as old branches like cigar manufacturing, in which women's share rose to 30 percent in 1930⁵⁰.

The boom in food production lasted till 1924. Then, the management of the large Kwatta chocolate plant felt obliged to dismiss a number of 'expensive' adult male workers⁵¹. From 1933 on, Kwatta's repeated this policy, replacing adult males first by boys and in 1935 also by girls⁵². In 1933, their competitor De Heer started by replacing men and boys alike by girls, but reversed this three years later, substituting the older girls working at the packing machines by boys, starting with lower wages⁵³. Generally, the cocoa and chocolate industry

Nazis. All Jewish workers and their families, 1,600 people in total, were transported to the mass extermination camps; only six survived. Harmsen et al, *Mensenwerk*, p. 138.

⁴⁷ Van Waarden et al, *Fabriekslevens*, p. 165.

⁴⁸ Van Waarden et al, *Fabriekslevens*, p. 167.

⁴⁹ Van Waarden et al, *Fabriekslevens*, p. 171.

⁵⁰ Van der Veen, *Zij telt voor twee*, pp. 56-7, 71, 78, 85; Schrover, *Het vette, het zoete*, p. 185.

⁵¹ Stegeman, *In het gareel*, pp. 19-20. From 1922 to 1928, a combination of rationalisation and mechanisation played a major role at Kwatta's too, causing a productivity increase per employee of over 70 percent (calculation based on Laurier & Pot, "Sociaal-demokratiese arbeidersbeweging", p. 77).

⁵² Stegeman, *In het gareel*, p. 38; Schrover, *Het vette, het zoete*, p. 186-7.

⁵³ Stegeman, *In het gareel*, pp. 28-38; Schrover, *Het vette, het zoete*, p. 187.

continued to employ many women in mainly unskilled jobs: between 1925 and 1954, women's share fluctuated between 43 and 54 percent⁵⁴.

At the end of 1931, at the instigation of the Roman-Catholic Tobacco Workers Union, a collective agreement was agreed upon in the cigar industry, stating that the employers should not hire married women, except for cleaning purposes. Women workers that were going to marry should be dismissed. Many married women were already fired in the months before, when the cigar producers started to make large losses⁵⁵.

4.4 THE ELECTRICAL ENGINEERING INDUSTRY

Already in the early 1920s, Philips exhausted the stock of girls and young women in the Eindhoven region. The company expanded rapidly, their Dutch labour force growing from 4,700 in 1920 to 11,600 in 1928. One solution for the labour shortage was a daily shuttle bus service, pulling both women and men from Belgium⁵⁶. Yet, Philips did hardly (dare to) hire married women; in 1930, the firm employed only 189. As a second solution, Philips stimulated the migration of poor farmer families from the Northern province of Drenthe. These families were entitled to a house in Eindhoven if they could deliver at least three girls over 14. During the 1928-1929 boom, the company recruited 554 of such families. However, Philips was forced to hire more male workers than they planned to⁵⁷. The start of radio production, in 1928, had been a major stimulus for the doubling of employment, to 22,700 workers in November 1929. Although the number of women workers grew from 3,500 to over 6,000, by 1930 women's share in Philips' workforce had sunk to 27 percent⁵⁸.

While mainly men were hired for the production of new Philips' products, productivity increased tremendously in the female domain. In the 1930s, women's work in light bulb assembly was rationalized by the introduction of conveyor belts combined with the further division of labour. A communication from 1929 already indicated: "*Some times ago, an improved mechanical method was introduced by which the girls had to work in combination. (...) At first, 13 girls were needed to produce 780 bulbs per hour. Every now and then, a boss sat down with the children, watch in his hand, and pushed them to work harder. Nowadays, a team needs only 8 girls, but production has gone up to 1050 till 1080 bulbs per hour*"⁵⁹.

The economic crisis halted the expansion of Philips in the Netherlands and stimulated production abroad. From January 1931 to May 1932, Philips dismissed exactly half of their Eindhoven staff: 52 percent of all men, 43 percent of the women. Young commuters, for the most part women, were the first to be dismissed. Then, the many unmarried craftsmen that had board and lodging in Eindhoven were fired⁶⁰. The share of women workers at Philips Eindhoven went up to 33 percent in early 1940, when the company had concentrated hiring strategies on young women again⁶¹.

