THE MAKING OF SCOTLAND'S FIRST INDUSTRIAL REGION: THE EARLY COTTON INDUSTRY IN RENFREWSHIRE

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At the end of the eighteenth century, a remarkable proportion of Scotland's high quality textile production was concentrated in and around the town of Paisley. It included half of Scotland's powered cotton spinning capacity, probably as much of its fine weaving, the bulk of the country's silk industry, and a very significant part of its thread making, bleaching, dyeing and printing. At British level, Paisley could stand comparison with the main textile centres of Lancashire. Its textile printing predated that of Lancashire by a generation and its first powered spinning mills were constructed within a year of those of Lancashire. By the 1790s around ten per cent of Britain's and half of Scotland's machine spinning was located within ten miles of the town.

The object of this article is to explore how this small area, relatively remote from the main concentrations of the industry at British level, should have become one of the main centres of the first textile-based industrial revolution. It is suggested that there are three main explanations.

First, a relatively large and stable group of merchant manufacturing families largely ran the town from the beginning of the century, constructing partnerships for long distance trading, and producing specialist high quality textiles for fashion markets. The second explanation derives from the first, that is, the speed with which Paisley merchants responded to the changing needs of the London market and experimented with new technologies and materials: mixed cotton and linen from the 1700s, mechanical thread production and water-powered lint mills from the 1720s, cotton bleaching and printing from the 1730s, silk weaving and mechanised stocking production from the 1750s, and cotton spinning and muslin weaving from the 1770s. Finally, there was the ability to develop and retain a fully integrated textile making region to the end of the century, by developing water resources to keep the new cotton spinning industry within the region.

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This article will examine the sequence of changes which led to the region capturing all stages of the textile production process by the 1750s, refining this by weaving silk and cotton, and dominating the early water-powered spinning of cotton by the 1790s.[1]

I

This period falls within the terms of what has traditionally been classed in Britain as the 'Industrial Revolution'. The relative significance of the term has varied in different periods, but in Scotland's case there are fewer doubts, partly due to the rapid change within a short period, particularly when considering cotton.[2]

Writers from the late nineteenth century saw the beginnings of the factory in Britain as having occurred primarily due to advances in technology and invention.[3] Social changes were also recognised as important, but were often considered to be the result of technological progress. Most theories still have some relevance, and the historiography demonstrates that they can often return to the spotlight decades later. The relevance of technology was stressed again by Landes in the 1960s.[4] More recently the importance of *micro* inventions, or a much wider number of small local advances and ongoing innovation was as important as the 'glorious' inventors such as Arkwright and Watt.

Attempts to understand early industrialisation, have moved from patterns or stages of economic growth, through cycles of growth, to Rostow's five stages of growth, leading to 'take off'.[5] In Scotland Smout, following Hamilton, suggested a two-stage process, marked by cotton from 1780 and iron from 1830.[6] More recently the term 'Industrial Revolution' has been challenged by the concept of the 'industrious' revolution. This change was driven by early demand at household level preceding the supply-side phenomena of industrial revolution.[7]

This pushing of the origins of industrialisation backwards has been an ongoing process. Clapham promoted a more gradualist position due to the survival of

[1] This article is based on the author's 2004 PhD thesis, published as: S. M. Nisbet, 'The Rise of the Cotton Factory in Eighteenth Century Renfrewshire', *British Archaeology Reports, British Series* No. 464 (Archaeopress, 2008). I acknowledge the valuable assistance of Professors John Foster, Chris Whatley and the late John Butt.

[2] C. A. Whatley, *The Industrial Revolution in Scotland* (Cambridge, 1997), p. 6.

[3] A. Toynbee, 'Lectures on the Industrial Revolution in England' (London, 1884), p. 31, quoted in P. Hudson, *The Industrial Revolution* (London, 1992), p. 11.

[4] D. S. Landes, 'The Fable of the Dead Horse or the Industrial Revolution Revisited' in J. Mokyr, *The* British *Industrial Revolution* (Colorado, 1992), p. 132.

[5] J. A. Schumpeter, *A History of Economic Analysis* (Cambridge, 1982 edn); W. W. Rostow, *The Economics of Take-Off into Sustained Growth* (1963).

[6] H. Hamilton, *The Industrial Revolution in Scotland* (Oxford, 1932), p. 1; T. C. Smout, *A History of the Scottish People 1560–1830* (London, 1969), p. 230.

[7] J. De Vries, 'The Industrial Revolution and the Industrious Revolution', *Journal of Economic History*, Vol. 54, No. 2, (1994), pp. 249–70.

rural manufacturing alongside factory industrialisation after 1800.[8] Mantoux then pushed the date further back, suggesting that the Industrial Revolution was the culmination of movements which had long been underway.[9] By the 1980s this had been taken much further by Crafts, and it began to be accepted that the supposed *revolution* in industry was more of an *evolution*.[10] Although widely accepted for Britain as a whole, there are difficulties in quantifying an aggregate approach in Scotland. For a start, very few of the sources used in developing the approach were from outside of England, and Scotland was omitted altogether.[11] Part of the reason is the lack of surviving data, and the principal modern authorities admitted great frustration, noting that 'the quest for details . . . has provided a scant reward for enterprise'.[12]

The inherent paradox is that without detailed background studies of the cotton industry in Scotland, it is very difficult to create overall patterns. The words of Landes are particularly appropriate in Scotland, that the 'quantifiers build brave structures on shaky foundations'.[13]

Following the prominence of gradualism and national patterns, there was a contrasting emphasis on the regional aspect of industrialisation, which could be missed by national statistics.[14] It was suggested that regional studies may be more useful than national studies in understanding the changes, and that 'attempts to understand the Industrial Revolution are best made with the regional perspective at central stage'.[15]

From the 1960s it was evident that there were other, earlier roads to economic growth including manufacture in peasant situations in parallel with subsistence farming. This led to the concept of the evolutionary theory of 'proto' industrialisation. It suggested that three main ingredients: rural industries, external markets and part-time agricultural work could lead to centralised factory-type manufacture.[16] Although the model was flawed when applied to Scotland,[17] Proto-industrialisation was particularly useful in generating regional studies relating rural manufacture to industrial growth. This paper is one such study.

[8] J. H. Clapham, *An Economic History of Modern Britain* (Cambridge, 1926–1938), Vol. 1, p. 143.

[9] P. Mantoux, *The Industrial Revolution in the 18th Century* (1928).

[10] N. F. R. Crafts, *British Economic Growth During the Industrial Revolution* (Oxford, 1985).

[11] J. Hoppit, 'Counting the Industrial Revolution', *Economic History Review* (EcHR), 43 (1990), p. 183.

[12] S. D. Chapman and J. Butt, 'The Cotton Industry 1775–1850' in C. H. Feinstein and S. Pollard (eds), *Studies in Capital Formation in the UK 1750–1920* (Oxford, 1988), p. 105.

[13] Landes, Fable *of the Dead Horse*, p. 145.

[14] M. Berg, *The Age of Manufactures 1700–1820: Industry, Innovation and Work in Britain* (London, 1994), p. 27.

[15] P. Hudson (ed.), *Regions and Industries: A Perspective on the Industrial Revolution in Britain* (Cambridge, 1989), p. 2.

[16] F. Mendels, 'Proto-industrialisation, Theory and Reality: General Report' *Eighth International Economic History Conference* (Budapest, 1982), p. 76.

[17] I. D. Whyte, 'Proto-industrialisation in Scotland' in P. Hudson (ed.), *Regions and Industries: A Perspective on the Industrial Revolution in Britain* (Cambridge, 1989).

The first writers to seriously consider the topic in Scotland were Marwick and Mitchell in the 1920s.[18] This was ahead of its time, anticipating ideas developed fifty years later. The first line of their paper reads 'The study of the Industrial Revolution in Scotland must be regional in character'. Hamilton was the first to cover the early period, and much of his work remains valid, although the overall conclusions are dated.[19] Subsequently the most detailed account returned to primary material.[20] A number of English writers have made significant contributions, including Jennifer Tann and Stanley Chapman, whose work using insurance valuations in the 1970s was ground-breaking.[21] This research had much wider benefits, providing the first comprehensive database of the earliest Scottish cotton mills, giving details of location, partners and relative scale.

Most general writers on the early Scottish cotton industry have focussed on drawing up lists of the spectacular mill sites, such as New Lanark and Stanley. Such sites were scattered very widely throughout Scotland on the major rivers. Some individual studies have also been carried out on these prominent sites,[22] but regional studies in Scotland are almost totally absent.[23] In the 1980s the balance began to be redressed, when attention was drawn to the importance of the concentration of the early industry in Renfrewshire.[24] This was mirrored by attempts by the present writer to research the origins of several Renfrewshire mills using primary sources and fieldwork.[25] Research and published material in Renfrewshire has been lacking and there have been no previous regional studies of the early cotton spinning industry. Within the Paisley area, there exists a strong cultural pride in textile heritage, but it concentrates on 'Paisley pattern' shawls and cotton sewing thread, neither of which became significant until the 1830s. One has to look to national accounts to attempt to find Renfrewshire's earlier

[18] R. H. Marwick, 'The Cotton Industry and the Industrial Revolution in Scotland', *Scottish History Review* (*SHR*), Vol. 21 (1924); G. M. Mitchell, 'The English and Scottish Cotton Industries: A Study in Interrelations' *SHR*, Vol. 22 (1924).

[19] Hamilton, *Industrial Revolution*, pp. 118–48.

