

INNOVATION IN LATE MEDIEVAL AND EARLY MODERN CLOTH-MAKING WITH PARTICULAR REFERENCE TO SUFFOLK

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INTRODUCTION

FOR MANY CENTURIES the wool textile industry was the most important in England, providing employment for many thousands, creating fortunes for an enterprising few, and generating a flow of export earnings that fluctuated but never ran dry. As early as 1454 Parliament declared that ‘the making of cloth within all parts of the realm is the greatest occupation and living of the poor commons of the land’.¹ Nowhere was this more true than in the county of Suffolk.

A BRIEF HISTORY OF SUFFOLK’S LATE MEDIEVAL AND EARLY MODERN WOOLLEN CLOTH INDUSTRY

The manufacture of woollen cloth in Suffolk’s towns can be traced back to the early years of the thirteenth century, and that in rural Suffolk to the later years of the same century. The evidence of these beginnings is varied. Bury St Edmunds and Sudbury paid fines in 1202 for exemption from the assize of cloth and the right for their cloth-makers to carry on producing it in their own way. Personal names in tax lists, charters and rentals tell of those who followed cloth-making occupations, be they spinsters, weavers, fullers, dyers or shearmen. Fulling mills and dye-houses are mentioned in charters and brief summaries of criminal trials. Customs documents record imports of dyes, particularly woad, and exports of cloth. Merchants of Amiens sold woad to cloth-makers in Clare, Great Waldingfield, Lavenham, Nayland and Sudbury.²

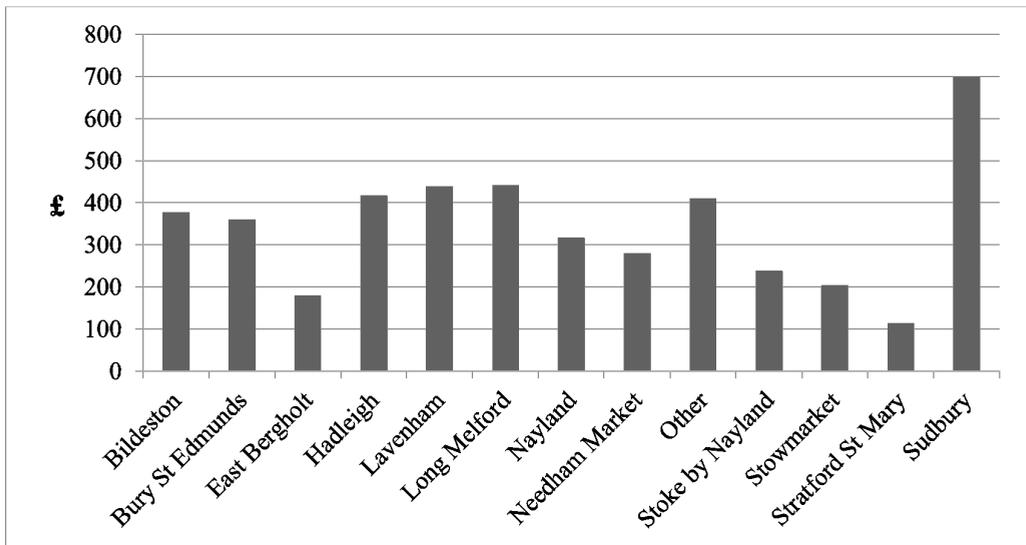
After the Black Death of 1348/9 a combination of import controls on overseas cloth and heavy export duties on raw wool protected England’s domestic industry from foreign competition and created an environment in which it could prosper. Suffolk’s textile industry continued to grow, producing coarse, short, narrow cloths which, according to Bailey, comprised ‘an eclectic range of cloths in various styles across the lower to middling sectors of the textile market’.³ Quantifying fourteenth-century growth is, however, impossible. Some centres, such as Hadleigh, appear to have enjoyed a boom, while others, such as Clare, went into relative decline.⁴ Alnage accounts, prepared in accordance with a nationwide scheme of quality control and taxation of cloth, suggest a fivefold increase in county production between the mid-1350s and the late 1390s.⁵ However, this is misleading because the accounts of the 1390s counted narrow cloths, whereas those of the 1350s did not.⁶ What is clear is that, between the two periods, Suffolk’s contribution to total national output, as recorded in these accounts, rose from 3.5 to 5.7 per cent.

Between the late 1390s and the late 1460s, alnage accounts record that Suffolk cloth production increased from an average of 2797 broadcloths (or their equivalent in narrow ones) each year to one of 5006 — a compounded growth rate of just under 1 per cent per annum. Here, like is compared with like. In the final third of the fifteenth century, output continued to grow by as much as 1.5 per cent per annum. Such a sustained, if never constant,

rate of growth over more than a century was, for any medieval industry, quite phenomenal.⁷ As the county's output became increasing geared towards overseas markets, we see a trend away from production of narrow cloths towards that of unfinished broadcloths, some uplift in the quality of the fabric, and an increasing dominance of the industry by wealthy clothiers. Whereas in 1400 most of the wool for Suffolk cloth had probably been sourced locally, particularly in Breckland to the north-west of the county, by 1500 it was bought in from across England. Breckland wool was rarely sufficiently fine to make export-quality cloth.

Small towns and villages in the south and centre of the county hummed with activity (Graph 1). In 1500 as many as 4000 Suffolk men and women were engaged in making wool textiles, perhaps 10 per cent of the county's adult population. Together they turned out about 8000 broadcloths (or their equivalent) each year, nearly half a million square yards of fabric. In his survey of its economy, Bailey describes medieval Suffolk as 'the most industrialised and urbanized county in England [...] one of western Europe's prominent false starts along the road to industrial capitalism'.⁸

Although its lead over the West Country shires may have been closing, at the midpoint in the millennium Suffolk still produced more woollen cloth than any other county in England. A few of the first generation of wealthy clothiers, such as William Forthe of Hadleigh, lingered on into old age. For the most part, however, they had given way to a second generation. Thomas Spryng III had succeeded his father Thomas II as industrial captain of Lavenham, while Thomas Horrold had succeeded his father John in Clare. They enjoyed close ties with London merchants, particularly those members of the Mercers' Company who traded overseas as Merchant Adventurers. Probably two-thirds of all cloth produced in



GRAPH 1 – Value of Suffolk clothier litigation in Court of Common Pleas 1475 to 1510
 (Notes: references to 'clothier' include references to 'cloth-maker' and 'clothman' which terms appear to have been synonymous and indeed interchangeable. As required by the Statute of Additions 1413, when enrolling a plea the residence and occupation of the defendant had to be stated, but not those of the claimant. So, most of this data is drawn from the defendant side. The figure for Long Melford is inflated by and even higher value claim for £200 by William Gibbons;
 Sources: Sources: TNA CP 40/853, 861, 871, 883, 885A, 888, 891, 895, 907, 911, 919, 931, 943, 951, 959, 971, 983, 990 – these rolls were chosen because they have been indexed by AALT).

Suffolk was shipped to continental Europe, particularly to the great *entrepôt* of Antwerp. The prominence of Suffolk clothiers is evident in two quite different sources. Up to and including the year 1510 more than twice as many Suffolk clothiers (277 out of 981) as those from any other county were recorded as litigants in sample rolls of the royal Court of Common Pleas; and up to and including the year 1530 more than three times as many (79 out of 179) had their wills proved in the Prerogative Court of Canterbury (PCC) — a court reserved for the wealthiest of testators.

During the sixteenth and seventeenth centuries textiles remained a crucial sector in the county economy. As we shall see, the arrival of the new draperies breathed fresh life into the industry. Nevertheless, Suffolk lost its pre-eminence and was overtaken by the West Country and Yorkshire. In consequence, some of the county's cloth towns fell into decay and most clothworkers earned only a meagre and precarious living.

This paper examines the importance of innovation — technological, organisational and product — in promoting growth of the Suffolk textile industry. It also considers the extent to which clothiers and cloth-working artisans shared new ideas among themselves, and how effective one generation was in passing on those ideas to the next — so called 'technology transfer'. The Suffolk experience was outstanding, but not unique, so this paper sheds fresh light on the history of the industry in England.

TECHNOLOGICAL INNOVATION

During the Middle Ages several technological innovations transformed cloth-making — carding as a method of preparing wool for spinning; the wheel in spinning yarn; the horizontal treadle-loom and the broadloom in interlacing that yarn; the fulling mill in cleaning, matting and felting the cloth by pummelling it with oaken trip-hammers; of somewhat lesser importance, an 'engine' in stretching on the tenter-frame cloth that had been fulled; and the gig-mill in napping the cloth which involved raising the rough layer of projecting threads or fibres on the surface of the fabric so that they could be cut off. All of these innovations improved productivity and saved labour. Each is considered in more detail below.