⁵⁴ De Jong, *Nederlandse industrie*, p. 154; Schrover, *Het vette, het zoete*, p. 201.

⁵⁵ Van der Veen, *Zij telt voor twee*, pp. 71-3.

⁵⁶ Blanken, *Geschiedenis, Deel III*, p. 302.

⁵⁷ Blanken, *Geschiedenis, Deel III*, pp. 293-4; Van Drenth, *De zorg*, pp. 76-7.

⁵⁸ Blanken, *Geschiedenis, Deel III*, p. 290; Van der Coelen, *100 jaar*, p. 20; Van Drenth, *De zorg*, pp. 72-6).

⁵⁹ Laurier & Pot, "Sociaal-demokratiese arbeidersbeweging", p. 77.

⁶⁰ Teulings, *Philips*, p. 83; Blanken, *Geschiedenis, Deel III*, pp. 421-7.

⁶¹ Van Drenth, *De zorg*, p. 136.

In the Second World War, the Philips family tried to show friendly faces both to the Allies and to the Nazis. A major goal of CEO Frits Philips was to keep the Eindhoven facilities going⁶², and deploying young women was instrumental in reaching that goal. On March 24, 1943, the company magazine published an article heading “*Dismissal because of marriage? Only possible in some cases*”. Although these dismissals had been normal practice throughout the 1930s, now the director of the local Employment Exchange could only give his permission to do so if “*the social conditions of the married couple make such action urgently advisable*”⁶³.

⁶² Blanken, *Geschiedenis, Deel IV*, p. 103-4.

⁶³ Van Drenth, *De zorg*, p. 137.

5 THE RISE AND DECLINE OF MANUFACTURING INDUSTRY, 1945-1975

From 1945 to 1956, the consecutive Dutch administrations tried to stimulate industrialisation by a low-wage policy, with the support and consent of the three ‘recognized’ trade union confederations⁶⁴. From 1956 until the ‘wage explosion’ of 1963 and 1964, wages were still lower than those in the main competing countries. The first two decades after the war were characterized by a labour-intensive pattern of economic growth⁶⁵. Female labour supply mainly consisted of girls. In the 1950s, many working class girls started working directly after completing compulsory education at age 14, often as an escape from their school situation. Once working in manufacturing industry, an orientation towards marriage and family life rapidly developed, preparing the escape from monotonous work under bad conditions⁶⁶. Increasingly, girls aimed for longer education and preferred jobs in the service sector. Women married at a young age, and almost all married women became housewives. Thus, manufactured industry suffered from short supply of women’s labour.

5.1 THE CLOTHING INDUSTRY

After World War II, demand in the Netherlands for textiles and clothing soared and production expanded. The Dutch clothing industry was soon confronted with labour shortages. Clothing manufacturers concentrated their production in the industrialized west of the country, hiring mainly 14-20 year old girls. They went on in splitting up the labour process, especially in the sewing rooms⁶⁷. While the level of training required for seamstress jobs went down, the aversion against them grew. From 1950 on, the larger producers tried to maintain their labour supply by transferring their sewing facilities to the eastern and southern periphery of the Netherlands, where wages were 15 percent lower than in the west. In 1963, two-fifths of the Dutch clothing employment was located in this western part, as against three-fifths in 1950⁶⁸.

In the early 1960s, girls’ aversion against factory work became visible in the periphery too. The clothing employers’ federation advised their members to recruit married women. Most larger manufacturers did try, but they seldom adapted their organizations to the needs of these part-timers. Neither did they develop a vocational training structure, nor did they improve bad labour conditions substantially. The percentage of women workers in clothing being married was to remain under 25⁶⁹.

Employment in the Dutch clothing industry went slightly down, from 102,000 workers, of which 72 percent were women, in 1947 till 84,000 (with still 72 percent women) in 1965⁷⁰. From that year on, clothing imports by chain stores grew quickly. In turn, Dutch producers started ‘runaway’ sewing facilities in Belgium, Portugal and Tunisia, producing for re-

⁶⁴ De Liagre Boehl et al, *Nederland industrialiseert!*, pp. 168-236; Visser & Hemerijck, ‘A Dutch Miracle’, pp. 92-3.

⁶⁵ Van Zanden & Griffiths, *Economische geschiedenis*, pp. 45-7; Van Klaveren, “Structuurpolitiek”, pp. 46-48.