[20] J. Butt, 'The Scottish Cotton Industry During the Industrial Revolution, 1780–1840' in L. M. Cullen and T. C. Smout (eds), *Comparative Aspects of Scottish and Irish Economic and Social History* (1977). John Butt was also working on a comprehensive account of the early Scottish cotton industry in his retirement, but sadly died in July 2002, before completing it.

[21] S. D. Chapman, 'Fixed Capital Formation in the British Cotton Industry 1770–1815', *EcHR*, 23 (1970).

[22] J. R. Hume, 'The Industrial Archaeology of New Lanark' in J. Butt (ed.), *Robert Owen, Prince of Cotton Spinners* (1971); A. J. Cooke, 'Richard Arkwright and the Scottish Cotton Industry', *Textile History*, Vol. 10 (1979).

[23] One exception being J. Butt, 'The Industrial Archaeology of Gatehouse of Fleet', *Industrial Archaeology*, Vol. 3, Pt 2 (1966).

[24] J. Shaw, *Water Power in Scotland 1550–1870* (Edinburgh, 1984), pp. 331–6.

[25] S. M. Nisbet, 'Busby Cotton Mill', *Scottish Archaeology Gazette*, No. 19, (1989); 'Newmill – an early Scottish Cotton Mill', *Scottish Industrial History*, Vols 11–13 (1990); 'Busby and Dovecothall Cotton Mills', *Renfrewshire Local History Forum* (RLHF) Journal, Vol. 2 (1990); 'Eaglesham Cotton Mills', *RLHF Journal*, Vol. 7 (1995); 'Conservation Plan for Johnstone Old Cotton Mill' (Unpublished, 2002).

contribution, where it has traditionally been overshadowed by the wider and supposedly more spectacular Scottish sites. A study of the importance of the early Renfrewshire industry is thus long overdue.

II

If water-powered factory cotton spinning was the peak of achievement, to understand it we need to go back three or four generations, to the beginning of the eighteenth century. At this time, textile manufacture in Renfrewshire was mainly a cottage weaving industry, serving local needs. One of the first notable changes was in the location of the weavers. The parish of Kilbarchan is typical, and later became a centre of quality weaving. In the early years, it had thirty four weavers, but only one lived in the parish village. The remainder were scattered widely throughout the parish.[26] Even in the main settlement of Paisley, of nearly 350 weavers in total, less than 20 per cent lived in the town.[27] Textiles were very coarse and poorly finished, but from this point onwards the region followed a different strategy from most of Scotland by focussing on quality rather than coarse weaving. Although the bulk of goods woven were made of linen, other raw materials were introduced, including cotton. Mixed cotton-linens, known as 'checks', were being woven by 1702, and within a decade fine quality lawns, or 'muslins', were produced to imitate Indian varieties.[28]Other new branches were encouraged, partly by increases in the tax on printed linens, including embroidered lawns, fine checked handkerchiefs and cambrics by the mid-1720s.[29]

When the Scottish Board of Trustees for Manufacture was founded in 1727, the records show a very quick growth of fine linens in the region up to mid-century. One of the local strengths was the sheer variety of fine cloths produced, some being so specialised that they were renamed. In 1748 the Board of Trustees changed the name of muslin cravats to 'Paisleys', and embroidered muslins to 'Glasgows', despite most being manufactured around Paisley.[30] Overall, up to 1750 the quantity of Renfrewshire's linen output increased at double the rate of the Scottish industry. If measured by value, the increase was up to double this again, i.e. four times the general Scottish increase.

As with the coarser textile manufacture in most of Scotland, the growth of fine weaving relied largely on English markets. The importance of external markets

[26] Poll Tax Roll for Renfrewshire, republished by J. Malden (Paisley, 2002), Kilbarchan Parish.

[27] Poll Tax Roll, Paisley Parish: including 118 weavers in Abbey Parish and 72 in town (of 344 in shire).

[28] J. Gibson, *The History of Glasgow* (Glasgow, 1777), p. 239: checks were woven by crossing cotton weft with linen warp, forming a simple checked pattern; J. Wilson, *General View of the Agriculture of Renfrew* (Paisley, 1812), p. 239; W. Semple, *History of the Shire of Renfrew* (Paisley, 1782), p. 311.

[29] General linen background and statistics on linen industry from A. J. Durie, 'The Fine Linen Industry in Scotland 1707–1822', *Textile History* (1976) and *The Scottish Linen Industry in the Eighteenth Century* (Edinburgh, 1979).

[30] Durie, *Fine Linen Industry*, pp. 174, 182.

had been appreciated at an early stage especially with England following the Union of 1707:

> a free trade with England being opened . . . several of the traders went up to England to sell their Paisley manufactured goods, which yielded great profits, and turned well to their advantage, by acquiring a more general knowledge of trade, and settling a correspondence there, which was of great use to them afterwards when they came home.[31]

In particular, the London fashion market became the main market for the remainder of the century, through contact with partners and agents based in the capital. Paisley was the commercial centre, but in settlements including Lochwinnoch, Pollokshaws and Kilbarchan, the merchants also developed a putting-out structure, supplying the yarn and collecting the woven cloth. The wage-earning potential of such organisation favoured transfer of labour from a subsistence agricultural background to living and working in villages and towns. By the 1740s the settlement pattern was transformed, with more than a thousand weavers settling in Paisley town alone, fifteen times the number at the start of the century.

From this time onwards centralised textile 'manufactories' developed, based around a weaving shop, with warehouses for distributing raw materials and storing finished goods. In the generation after 1740, around twenty textile manufactories were established in the region. One example was Kerr and Pollock, who had a weaving manufactory by 1738 in Shuttle Street, Paisley, making fine quality linen gauzes, lawns, and checked handkerchiefs for the English market.[32] By 1745 their warehouse and two weaving shops were valued at £1,200, a large sum for the period.[33] The bulk of their finance relied on a credit system based on bills of exchange drawn on London. In a typical year (1759) sixty-six bills were drawn by Kerr and Pollok on one London agent, totalling over £5,000 sterling. In the same year they also had capital totalling £2,300 held in loans. The financial risks which ensured ongoing growth were high, and both partners were imprisoned for debt in the 1760s.

Another centralised manufactory was the Paisley Stocking Factory, started in the newly developed suburb of Sneddon in 1750.[34] Stocking factories were associated with the fine end of the hosiery market and their stocking frames could increase output over hand-knitting by a factor of ten.[35] A factory management structure was established, employing a full-time manager who was given a salary and a house. Journeymen were employed to train apprentices for which the

[31] Semple, *History of the Shire*, p. 311.
[32] National Archives of Scotland (NAS) CS 96/2009, 2020–2: Kerr, Pollok & Co.
[33] Guildhall Library London (GLL), Sun Insurance Policy No. 11936/75, 19 Mar. 1745.
[34] NAS CS 96/4444-4447: Paisley Stocking Factory.
[35] C. Gulvin, *The Scottish Hosiery and Knitwear Industry 1680–1980* (Edinburgh 1984), p. 2.

manager was paid five pounds per apprentice taught. General Scottish sources suggest that textile manufacture in the west at the time was almost exclusively linen, but various stocking factories were established in the west of Scotland from 1740.[36] Enterprises such as the Paisley Stocking Factory were an early example of a factory using a variety of raw materials, including worsted, silk and cotton, and this experience would be very important for future developments.

Custom relied largely on external markets and sales were mainly to London, but also to a long list of the main provincial towns including Durham, Liverpool, Sheffield, Mansfield, Nottingham, Penrith, Coventry, Keighley, Chester, Cirencester, Bristol and Portsmouth.[37] The partners were the driving force of change. They formed an influential group of families, who would straddle various textile innovations, and link through to the later cotton spinning period. They were a close-knit group, deeply involved in society, culture and a growing number of churches. The dependence on the London market meant that there was little sympathy for Jacobite politics. When Prince Charles' army passed through Paisley in 1745, the textile merchants were bold enough to negotiate a reduction in the fine imposed on the town by the Prince.[38]

III

Although the early textile manufactories were primarily hand-based, from an early stage the Board of Trustees equated progress with the application of power, specifically water power.[39] The key concept was an increase in the rate of change, beyond what was tied to population increase and the tradition of one person to each spinning wheel or loom. This relied largely on the multiplying factor of the application of power.

At the start of the eighteenth century, Renfrewshire had at least 120 grain and waulk mills, in a concentration no greater than most regions. From the late seventeenth century water-powered sites grew in demand for an increasing number of manufacturing processes. In the textile industry the first to be mechanised were thread mills, pioneered in Renfrewshire in 1722 by Christian Shaw, who brought a twist mill from Holland. The machines twisted several strands of hand spun yarn into a strong sewing thread. Increasing rapidly in size, they needed power, not to operate them which was carried out by girls, but to provide motive power.[40] The power source was mostly manpower, usually 'stout Highlanders' turning wheels to drive several machines at once. Gradually water

[36] Semple, *History of the Shire*, pp. 208, 327; Glasgow City Archives (GCA), *Register of Companies to 1775*; Gibson, *History of Glasgow*, p. 246.

[37] Locations of Customers of Kerr & Pollok, NAS CS 96/2009, 2020–2.

[38] D. Semple, *Saint Mirin* (Paisley, 1872), p. 57.

[39] R. H. Campbell, *States of the Annual Progress of the Linen Manufacture 1727–1754* (Edinburgh, 1964), p. 9.

[40] M. Blair, *The Paisley Thread Industry* (Paisley, 1907), p. 21; Shaw, *Water Power in* Scotland, p. 353. This was similar to the later multiplication of spindles in cotton spinning jennies.

power was also applied, and in 1755 the region was the first to apply water power to a thread mill.[41] Despite this, most thread mills were already situated in urban areas, limiting the number of water-powered sites available, and it was usually more convenient to stick to manpower.