The drivers of these technological innovations between the eleventh and early fourteenth centuries were various. Population growth in England, as elsewhere, increased demand for textiles, demand that could not easily be met by older methods of production. At the same time, economic growth and urbanisation meant that more artisans could make a living by manufacturing cloth and more people could afford to buy commercially produced textiles, rather than rely on homespun fabric. Stronger trade links between different parts of the globe encouraged skilled cloth-makers to migrate and allowed new ideas to circulate.⁹ The earliest records of carding and wheel-spinning in England, in the first half of the fourteenth century, are contemporaneous with measures by the Crown to attract clothworkers of 'strange lands' to work here.¹⁰ Both the spinning wheel and the treadle-loom probably originated in the Orient and their ultimate source may well have been China.¹¹ Yet, although the impact of these technological innovations is beyond dispute, few of them were embraced with any great enthusiasm by the industry and so perhaps never achieved their full potential. Let us consider each in turn.

Carding involved rubbing wool between two iron wire brushes to produce a spongy air-filled roll, known as a rolag, which was then drawn off on to the distaff. In the production of woollens, as distinct from worsteds, it largely supplanted the earlier method of combing, being a less wasteful and more effective means of preparing short fibre wool for spinning. It required less human muscle power than combing and so was often carried out by the same

women who spun the yarn, a practice expressly permitted by a statute of 1363.¹² Carders and spinsters are shown working happily together on a page of an early fifteenth-century illuminated manuscript edition of Boccaccio's *Le livre des cleres et nobles femmes*.¹³ Carding is first recorded in England shortly after 1300 and over the course of the next two centuries became widespread. Cards are very occasionally mentioned in wills. In 1418 Agnes Stubbard, who belonged to a prominent family of Bury St Edmunds woolmen, bequeathed several to servants who had toiled in her workshop.¹⁴ Card-making itself became big business in some towns, such as Coventry, but not, it would appear, in the urban centres of Suffolk. A few card-makers from each of Bury St Edmunds, Hadleigh, Ipswich and Sudbury are recorded, but were earning only a modest living. Nevertheless, initial hesitancy in the use of carding to prepare warp yarn, particularly in the making of premium quality fabrics, arising from concern about whether it might break when stretched on the loom, was never fully overcome. A further concern was that dishonest carders would fraudulently blend cheaper wool with that of better quality.



FIG. 135 – Woman with spinning wheel, Luttrell Psalter (© The British Library Board).

The spinning wheel was first introduced into England at a similar date to carding and is illustrated in illuminated manuscripts of the time, including the *Smithfield Decretals* and the *Luttrell Psalter* (Fig. 135) dating from the first half of the fourteenth century.¹⁵ Munro estimated that it achieved a threefold increase in labour productivity over hand spinning ‘by the rock’ with distaff and spindle.¹⁶ Since spinning was the most labour intensive stage in cloth-making, one might have expected the wheel to have been quickly and universally adopted, but this did not happen. None of the seventy-nine wealthy Suffolk clothiers referred to above bequeathed spinning wheels in their wills. Such bequests in other Suffolk wills, while not entirely unknown, are few and far between. Miller and Hatcher opined that the spinning wheel ‘was in nothing like general use before Tudor times’.¹⁷ Even after that, its uptake was slow and unsure. Groups of roadside hand spinners could still be seen in the eighteenth century.¹⁸ In 1757 the poet John Dyer penned in *The Fleece* that:

And many, yet adhere
 To th' ancient distaff, at the bosom fix'd
 Casting the whirling spindle as they walk:
 At home, or in the sheepfold, or the mart
 Alike the work proceeds.¹⁹

Why was this? Cost was probably not an issue because a basic wheel could be bought for pennies. In 1446 Anne Catour (alias Neve) of Ixworth valued hers at just 10d.²⁰ Having studied many probate inventories, Muldrew concluded that 'it is rare to find wheels valued at more than a shilling and some were worth considerably less'.²¹ One reason for hesitancy in adopting the new technology was, as with carding, a well-founded fear that wheel-spun warp yarn would be weak, uneven and so break on the loom. According to the late thirteenth-century *Livres des Metiers* [Book of Trades], it left 'too many knots'.²² Furthermore, hand spinning still had advantages. The distaff and spindle were simple to make, easy to store and highly portable. As Dyer penned, they could be taken out into the fields or to the market and put to use during quieter moments of the working day. The great wheel required its operator to walk as many as thirty miles each week in order to step forward to the tip of the spindle and back again for the draw-out, while hand spinning demanded no such effort.²³ The later Saxony wheel, with added foot treadle and U-shaped flyer, dispensed with the need for endless walking, but even in Germany was slow to be adopted. Illustrations from the 1730s of Count Waldstein's state-of-the-art woollen mill in Bohemia clearly show spinsters using a great wheel rather than a Saxony wheel.²⁴

Undoubtedly, the most important and widely adopted technological advances were made in the design of the loom. First, in the eleventh century, the horizontal loom, with foot treadles, replaced the ancient vertical model and then, from about the mid-thirteenth century, to an extent, the broadloom supplanted the narrow one (Fig. 136). Longer and better-quality fabric could be produced, and an increase in productivity of more than threefold was thus achieved.²⁵ The late thirteenth-century Ipswich Domesday differentiated between 'double werk that they call tomnesette', that is, cloth produced on a broadloom with two men's seats; and 'cloth of longe webbe, that they call omannesette', that is, cloth



FIG. 136 – Woman using narrow treadle loom, Egerton Genesis (© The British Library Board).

produced on a narrow loom with one man's seat.²⁶ Some Suffolk cloth-making centres, such as Sudbury, adopted the broadloom earlier than others. In that town's Minister's Accounts, which date back to 1340, broadlooms easily outnumber narrow ones.²⁷ A master weaver might work side-by-side with his wife, journeyman or even apprentice to increase output. However, the narrow loom did have its merits, being cheaper to build, operate and maintain. Furthermore, in weavers' small cottages it took up less space. It could be used by one person working alone and was better suited than the broadloom to more intricate twill-weave patterns.²⁸ An extra-wide loom was also in use before the end of the Middle Ages for weaving wool into blankets and coverlets for bedding. In 1495 Bennet Wareyn of Bury St Edmunds bequeathed to his widow Margaret two looms as long as she 'wull use wevyng', then one each to his sons John and William. One was three yards wide, the other nine quarters of a yard.²⁹

As we have seen, the fourteenth-century Suffolk industry was still primarily geared towards the production of narrow cloths known as cogware, kerseys and straits. In the face of legislation of 1373 that appeared (perhaps unintentionally) to prohibit these fabrics, petitions to Parliament in 1376 and 1394 from the cloth-makers of Essex and Suffolk prayed successfully for the right to continue producing them.³⁰ As late as the 1390s the output of narrow cloths in Suffolk easily exceeded that of broadcloth. Even in the 1460s the foremost cloth-maker John Stanesby of Bildeston built his fortune by producing straits. By then, however, he was in a minority, with the demands of the export market having persuaded most of his contemporaries to switch their output to broadcloths. By a statute of 1468 these were to measure twenty-eight yards, twenty-eight inches long, by seven quarters of a yard wide, and to weigh not less than thirty-eight pounds. In 1552 the minimum weight rose to eighty pounds.³¹

The impact of the fulling mill on English cloth-making was described by Carus-Wilson in (perhaps) overdramatic terms as an 'industrial revolution of the thirteenth century'.³² Certainly, the harnessing of hydraulic power to the cause of cloth-making was momentous.³³ Again, according to Munro, an impressive 70 per cent saving in labour costs and a 3.3 fold productivity gain could be achieved over foot fulling, albeit that the cost of fulling comprised only a small percentage of the total cost of the main manufacturing processes.³⁴ The introduction of the overshot wheel, which was twice as powerful as the undershot one, enabled fulling mills to operate on the slower-flowing rivers and streams of lowland England. Rather than striking paddles direct, water was channeled into buckets attached to the wheel, which then rotated under force of gravity. Just like the spinning wheel, the overshot mill was illustrated in the early fourteenth-century Luttrell Psalter, but may not have been widely diffused in England for another two hundred years.³⁵ This could help explain why relatively few fulling mills were to be found in medieval Suffolk. A diligent search of the county's medieval archives by Northeast, Bailey and the author has uncovered references to just thirty-one spread over a period of more than two hundred years.