⁶⁶ Van Klaveren, “Gehuwde vrouw”, pp. 213-7.

⁶⁷ Van Klaveren & Kooistra, *Internationalisation*, pp. 15, 23, 26; Elias, *Fabrieksgeschiedenis*, p. 111.

⁶⁸ Van Klaveren & Kooistra, *Internationalisation*, pp. 16-7, 65.

⁶⁹ Van Klaveren & Kooistra, *Internationalisation*, pp. 25-7.

⁷⁰ CBS, *Productiestatistiek Confectie-industrie (Production Statistics Clothing Industry) 1965*.

import to the Netherlands. Employment in the Dutch clothing industry was halved in the next decade⁷¹. In 1975, the branch counted 39,400 workers, of which 67 percent women. The percentage of women had diminished because of compositional effects: employment in outerwear production, employing relatively few women, went down slower than employment in other product groups⁷². Except for the upper part of the market, manufacturers keeping their Dutch facilities replaced married women by 16-22 year old seamstresses. The image of the clothing industry as an employer eroded further⁷³.

5.2 THE TEXTILE INDUSTRY

After 1945, the Dutch textile industry went through processes of mechanisation and rationalisation. In the 1950s, production technology was comparatively advanced. Yet, the dominant managerial orientation was inward, and insights in internationalising markets remained limited. Opposite to the clothing industry, the textile industry has always been dominated by men and their skill structure⁷⁴. Be it for partly different reasons, developments in employment turned out to be similar.

In the post-war expansion period, Dutch textile manufacturers nearly exclusively attracted men. Hiring new staff was a highly competitive business, fought with nice canteens, free sports facilities and the like, but the sexual division of labour was firmly maintained. In 1947, employment in the textile industry was slightly under that of 1930. However, the number of women had gone down more quickly, to 21,800 in 1947, 27 instead of 31 percent. In the Tilburg region, over 90 percent of the women working in textiles before the war did not return in this branch, most of them because they were married. The Tilburg textile manufacturers did not accept married women in their factories. After 1945, they contracted out 'stopping' work to home workers -- mostly married women. Here too, girls showed an aversion against factory jobs⁷⁵. The 1950s were 'the golden years' of textile manufacturing. Employment grew till 1960, when 103,700 workers were employed, among which 27,200 women (26 percent). Especially 14-19 year old girls were in short supply. The two-shift system that prevailed in the Twente cotton industry formally prevented the recruitment of married women: official working time regulations did not allow for full-time shift work by women with household responsibilities. Nevertheless, once the Labour Inspection found 480 married women working in two shifts -- without permits⁷⁶.

Especially in Tilburg, prosperity did not last for long, as from 1959 on woollen-manufacturers closed down factories. In Twente, the first mass dismissals took place in 1964. In May 1967, one of the largest cotton manufacturers, Van Heek & Co., dismissed over 1,000 workers: 40 percent of all men, 21 percent of the women. Other firms also dismissed comparatively more male workers⁷⁷. Yet, because turnover rates were much higher for women, these dismissal policies did not affect the gender composition of the sector.

The decline in employment in the textile industry has been as dramatically as in the clothing industry. Again, transferring production abroad played a major role, although rationalisation

⁷¹ Van Klaveren & Kooistra, *Internationalisation*, pp. 74-85.

⁷² Van Klaveren & Kooistra, *Internationalisation*, p. 90.

⁷³ Van Klaveren & Kooistra, *Internationalisation*, pp. 28, 76.

⁷⁴ Van Waarden et al, *Fabriekslevens*, p. 97.

⁷⁵ Happel et al, *De ondergang*, pp. 27, 146-64; Plantenga, *Afwijkend patroon*, p. 140.

⁷⁶ Van Waarden et al, *Fabriekslevens*, p. 185.

⁷⁷ Van Klaveren, *Verlag*, p. 47.

and automation were important factors too. The shortages of women and girls even remained when the industry was in decline. Here, we found an example of substitution of women by men, because a number of men was retrained for ‘women’s jobs’⁷⁸.

5.3 THE FOOD INDUSTRY

After the Second World War, the Dutch food industry flourished, especially when food rationing ended in 1948. In the 1947-1960 period, employment grew to 199,000, but afterwards it went down slowly, to 179,000 in 1975. Yet, the number of women workers kept on growing and the percentage of women in the food industry rose from 10 percent in 1947 to 19 percent in 1975. This was mainly due to growth in the women’s domain.