From the 1720s lint mills improved the speed of preparation of flax for spinning, and were exclusively water powered. Most Scottish lint mills were partly-funded by the Board of Trustees, but the first water-powered lint mill in Scotland was built in Paisley in 1726, a year before the Board was established.[42] Lint mills demonstrated to everyone that water power could be applied to the textile industry on an industrial basis and around half of Renfrewshire's fifteen lint mill sites were later redeveloped as cotton mill sites.

A third early user of water power was the bleachfield and printfield. At the beginning of the century, London dominated the textile finishing trade for the whole of Britain. A breakthrough in Renfrewshire in 1738 enabled the first successful printing of cotton-linen mixed fabrics outside London.[43] This early commencement of printing gave Renfrewshire a head start over other regions, particularly Lancashire, which did not commence cotton printing until at least fifteen years later.[44] This released the manufacturers from London's dominance and was the final piece in the jigsaw which ensured fully integrated manufacture within the region.

Progress in bleaching and printing has received much less attention than other branches of the textile industry, such as spinning. Improvements in bleaching were arguably just as consequential as the inventions of Arkwright (the water frame), Hargreaves (the jennie) and Crompton (the mule).[45] The bleaching and finishing of cloth was particularly important for the fine linen industry and the Board of Trustees spent much of its time and effort attempting to improve bleaching. The significance of finishing cannot be over-emphasised in an increasingly fashion conscious market where colour, texture and printed pattern sold fine textiles. By the end of the eighteenth century, there were at least one hundred bleachfields and printfields in Renfrewshire, around half the Scottish total.[46] Bleachfields and printfield were the first really large employers in the textile industry, bringing up to a hundred or more workers into an area at a time. They have been described as the first true industry and the precursor of factory production in Scotland.[47]

[41] NAS, Records of the Board of Trustees for Manufacture (BOT) NG 1/1/13: James Alexander in Kilbarchan invented a machine to go by water for twining thread (25.7.1755,); given £20 towards cost (23.1.1756). Despite the availability of water-powered technology from 1755, relatively few water-powered thread mills were built in Scotland.

[42] R. Brown, *A History of Paisley* (1886) Vol. 2, p. 398.

[43] H. Hamilton, *An Economic History of Scotland in the Eighteenth Century* (Oxford, 1963), p. 166.

[44] A. P. Wadsworth and J. de L. Mann, *The Cotton Trade and Industrial Lancashire 1600–1780* (Manchester, 1931), p. 142.

[45] Durie, *Textile Finishing*, p. 1.

[46] Nisbet, *The Rise of the Cotton Factory*, Appendix 3A.

[47] Shaw, *Water Power in Scotland*, p. 243.

The process was mostly hand based but most fields used water power for washing, but also for rubbing, beetling, polishing printing plates, pressing cloth and grinding dyes and ashes. They also required significant amounts of coal, even in the pre-steam power period, and a local supply was crucial for their boiling houses.[48] The average bleachfield used several hundred tons of coal per year in heating and drying processes.[49] In the last decade of the century, steam power was also applied to printfield machinery, increasing the use of coal beyond the use for heating and boiling. The wide variety of processes in bleaching, washing and finishing stimulated other branches of manufacture such as the soaperie in Paisley in 1764, which became an important secondary industry by the 1780s with an output of £30,000 per annum.[50]

Despite the growing experience with powered manufacture, textile manufacture was still overwhelmingly hand-based. The spectacular increase in output thus relied on a parallel increase in population. In the first part of the century the population increase in the region was many times the general rise in Scotland (77% compared with 15% for Scotland as a whole).[51] The surplus population from farming improvements, plus natural increase, could simply not supply the rising demand for textile workers. This relied mostly on migration, through Greenock and Port Glasgow, from the sea lochs of the very southern fringes of the Highlands in Cowal and Argyll.[52] This large movement of population, predated the so-called 'Highland Clearances' by more than a century.

The growth of the putting out process removed the spinners and weavers from their immediate source of raw material, making it easier for merchant-manufacturers to centralise production.[53] Much of the spinning and distribution of yarn was carried out by women. Girls were increasingly employed in bleach-fields and thread mills, and boys as weavers' draw boys. In Paisley by mid-century the home was already partly separate from the workplace, with a distinction between work done by women and children for the household and that done for the beginnings of factory-type industries. By 1750 more than half of the 4,000 employed directly in the textile industry in Paisley were women and children.

The rise of high quality textile production by mid-century was becoming increasingly important in Britain as a whole. This continued into the third quarter of the century, when fine linen production in the region rose by a factor of five.[54] The growing manufacture of twisted linen thread also rose to match half the

[48] E. Gauldie, 'Mechanical Aids to Linen Bleaching Scotland' *Textile History*, 1 (1969), p. 130.

[49] NAS CS 96 1298/9, Allan Pollok, Bleacher, Wellmeadow Field, Mearns parish, Renfrewshire.

[50] E. Gauldie, 'Scottish Bleachfields 1718–1862' (Unpublished PhD thesis, University of St Andrews 1967), p. 329; Semple, *History of the Shire*, p. 326.

[51] Figures from comparison of the 1695 Poll Tax with the OSA: Nisbet, *Rise of the Cotton Factory*, Table 4.2.

[52] Ibid., Chapter 4; also R. D. Lobban, *The Migration of Highlanders into Lowland Scotland, c.1750–1890* (Unpublished thesis, University of Edinburgh, 1969).

[53] Whatley, *Industrial Revolution*, p. 42.

[54] Based on Board of Trustees figures, see Nisbet, *Rise of the Cotton Factory*, Appendix 4B.

value of fine linen cloth. In this period the population increase was even more spectacular, by far the highest in Scotland (135%).[55] Several writers have already suspected that something special was happening in this region, describing the growth as 'staggering'; a cause of 'profound economic and social change', and the 'single most impressive piece of evidence for fundamental change in Scottish society'.[56]

The growth of the town of Paisley was particularly significant, rising from seventh position in 1755, and overtaking Perth, Inverness, Aberdeen and Dundee to become Scotland's third largest town after Glasgow and Edinburgh by the late 1790s.[57] The Renfrewshire parishes containing the main towns of Paisley and Greenock accounted for fifty seven per cent of the overall growth. In adjacent Lanarkshire and Dunbartonshire, the traditional burghs lagged far behind the leaders. Dumbarton and Lanark were struggling to reach a population of 3,000 by the 1790s, and Hamilton bemoaned Paisley's tenfold lead.

The attention paid to Scottish textile manufacture has focused largely on the linen industry, partly because this is the only sector for which decent records survive. However, in Renfrewshire we have seen that various other raw materials were used, including wool and cotton. The most surprising innovation was the introduction of silk from London in the 1750s. The significance of this for Paisley cannot be overstated, as in many ways it was as important as the subsequent move to cotton. It is often claimed that the silk industry in the capital was almost wholly superseded by Paisley.[58] However, comparison with the English silk town of Macclesfield has shown that in both cases the transfer of silk relied on local merchant families, with partners in London, identifying a gap in the fashion market.[59] At least six London silk partnerships moved to Paisley and settled permanently from the 1760s, later moving into fine cottons.[60] Silk has had scant attention in British industrialisation but had various analogies with cotton, producing fabrics which competed with muslins in quality markets, and relied on similar sources for raw materials.[61] In the two decades between 1760 and 1780, silk weaving grew from virtually nothing to exceed three times the value of the region's fine linen industry.

[55] Ibid., Chapter 4.

[56] B. Lenman, *An Economic History of Modern Scotland* (London, 1977), p. 102; T. E. Tyson, 'Demographic Change' in T. M. Devine and J. R. Young (eds), *Eighteenth Century Scotland: New Perspectives* (East Linton, 1999), p. 196.

[57] Smout, *Scottish People*, p. 243.

[58] New Statistical Account (NSA) Renfrewshire, Paisley, p. 827.

[59] Humphrey Fulton was first, by 1759 (Semple, *History of the Shire*, pp. 322–3); but others such as the Storie family encouraged silk weavers to settle in Paisley in 1760 (W. Metcalfe, *The Lordship of Paisley*, undated, p. 62); The first big London firm, Phillips & Co., came and set up in 1762 (Wilson, *General View*, p. 243).

[60] Semple, *History of the Shire*, p. 323.

[61] Turkey and the Levant were the main sources of raw silk and cotton until the 1790s – N. K. A. Rothstein, *The Silk Industry in London 1702–1766* (London, 1961), pp. 120, 236; G. B. Hertz 'The English Silk Industry in the 18th Century', *English Historical Review*, No. 24 (1909), p. 711.