From the late thirteenth century fulling mills were operating along the banks of the rivers Brett, Gipping and Lark. They may have been erected by manorial lords to encourage local people to make cloth, just as a generation earlier village markets had been chartered as an inducement to trade so as to generate income for the lord. Evidence for the operation of these same fulling mills in the early years of the following century comes from gaol delivery rolls and, in particular, four recorded incidents of burglary or theft. In each case the volume and value of the misappropriated cloth was relatively small. In 1308 Hugh le Taylur was convicted and hung for stealing five ell (6¼ yards) worth 5s at Barton Mills on the river Lark, while four years later Gilbert Hunoman was acquitted of taking 10s worth at Great Blakenham on the river Gipping.³⁶ It was the Stour in south Suffolk, rather than the Gipping or Lark, that became the main artery of the county's cloth-making. Here, however, the evidence for fulling

mills is more sketchy. In 1482 John Howard, duke of Norfolk, received cloth from the clothier Robert Sergeant of Stoke-by-Nayland for fulling in his mill.³⁷ Only four of Sergeant's near contemporaries, namely John Horrold of Clare, Richard Davy (a shearman) and John Payne of Nayland, and Hugh Turnour of Stoke-by-Clare mentioned fulling mills in their wills.³⁸ Davy and Payne's mill may have been one and the same as the latter, who survived the former by twelve years, may have taken it over on Davy's death. In Long Melford, the foremost centre of fulling in Suffolk, there is no record of any at all, similarly in Lavenham.³⁹ In his analysis of mill numbers, Langdon opines that in the late fifteenth and early sixteenth centuries in the eastern counties 'fulling mills seem gradually to have died away'.⁴⁰ Elsewhere in the country at this time, he detects an upward trend in the number of industrial mills, but this is not reflected in the wills of the wealthier clothiers outside Suffolk. Only one, namely Henry Benett of Newbury in Berkshire, specifically mentioned a fulling mill.⁴¹

So the initial burst of enthusiasm for mill-fulling appears, at least in Suffolk, to have abated and, if such enthusiasm was ever rekindled, it was only at the very end of the Middle Ages. Why was this? As with carding and wheel spinning, quality control was an issue, a fear that the hammers of the mill might damage the cloth. Also, to the disappointment of many manorial lords, fulling mills did not always give rise to a thriving cloth-making community. Indeed, they often generated less income than grain mills. For instance, at the manor of Blakenham in the 1270s and 1280s, the abbot of the alien abbey of Our Lady of Bec received a steady 34s a year from the tenant of his fulling mill, whereas the rent from his grain mill, part of which was received in corn, varied, but was never less than 39s 11d a year (excluding the value of corn).⁴² Fulling mills could become liabilities. Moving forward to the mid-1400s, the borough of Ipswich owned Horsewade fulling mill at Greyfriars Bridge. The town archives tell a sorry tale of default by successive tenants, mounting arrears and falling rental income.⁴³ Fulling mills, particularly those of the overshot type, were expensive to build and maintain. The accounts of Christchurch Priory, Canterbury, provide details from the late thirteenth to the late fifteenth centuries of the income from, and expenditure on, one fulling mill, that of Priestbridge on the river Brett at Hadleigh, one of the most successful textile centres in Suffolk. If such a mill was ever to generate a healthy return, one would expect it to do so there. Yet, as Woods has shown, although the priory's rental income from this mill did indeed rise over time, maintenance and repair made constant demands on its purse to an extent that in some years any profit was wiped out.⁴⁴ Finally, the landscape work necessary to power fulling mills, in the form of weir, floodgates and mill-race — which are all mentioned in the Christchurch accounts — affected the flow of water and could thus impede riverine traffic. This might not matter on the river Brett, but it did matter on the river Stour, which had been an important waterway since Roman times. It took a lord as powerful as John Howard to override the interests of watermen. In conclusion, one can but echo Bailey who opined that Suffolk's fulling mills 'were not established in large numbers; many important textile centres functioned without them and most mills generated modest profits'.⁴⁵ It is telling that Suffolk became the leading wool textile producing county in England without extensive use of the fulling mill. Maybe, as Bailey infers, 'many of the cloths produced in Suffolk were lightly fulled, or not fulled at all'.⁴⁶ However, this is more likely to have been true of the cheaper narrow cloths that were produced in 1400 than the heavier broadcloths that were in vogue a hundred years later.

As cloth was fulled it shrunk so, once fulled, it was mounted on a tenter-frame to stretch it back into shape. The frame could stretch the width, but not so easily the length. The means that were devised to overcome this limitation included a wrench, rope, ring, or other 'engine' of unknown design. According to Unwin, prior to 1552 and possibly even thereafter, such an

engine was in common use in Suffolk. However, if cloth was overstretched it was weakened. The risk of overstretching, whether innocently or fraudulently, led in 1552 to such devices being prohibited by statute.⁴⁷

The gig-mill, like the fulling mill, used hydraulic power to run teasels over cloth and so mechanized the wet and dry napping processes described above. In theory the gig-mill could achieve a ninefold productivity gain.⁴⁸ A few are recorded from Gloucestershire and Wiltshire, one in operation in Castle Combe in 1435 and another in Bishopstrowe a hundred years later, but none are known in Suffolk.⁴⁹ The risk of damage to a cloth that had already taken many laborious hours to produce was considered too great. In 1463 a Parliamentary petition prayed ‘that because of the great deceit daily practised in the working of woollen cloth fulled in mills called gig-mills and town mills, that all such mills be completely abandoned and not used’. The resulting statute merely prohibited the use in them of cards, as distinct from teasels, for napping. An outright statutory ban on gig-mills was not introduced until 1552, explicitly in response to their becoming more diffuse, when the statute echoed the earlier petition in lamenting how they ‘wonderfullye empairyred’ the industry and ‘deceitfully made’ the cloth.⁵⁰

Colman opined that, during the early modern era, cloth-making was ‘one of the more technologically stagnant and conservative industries in European economic history. The great majority of important mechanical innovations that were made took place in the Middle Ages before the widespread development of a rural industry’.⁵¹ Munro echoed this view in writing that ‘the medieval technological changes were more important than those of the intervening early modern era (i.e. from c.1500–c.1720)’.⁵² Yet, Adam Smith wrote in *The Wealth of Nations*:

It is naturally to be expected, therefore, that some one or other of those who are employed in each particular branch of labour should soon find out easier and readier methods of performing their own particular work, whenever the nature of it admits of such improvement. A great part of the machines made use of in those manufactures in which labour is most subdivided, were originally the invention of some common workmen, who, being each of them in some very simple operation, naturally turned their thoughts towards finding out easier and readier methods of performing it.⁵³

Smith describes a phenomenon that modern economists term ‘local learning’. Why did this not happen in the early modern wool textile industry? Having harnessed hydraulic power for fulling in the mid-thirteenth century, why did textile manufacturers wait five hundred years before doing the same for spinning and weaving? After all, the development of hydraulic power did not depend on the Scientific Revolution of the late seventeenth century. As we have seen, several technological innovations faced resistance because of concerns over quality control. But such concerns could have been addressed by incremental improvements in plant and equipment. Even when, as was the case with the gig-mill, the innovation was ultimately outlawed, there was a substantial time lag between its first use and its prohibition during which its shortcomings could perhaps have been rectified. The lack of enthusiasm for automation before 1500 has already been discussed. The paucity of technological innovation after that date has various further explanations.

Textile guilds have long been condemned as innately conservative and enemies of technological innovation.⁵⁴ As we shall see, one of their original purposes was to protect the reputation of urban-made cloth. So new and untried devices that might spoil that cloth and undermine that reputation were regarded with suspicion. Furthermore, capital intensive innovations were often expensive and beyond the pocket of the majority of guild members. And, according to Epstein, they ‘devalued investments in current skills and reduced

incentives to invest in new ones', thus undermining one *raison d'être* of guilds which was to foster a skilled workforce.⁵⁵ The guilds' innate conservatism should not, however, be overstated, because, as we shall see, they showed themselves to be vehicles of much product innovation.

Among those employed in cloth-making, there was a natural resistance to labour-saving innovations that might cost them their jobs. For example, in the mid-fifteenth century at least eleven fullers were working in Hall Street in Long Melford. Had a fulling mill been built there on the Chad Brook, then most of them would have been out of work. Journeyman weavers and fullers enjoyed significant collective bargaining power. Rosser remarks on 'the remarkable diversity and adaptability of organizations of working people in medieval European towns'.⁵⁶ They protected their interests, often through restrictive practices enshrined in guild ordinances. For instance, as we shall see, the rules of Bury St Edmunds' weavers' guild restricted entry into the craft of those who had not been apprenticed in the town. Section XXVI of the Statute of Artificers 1563 required every cloth-maker, once he had three apprentices, to employ at least one journeyman, and another for the fourth and each additional apprentice.⁵⁷ Journeymen might even have a say in the recruitment and training of apprentices.⁵⁸ The purpose of all these measures was to protect journeymen from being undercut by low-paid or even unpaid labour, apprentices generally being unwaged. Technological innovations which might have replaced their skills and so facilitated such undercutting were to be resisted. Witness the violent reaction of the Luddites to the inventions of the Industrial Revolution.

The ruling classes were concerned that high unemployment might undermine civil order. Indeed, this proved to be the case during Cade's Rebellion of 1449, in which several Hadleigh clothworkers were implicated, and in the reaction to the Amicable Grant of 1525 when protest centred on the textile region of south Suffolk. The protesters pleaded that any offence they might commit was 'only for lack of worke soo that they knewe not howe to gett their lyvinge'.⁵⁹ The authorities were no more enthusiastic about labour-saving inventions than most guild members and the workers themselves.