Immediately after the War, wages in the food industry were below manufacturing averages. Shortages of labour were second only to those in the clothing industry. Working in biscuit, chocolate and confectionery factories had a poor image. Again, substitution of women by men can be traced, although on a limited scale and just for a while. In 1946, Verkade’s biscuit factory hired 14 and 15 years’ old boys for ‘girls’ work’, mainly packing⁷⁹. Verkade is a good example of an employer actively trying various options when labour shortages became acute in the 1950s, although maintaining gender boundaries. First, the firm widened its regional scope, with hiring actions like family evenings some 60 km away. In the Netherlands, with its limited geographical mobility, this was felt as a long distance. Second, Verkade’s hiring strategy changed to married women, using the slogan “*Girls, come to work with Verkade and bring your mother with you*”. Third, bringing down turnover of pregnant women proved to be essential. In 1961, the firm was one of the first in the Netherlands to start an own day care centre. Fourth, Verkade promoted part-time work. After some years, they employed over 100 ‘evening ladies’. Fifth, the firm hired migrant workers: not only men, but from the very start in 1963 also women, initially Spanish and Italian and later on Turkish women. In the end, Verkade replaced their packing facilities 50 km up North, in a region with high unemployment. At the time, 400 out of 600 women workers were married.⁸⁰

The confectionery producers in the Catholic south, when confronted with labour shortages, chose for recruiting married women with elder children. The public condemnation of married women’s factory work was a major argument to exclude women with younger children, even at the end of the 1950s. Then, in the new Liga biscuit factories and at Kwatta’s separate married women’s packing departments were set up. These departments were all-female, led by ‘ladies of supervision’⁸¹. The food industry attracted more married women than the other manufacturing industries. In 1966, 4 out of every 10 women food workers were married⁸².

⁷⁸ A Labour Inspector stated about the government-financed retraining process: “*Many men found these jobs rather inferior. Yet, we succeeded, especially because the job content was changing due to mechanisation*”. Van Waarden et al, *Fabriekslevens*, p. 185.

⁷⁹ Hogema & Van der Padt, *Ruytermeisjes*, pp. 73-5, 80.

⁸⁰ Hogema & Van der Padt, *Ruytermeisjes*, pp. 113-29, 139-44.

⁸¹ Stegeman, *In het gareel*, p. 46.

⁸² Van Klaveren, *Terugkeer*, p. 72.

5.4 THE ELECTRICAL ENGINEERING INDUSTRY

Directly after 1945, the electrical engineering industry of the West entered into a period of unknown expansion, with Philips in its first ranks. Already in August 1946, the firm employed 28,500 people, of whom 5,700 (20 percent) women. One year later, the Philips archives mentioned 34,500 workers, including 6,000 women: a net growth of only 300 women, lowering their percentage to 17⁸³.

Recruiting unskilled girls for assembly work proved to be very difficult. A Philips brochure as of 1948 urged the Eindhoven girls to join the company, using the slogan “*girls for girl’s work and men for men’s*”. If they would not come, the brochure went on, “*then we have men to do control and fine assembly work and packing bulbs*”⁸⁴. As this threat did not work, Philips started to search for girls outside the home town, opening assembly factories in the Dutch periphery. Here, girls and young women assembled radio and TV sets, shavers and other consumer appliances⁸⁵.

Yet, soon the problems along these assembly lines became evident. The high speed required and the strict control regime caused symptoms of work stress. Labour turnover went up again, as did hiring costs⁸⁶. Philips’ policies changed towards hiring married women, although they did not start day care centers like Verkade did: these provisions for married women were still felt to be morally unacceptable. Philips started up small assembly factories for part-time working married women only. Here, work structuring experiments were set up, breaking with the assembly line system by using buffer stocks and by broadening tasks. Since 1960, personnel officers had advertised married women as a group that could handle the resulting larger responsibilities. The experiments were evaluated positively, but their impact remained limited: only 3.5 percent of Philips’ Dutch labour force were involved⁸⁷. Within ten years, when the demand for women’s labour had fallen, work structuring was judged to be outdated.