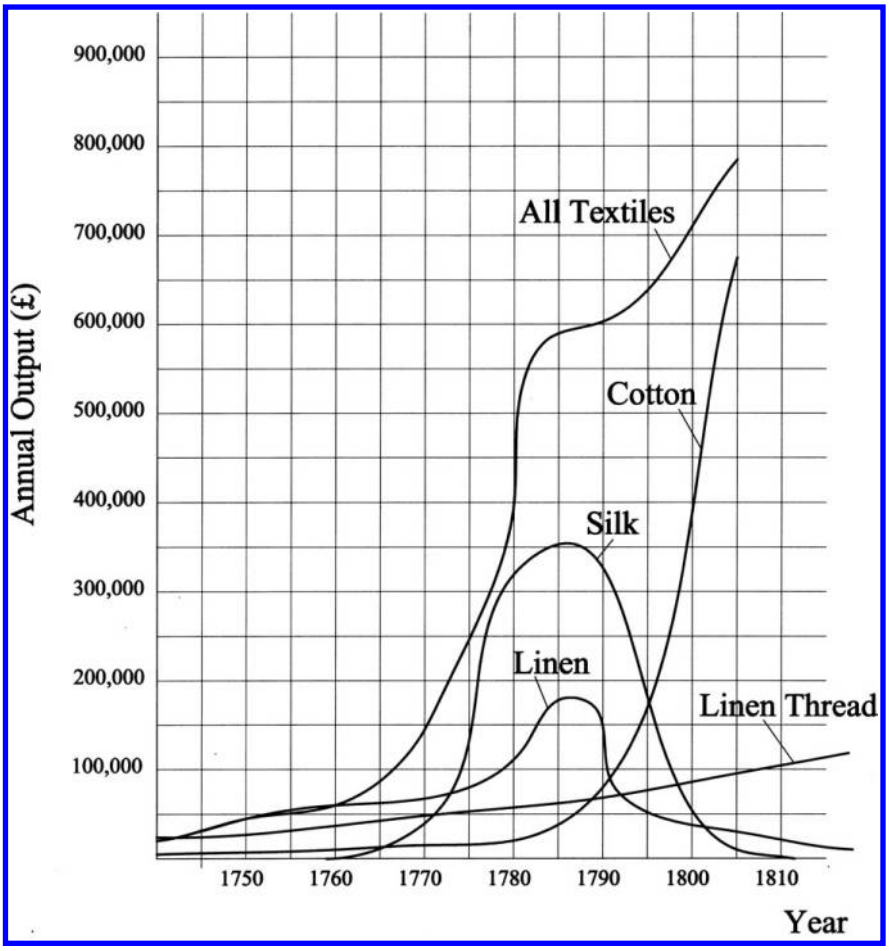

Figure 1. The main trends.

The graph in Figure 1 shows the main trends, and after the steady growth through the early and mid-eighteenth century, there was a sharp upturn during the 1760s. The increasing rate of production continued until c.1785. Despite short-term fluctuations, the overall trends are clear, showing the spectacular rise of fine linen and silk, transition to cotton, and subsequent parallel decline of linen and silk. On the eve of cotton spinning c.1780, almost ten per cent of Scotland's linen cloth would be made in the region. By this time the main town of Paisley alone had around 4,000 weavers. Adding linen thread manufacture, and the new and much larger silk industry, the total textile output exceeded £530,000.[62] This

[62] Breakdown: Linen cloth £130,000, Linen thread £66,000, silk cloth £336,000; for sources see Nisbet, *Rise of the Cotton Factory*, Appendix 4A & 4B.

was more than the entire linen manufacture in the rest of Scotland.[63] This was outstanding for a region making up only a fraction of one per cent of the area of Scotland. It is also highly significant that such an enormous increase was achieved *before* the advent of factory cotton spinning. Thus if a traditional 'take off' is to be located, a likely suspect is where the curves of output were already rising sharply on the eve of the accepted Industrial 'Revolution'.

IV

How did this compare with other British regions? The region which provides the closest comparison with Renfrewshire's experience is Lancashire,[64] which became the most prominent in early factory manufacture of cotton. It is noteworthy that much of the evidence for early use of cotton in Renfrewshire comes from work on the English textile industry. Wadsworth and Mann noted that:

> it is significant that the features common to the two centres of Manchester and the west of Scotland, where the cotton industry flourished and expanded, was the prior and continuous existence of a linen industry by the side of cotton.[65]

Lancashire was a large county, more than seven times the area of Renfrewshire,[66] but in both counties only a sub-region is most relevant, the early comparison being between the Cart basin of Renfrewshire and the south-east of Lancashire. Manufacture in both regions was controlled mainly from the county towns of Paisley and Manchester. Putting-out was the norm by the mid-eighteenth century, with a parallel transition to a form of waged labour. By mid-century definite specialisation had occurred in textiles, which had become the main employer, with an early tendency for weavers to migrate towards towns. The major source of working capital was the bill on London, and fixed capital for the transition to factory production was developed by merchants trading mainly with London. By mid-century both regions were displaying the main elements of putting-out.

V

Cotton had always been used to some extent throughout the century, but from the 1770s became the next big transition in raw material, rising very rapidly to dwarf all other textiles in the west of Scotland. The background reasons included

[63] The overall value of Scottish linen output (excluding Renfrewshire) in 1780 was £516,288.

[64] General Lancashire sources: J. K. Walton, *Lancashire A Social History 1558–1939* (Manchester, 1987); J. K. Walton, 'Proto Industrialisation and the First Industrial Revolution: the Case of Lancashire' in Hudson, *Regions and Industries*; S. Kenny, 'The Location and Organisation of the Early Lancashire Cotton Industry', *Manchester Geographer*, Vol. 6 (1985); Wadsworth and Mann, *Cotton Trade*.

[65] Wadsworth and Mann, *Cotton Trade*, p. 171.

[66] Renfrewshire 0.16M acres; Lancashire 1.21M acres.

the softer texture of cotton goods and repeal of the Calico Act in 1774, which had restricted cotton manufacture since the 1720s. The spectacular growth of cotton is usually typified by large water-powered mills. In Renfrewshire these were crucial, and will be covered below, but were only the most spectacular aspect of a wider story. In the background, the pre-existing weaving of fine textiles continued to grow, the main change being a move to cotton, instead of linen and silk.

In the 1770s Paisley textile families such as the Orrs were experimenting with cotton machinery obtained from India. This drew interest from the pioneers of the Scottish cotton industry, including the founders of Scotland's first two spinning mills at Rothesay and Penicuik.[67] From the early 1780s Paisley manufacturers began producing cotton muslins commercially. One producer was Robert Barr, born in 1735 and beginning as a weaver. By 1771 he had formed Robert Barr & Company, in partnership with prominent Paisley yarn merchant and bleacher John Cochrane.[68] In the 1770s they built up a business, putting out work to several dozen domestic weavers, and had a weaving 'factory' and warehouse in Gauze Street in Paisley's New Town. They became a typical medium-sized Paisley textile firm, manufacturing high quality lawns and gauzes in linen and silk. By 1784 Barr's turnover exceeded £8,500 per annum, split almost equally between linen and silk.

Robert Barr's letter books provide a new insight into the start of muslin manufacture in Scotland. English sources acknowledge that Renfrewshire had been the first region in Britain to attempt muslin manufacture, back in the early eighteenth century.[69] In the 1780s Robert Barr was experimenting with pure cottons, and in 1784 began to produce them commercially, advising one of his customers that in addition to the usual fabrics, 'we are also making some muslins, but none will be ready this season'.[70] Early the following year he wrote to a customer in London that, 'besides our usual kind we have this winter made a few muslins (checked, striped and spotted)'.[71] The muslins were a direct replacement for quality linens: 'these (muslins) we have meant as a substitute for the like kinds of linen goods which we flatter ourselves will answer the market full as well as those which are made more like the East India goods'.[72]

Barr's letter books document a major but seamless transition from weaving fine linens and silks to weaving fine cottons. Within a short period his sales include a wide variety of quality muslins, and at prices low enough to compete with other regions. By the end of 1786 he advised several customers that, 'we make very neat

[67] NAS NG 1/1/22 16 Dec 1778. For a detailed account of the 'Paisley Orrs' see S. M. Nisbet and J. Foster, 'Protection, Inward Investment and the Early Irish Cotton Industry: The experience of William and John Orr', *Irish Economic and Social History*, Vol. 35 (2009), pp. 23–50.

[68] NAS RS 1767, 1773.

[69] G. Unwin, A. Hulme and G. Taylor, *Samuel Oldknow and the Arkwrights* (Manchester, 1924), p. 3.

[70] NAS CS 96/3436, Robert Barr & Co. Letter Book, Barr to Mackenzie & Hay, Nov. 1784.

[71] Ibid., Barr to John Muir, London, per Mr Watt, Feb. 1785.

[72] Ibid., Barr to John Muir, London, per Mr Watt, Feb. 1785.

things in the muslin way and lower than was ever seen in this country'.[73] In 1789 Barr wrote to a customer in America, 'The muslin manufacture here has greatly increased . . . and the goods are every day improving'.[74] By the early 1790s fine Paisley muslin was known not only in the capital and abroad, but throughout the country.[75]

Lancashire was the main competitor and the new fine cotton muslins made in Paisley were in direct competition with Manchester merchants. Samuel Oldknow, an associate of Richard Arkwright, also began making muslin in 1784 and the two regions competed directly on the London market. In 1786 a London buyer wrote, 'our ears are stressed every day with the excellence of the Scotch and Lancashire muslins, if cheapness proves any excellence they have it indeed'.[76] The spotted and striped muslins made in Paisley began to dominate the market, and a London merchant wrote in 1786,

> The Scotch have done much better this two months . . . striped will not do any longer, the Scotch have routed them out . . . indeed the Scotch perseverance and ingenuity are doing wonders. The Lancashire people are all exerting themselves, and no less than three or four houses opened to sell Lancashire muslins . . . (but) the Scotch have sent up many spotted muslins, indeed too good and too cheap.[77]

In 1786 two foreign visitors to Paisley noted that cotton manufacture had greatly expanded in the town. This included not only cottons mixed with silk, but pure cottons: 'what one thinks of as light *Manchester* fabrics, Paisley makes them so beautifully that she competes easily with Manchester'.[78] By the next decade the correspondence of McConnel and Kennedy, one of Manchester's largest yarn firms, confirmed that Scottish yarn for weaving muslin could easily compete with English for quality. One merchant wrote, 'we have never yet got yarn from England equal to a few known spinners we deal with in Scotland'.[79] In addition to being the main market, London was still the main source of Paisley credit at this time. Robert Barr's surviving letter books illustrate that the most common method of payment for his sales was by bills drawn on London.[80] His surviving

[73] Ibid., Barr to Thos. Durie, Oct. 1786.