Innovation demanded substantial upfront investment of time and energy in research and development. For example, James Hargreaves invested the equivalent of ten years' wages in perfecting the spinning jenny.⁶⁰ Any such investment might ultimately prove to be unproductive. Even if it were productive, until the late eighteenth century the absence of effective patent law allowed competitors to free-ride on any invention.⁶¹ In 1500 and for many years thereafter, capital investment in industry was hard to find. Even wealthy clothiers had other spending priorities such as land and houses, plate and treasure, which were seen as safer bets in terms of wealth and status.⁶² Thomas Spryng III's eldest son John preferred the life of the landed gentleman to that of a captain of industry. The potential gains from capital investment in textile production did not justify the risk. According to Allen, only with the Industrial Revolution did inventions generate 'enough profit to make the cost of developing and perfecting them worthwhile'.⁶³ Furthermore, the Great Divergence gave western Europe an economic and technological lead over the Middle and Far East.⁶⁴ While this did not reduce the flow of inter-regional trade, it meant that during the early modern period the east had less to offer the west by way of technology transfer — a factor that had been so crucial to development of the medieval textile industry.

As a proportion of the total cost of cloth-making, labour was relatively cheap and, at least until the eighteenth century, remained so. Spinning and weaving accounted for no more than a third of the cost of producing and finishing a cloth.⁶⁵ A medieval spinster might earn only 2d a day. Wage inflation which followed belatedly after the Black Death does not appear to have much benefited clothworkers. In the early 1360s, John, a weaver of Euston, had the

audacity to charge ½d per yard rather than the prescribed 1d per three yards, and so was fined by Suffolk's JPs for infringing the Statute of Labourers.⁶⁶ As the population grew from the second quarter of the sixteenth century, any upward pressure on wages subsided and so, in real terms, the labour costs involved in textile production, particularly that of spinsters, declined.⁶⁷ Confederacies or conspiracies among artisans aimed at raising rates of pay were prohibited by legislation of 1548.⁶⁸ A Parliamentary bill of 1593 proposing a one third increase in the wages of spinners and weavers failed to pass.⁶⁹ A contemporary Puritan divine, Thomas Carew of Bildeston, berated Suffolk clothiers for the poor treatment and pay of their outworkers, particularly spinsters, the most diligent of whom could not hope to earn more than 3d or 4d a day.⁷⁰ In the centuries leading up to the Industrial Revolution, English artisans worked an increasing number of hours each year, a phenomenon that historians have dubbed the 'industrious revolution'. More children were drawn into the textile industry and were paid less than adults. In 1597, in Ipswich, there was appointed for the girls 'a good teacher to spyne all kynd of woole'.⁷¹ Elsewhere in Suffolk, children carded and span in their cottage homes, albeit not always in accordance with instructions and not always with optimum results.⁷² The continuing immigration of Flemish weavers and other textile workers from continental Europe, such as the eleven who, in 1483, worked for John Stanesby, inflated the supply of labour and so may well have been yet another factor in depressing wages. In consequence, there was little incentive to save labour and improve productivity.

A further reason for this lack of technological progress after 1500 may well have been the changes in the organisation of the industry, particularly rural cloth-making, that will be considered next.

ORGANISATIONAL INNOVATION

The organisation of medieval and early modern cloth-making took three main forms: firstly, the independent artisan working alone or with a small number of family members, journeymen, apprentices and other servants; secondly, the craft guild, or as it was known 'company' or 'mystery', normally in larger towns which regulated independent artisans, with a set of ordinances, quality controls, a system of training through apprenticeship, and sometimes a common meeting place; and, thirdly, the putting-out system of proto-industry, normally in rural areas, with a clothier and self-employed, but dependent artisans operating in their own homes, at modest piecework rates, often using their own tools and equipment, but not owning the raw materials.⁷³ In addition, some early experiments with the factory system are recorded, such as John Stanesby's relatively large workshop in Bildeston (Fig. 137), where he employed eleven alien weavers, and, more famously, that of William Stumpe in part of Malmesbury Abbey which he took over after the Dissolution.⁷⁴ Bolton found it surprising that there was 'no concentration of production, no use of the factory system [*because*] it was a more efficient method of manufacturing' on account of lower transport costs and less artisanal fraud.⁷⁵ Nevertheless, before the Industrial Revolution, such experiments were unusual and were not to endure.

Independent artisans

Before about 1470 independent artisans were the archetypal figures in rural cloth-making. In Suffolk, during the first half of the fifteenth century, their numbers grew as the industry expanded and they could be found in small towns and villages throughout the county. Nearly 75 per cent of those who presented cloth for approval to the royal alnager, William Whelpdale, between 1465/6 and 1468/9 produced on average less than eight broadcloths (or



FIG. 137 – Building which was possibly John Stanesby's workshop in Chapel Street, Bildeston.

their equivalent) a year.⁷⁶ As the textile industry was an early exemplar of the division of labour, these artisans tended to specialize in one stage of cloth-making or finishing — be it weaving, fulling, dyeing or shearing. By a statute of 1363 artisans were required to pursue just one craft, an exception being made for female ‘carders, and spinners, and workers of wool’, but undoubtedly some could turn their hand to more than one skill.⁷⁷ Very occasionally, there appears in the records a figure such as William Danyell of Stoke-by-Nayland who was described as a ‘fuller alias dyer’.⁷⁸ These artisans operated from small workshops, often part of their own homes, sourced their supply of wool from woolmen; probably cooperated with each other to make up for those skills they lacked themselves; and sold on their own behalf direct to customers or to drapers who might act as middlemen. They are highly visible in the plea rolls of the Court of Common Pleas.

For several years in the mid-1400s Suffolk cloth-makers sold much of their produce to German merchants of the Hanseatic League, particularly those of Cologne, for export through the ports of Colchester and Ipswich. How these sales were co-ordinated goes unrecorded. However, a little later, when the Hansards began buying the whole yearly production of cloth in many small Flemish towns, they did so by dealing with the cloth-makers’ craft guilds. This reduced the merchants’ negotiating costs and gave them some assurance of quality control. The trade was conducted on a cash, rather than credit, basis.⁷⁹ Notwithstanding the absence of evidence, it is possible that a similar guild arrangement existed for a time between the Hansards and the independent cloth-makers of south Suffolk and north Essex. It might help explain the paucity of records of legal disputes between the two groups. If payment was made in cash, then there was no risk of default. If such an arrangement ever did exist then, almost certainly, it lapsed after 1470 when the Hansards transferred their export trade back to London and when clothiers began to channel Suffolk cloth through city merchants for export.

Craft guilds and apprenticeship

By the late fourteenth century cloth-makers in many cities and towns had grouped together in craft guilds to protect their mutual interests. Their regulations extended to membership, apprenticeship, and quality control by means of intermittent inspections (known as 'searches') of workshops. Their underlying purpose was to protect the reputation and markets of high quality urban fabrics against growing competition from rural industry. In 1477 the weavers of Bury St Edmunds renewed the ordinances of their guild which had probably first been established much earlier. A preamble declared that a 'great multitude of people as well of men, women and children within the town of Bury St Edmunds be daily greatly occupied by the means of the craft of weaver, weaving all manner of woollen and linen cloth'. The ordinances went on, firstly, to give the wardens of the guild powers to inspect weavers' workshops to ensure that quality standards were maintained and to penalize offenders; secondly, to restrict anyone from setting up business or working as a weaver in Bury who had not been apprenticed in the town; thirdly, to prohibit any weaver from using more than four looms; fourthly, to oblige every master weaver to answer for the good workmanship of his journeymen; fifthly, to set a minimum term for apprenticeship of seven years; sixthly, to require master weavers to provide work for their journeymen or compensate them for lost pay; seventhly, to require journeymen to be loyal to their masters; and, finally, to prohibit the poaching of journeymen or apprentices working for other town weavers.⁸⁰ The closing years of the fifteenth century witnessed a resurgence of weaving in the town, particularly of coverlets for bedding. How far this resurgence can be attributed to the ordinances is debatable, but they may have played some part in restoring business confidence after the Great Slump which struck England in the mid-fifteenth century. By their nature, however, guilds mitigated against the formation of larger businesses and economies of scale. In the period 1465–9, according to the alnage accounts referenced above, the output of the most prolific Suffolk cloth-maker, John Stanesby of Bildeston, which had no known craft guild, was nearly twelve times that of the most prolific in Bury, namely Andrew Starbot.

The Bury ordinances of 1477 were granted by the sacrist of the abbey of Bury St Edmunds who enjoyed jurisdiction over the town. Most other provincial guilds were established in a similar way by the local civic authority which generally meant that they were subordinate to that authority and, according to Rigby, were used as 'a means of regulating the urban economy'.⁸¹ However, in the late sixteenth and early seventeenth centuries a small number of such guilds, mostly in the cloth industry, were granted royal charters.⁸² Shortly after Bury St Edmunds had been granted its borough charter by the Crown in 1606, the town's clothiers, clothworkers, woollen weavers and tailors obtained a second royal charter for the incorporation of a guild whose authority extended beyond the borough boundary to include nearly all those Suffolk districts where clothmaking was carried on. Its governing body included representatives from Hadleigh, Lavenham, Glemsford, Waldingfield, Boxford and Groton, but no doubt the real power lay with the ruling elite of Bury. This attempt by the town to exercise control over the rural industry met with immediate resistance and was probably doomed from the outset.⁸³ Guilds could not successfully challenge the dominance in the countryside of the putting-out system of production.