In 1970, Philips’ Dutch workforce reached its all-time peak with 100,900, of which 18 percent were women⁸⁸. From then on, closing down departments and factories, already starting in 1966 when results were ‘disappointing’, was intensified. Divisions and factories with comparatively many women were most severely hit. The main forces behind the decline in employment were (rigid) factory automation, scaling-up of manufacturing, and ‘runaway’ investments in South East Asian and Mexican assembly lines. Philips’ investments in micro-electronics factories in Taiwan, for example, had direct negative effects on women’s employment in the firm’s two largest Dutch microchip factories⁸⁹, although in the long term the combined effects of automation and scaling-up on female employment in Philips’ Dutch factories were larger⁹⁰. Until 1975, these negative effects were mitigated by the influx of office women. In that year, Philips employed 14,800 women in the Netherlands, still 18.5 percent of their workforce⁹¹.

⁸³ Van der Coelen, *100 jaar*, p. 43; Van Drenth, *De zorg*, p. 139.

⁸⁴ Van Drenth, *De zorg*, p. 148.

⁸⁵ Teulings, *Philips*, pp. 152-3; Van Drenth, *De zorg*, pp. 140-1.

⁸⁶ Van Drenth, *De zorg*, pp. 157-9.

⁸⁷ Teulings, *Philips*, pp. 155-6; Van der Coelen, *100 jaar*, pp. 53-68.

⁸⁸ Van der Coelen, *100 jaar*, p. 43.

⁸⁹ Van Klaveren & Vaas, “Wie wordt”, p. 78.

⁹⁰ Teulings, *Philips*, p. 157; Van der Coelen, *100 jaar*, pp. 103-6; Van Klaveren & Vaas, “Wie wordt”, pp. 81-8.

⁹¹ Van der Coelen, *100 jaar*, p. 101.

6 AUTOMATION IN MANUFACTURING INDUSTRY: THE IMPORTANCE OF SKILL, 1975-1999

Since the mid-1960s, total employment in Dutch manufacturing industry decreased (see table 1). However, women's employment showed a remarkable recovery, especially between 1975 and 1990. This recovery rested on employment growth in the food industry, as well as in some industries in which women used to be small minorities, notably printing and publishing (1999: 33,000 women, 34 percent) and chemicals (1999: 19,000 women, 23 percent). This influx stemmed from office jobs, but the number of women in manufacturing and laboratory jobs increased substantially too⁹². From 1977 to 1985, the total number of female manual workers grew by 23 percent, while the number of those in unskilled jobs even grew by 52 percent⁹³. Although these figures are not quite comparable with more recent ones, the latter suggest that the growth of the number of women performing unskilled work in manufacturing industry, although slowing down, continued from 1985 to at least 1995⁹⁴. The domain of unskilled manufacturing jobs is reducing, but women's share in it rises sharply.

6.1 THE CLOTHING INDUSTRY

The official figures state that the clothing industry had decreased to 8,000 workers in 1999, among whom 6,000 women (a record 75 percent). In the 1990s, most of the larger Dutch clothing manufacturers automated design, pattern drawing, cutting and pressing, at the cost of mainly male jobs. They contract out sewing activities to abroad. A small number is betting on better products, and is experimenting with work structuring and group work⁹⁵.

The figures mentioned underestimate the real size of production and employment. The 1970s and 1980s witnessed the growth of an informal clothing industry, located especially in Amsterdam, composed by 'modern' sweatshops, small factories and home workers. They were at the lowest level of subcontracting chains, covering the need of department stores for quick deliveries of trendy ready-to-made clothing⁹⁶. Bad physical labour conditions and low incomes are standard. Here, the sexual division of labour of the formal clothing industry is turned upside down: most sewing machine operators are men, especially Turks. In 1992, the informal clothing industry should have reached its peak; at the time, a reliable source mentioned 8,000 workers⁹⁷. Their numbers seem to have fallen drastically since, mainly because of more strict observance of the law by tax and local authorities⁹⁸.

6.2 THE TEXTILE INDUSTRY

Since 1975, the textile industry developed similar to the clothing industry, except that contracting chains remained limited. Although many textile factories closed down, the

⁹² Tijdens & Goudswaard, *Kantoorarbeid van vrouwen*; CBS, *EBB 1996*.

⁹³ They were mainly but not all working in manufacturing industry. The similar figures for men were a decline of 13 percent and a growth of 1 percent. Cf. Huijgen, *De kwalitatieve structuur*, pp. 56-7.