[74] Ibid., Barr to Callendar Henderson, Fredericksburg, May 1789.

[75] OSA Forfar, Marytown, Vol. 9, p. 404: 'The country lass makes her appearance at church or wedding dressed in the manufactures of . . . Paisley'.

[76] G. Unwin, *Samuel Oldknow and the Arkwrights* (1924), p. 66: S. & W. Salte, merchants London to S. Oldknow, 23 May 1786.

[77] Ibid., p. 67: 5 Jun. 1786.

[78] N. Scarfe, *To the Highlands in 1786* (Suffolk, 2001), pp. 210–11.

[79] McConnel and Kennedy was founded by two Scottish machine makers in the early 1790s; John Rylands Library, Manchester, McConnel & Kennedy Papers: Gemmill, Smith & Co., Paisley to McConnel & Kennedy, 29 Jun. 1795.

[80] See S. M. Nisbet, 'Financing the Early Textile Industry in the West of Scotland', *Scottish Business and Industrial History*, Vol. 24, Series 2 (Jul. 2008), pp. 3–27.

Table 1. Fineness of cotton yarn achievable by date

Approx. Date	*Spinning machine*	*Typical Count*	*Typical Application*
Pre-1775	Hand wheel	<20	Checks
From 1775	Water frame	up to 50	Calico
From 1775	Jennie	up to 50	Calico
From 1785	Mule	up to 200	Muslin

Source: Harley, pp. 53–5. This table shows what was achievable, not what was common, and the demand for very high counts was low outside Paisley.

letter books and ledgers in the Union Bank illustrate his daily business, including regular discounting of London bills.[81] Barr will be encountered again below, when he virtually abandoned his muslin business to build a large water-powered cotton spinning mill.

VI

Fine muslin weavers such as Robert Barr demanded much finer yarn than could be spun in the growing number of water mills. Some commentators on the Paisley cotton industry have linked water frame spinning directly with fine muslin manufacture, but the two are not compatible.[82] This is a paradox of the industry in Renfrewshire, that the big mills could not spin yarn suitable for the ongoing fine weaving industry. In the 1780s and 90s the supply of fine yarn depended on skilled spinning on the jennie, followed by its derivative, the mule. The jennie was always a hand machine but the mule became partly powered from the early 1790s.

The growth of demand for specific spinning machinery was driven largely by the fineness of yarn which each could spin. Before Arkwright's powered spinning developments, cotton yarns spun in Paisley for mixing with linens were below a No. 20 count (Table 1).[83] Water frame yarns are usually described as 'coarse', but this term is relative. The best quality water frame yarns were termed 'superfine', and used for items such as high quality calico shirts. The water frame spun yarn which was far finer than was generally spun by hand in Britain, up to a No. 50 count. The jennie was similar, although the higher counts depended on the skill of the spinner. Beyond this, the mule was the only alternative for extremely fine yarns up to No. 200 or more, and opened up a new market for fine quality British muslins.

[81] Bank of Scotland Archive, Edinburgh, Union Bank of Scotland, Paisley Letter Book No. 8/13/1.

[82] M. Lochrie, 'The Paisley Shawl Industry' in J. Butt and K. Ponting (eds), *Scottish Textile History* (Aberdeen, 1987), p. 99.

[83] The 'count' defined the relative fineness of yarn, and referred to the number of standard reels per pound weight. Thus a No. 40 count yarn (40 reels per lb) was a relatively thick yarn compared to a number 140 (140 reels per lb).

From a national perspective, fine mule yarn was a specialised market and the vast majority of yarns were in the lower grades. By the end of the eighteenth century the *average* count in Britain had only increased to the high No. 20s, and very high counts in the 100s and 200s were relatively uncommon outside Lancashire and Renfrewshire.[84]

The most successful early developments in powered manufacture were dominated by Richard Arkwright and his water frame. However, one of his less widely known developments was even more important, as it applied to water frame, jennie and mule spinning. Most earlier attempts to improve spinning had been hampered by bottlenecks in slow preparation of raw cotton, up to a coarse strand or 'roving' ready for spinning. This included combing, teasing, carding, roving and reeling, all of which were very labour intensive. This was solved by Arkwright's separate development of a production line of powered preparation machines, bringing the raw cotton up to a stage ready for spinning. The big advantage of this in Renfrewshire was that it was applicable not only to the large water frame mills but equally, with some development,[85] to preparing cotton for spinning the finest yarns on hand jennies. This opened up the possibility of spinning yarns for weaving muslins in large quantities, using yarn prepared in bulk on Arkwright's powered machinery, then spun by hand on jennies. The Paisley weaving shops had perfected the transition to muslin spinning using hand-powered jennies and mules.[86] However, significant increase in *output* depended on the supply of cotton rovings from Arkwright's powered preparation machinery. From the mid-1780s many water mill owners also built a 'jennie shop' on the same site. One example was Johnstone Old mill, which had a hand-operated jennie shop supplied with rovings from its adjacent water-powered mill. The owners also acquired the newly built water mill at Elderslie and fitted exclusively jennies and mules.[87]

However in addition to the water mills, a more subtle branch of cotton mill developed in Renfrewshire, which did not need a water-powered site. This used Arkwright's powered preparation machinery (usually driven by horses) to supply hand-operated jennies. As these mills did not require a large source of power such as water power, they could be located in urban areas. In 1782 a jennie mill was built in Abbey Street, in central Paisley and numerous other ventures sprang up,

[84] Harley, *Cotton Textile Prices*, pp. 53–5: The confusion and bias caused by the survival of records representing mainly one branch of the cotton yarn industry (i.e. the fine yarns of McConnell & Kennedy) has analogies with the traditional Scottish concentration on the well-documented linen industry, at the expense of the important but poorly-documented silk manufacture.

[85] Particularly the stretching frame: R. L. Hills, *Power in the Industrial Revolution* (Manchester, 1970), p. 123.

[86] The spinning jennie (or jeanie in Scotland) was a hand-driven fine spinning machine contemporary with the water frame. The mule was a development from both jennie and water frame, being initially hand powered, but was partly powered from c.1790. The names mule and jennie became interchangeable often termed the mule jennie.

[87] NAS BCP I, 59,801: W. & J. King (Corse & Co.) vs John Buchanan, Bill of Advocation re management of Elderslie Mill (1798).

including those of Matthew Corse, William Clarke, John Davidson, John Dalziel all in Paisley, and others in Johnstone and Lochwinnoch. Each had around a dozen jennies or mules along with preparation machinery powered by sources other than water. Larger enterprises followed, such as the mills of David Findlay and Alexander Pollok, in the late 1780s. These mills contained at least twenty mule jennies,[88] or around 3,000 spindles.

During the first generation of the cotton industry, the preparation stage in jennie mills went through a remarkable evolution in power source. Each of these provided a central source of rotary motion which was applied to the machines via shafts, gears and belts. The first power source was manpower, in the form of labourers or 'stout Highlanders' turning cranks.[89] The second was horse gins, the power source originally developed by Arkwright, with two or more horses walking in a circular mill rink, turning a central axle. The third alternative power source used water wheels powered by a fall of water, but not situated on a river. The water wheel was fed from a large tank or pond which was constantly replenished by a steam pumping engine. The power source was not yet a Watt engine, but a traditional Newcomen or Savery steam pumping engine which had been developed since the beginning of the century to pump water from mines. The Paisley region has been identified as the only area in Britain where such an innovative search was carried out to power large urban mills in the prelude to the adoption of James Watt's rotary steam engines.[90] The intensity of change in this period has hidden this remarkable evolution, which has been overshadowed by the more spectacular water mills.

One example was the Underwood mill in Paisley. Built in 1789, it was initially powered by more than a hundred labourers turning cranks.[91] Within two years manpower had been changed to horsepower, but as with Arkwright's early mills, this proved to be too expensive.[92] A water wheel was installed, not on a river, but replenished with water from a traditional Savery steam engine, which pumped water from a pond to the wheel. Within six years the mill was the largest in Paisley, with 13,000 spindles.[93]

Apart from the Orrs who had brought machines from India, the fine spinners behind the new mule spinning mills included William McKerrel, son of the founder of the Paisley silk industry. Another large mule mill, Adelphi mill, was founded by the Twigg brothers, who had been attracted to Paisley from London to weave silk in the 1760s.[94] By the 1790s they were spinning and weaving muslin

[88] From the 1790s in the terms jennie and mule became interchangeable to describe the same machine, often termed 'mule jennies'.

[89] M. Blair, *The Paisley Thread Industry* (Paisley, 1907), p. 36.

[90] J. Tann, *Evolution of the Factory* (London, 1970), p. 49.

[91] Personal communication Dr Sylvia Clark.

[92] Hills, *Power in the Industrial Revolution*, p. 89.

[93] Guildhall Library London, Sun Ms.11937/11/649006 (1796).

[94] The Twiggs originated from Derbyshire: Butt, *Scottish Cotton Industry*, p. 120. I acknowledge assistance from the late John Butt for input to this project.