Although the annual Corpus Christi celebrations in Ipswich suggest some form of organisation within each of the crafts represented in the procession and feast that followed, there is no surviving record of medieval craft guilds in the town.⁸⁴ Not until 1590 do we hear of a chartered corporation of clothworkers, shearmen and dyers. Like the contemporaneous corporation in Bury St Edmunds, it ran into strong opposition. In 1620 the bailiffs, portmen and common council, as well as the merchants and clothiers of the town, all petitioned the

Privy Council for its dissolution. The gist of their complaint was that, by reason of its restrictive practices and self-policing of workmanship, the corporation had undermined the quality of the finishing work for which Ipswich had long been renowned. The Privy Council recommended reform rather than winding up, and a new set of ordinances gave the borough authorities, merchants and clothiers stronger oversight over quality control. However, the Privy Council went on to conclude that such independent corporations were generally injurious and few lasted very long.⁸⁵

Craft guilds have been criticized as reactionary and self-serving bodies by historians and economists ever since Adam Smith famously lambasted them thus:

People of the same trade seldom meet together, even for merriment and diversion, but the conversation ends in a conspiracy against the public, or in some contrivance to raise prices.⁸⁶

Nevertheless, they had redeeming features, among which was their role in technology transfer.⁸⁷ This happened in two ways: one through discussion between master craftsmen, particularly if they carried on business within a tight geographical zone, so called ‘clustering’, or owned a guildhall in which they could regularly meet; and the other through passing on of skills, from one generation to the next, by masters to their apprentices. The Statute of Artificers 1563 set apprenticeship within a national framework and established a standard seven-year term.⁸⁸ Adam Smith regarded such a long term as ‘altogether unnecessary [...] the lessons of a few weeks; perhaps those of a few days might be sufficient’. Anything longer he condemned as a restrictive practice, the purpose of which was to keep profits and wages high.⁸⁹ Conversely, in the view of Epstein and some other modern historians, seven years allowed time for essential tacit knowledge, that could only be learned through observation, imitation and hands-on practice, to sink in.⁹⁰ Furthermore, the better the reputation of the master, the more apprentices he would attract and the higher the general quality of textiles would become. The Brewer case highlights the shortcomings of crash courses. In 1478 John Sele of Ipswich engaged David Brewer to teach him the art of dyeing for an agreed tuition fee of 40s. Brewer later alleged that he had ‘well and faithfully taught, serviced and informed Sele so that he learned all things relating to the art’, but his pupil nevertheless failed to pay up.⁹¹ Very probably, Sele had not absorbed the tacit knowledge necessary for the subtle art of dyeing, which demanded an understanding of organic chemistry. Let us now compare these channels of technology transfer in London, which had powerfully independent craft guilds, and Suffolk which did not.

In London those artisans working in the finishing of cloth, namely dyers, fullers and shearmen, were particularly successful in the closing years of the fifteenth and early years of the sixteenth centuries.⁹² As the export market increasingly focused on London and unfinished cloth flooded into the city, they won a huge share of the nation’s finishing work. While that share cannot be quantified, according to Oldland, ‘London had become by far the leading centre for cloth finishing and dyeing in England at the expense of those industries in provincial towns’.⁹³ In 1528 the Fullers’ and Shearmen’s Companies came together to form the Clothworkers’ Company; a guild which, nine years later, was recognized as one of the twelve great London companies. They clearly had a strong sense of collective identity. Of the thirty-five London dyers, fullers and shearmen whose wills were proven in the PCC in or before 1530, twenty made bequests to their guild. Most bequeathed cash, but some silverware, and others furnishings for the guildhall. For instance, in 1522, the shearman Thomas Dyconson gave ‘a cup of silver with the cover and my mark thereon’ and ‘a new fine carpet made to the best fashion with my mark’, and, in the following year, another shearman, Raynold Eglisfelde, gave his ‘best carpet’, in each case for use in the guildhall.⁹⁴ In 1528

Richard Shepard, a fuller, bequeathed to his fellow guildsmen 40s 'to make unto them a drinking' and to their hall 'a standing cup of silver and gilt with an eagle on top'.⁹⁵ Although the language of these bequests is far from poetic, one senses the affection with which these men remembered their guildhall and the company they had kept there. It is not hard to imagine that, as they drank Shepard's health from his standing cup and other silver goblets donated by past members, the master fullers would have talked business at the table and, as their tongues loosened, shared secrets about their newest fabrics. As Prak and Wallis argue, 'knowledge spill-overs produce a chain-reaction of new ideas resulting from the interactions between practitioners, even where these are not necessarily focused on innovating'.⁹⁶ Some people are inclined to brag even when they know they shouldn't.

Out of the same thirty-five testators, fourteen remembered current or former apprentices in their wills, most of them dyers and shearmen. That is 40 per cent of the total, a much higher rate than that found by Hovland (12.5 per cent) in her study of wills in four London parishes between 1374 and 1499.⁹⁷ Five of the dyers had more than one apprentice. Another study of London wills reveals that those dyers who made bequests to apprentices remembered an average of 3.4 apprentices — significantly more than fullers at 1.9 and shearmen at just 1.4.⁹⁸ The majority of the fourteen bequeathed cash, but some left tools, and others released their apprentices from any remaining years' service so that they could begin paid employment as journeymen. In 1523 Raynold Eglisfelde gave to each of his 'four apprentices that at this present day dwell and be in service with me a pair of shearmen's shears on completion of his term of apprenticeship with my wife'.

In London, as in Bury St Edmunds, the normal term of apprenticeship was seven years. Fewer than half of all London apprentices finished their full term, and those who left prematurely might find employment as journeymen in the provinces.⁹⁹ A statute of 1549 implicitly recognized and sought to regulate such resorting 'from place to place' by prohibiting the employment of unmarried journeymen in the textile industry for a term of less than three months at a time, a period extended in 1563 to a year.¹⁰⁰ Nevertheless, this pattern of post-apprenticeship mobility continued. Rappaport estimated that in the late sixteenth and seventeenth centuries, roughly two-thirds of the English male labour force had, at one time or another, been apprenticed in one of the greater cities, primarily London which became a 'vocational training centre for a national economy'.¹⁰¹ In dispersing as they did, so-called 'tramping', the young cloth-finishers spread knowledge of, and skill in, their craft.¹⁰² As we shall see below in the section on innovations in product, such knowledge and skill did not go to waste.

In Suffolk several medieval and early modern guildhalls survive, famously at Bury St Edmunds, Hadleigh and Lavenham. The old guildhall (alias moothall) in Ipswich was demolished in the nineteenth century. None of these belonged to a craft guild, and most were the property of the local civic authority or a socio-religious fraternity. However, as the elites of each town included a significant number of cloth-makers, almost certainly the same business talk that filled the air of the London guildhalls would have pervaded these local ones too. Indeed, the Bury weavers' ordinances expressly envisage all members assembling and meeting together once a year on 13 October in the guildhall to elect their wardens and other officers.

Evidence of apprenticeship in the county's textile industry is limited. In Bury St Edmunds, notwithstanding the provisions relating to apprenticeship in the 1477 weavers' ordinances, up to and including the year 1520 only one weaver, John Couper, had remembered an apprentice in his will and he had done so in the year before those ordinances were promulgated. He bequeathed the modest sum of 12d to his former apprentice John Hosteler.¹⁰³ Up to the year 1500 no Ipswich cloth-maker remembered an apprentice in his

will, but evidence of apprenticeship is found in the register of the town's general court.¹⁰⁴ Apprenticeship was a route towards becoming a freeman of Ipswich borough, rather than a member of a craft guild. Of the half-dozen medieval clothworkers known to have completed that route and become freemen, all but one were dyers.¹⁰⁵ This reflects the prosperity of cloth-finishers, particularly dyers and shearmen, and the long-term decline of weaving and fulling in the town. In Sudbury, members of the Shorthose family were well-established weavers. Richard was in business from about 1400 and his son Thomas succeeded him. When he died in 1459 Thomas bequeathed to his apprentice John Kent 'the broadloom on the east side of my shop'.¹⁰⁶ Kent went on to work as a weaver in nearby Great or Little Waldingfield.¹⁰⁷ Outside these three main towns of Bury, Ipswich and Sudbury, textile apprenticeship goes largely unrecorded in the Middle Ages. As will be discussed below, just four medieval Suffolk clothiers named apprentices. Otherwise the record is silent. Moving forward to the period between 1710 and 1750, when admittedly the county's textile industry was in decline, not a single Suffolk woollen weaver paid stamp duty on an apprenticeship indenture and registered it, as required by law, in the Board of Stamps' apprenticeship books.¹⁰⁸ Absence of evidence is not, of course, always evidence of absence. Suffolk cloth-makers may have had a multitude of apprentices whom they did not care to remember when they died, or for whose apprenticeship they evaded stamp duty. Nonetheless, the contrast between the evidence of Suffolk and London is striking. Most Suffolk clothworkers appear to have begun work without the formality of an apprenticeship, and, as we shall see, most were never more than semi-skilled.