⁹⁴ Indications from: CBS, *AKT*, 1985; CBS, *EBB*, 1990, 1999; CBS, *LSO*, 1995.

⁹⁵ Scheffer, *Trading Places*, pp. 191-2; Peeters, *Groepswerk*, pp. 85-138.

⁹⁶ Peeters, *Groepswerk*, p. 41; Braam, *De blinde vlek*, pp. 22-3.

⁹⁷ BEA, *Illegale confectie-ateliers*, p. 12.

⁹⁸ Cf. Zorlu & Reil, "De Amsterdamse confectie-industrie", p. 759.

industry did not leave the Netherlands entirely. In 1999, it had a workforce of 23,000, less than a quarter of its size in 1960, but women's share went up from 26 to just over 30 percent. This growth is mainly caused by a composition effect that is by the growing importance of hosiery and ladies' underwear production, where women already had a share of over 40 percent⁹⁹.

Especially in the Twente region, a number of innovative companies has survived, producing specialized fabrics by highly capital-intensive and automated techniques. Unlike their predecessors, they are market-oriented. Here, the remaining control work is nearly all carried out in three or five shifts, and consequently women's share is rather low¹⁰⁰. Yet, total employment in these factories is small.

6.3 THE FOOD INDUSTRY

Between 1975 and 1999, employment in the Dutch food industry diminished slowly. Yet, the number of women went up, so the growth of women's share persevered, reaching nearly 31 percent in 1999.

The growing number of women in the 1970s and 1980s may seem remarkable. They can be attributed to the following mechanism. Over the 1970-1989 period, the percentages of women workers were highest in fish processing (nearly 50 percent) and in bread, biscuit and cookies production (about 40 percent). These branches showed the strongest employment growth in this period too. On the other hand, in branches where employment diminished most heavily, the percentages of women went down: in tobacco-processing from 42 percent in 1970 to 21 percent in 1989, in vegetables and fruit-processing from 25 to 19 percent¹⁰¹. Here, as well as in cocoa, chocolate and sweets confectionery production, most production jobs of women remain in packing. Since the mid-1980s, these jobs have been threatened by new technology, starting with PLC (Programmable Logic Control) guided equipment, linked up with BAR coding, later on by CAM (Computer Aided Manufacturing). In 1986-1987, automation and the organization of work were thoroughly researched in the confectionery industry. Then, computerization asked for the renewed definition and allocation of jobs. Tasks directly related to the operation of new equipment were defined as the core of new jobs and were segregated from residual tasks, resulting in a classification of 'key jobs' and 'marginal jobs'. In this process, as well as in the allocation of jobs to people, prejudices about skills attributed to men and to women often proved to be essential. Key jobs were supposed to ask for technical know-how and 'machine sensitivity'. Decision makers did not try to describe these skills objectively. They attributed the related qualities nearly exclusively to men. These processes of organizational choice resulted in continuous job segregation: equipment control continued to be a male domain¹⁰².

Yet, segregation could not be maintained consistently. In some packing departments, women came to work as machine operators, but their jobs were not classified as such and they were still paid as packers. For the companies, this 'solution' was cost saving and diminished the resistance of men against the entry of women in their domain¹⁰³. The Verkade company showed an even more subtle solution. In 1996, the biscuit producer only

⁹⁹ CBS, *Algemene IndustrieStatistieken*, 1960, 1970, 1980.

¹⁰⁰ *NRC-Handelsblad*, May 21, 1996.

¹⁰¹ Van Klaveren & Tom, *Occupational*, p. 7.

¹⁰² Braaksma et al, "Vingervlugheid", pp. 38-9; Poutsma & Trommel, "New technologies", pp. 58-9.

¹⁰³ Braaksma et al, "Vingervlugheid", p. 39.

employed 148 women (22 percent). 40 women were working directly at the conveyor belt; the other 60 factory women, the former belt bosses, were now called machine leaders¹⁰⁴. The latter had to follow longer courses in operating equipment, but they showed little willingness to do so, presumably mainly because they perceived small chances to enter into the male domain. Indeed, the machine leaders became subordinated to a new and expanding group, the process counsellors. They were all men.....¹⁰⁵.