Table 2. British water-powered cotton mills established before 1780[a]

Date	*Water Frame Mill (County)*	*Founder*
1771	Cromford Upper (Derbyshire)	Arkwright
1776	Belper (Derbyshire)	Strutt (Arkwright associate)
1776	**Penicuik (Midlothian)**	**Brotherstone & Co.**
1777	Birkacre (Lancashire)	Arkwright, Strutt & Co. (destroyed 1779)
1777	Wirksworth (Derbyshire)	Arkwright
1777	Holywell (Wales)	Smalley (Arkwright's former partner)
1777/8	Bakewell (Derbyshire)	Arkwright & son
1778	**Rothesay (Bute)**	**Kenyon & Co.**
1778	R. Derwent	Gardom Praes & Co. (Arkwright licensee)
c.1778	Papplewick (Bulwell?)	Robinson (Arkwright licensee)
1778	**Busby (Renfrew)**	**Wm Ferguson**
c.1778	Nottingham	James (Arkwright licensee)
1779	**Dovecothall (Renfrew)**	**Haughs, etc.**
c.1779	Milford (Derbyshire)	Strutt
1779	Cressbrook (Tideswell)	

[a] *Main Sources:* S. D. Chapman, *The Early Factory Masters* (Newton Abbot, 1967), pp. 67-9; Wadsworth and Mann, *Cotton Trade*, p. 434; R. S. Fitton, *The Arkwrights: Spinners of Fortune* (Manchester, 1989), p. 57; Fitton and Wadsworth, *Strutts and Arkwrights*, p. 78; S. M. Nisbet, 'Busby and Dovecothall Cotton Mills', *RLHF Journal*, Vol. 2 (1990).

in Paisley and sending it to London for sale by their relatives. Various other large mule mills developed in Paisley, avoiding the restriction of a riverside location, and leading the way to the urban cotton mill built on any street corner.

VII

Despite the background continuation of fine spinning, the advent of powered industrialisation depended on the better-know water frame mills. These used water power to spin relatively coarse but strong warp yarn on Arkwright machines. Paisley continued as the commercial hub, but had no water resources available to power large cotton mills, and they sprung up in a ten mile radius in the basin of the Cart river system.[95]

Richard Arkwright had developed his first powered cotton spinning mill at Cromford in Derbyshire from 1771, and the next English mills were founded in 1776 (Table 2). Scotland's first water frame mill at Penicuik was established in the same year, and was followed by Rothesay (1778).[96] The next few mills were in Renfrewshire at Busby (1778), Dovecothall (1779), Johnstone Old (1782) and Johnstone Laigh (1784).[97] All predated Richard Arkwright coming to Paisley

[95] Principally the waters of the White Cart, Black Cart, Levern and Gryfe and their contributing streams.

[96] S. M. Nisbet, 'The Early Cotton Spinning in the West of Scotland: Rothesay Mills (1778–1799)', *Trans. Buteshire Natural History Society* XXVI (2004).

[97] Nisbet, *Rise of the Cotton Factory*, Chapter 6.

in October 1784 to be made a Freeman of the town, followed by his much better-known visits to Glasgow and Lanark the following month. Unlike England, where Arkwright's patents were supported by the law, cotton mills developed in Renfrewshire without his direct input. All were on a large scale and Johnstone Old mill was one of the biggest in the country.[98] Several mills were built each year, with a peak of nine mills in 1792. The vast majority of the mills were founded by pre-existing textile merchants, most of whom had a pedigree of two or more generations of fine textile manufacture.

Unlike the English mills in the 1770s, the early Scottish mills were pioneers of spinning without Richard Arkwright's involvement. All but one of the English mills were established in the Midlands. Although Lancashire subsequently became the main region, it had only one mill in the 1770s, which was destroyed by a crowd in 1779[99]. The Lancashire cotton manufacturers were very nervous of litigation by Arkwright who instituted nine actions against infringers of his carding patent in 1780.[100] This delayed the start of building of cotton mills in Lancashire until the early 1780s, after the patents were annulled.[101] This gave Scotland a head start in the new spinning industry.

VIII

Although manufacturers such as Robert Barr made the successful transition to fine cotton weaving, the prospect of entering cotton spinning was perceived to be even more profitable.[102] In 1785 there were only five cotton mills operating in Scotland, one of which was at Rothesay, which was advertised in that year. Barr's partner visited the site and made an offer, but it sold to a slightly higher bidder.[103] Despite this early setback, Barr remained committed to investing in cotton spinning. In 1792 he virtually abandoned his successful muslin weaving business and entered a partnership to build a water frame mill from scratch. The initial stock was agreed at £4,000 and the mill was to be one of the largest to date.[104] The site chosen was ambitious, needing a new lade two kilometres long to create a fifteen metre high fall, providing sixty horsepower.[105] Barr was to

[98] S. D. Chapman, 'The Arkwright Mills – Colquhoun's Census of 1788 and Archaeological Evidence', *Industrial Archaeology Review* No. 6.1, (1981), p. 8.

[99] Birkacre Mill: Fitton and Wadsworth, *Strutts and Arkwrights*, p. 79. This delayed subsequent developments until after expiry of patent.

[100] Fitton, The *Arkwrights*, p. 93. Not all the carding evasions were for water-powered factories, some were for jennie mills.

[101] Fitton, *The Arkwrights*, pp. 63, 148.

[102] In 1792 Barr 'conceived of the idea that his stock might be laid out more beneficially in that line (cotton spinning) than formerly': Signet Library, Edinburgh (SL) 227/22: Answers for J & J McIlwham & Arch. Speirs to Robert Barr (1802).

[103] *Glasgow Mercury*, 23 Mar. 1785; SL 411/62: John Brown & Robert Carrick Merchants Glasgow vs William Scott & others Trustees of deceased Charles Scott of Woodbank, 25 Nov. 1800.

[104] The McIlwham brothers had one share between them.

[105] Parliamentary Papers XX, (1834) Factory Commission Report on Cotton Mills.

manage construction and virtually gave up his Paisley weaving businesses, moving to the site in 1792.

Spinning did not commence until three years after construction. The capital input by this time was almost £10,000, two and a half times the original estimate. However, six years after commencement, the mill was still only half full of machinery, and capital input was ongoing. This was the situation in most mills, and the largest and most successful mills took up to ten years to completely fill their works with machines.[106] In mills such as Busby and New Lanark the mill buildings were used for many years as workers' accommodation before coming into production. With a mill on the scale of Crosslee, the founders faced a momentous task. Barr stated in 1797, 'I do not believe there is a mill of the size in the country . . . this is as arduous an undertaking as perhaps has been undertaken'.[107]

Barr's situation demonstrates the determination of pre-existing textile merchants to enter cotton spinning, despite the unknown cost. It had been recognised from the start by all parties that his capital was limited and that he would soon have to borrow.[108] Fifteen months into construction, his capital was exhausted and he had to try to extract ongoing finance from the other partners. Several times he was unable to pay wages. In frustration he declared, 'the work can no more go without money than the machinery without water'.[109] He was finally marginalised in 1802, when his partners sold Crosslee mill and immediately re-purchased it themselves at a reduced price. The difference between the costs to date and the selling price equalled the original capital stock. This was a poorly-concealed ploy to write-off Barr and his capital investment in the mill.[110]

The capital required to enter cotton spinning was beyond the means of many medium sized manufacturers. A significant part of the industry only became solvent by writing off much of the construction debt, usually at the expense of one or more partners. This strategy was commonplace, and an identical situation arose at Penicuik mills, which were sold back to some of the existing partners for £10,500 in 1802, despite having cost £20,600 at that date.[111] A similarly attempt was made at Johnstone mill in 1795 to isolate the technical founder.

The study of Crosslee mill, plus similar experience at Penicuik and Johnstone, indicates that the fixed capital required to establish large water-powered cotton

[106] 'Every manufacturer who attempts so great an establishment contrives his machinery so as to admit of being suited to the gradual extension of hands': NAS Unextracted Processes 1 Currie Dal C/9/1, Corse Burns & Co. (1788).

[107] SL 290/18: Barr to McIlwham, 23 May 1797.

[108] At an early stage he wrote, 'you very well know, and I have all along let you know, that I could not advance more than the sum mentioned, which is now larger than first proposed and therefore must be got either from the (other) partners or others to borrow': SL 290/18: Barr to McIlwham, 14 Nov. 1794.

[109] Ibid., 10 Mar. 1795.

[110] Ibid. 'They became purchasers of the works for £10,500, which had originally cost £16,000, by which operation . . . they created an apparent loss sufficient to absorb all of his original stock'; also *Glasgow Courier*, Aug. 1802.

[111] SL 449/23: Bertram Gardner & Co. vs John White & Co. cotton spinners, Penicuik (1803).

mills was stretching the means of the average textile merchant to the limit. The new skills required, plus the extended timescale and lack of appreciation of the overall construction cost, increased difficulties. Once the mills were operating, the variety of yarns being spun assisted Renfrewshire's competitive position in the British yarn market. The growth of muslin weaving in parallel with cotton spinning resulted in a demand for fine yarns which could not be fully met locally, and depended on the Lancashire market. Despite the purchase of yarns from elsewhere, Renfrewshire competed successfully with other regions on the London market. In both the Midlands and Ireland a successful initial take-off had not guaranteed ongoing success. Industrialisation was a transition which did not stand still, but was linked to ongoing change. In these other regions, the slow adoption of mules has been cited as a main factor in the decline of the early industry. This contrasts with the situation in Renfrewshire, where there was an intensive drive during the 1790s to develop powered mules, through a variety of innovations.

Renfrewshire and Lancashire became the most successful regions, and the question is what made them different from everywhere else? There are various ways in which the experience of the two regions stand out from the norm. They were the British regions with the most previous experience of the use of cotton, and both had significant experience of purchasing, working and marketing it from the start of the century, partly mixed with linen and within linen markets. Cotton had various advantages over other raw materials and was the right material at the right time when technology matured to spin it mechanically. This does not imply that the move to cotton was in any way inevitable or that anything was 'leading to' industrialisation in cotton. Lancashire, like Renfrewshire had gone through various transitions in the type of fabric and raw material and cotton spinning would simply be one more of these transitions.