In popular memory craft guilds and apprenticeship are inextricably linked. As we have seen in the success of London's late medieval cloth-finishing industry, that link could be a fruitful one. Yet, the Suffolk evidence suggests that the formation of craft guilds was neither necessary for the operation of apprenticeship, nor any guarantee that cloth-makers would take and train apprentices. As Rigby noted, 'most medieval towns were so small that they did not possess the number of artisans in any particular occupation which was needed to support guild organizations', yet successive generations of craftsmen emerged in most of them.¹⁰⁹ Conversely, according to Wallis, even in those larger towns that supported guilds 'a significant proportion of master craftsmen in some crafts and trades did not take apprentices. Many more took only one or two over their careers'.¹¹⁰

Putting-out

The next innovation, after guilds, in the organisation of the medieval cloth-making was the putting-out system. Spinsters, weavers and fullers, but generally not cloth-finishers, became outworkers.¹¹¹ Clothiers brought each of them in turn the material on which they were to work and then took the product away to sell for profit, often to merchants for ultimate sale overseas. The putting-out system in England can be traced at least as far back as the late fourteenth century, but only after about 1470 did it emerge as the dominant mode of woollen production in many regions until the Industrial Revolution. Cloth-making thereby became a rural pursuit. In the final third of the fifteenth century putting-out was adopted in the small towns and villages of several counties of eastern and western England. During that period clothiers of those counties were able to expand output more rapidly than before and faster than in other shires where cloth-making remained organised in more traditional ways.¹¹² On average a growth rate of 1.5 per cent a year was thereby achieved. Tawney wrote of those:

who fled, precocious individualists, from the fellowship of borough and craft, that they might grow to what stature they pleased in rural isolation [*and, in doing so, were instrumental in*] the outburst of capitalist enterprise in [...] textiles.¹¹³

Coleman recognized ‘the spread of the rural putting-out system, which, because of its use of part-time labour in the household context, permitted low-cost production on an unprecedented scale’.¹¹⁴

As ever, there was a price to pay. Coleman described putting-out as ‘perhaps the biggest impediment to mechanical innovation the industry ever experienced [*which*] evolved as an innovation in organisation, without drastic change in techniques’.¹¹⁵ Why was this the case? The outworkers were relatively low-paid, semi-skilled operatives, generally based in the countryside, rarely members of a guild, and to a large part isolated from all but their immediate family and friends. So the opportunity to develop higher skills or share ideas with fellow workers that might have coalesced into technological innovations was limited. As the Bury ordinances spelt out, most weavers undertook relatively simple plain or tabby weaving whereby the weft yarn passed over one warp thread and under the next. Twill weavers, who deployed greater skill in producing a more complicated pattern, were in business during the fifteenth century in Woodbridge and surrounding towns and villages in north-east Suffolk, but they were a small minority. As the Suffolk textile industry expanded, at that time the aim was to pile high and sell, at competitive prices, standard quality broadcloth. More often than not the fabric was finished in London, or even Antwerp, when the pattern of the weave was obliterated. So, paying premium rates to skilled weavers to produce fancy patterns was wasted expenditure.

Their wills suggest that few wealthy clothiers were directly engaged in the earlier production processes of spinning, weaving and fulling. Only a few bequeathed looms, none spinning wheels. Almost certainly most lacked the day-to-day hands-on experience and so the

Asset	Number of Suffolk clothier wills (total 79)	% of total references	Number of all English clothier wills, inc Suffolk (total 179)	% of total references
Dyes	16	30.2	26	29.9
Dye houses/vats	16	30.2	27	31.0
Fulling mills	3	5.7	4	4.6
Looms	5	9.4	13	14.9
Shears or shearing boards	1	1.9	3	3.4
Spinning wheels	0	0	0	0
Tenters and tenter yards	12	22.6	14	16.1
Total	53	100	87	99.9

TABLE 1 – Assets referred to in PCC wills of clothiers up to and including 1530
 (note: Some wills mentioned more than one class of asset, whereas most wills mentioned none at all.
 The fact that a testator did not mention a particular asset does not necessarily mean that he did not own one; sources: TNA, PROB 11).

inspiration to improve the plant and equipment with which such work was done. Only a tiny number of detailed probate inventories survive from the medieval period, but even those that do may not reveal ownership of such equipment. In 1499 John Reynham's executors made a detailed list of his belongings, including the wool, cloth, and dyes in his warehouse, but there is no mention of a loom or spinning wheel.¹¹⁶ Many more clothiers did retain an interest in cloth-finishing, particularly dyeing. As Table 1 illustrates, they mention dyes — nearly always woad — and dye-houses far more often. Both in Suffolk and nationwide, references to these particular assets comprised just over 60 per cent of total references to cloth-making related assets (excluding wool and cloth). Even those who did not themselves get their hands dirty probably exercised closer supervision over the 'blue-nails' who did and so were more familiar with the process. Clothiers' interest in dyeing would, as discussed below, engender much product innovation in the medieval and early modern eras. Nor do clothiers appear to have facilitated 'technology transfer' through the traditional routes of craft guilds and apprenticeships. Some no doubt frequented the Suffolk guildhalls mentioned above. A few made bequests to socio-religious guilds, including John, Robert and Stephen Reynham who all remembered those of Holy Trinity and St Thomas in Stoke-by-Nayland.¹¹⁷ Others, such as John Motte and John Stanesby of Bildeston, belonged to London livery companies, in their case the stockfishmongers, but these were generally organisations of merchants. Yet more — including members of the Forthe family of Hadleigh and the Sturmyn family of Lavenham — sent their sons to London as apprentices to city mercers where they would have learnt how to trade in cloth, not how to make it.¹¹⁸

None of the 179 wealthy English clothiers whose wills were proved in the PCC made a bequest to a craft guild, suggesting perhaps that they did not belong to one. Since most of them, like the artisans who produced their cloth, lived in the countryside they probably had less time and opportunity than the London cloth-finishers to socialise and share ideas with their contemporaries. Just ten remembered apprentices in their wills, only four of whom made their cloth in Suffolk.¹¹⁹ None of the four mentioned more than one apprentice, not even the richest clothier of his era, Thomas Spryng III, who only named Peter Gawge on whom he bestowed ten half bales of woad. One of the four, John Kyng, lived in London and was a prominent member of the city Grocers' Company, so his apprentice, Thomas Cook, may well have been learning the trade of a grocer. In 1514 Stephen Reynham bequeathed 33s 4d to his apprentice Edmund once the same completed his apprenticeship. Miles Wytton of Lavenham provided that, two years after his death in 1520, William Wylson should have 40s and be released from the final two years of his apprenticeship, and 'he too take his avantage of the same two years'. In other words, William was to use the intervening time wisely and not waste it in idle pursuits. William Barley of Potterne in Wiltshire was very much the exception in remembering three apprentices with cash gifts made conditional on completing their terms of service.¹²⁰

So the putting-out system generated immediate growth in output, but impeded longer-term technological innovation. Firstly, it relied on low-paid, semi-skilled artisans who lacked the motivation or expertise to explore ways of improving their plant and equipment, and, as they had no financial stake in the success of the business, had no incentive to raise productivity and quite possibly make themselves redundant. Secondly, it divorced clothiers from direct involvement in the production processes, notably spinning, weaving and fulling. Thirdly, it dispersed the textile industry, largely dispensing with craft guilds and apprenticeship, in a way that made it far less likely that clothiers and artisans would come together to share ideas and innovations.

PRODUCT INNOVATION

While Coleman was very sceptical about the scale of technological innovation in the early modern period, he was much more positive about the existence of product innovation driven by consumer demand:

The continuous emergence of “new products” [...] new fabrics, new designs, different colours, different finishes; changes in yarn, in weaves, in patterns [...] frequently changing, in an almost infinite variety of small ways, the combination of inputs which determined the look, feel, finish, colour, pattern or weight of the final product.¹²¹

It is perhaps surprising that this should be so, but it suggests that clothiers and their outworkers could respond to the fast-changing demands of fashion without any fundamental advance in technology or process. Putting-out was sufficiently flexible to remain the dominant mode of rural textile production for the best part of three hundred years.

From the fifteenth century the rise of consumerism, meaning the greater accumulation of personal and household goods, has been traced by historians such as Kowaleski and Sear. The importance of consumer goods to the wealthier townsfolk of Ipswich is evident from bequests in their wills and the nature of cargoes arriving on ships from abroad.¹²² Mercery, haberdashery, furniture and furnishings are far more evident in the customs accounts of the 1460s than those of the 1390s. This is in sharp contrast to the picture of Suffolk society drawn from the gaol delivery rolls of the previous century in which references to stolen grain and livestock easily outnumber those to clothes and household items.¹²³

By 1500 clothes were among the most prized of all possessions, often referred to in wills and bequeathed to close family and friends. Through sumptuary laws Crown and Parliament had sought to limit the fabrics that ordinary folk might wear, but such laws had proved ineffective. According to Sear and Sneath:

For a growing proportion of society, clothing was no longer simply a practical necessity which provided warmth and comfort, but an important consumption item which conveyed a wider message about the wearer.¹²⁴

Both the wealthy clothier John Fermer of Lavenham and the merry widow Margaret Fastolf of Ipswich took great pride in their scarlet gowns cut of the finest cloth, as is evident from bequests in their wills.¹²⁵ William Forthe built a business empire in East Anglia selling his fabrics to much humbler folk — ashburners, bakers, barbers, beer-brewers, carpenters, glovers, ironmongers, mariners, millers, pewterers, sawyers and smiths.