The food industries' skill demands went up quickly as it concerned machine operator jobs, especially where continuous processes developed. Here, multi-skilling was asked for. Already in 1985, a number of food companies required medium level vocational school as a basis for multi-skilled jobs, to be completed by two-year apprenticeship courses. This level has become the industry standard since, although it is judged broadly as being quite heavy for production workers. Thus, female production staff is likely to remain 'locked up' in the lowest wage groups. If their jobs are endangered, like in packing, and new jobs are created on top of old pay and grading schemes, many women have to jump too high¹⁰⁶. Then, women's share in food production can be expected to diminish.

6.4 THE ELECTRICAL ENGINEERING INDUSTRY

In the 1975 to 1984 period, Philips went on concentrating production in larger factories, victimizing women even more than men. In this period, Philips' labour force dropped from 80,000 to 65,900, and the female labour force from 14,800 (18.5 percent) to 9,800 (15 percent). Up till 1980, this slimming down happened by means of natural turnover. Then, Philips announced mass redundancies in their microchip and glass-producing divisions. The remaining 'women's factories' were closed down¹⁰⁷.

Since the late 1980s, Philips invested heavily in flexible automation and in information systems, and strove for the extension of operating hours to have these investments paid off. A flexible circle around the core labour force filled in the extra operating hours. Women made up for 90-95 percent of this circle, and most women worked on temporary contracts. Between 1985 and 1990, the share of temporary staff in Philips' Dutch labour force fluctuated between 5 and 10 percent¹⁰⁸.

Segregation between male and female jobs remained virtually inviolable in Philips' manufacturing. Monotonous female labour proved to be vulnerable for automation. Continuing employment of low-paid women sometimes seemed to postpone production automation, but in most cases the (cost) advantages of automation were so large as to pursue further labour-saving investments¹⁰⁹. The unions succeeded to include an Affirmative Action clause in the 1988 collective agreement of Philips. Soon, a strong top managerial commitment turned out to be indispensable to even out segregational tendencies and to break down the conserving power of the firm's male-dominated middle management. Breaking this power was one of the challenges for CEO Jan Timmer when he started Operation Centurion in 1990. The main purpose of Centurion was to make the company lean and mean, and to realize a quick improvement of profitability. A number of management buy-outs took place. Philips' profits went up, but the power of middle

¹⁰⁴ Hogema & Van der Padt, *Ruytermeisjes*, pp. 133-44.

¹⁰⁵ *Forum*, November 29, 1990; Hogema & Van der Padt, *Ruytermeisjes*, p. 154.

¹⁰⁶ Van Klaveren & Tom, *Occupational*, pp. 22, 36-41.

¹⁰⁷ Van der Coelen, *100 jaar*, pp. 106-8, 116.

¹⁰⁸ Van der Coelen, *100 jaar*, pp. 116-20.

¹⁰⁹ Van der Coelen, *100 jaar*, pp. 111-3.

management still worried Cor Boonstra, Timmer's successor. The resulting changes in the Eindhoven labour market have been to the benefit of higher qualified men. The effects on former Philips women workers in lower classified jobs are less favourable¹¹⁰. Operation Centurion weakened the position of women at Philips, of which 6,200 (15.5 percent) remained in 1996. The Personnel Director of a large Dutch Philips establishment frankly stated: "*Because of Centurion, all plans for women have actually suffered a backlash*"¹¹¹.

¹¹⁰ Source: RBA (Labour Office) Eindhoven.

¹¹¹ Elias, *Fabrieksgeheimen*, p. 43.

7 CONCLUSION

We followed two lines of reasoning in explaining fluctuations in the gender composition in the labour force in the four selected manufacturing industries during the past hundred years: one based on segregation, the other on substitution. Concerning segregation, changes in gender composition are primarily explained by changes within the male and female domains of the work force. These domains have been defined in terms of occupation, department, plant, skill and hierarchy. Concerning substitution, changes in gender composition are related to breakthroughs in the sex-typed domains, mostly realized by hiring and firing strategies of firms.

Around 1900, women went to work in ready-to-made clothing factories and made inroads in the formerly male domain of tailor work. At the same time, in textiles, parts of food production and electronics engineering a male domain was established in occupations defined as skilled or semi-skilled, a definition mainly linked with the operation of larger, capital-intensive machinery. Yet, some employers continued to hire women workers for this type of work until 1910. This practice ended when formal training at craft schools was required for most occupations. When assembly processes in clothing and food, and at Philips electrical engineering, were taylorised on a large scale, the dexterity of girls and women became a major factor and they made up for a majority of the corresponding labour force. Although in all four industries women's lower wages certainly played a role in employers' recruiting strategies, substitution could hardly be traced. Our examples suggest that occupational segregation took one or more decades to be established in new firms and activities. By 1920, assembly and packing jobs in clothing, food and electronics engineering industries were labelled female. The sex typing of supervisory occupations continued to vary. When the clergy made objections against contacts between men and women supervisors were female, otherwise they were mostly male.