What was most important was that the regions had recognised the advantages of continuously seeking new developments, and were thus among the very first to exploit a new market and recognise and adopt the new technology. Previous experience of using cotton was not essential for the establishment of the early spinning mills. The spinning of cotton flourished in many isolated outposts, which had no pre-existing infrastructure or resources of any kind, apart from water power. Cotton spinning could and did survive in isolated locations, but to succeed on a *regional* basis, many more factors were required.

Most of the facets of the pre-existing textile industry transferred easily to cotton, including weaving and finishing. The same markets and credit system overlapped into cotton spinning. Early experience of mechanisation, although limited, was important. Previously established skills in cotton printing came to the fore, allowing markets to be exploited. The two regions were the earliest to adopt printing, including calico printing from London.[112] The development of the bleaching, printing and finishing stage of textile manufacture facilitated control

[112] Wadsworth and Mann, *Cotton Trade*, p. 142.

over all stages of manufacture, increased potential profits and capital accumulation, and freed manufacturers from London bleachers.

IX

The water-powered mills were the basis of the scattered rural settlements which still form the core of the region. These included a variety of deliberately planned villages, and unplanned settlements or pre-existing parish villages, growing alongside new bleachfields and cotton mills. The building of cotton mills continued to stimulate the population increase and in the two decades from 1780, the workers in the rural mills were mainly families. This was related to the structure of the new mill settlements, which favoured incoming families. The numbers of boys, women and girls were roughly equal, with half as many adult males. The situation differed in the growing towns, where child workers were more numerous.[113]

By the 1790s, the living conditions and housing of the rural workers were improving, and were considered to be better than for the agricultural population.[114] In Kilbarchan, improvement was also expressed by improved dress.[115] However, rapid fluctuations in trade caused ongoing hardship, and in Bridge of Weir in 1794 'all branches of business are in a very languid state'.[116] In the larger urban settlements, particularly in Paisley, the workforce were much more vulnerable to the frequent downturns in the market, and were forced to rely on the charity of the town council and textile merchants to carry them through the frequent crisis periods. Despite improving living conditions in the rural textile settlements, working conditions in the new factories were poor, with pale and sickly young workers suffering from respiratory problems due to the stour [dust] in the air. At mills such as Crosslee it was difficult to retain workers, especially children in winter months, particularly if they had to walk a mile or more to work.[117] The high mobility within the early factories within the Cart Basin is apparent from the parish records.

X

By the mid-1790s Renfrewshire had more than forty large cotton mills.[118] Glasgow is often given the credit for these, but such premature enlargement of

[113] At Johnstone planned town in 1786, 'they employ girls and children, so this great number of machines of many kinds is worked only by children', Scarfe, *To the Highlands*, p. 214.

[114] Old Statistical Account (OSA) Renfrewshire, Cathcart, Vol. 5, p. 355.

[115] OSA Renfrewshire, Kilbarchan, Vol. 15, p. 495: 'In this they are much more gay and splendid than formerly'.

[116] Ibid., p. 503.

[117] 'Some children, which have been with us thro' summer come perhaps a mile or more every morning and return every evening, left us so soon as the bad weather set in', SL 290/18: Barr to McIlwham, 22 Dec. 1897.

[118] A total of 45 large mills. 'Large' is defined as valued (for Insurance purposes) at £1,000 or more. Approximately three quarters were rural and water-powered and the rest were mule mills powered by lesser means.

eighteenth century Glasgow to encompass a twenty mile radius is a common distortion.[119] Glasgow can barely lay claim to one water-powered mill, two miles west at Woodside on the River Kelvin.

The background of the eighteenth century Renfrewshire cotton mill founders has been identified from a wide variety of sources. Over ninety-five per cent had previous textile interests, coming overwhelmingly from an established textile base in the various branches of fine linen, silk and thread production. For example the McKerrels had moved from silk to cotton production, the Orrs from fine linen to cotton, the Cochranes from linen thread to cotton yarn, and the Kings from bleaching linens to bleaching and printing cottons. The remaining five per cent included a timber merchant, two wrights, a lawyer and a banker. Eight other founders became bankers, but the founding of the Paisley banks, the Paisley (Old) Banking Co. (1783) and Paisley Union Bank (1788) post-dated their textile interests.[120] Five founders were colonial merchants, the principal example being McDowall of Castlesemple, a third-generation merchant who fits several categories, primarily as a Renfrewshire estate owner and improver. Colonial merchant investment in Renfrewshire cotton mills was only about eight per cent of total mill value.[121] This compares with an estimated seventeen per cent investment by colonial merchants in the Scottish cotton industry as a whole.[122] Even this is a relatively small contribution, compared with the traditional erroneous assumption that tobacco capital had played a large part in financing the Scottish cotton industry.[123]

The number of partners per mill varied from one to nine, the norm being two to three in each mill. Larger partnerships spread the financial risk, but lessened individual control. Given the difficulties in recruiting able and trustworthy managers, lack of day to day control was a major business hazard and caused problems for most partnerships. A number of very successful textile merchants invested in cotton mills, including Corse, Fulton and McKerrel, but most were middling merchants with relatively limited capital. A similar conclusion was reached for English cotton mills.[124] While no cotton mill founders rose from very humble origins, most originated as weavers, before moving to fine linen and silk in the 1760s. Around eighty per cent of founding partners were Renfrewshire-based, fifteen per cent from Glasgow and about three per cent from England. The Glasgow

[119] S. Pollard, *The Genesis of Modern Management*, (London, 1965), p. 91.

[120] C. F. Freebairn, 'An Old Banking Institution: The Paisley Union Bank' *Scottish Bankers Magazine* (1924), p. 110.

[121] Colonial proportion: McDowall – Cartside mill £4,000; Calderpark mill £2,000; Oswalds – Linwood mill £7,000/3; Black Hastie – Gryfe mill c.£2,000; Robert Dunmore – Pollokshaws mill c.£3,000. Total 13,300 = 8% of insured total of £130,000 in 1795. It could be argued that not all of this investment came directly from colonial trade, e.g. part of McDowall's income was from his Renfrewshire estates.

[122] T. M. Devine, 'The Colonial Trades and Industrial Investment in Scotland 1700–1815', *EcHR* 29 (1976), p. 2.

[123] T. M. Devine, *The Tobacco Lords* (Edinburgh, 1975), p. 44.

[124] K. Honeyman, *Origins of Enterprise* (Manchester, 1982), p. 81.

merchants were primarily textile manufacturers from the quality textile 'sub-region' of Anderston.[125] It is significant that, while various Glasgow merchants invested in Renfrewshire mills, almost none of the established Renfrewshire textile merchants were involved in mills beyond their home county. This demonstrates their commitment to remaining in a region with established textile infrastructure, despite its limited water resources compared with wider Scottish sites.

Although only about three per cent of mill founders came directly from England, about fifteen per cent were first or second generation silk manufacturers, who had come north from London several decades earlier. The Twiggs moved to Paisley from London in the late 1750s to manufacture silk, and in the 1790s were involved in at least four companies on a British basis, including some partners still resident in London.[126] Of the eighteen main silk manufacturing firms in Paisley in 1782, six were London based, and a further eight had their own London warehouses.[127] The success of many Paisley textile merchants who founded cotton mills stretched back several generations to the early eighteenth century. The current study of the principal Paisley textile families shows that, not only were they selling most of their textiles and receiving working capital from London, but they also had sons or brothers resident in the capital. There were various family groups in early cotton mill partnerships, mainly brothers and other relations, although none were exclusively single-family groups.[128] In many ways the cotton spinning partnerships continued the tradition in Renfrewshire textile firms of very mixed partnerships, including relations, business associates, and fellow manufacturers who could contribute a variety of experience. The lack of specific ties or groupings in cotton mill partnerships is demonstrated by the various merchants who were partners in several mills, but not necessarily with the same partners. Probably the most important consideration when choosing a partner was knowledge of their financial and business standing, either from personal experience, or by reputation. Personal acquaintance was not always a factor, thus the motives of fellow partners were not necessarily obvious at the start. The subsequent failure of various partnerships suggests that this was not always a reliable way of forming successful partnerships.

Beyond the impressive mill numbers, how does the scale and value of the Renfrewshire mills compare with Scotland overall? New Lanark is the best known Scottish site, and the reasons go beyond value, to the renown of the founder David Dale, and later social experiments of Robert Owen. General sources promote New Lanark as the largest cotton mill in Scotland, having four individual mill buildings by 1795.[129] However, one of the four New Lanark 'mills' was in fact

[125] As was seen in Chapter 8 (Table 8.1).
[126] NAS Unextracted Processes, Currie Dal Seqn. T1/13, 1803.
[127] Semple, *History of the Shire*, p. 323.
[128] Similar conclusion in J. Butt, *Scottish Cotton Industry*, p. 117.
[129] I. H. Adams, *The Making of Urban Scotland* (London, 1978), p. 87. New Lanark's four mills were from 40 to 47 metres long by 5 to 6 stories. James Dunlop's Renfrewshire mills were from 40 to 105 m long by 5 to 6 stories.