In the manufacture of textiles, new fabrics, patterns and colours began to emerge. Although, as we have seen, in the late fifteenth-century Suffolk cloth-makers focused on producing standard quality unfinished broadcloth for sale to London mercers and ultimate export markets, there is even then evidence of different quality fabrics. In Lavenham, prior to his death in 1491, Nicholas Gosselyn produced cheaper broadcloth called vesses, each worth 36s.¹²⁶ Evidently, he was not alone in his interest in this type of cloth. In 1532 Henry Tooley shipped vesses from Ipswich.¹²⁷ A series of statutes, the last in 1523, was enacted for the express benefit of Suffolk clothiers. They permitted vesses to be exported unfinished, and exempted those destined for sale abroad, ‘what colour soever they be of’, from normal limits on shrinkage when wet. Yet another statute of 1566 finally prohibited the export of unfinished Suffolk cloth regardless of value.¹²⁸ Domestic cloth-finishers had finally been successful in persuading the government to keep this work in England.

As western Europe transitioned, in the late Middle Ages, from the Medieval Warm Period

to the Little Ice Age, the climate became noticeably cooler, and darker heat-absorbing colours came into vogue, generally dyed in woad. Having previously produced unfinished cloth, in the early sixteenth century Lavenham clothiers began to manufacture famous Lavenham blues in various shades of that colour — known as blues, azures, plunkets, and watchets. A statute of 1552 permitted cloth to be dyed in the following colours: scarlet, red, crimson, murrey, violet, puke, brown blue, black, green, yellow, blue, azure, orange, tawney, russet, marble grey, sad new colour, sheeps colour, watchets, lion colour, motley and iron grey. Six years later yet more shades were added to the prescribed list including friars' grey, crane colour, purple and old medley.¹²⁹ Bearing in mind that all these colours were produced from a tiny number of natural dyes — principally woad, madder, weld and occasionally litmus — the range is remarkable and the skill of the dyer's craft all the more admirable.

Some product innovations were more fundamental than mere changes in pattern or colour. From the late sixteenth century, with the arrival of Dutch refugee cloth-makers in East Anglia, so called 'new draperies' began to penetrate both domestic and overseas markets.¹³⁰ As an increasing proportion of the English landscape was devoted to grassland and more sheep were pasture-fed rather than fallow-fed, the staple of their fleece grew longer and coarser. Coarse long-staple wool was not ideal for broadcloth, but it was suitable for producing fabrics bearing a plethora of names but known generically as 'stuffs', 'bayes' or 'sayes'. They were similar to worsted and lighter and cheaper than the woollens of the 'old draperies'. As they were rarely heavily fulled, the weave pattern of stuffs was highly visible and attractive to potential buyers.

Initially, Suffolk clothiers did not respond positively to this innovation. In 1577 they complained to a Royal Commission about the high price of wool and blamed the Dutchmen for cornering the market to make their 'slight and vaine' fabrics, 'wherein the common people delight and bestowe great sums of money'.¹³¹ Nevertheless, it was not long before 'many clothiers [...] altered their making of broad clothes into making of bayes'.¹³² Generally, manufacturing new draperies required less stock, produced quicker returns and generated higher profits for a specific weight of wool.¹³³ The seventeenth-century economist Josiah Child commented that:

the humours and fashions of the world change, and at some times, in some places (as now in most), slight, cheap, light cloth will sell more plentifully and better than that which is heavier, stronger, and truer wrought.¹³⁴

The new draperies did not, however, sound the death knell of the old which retained a significant share of both domestic and overseas trade until the Industrial Revolution.¹³⁵ Product innovation could also revitalise the old draperies. In the late sixteenth century, as sheep were increasingly pasture-fed so that the domestic supply of fine wool contracted, Suffolk clothiers, among them William Cardinal, John Browne and John Winterfloode, turned to the merino wools of Spain in order to produce cloths known alternatively as 'Suffolk Spanish sorts' or 'Cardinals'.¹³⁶ Heavier cloth continued to sell well in colder climes, both to existing markets in northern Europe and new ones further afield. Thus, at least from 1568, and despite a prohibition on trade with the Spanish Netherlands, William Cardinal sold his products in Antwerp.¹³⁷ In 1613 members of the Muscovy Company were said to export to Russia 2500 vesses yearly, nine-tenths of which were finished and dyed in Suffolk.¹³⁸ The merchants of the Levantine Company shipped broadcloth to those regions of western Asia which experienced cold winters, such as Anatolia and Persia, and which became important markets for Suffolk fabrics.¹³⁹

In aggregate, the county's industry held up reasonably well, at least until 1700. Keibeck

estimated that in 1601, 12.6 per cent of Suffolk's male labour force was engaged in textiles, rising to 16.3 per cent by the end of the seventeenth century, before trailing off thereafter.¹⁴⁰ But undoubtedly some textile towns and villages fared better than others. Hadleigh retained a thriving broadcloth industry, while Sudbury became a major centre in the production of new draperies, as did Glemsford and Long Melford and, to a lesser extent, Cavendish and Clare.¹⁴¹ However, Betterton and Dymond found 'considerable documentary evidence for depression and poverty in the clothing centres of the Babergh area' in the seventeenth century.¹⁴² Why this difference in early modern experience? Several explanations have been offered by historians. Maybe clothiers in towns, such as Hadleigh and Sudbury, were in a stronger position to exploit the rural workforce on whom they relied. Furthermore, they retained their regular local markets, which served as outlets for at least some of their produce, while those in many villages had folded by then.¹⁴³ Maybe some smaller centres became over reliant on particular clothier families, notably the Spryngs of Lavenham, and suffered decline when those families quit the industry. In 1674, in Lavenham, over 50 per cent of households were sufficiently poor to be exempted from the hearth tax.¹⁴⁴ Maybe some communities were more welcoming to, and better able to accommodate, those immigrants who brought new draperies to Suffolk. The entrepreneurial spirit and success of key individuals, such as William Cardinal of East Bergholt, almost certainly also played a part. Ironically, it was those settlements, such as Lavenham, that fell into decay which kept their timber-framed street fronts that so appeal to tourists today, while those that prospered, such as Hadleigh, hid the timber-framing behind less picturesque brick facades.

The production of new draperies was even more labour intensive than the old. Yet, once more, there were no dramatic technological or organisational innovations. Yarn was prepared by combing rather than carding and, as mentioned, there was less need for heavy fulling. Otherwise production methods remained much the same as before. Productivity gains were not a priority. Innovations in product were. The fashion conscious 'middle classes' of early modern England demanded them. Cloth-finishers continued to join guilds, meeting together to share ideas, and, by training apprentices, passing on those ideas to the next generation. Imitation was the most sincere form of flattery.

CONCLUSION

The three great drivers of growth in the late medieval and early modern textile industry were first technological, then organisational, and finally product innovation. This paper suggests that these drivers did not always work in harmony. By 1500 most technological and organisational innovation had already occurred and the industry had settled into long-term stasis that would not be shaken until the Industrial Revolution nearly three hundred years later. Organisational innovation had cancelled out the potential for further technological innovation because proto-industry was resistant to such change. The putting-out system, which became the dominant form of organisation, went unchallenged until significant new inventions were made in the late eighteenth century. Even then Luddites fought hard against change. Nevertheless, the early modern period witnessed continuous product innovation probably because cloth-finishers were better able to share and pass on new ideas.