In the course of the 20th century, the definition of 'skill' appears to be of growing importance for the sex typing of industrial occupations. In more advanced production processes, tasks directly related to the operation of (semi-) automated machinery were defined as skilled jobs. As research in the food industry showed in the 1980s, such jobs were supposed to require technical know-how and 'machine sensitivity', qualities stereotypically attributed to men. Such processes of stereotyping and segregation were, often in a less sophisticated form, already going on for over 60 years, resulting in a sexual division of labour that predominantly developed along lines of 'skilled' versus 'unskilled' occupations. As the gap in demand for these different skill levels is nearly continuously widening, this division of labour may be increasingly disadvantageous for women.

In the late 1920s and the 1930s, the introduction of scientific management, together with that of the conveyor belt and further rationalisation measures, sharpened segregation, concentrating women in the domain of 'unskilled' work. On the other hand, employers in clothing and textiles reacted to the slump of the 1930s by replacing male workers by cheaper girls. This substitution was easier in clothing, where the share of women was already high and mechanisation took away the need to train newly hired girls, than in textiles, where employers consequently also pursued a policy of lowering wages. In the food industry we found examples of the opposite: employers substituted older girls for boys that started at lower wages.

For the post-war period, we again traced examples of substitution of female labour by men, notably in 1946 by food producer Verkade and between 1965 and 1975 with the help of state-financed training programs in textile companies. Labour shortages were a major impetus here. In most cases a machine component was added to the job description in order to change the sex typing of the job and make the work acceptable for men. However, the relative size of these substitutions was small and they hardly influenced the gender composition in the four industries. Labour shortages in manufacturing industry generally were much larger for women than for men, because turnover rates in the female labour force were high, girls began to enjoy longer education, and gradually developed an aversion against factory work. A few times, employers aimed to break down gender barriers, but even they seemed scared of the prospect of men performing 'girl's work', like Philips clearly was in 1948. They rather broadened their strategies and aimed at recruiting groups of women not recruited before, widened their geographical recruitment area, and relocated production facilities to regions with high unemployment and, after the recession of 1967, abroad (clothing, textiles, Philips). In the 1970s the female domain of 'unskilled' assembly work became 'footloose'.

The growth of female employment in food manufacturing in the 1970s and 1980s seems to contradict this. However, we showed that composition effects largely explained this growth: growing branches maintained high percentages of women workers, while decreasing branches showed low and decreasing percentages of women. The food industry also provided insight into the higher skill demands of employers, especially for the new jobs in computerized production processes, and into the related mechanisms of choice of women. They may have perceived small chances for a lasting stay into a male domain, and acted accordingly by not following training courses.

In the 20th century, women's education level raised nearly up to men's level. Yet, within Dutch manufacturing industry women tend to be locked up in the unskilled domain as far as manual jobs are concerned. Skilled women are predominantly finding jobs outside manufacturing production. Industrial unskilled work will become even more vulnerable for global sourcing and automation. As the growth of (women in) administrative and supervisory jobs in industry seems to come to a standstill, one can assume that in the near future the gender composition of the Dutch manufacturing industry will become even more male dominated.

To conclude, we found that the fluctuations in the percentages of women in the four manufacturing sectors studied can primarily be explained by segregation, i.e. by fluctuations in employment within the male respectively within the female domains. Expansion and reduction of industries, mechanisation, computerization and routinization of production processes all have had their impact on the expansion or contraction of either the male or the female domain. We found few examples of substitution. Women were replaced by men when labour of women was in short supply, and men were replaced by women when unemployment rates were substantial. However, the numbers of workers involved were comparatively small. Over the past hundred years, the employers in Dutch manufacturing industry preferred to act within gender boundaries. In case of labour shortages for women's work, they preferred recruiting groups of women not recruited before, be it married women or migrant women, widened their geographical recruitment area, or relocated their production facilities.

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