Table 3. Value of Scottish Cotton Mills by Partnership Groupings c.1795

Partnership	*Mill Value (£)*	*Total Insured Value (£)*
Geo. Houston & Ptns +	Johnstone Laigh (7,800), Calderpark (6,900), Cartside (7,800), Hag (5,000[a])	27,500
Dunlop, Cochrane & Co. +	Gateside (5,000[a]), Linwood (>7,000), Arthurlie (5,800), Levern (7,500[a])	25,300
David Dale & Co.	New Lanark: Mill one (5,900), two (6,000), three (6,000), four (6,500).	24,400
Robert Corse & Co. +	Johnstone Old Mill (9,000), Elderslie Mill (4,000)	13,000
Wm McKerrel & Co. +	St Mirren Mill (5,000), Underwood Mill (7,800)	13,000
George Dempster & Co.	Stanley Mills one and two	10,500
Ballindalloch Co.	Ballindalloch Mills	10,300
Wm & Robt Osburn +	Thornliebank and Newfield	10,200
Claud Alexander & Co.	Catrine Mills	9,900

Main Source: Guildhall Library Insurance Policies. [a]Estimated. + Renfrewshire Partnerships.

used only for accommodation, workshops and storage, and did not come into production until the early nineteenth century.[130] In Renfrewshire the mills were easily equal to the biggest mills elsewhere and mills such as Linwood were the largest in Britain. Two partnerships, George Houston, and Cochrane & Dunlop each had four working mills by 1798 which exceeded the insured value of New Lanark's four mills (Table 3). Various other Renfrewshire partnerships had two or more mills which exceeded the value of Scotland's next largest mill sites at Stanley, Ballindalloch, Catrine and Deanston (Table 3). Thus Renfrewshire mill manufacturers were easily on a parallel with those traditionally seen to have been the most important in Scotland.

A breakdown for the three principal cotton producing regions in Britain in 1795 by insured capital demonstrates that by the mid-1790s Renfrewshire had half the cotton mills in Scotland (£177,520) and almost ten per cent of the British total of cotton spinning mills.[131] Despite the impressive nature of these figures, they still do not demonstrate the region's overall percentage of the Scottish cotton industry, as they ignore the quality cotton weaving industry. The fixed capital in the remainder of the Renfrewshire cotton industry at the time has been

[130] J. R. Hume, 'The Industrial Archaeology of New Lanark' in J. Butt (ed.), *Robert Owen, Prince of Cotton Spinners* (Newton Abbot, 1971), p. 225.
[131] Based on Guildhall Library insurance policies; see Nisbet, *Rise of the Cotton Factory*, p. 110.

estimated at almost £270,000, fifty per cent more than the estimated fixed capital in spinning mills.[132] Thus Renfrewshire's share of the overall cotton industry was much higher than that based simply on cotton mills.

By the late 1790s the big water mills had peaked and the potential arose for cotton mills to be built in towns, remote from riverside sites. In addition to the growing number of big mule mills in Paisley, smaller urban mills also began to spring up in nearby Glasgow. Firms such as Chadwick & Whyte, John McTaggart, James Monach and Peter Buchanan all started small mule spinning mills in Glasgow. William Ferguson, the founder of Renfrewshire's first water-powered cotton mill at Busby, also built a mule mill in Glasgow, showing the range of interests of the cotton manufacturers and the demand for the finest yarns. In wider Lanarkshire and Dunbartonshire, beyond the large water-powered sites at Blantyre and New Lanark, various more modest mule mills developed. These were served by water power or horse power to drive their carding machines. In Lanarkshire these included East Kilbride, Cambuslang, Wyndford, Rutherglen and Douglas. In Dunbartonshire at Duntocher, Kirkintilloch and Milngavie. Upstream of Dumbarton, the bleaching and printing on the Leven was much more significant, forming another standalone textile sub-region, and worthy of much more detailed study.[133]

The real boost to the urban cotton mill occurred in 1798, when Paisley's Underwood mill ordered the first Boulton & Watt rotary steam engine in Scotland.[134] This gave direct circular motion to the mill machinery, which previously could only be supplied by a water wheel. Following Underwood's pioneering order, and once its teething problems has been overcome, a flood of Scottish orders followed. Although the established rural water mills continued to flourish, this marked the virtual end of building new ones. Due to its flexibility of location, the urban steam mill thrived thereafter.

XI

Overall, how did such a small region manage to achieve such an impressive concentration of the earliest large scale powered industry? The first two decades were the age of water power, based on the developments of Richard Arkwright. However, the technology was relatively easy to replicate and wider success relied on being able to weave, bleach, dye, finish, package and sell the resulting product, via established trade routes, to familiar markets. It needed a source of labour to find several hundred workers at each mill site, within a very short period.

[132] Main basis of estimates: Chapman and Butt, *The Cotton Industry 1775–1850*.

[133] Some studies have been carried out, including C. G. Doherty, 'The Bleaching, Printing and Dyeing Industry in the Vale of Leven', *Scottish Industrial History*, 8.2, pp. 4–14 (1985).

[134] Secondary sources generally regard the first Scottish steam engine as being at Scott & Stevenson's Glasgow mill in 1792: e.g. A. Slaven, *The Development of the West of Scotland* (London, 1976), p. 95.

The whole manufacturing process needed organisation, training and the building and maintenance of mills and machinery. It has been suggested that a lack of machine-making skill hampered the early growth of the industry in Scotland.[135] Not so in Renfrewshire, where at the start of the powered spinning period, Paisley town alone employed 800 textile machine makers.[136] All of the necessary skills were within the previous experience of Renfrewshire textile merchants, who had already gone through major evolutions with various raw materials. In many ways cotton spinning mills were simply enlarged 'manufactories', with one new addition, the application of motive power. This was the true novelty which magnified output. It defined the location of most of the early powered spinning industry beside a source of water power. How was this achieved in such a small region containing only modest resources?

The conventional wisdom is that the new powered spinning industry had to be scattered widely to find sites on the major Scottish rivers to harness sufficient water power. On coming to Scotland, Arkwright only considered mill sites on the very largest rivers.[137] In Renfrewshire the opposite strategy was adopted. The objective was to keep the new industry within the existing rich textile making region, using the relatively minor watercourses which were to hand. How was this possible?

Historians speak again and again of cotton mills built beside 'fast flowing rivers', as if the simple task of building a mill and dipping its wheel into the stream guaranteed plenty of power.[138] However, it was far more difficult than this, and Renfrewshire's rivers were not fast flowing. For the mill to be viable, the watercourse needed to have a combination of sufficient height of fall and enough flow to power the wheel. Mills were initially built at existing falls, but as these were used up, falls were developed artificially by creating long lades. The most difficult item was to ensure adequate flow throughout the year, and the largest Scottish rivers had more than enough flow in most years. The Renfrewshire rivers did not, and success relied on developing storage reservoirs, often far upstream from the mill site. By 1790, large cotton mills were being founded on quite minor watercourses, fed by substantial man-made reservoirs. In some cases a watercourse large enough to drive a cotton mill was created from scratch, where virtually none had existed beforehand. Thus the successful strategy in Renfrewshire was to develop and actively manage limited water resources, rather than seek out remote sites with abundant flow.

[135] Hamilton, *Industrial Revolution*, p. 132.

[136] OSA Renfrewshire, Paisley Town, Vol. 7, p. 73: '800 makers of machinery, implements, heddles etc for silk and lawn'.

[137] A background reason to this was Arkwright's severe lack of water power at his early Derbyshire mills, see R. S. Fitton, *The Arkwrights*, pp. 64, 65.

[138] W. H. Fraser, *Conflict and Class: Scottish Workers 1700–1838* (Edinburgh, 1988), p. 58; K. Honeyman, *Origins of Enterprise* (Manchester, 1982), p. 78. Fast flow was not in fact required, the object was to slow and control the flow.

The expansion, concentration and retention of the industry in Renfrewshire in the 1780s and 1790s was achieved by innovative water management, which allowed water power to be developed from limited resources. The early and lasting success of the water mills was effectively due to over a thousand acres of storage reservoirs and innovative lade systems which had been developed on Renfrewshire moorland by the early nineteenth century.[139]

XII

Industrialisation has traditionally been seen as marking a revolutionary change. However, we have seen that in Renfrewshire at least, where the majority of Scotland's early cotton mills were built, it was simply part of an evolutionary process which had commenced back in the 1700s. Beyond all the social and economic preconditions, it was the application of power which allowed exponential growth in output, but also tied the first generation of mills to riverside locations. The pre-existing manufacturers sought to retain the new spinning industry within the rich textile-making infrastructure and succeeded by developing new water resources, often from scratch. This was an entirely different strategy from the better-known policy in Scotland of scattering mills to remote sites on the very largest rivers.

Just as the source of power fixed the early factory industry in the countryside, it was also the power source which latterly released the industry to urban areas. Again the change was not sudden, and the first twenty years were much richer and more diverse than has been acknowledged. An intensive and hitherto unknown determination occurred to develop new power sources. The changes were related as much to the powered spinning of finer yarns, as to releasing production from riverside sites. Renfrewshire bore most of the teething problems of this change. The subsequent move to urban sites, particularly to Glasgow, relied largely on the pre-existing experience of power sources, mill building, factory management, machine making and successful overall production by Renfrewshire manufacturers.

Despite the expansion in urban areas, most of the water mills continued to thrive and expand. The Paisley-based textile manufacturers continued to innovate. From the 1830s they developed world-leading manufacture of shawls and steam-powered twisting of sewing thread. It is a frequent paradox of Scottish history that such well-known events overshadow the true early strengths of an area. This research shows that the Paisley region had an equally important textile heritage dating back to 1700. It also suggests that the early history of Scotland's industrialisation needs to be reviewed to take account of the impact of Renfrewshire's textile industry.

[139] NSA Renfrewshire, General Remarks, Vol. 7, p. 539.