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NOTES

- 1 *Rot. Parl.*, v, 274.
- 2 The early history is addressed in more detail in the author's contribution on 'Suffolk clothmaking' to the *Encyclopedia of Medieval Dress and Textiles*.
- 3 Bailey 2007, 272.
- 4 Bailey 2007, 272–3.
- 5 Gray 1924, 34.
- 6 Amor 2016, 219–21.
- 7 TNA, E 101/342/8, 10, 25; TNA, E 101/343/2, 4, 5; Bridbury 1982, 114; Amor 2004, 417; Amor 2011, 166–8; Amor 2023, 277–8.
- 8 Bailey 2007, 8.
- 9 Ashtor 1989, 16–19.
- 10 *Statutes*, i, 281.
- 11 Baines 1977, 44–5, 54; Munro 2003, 194.
- 12 *Statutes*, i, 379–80.
- 13 Royal, MS 16 G V. f. 56.
- 14 SA/B[jury St Edmunds], 158 Osbern.
- 15 Royal, MS 10 E IV. f. 147v; BL, Add. 41230, f. 193.
- 16 Munro 2003, 201.
- 17 Miller and Hatcher 1995, 94.
- 18 Unwin 1927, 300.
- 19 Dyer, book III, lines 67–71, see Goodridge and Pellicer, 2019, <https://hcommons.org/deposits/item/hc:38635/> [Accessed 1 October 2022].
- 20 SA/B, 66 Baldwyne.
- 21 Muldrew 2007, 8.
- 22 Munro 2002, 264.
- 23 Baines 1977, 61.
- 24 Coleman 1973, 6.
- 25 Munro 2003, 196.
- 26 Twiss 1873, 197.
- 27 Redstone 1910, 102–3.
- 28 Kerridge 1985, 11.
- 29 SA/B, 34 Pye.
- 30 *Statutes*, i, 395; *PROME*, ii, 347; iii, 320.
- 31 *Statutes*, ii, 424–5; iv (1), 136.
- 32 Carus-Wilson 1967, 183.
- 33 From the early fifteenth century, in Germany hydraulic power was harnessed for wire-drawing, see Ashtor 1989, 33–4. Significant cargoes of wire were imported into Ipswich in the mid-fifteenth century, see TNA, E 122/52/42–8, which may possibly have contributed to more extensive use of cards in cloth-making.
- 34 Munro 2003, 207; Miller 1965, 72.
- 35 BL, Add. 41230, f. 181; Munro 2002, 232–3.
- 36 TNA, JUST 3/63/4, mm. 3v, 12v (AALT, IMG 129, 158).
- 37 Crawford 1992, II, 320.
- 38 TNA, PROB 11/6/472; PROB 11/14/728; PROB 11/18/50; PROB 11/22/209.
- 39 Amor 2016, 161–3.
- 40 Langdon 2004, 46.
- 41 TNA, PROB 11/7/287.
- 42 Lucas 2014, 345.

- 43 Amor 2016, 154–5.
 44 Amor 2016, 152; Woods 2018, 163, 277–86.
 45 Bailey 2009, 17.
 46 Bailey 2009, 17.
 47 *Statutes*, iv (1), 139; Unwin 1927, 277.
 48 Munro 2003, 210.
 49 Munro 2002, 262–4; Lucas 2014, 159.
 50 *PROME*, v, 502; *Statutes*, ii, 406; *Statutes*, iv (1), 156.
 51 Coleman 1973, 5.
 52 Munro 2003, 191; Kerridge took a more positive view of technological innovation in the early modern textile industry, but his is a minority view, see Kerridge 1985, 169–75.
 53 Smith 1776, 12.
 54 Ogilvie 2004, 314–22.
 55 Epstein 1998, 695.
 56 Rosser 1997, 30; see also Lis, Soly and Mitzman 1994, 9, 21–4.
 57 *Statutes*, iv (1), 420.
 58 Lis, Soly and Mitzman 1994, 17, 28.
 59 *Calendar of Patent Rolls, 1446–1452*, 338, 343, 356; MacCulloch and Fletcher 2020, 23–7, 143.
 60 Allen 2009, 918–9.
 61 Although the Statute of Monopolies 1624 granted rights to inventors of ‘new manufactures’, it took more than a century for patent law to fully develop, see Baker 2007, 451–2. James Hargreaves could not enforce his patent for his invention of the spinning jenny, see Allen 2009, 906.
 62 Bolton 1980, 283; Amor 2016, 191.
 63 Allen 2009, 903.
 64 Van Bavel, Buringh and Dijkman 2018, *passim*.
 65 Munro 2003, 216–7. For examples of textile manufacturing costs and wages in Colchester, see Britnell 1986, 60–3, and in York, see Swanson 1989, 34–5.
 66 Putnam 1938, 375.
 67 Humphries and Weisdorf 2015, 427–9.
 68 *Statutes*, iv (1), 58–9.
 69 State Papers Domestic, Eliz, CCXLIV, 126–9.
 70 Carew 1603, ff. T8r–V2r,
<https://quod.lib.umich.edu/e/eebo2/B11962.0001.001/1:12?rgn=div1;view=fulltext> [Accessed 7 December 2022]; McIntosh 2013, 143–7.
 71 Kerridge 1985, 202.
 72 State Papers Domestic, Eliz, CVI, 48.
 73 Lipson 1921, 5; Rigby 1995, 155–60.
 74 TNA, E 179/180/111. Based on evidence of property later owned by the Stanesby family, Susan Andrews suggests that the workshop may have been in 15–17 Chapel Street, lecture to the Suffolk Institute of Archaeology and History on 30 November 2022.
 75 Bolton 1980, 282.
 76 Amor 2004, 417.
 77 *Statutes*, i, 379–80.
 78 TNA, CP 40/951, m. 27r (AALT, IMG 57).
 79 Pfister 2008, 38.
 80 SA/B, B9/1/2.
 81 Rigby 1995, 159.
 82 Gadd and Wallis 2008, 272.
 83 Unwin 1927, 283–6.
 84 Amor 2011, 23.
 85 Unwin 1927, 281–2, 285–6; Gadd and Wallis 2008, 272.
 86 Smith 1776, 96.
 87 Epstein 1998, 701.
 88 *Statutes*, iv (1), 414–22.
 89 Smith 1776, 92. Swanson endorses Smith’s sceptical view of guilds and apprenticeship, see Swanson 1989, 115; as does Ogilvie, see Ogilvie 2004, 312.
 90 Epstein 2008, 166, 170; Wallis 2008, 847–9.

- 91 SA/[pswich], C/2/10/1/7, m. 11r.
- 92 Fullers performed an intermediary role in cloth-making, some, generally in the provinces, operating more as producers and others, generally in London, more as finishers.
- 93 Oldland 2008, 174.
- 94 TNA, PROB 11/19/455, 11/21/129.
- 95 TNA, PROB 11/22/508.
- 96 Prak and Wallis 2023, 5.
- 97 Hovland 2006, 112.
- 98 Oldland 2003, 125.
- 99 Oldland 2019, 172; Minns and Wallis 2012, 562–3, 573–4.
- 100 *Statutes*, iv (1), 121, 415.
- 101 Rappaport 1989, 77, 314.
- 102 Lis, Soly and Mitzman 1994, 18–19.
- 103 SA/B, Halwlee 217. A list of Bury apprentices is set out in the mid-fifteenth-century scrivener's notebook, Cambridge University Library, Add. Ms. 7318.
- 104 BL, Ms Add. 30,158.
- 105 Amor 2012, 418.
- 106 SA/B, 235 Baldwyne.
- 107 TNA, E 101/343/2
- 108 TNA, IR 1; Mokyr *et al.* 2019, 14.
- 109 Rigby 2004, 507–8.
- 110 Wallis 2008, 845.
- 111 Of sixteen known English clothiers who made bequests to outworkers, only one, namely Richard Stubbington of Fareham, remembered dyers, Amor 2023, 271; TNA, PROB 11/22/368.
- 112 Amor 2023, 278.
- 113 Tawney 1938, 79–80.
- 114 Coleman 1973, 8.
- 115 Coleman 1973, 5, 14.
- 116 TNA, PROB 2/87.
- 117 TNA, PROB 11/9/296, 11/11/743 and 11/18/55.
- 118 Sutton 2010, 165–6.
- 119 TNA, PROB 11/5/431; 11/18/55, 11/20/119, 11/21/179.
- 120 TNA, PROB 11/12/298.
- 121 Coleman 1973, 8–9.
- 122 Amor 2011, 33–4, 125–6.
- 123 Amor 2021, 32–7.
- 124 Sear and Sneath 2020, 101.
- 125 TNA, PROB 11/21/251; SA/I, R1/135.
- 126 TNA, PROB 11/8/630.
- 127 Webb 1962, 42.
- 128 *Statutes*, ii, 520; iii, 29, 217; iv (1), 489.
- 129 *Statutes*, iv (1), 140, 325.
- 130 Munro 2003, 190–1.
- 131 State Papers Domestic, Eliz, CXIV, 32.
- 132 Quoted by Kerridge 1985, 237.
- 133 Kerridge 1985, 237–8.
- 134 Quoted by Lipson 1921, 118.
- 135 Muldrew 2012, 518.
- 136 Chevis 2017, 57, 65–6, 71.
- 137 Chevis 2017, 74.
- 138 Unwin 1927, 277.
- 139 Kerridge 1985, 224.
- 140 Keibeck 2016, 646.
- 141 Holderness 1997, 231; Dymond 1999, 140–1.
- 142 Betterton and Dymond 1989, 57.
- 143 Scarfe 1999, 76–7.
- 144 Evans 1999, 96–7. Admittedly, even the more successful textile centres were each home to a significant proportion of poor households, no doubt due to the low wages paid to textile workers.

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ABBREVIATIONS

AALT	Anglo American Legal Tradition
BL	British Library
<i>Econ. Hist. Rev.</i>	<i>Economic History Review</i>
<i>Proc. Suffolk Inst. Archaeol.</i>	<i>Proceedings of the Suffolk Institute of Archaeology and History</i>
PROME	<i>Parliamentary Rolls of Medieval England.</i>
<i>Rot. Parl.</i>	<i>Rotuli Parliamentorum</i>
Royal	Manuscripts from the Old Royal Library now kept at the British Library
SA	Suffolk Archives
<i>Statutes</i>	<i>The Statutes of the Realm</i>
TNA	The National Archives