



Lessons from English pre-industrial times for a post-industrial circular economy

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ABSTRACT

This paper takes an interdisciplinary qualitative approach to repair, re-use and recycling. Collaboration between academics in the fields of economic sociology, sustainable production and consumption and medieval history permits a long-term perspective on the incentives and deterrents for sustainable practices in relation to resource flows. In England in the period 1250–1500 acquisition of raw materials and production processes were labour intensive, resources were scarce and production and consumption were not strictly separated. However, a dynamic manufacturing sector and rising consumer incomes meant that new goods were readily available.

Three options were available for practising circularity of items: prolonging use to avoid immediate disposal, passing on the item (as a gift or through sale) or re-processing it through recycling. Textiles, metal working, butchery, tanning and leatherworking were the industries in which such practices were most common. Repair and re-use was promoted in the domestic environment, including by the church. In a commercial context, however, trade organisations and government implemented legal deterrents that protected consumers but also limited competition for the producers of new goods. Analysis of these practices enables us to draw three lessons for the current move towards a circular economy. Firstly, efforts need to be made to revive the practice of repair in the household. Secondly, education and greater transparency can prevent quality-control rules from limiting the scope of the circular economy by prioritising new goods. Finally, attention should be paid both the financial and emotional motivations that can encourage sustainable practices.

1. Introduction

Analysing how circularity was practised in the past can help us to identify opportunities and challenges in the present (Boons, 2009; Cooper, 2010; Oldenziel and Trischler, 2015; Weber, 2021). Focus has been placed on how the Industrial Revolution of c. 1760–1850 inhibited circularity by reducing the cost of textiles, and how the Second World War of 1939–1954 re-incentivised it due to shortage of supply (Berg, 2015; Strasser, 1999; Summers, 2015; Thorsheim, 2015; Zimring, 2005: 165).

This article extends the chronological coverage back much further, to

1250–1500. In doing so it addresses calls for further research on ‘what materials industries have sought to reuse at different times, what public and private systems have developed to reclaim materials [and] the evolving rationales for material usage’ (Zimring, 2017: 5) and on further ‘historical studies of repair, reuse and disposal practices in Western Europe’ (Krebs and Weber, 2021: 48). Following the interdisciplinary approach advocated by academics in the field of Sustainable Humanities, the article presents the results of a collaboration between academics in the field of economic sociology, sustainable consumption and those in the field of medieval economic history (LeMenager and Foote 2012).

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Using documentary and archaeological evidence from England in the period 1250–1500 we examine the extent to which consumers and producers engaged in repair, reuse and recycling. We assess how their actions were shaped by the institutions of central government, local government, trade organisations and the church (Britnell, 1993, 1995; Davis, 2011; Musson and Ormrod, 1999).

For the purposes of the article, we define the terms as follows. Repair involves prolonging the use of items through the addition of labour (Bozkurt and Cohen, 2018: 1106). Re-use is characterised by the re-entry of an item into consumption, for example the sale of second-hand clothing or the gifting of a previously used item (Gregson and Beale, 2004; Gregson and Crewe, 2003). Recycling involves the return of items to production after consumption, for example using old clothing to make rugs. It can also involve the re-entry of production waste into production (Zimring, 2017: 159). We refer to this set of categories as practices of circularity (Wieser and Tröger, 2018).

We find that opportunities existed in 1250–1500 to engage in practices of circularity, particularly by consumers in relation to textiles and by producers in the interconnected industries of butchery, tanning and leather-working. However there were also significant barriers. These were the result of the policies of central and local government and trade organisations and justified on the grounds of consumer protection and quality control. Identifying these barriers can help us make the changes necessary to move to a fully circular economy and to align the requirements of consumers, producers and policy makers.

2. Academic context

The history of repair, re-use and recycling has an academic context within the discipline of history. We now briefly outline research that considers the perspectives of consumers, producers and local and national government, which so far has concentrated on the period 1600 onwards.

Consumer engagement with practices of circularity is evident in the period 1600–1750. Improvements in the standards of living, and the opening of international trade routes to America and Asia, promoted the acquisition of a diverse range of household items (Fennetaux et al., 2014; Fountaine, 2008; Stobart and Van Damme, 2010). However, during that period transport costs were high and the technology for mass production remained limited. Re-use of goods between family and friends allowed consumers to attempt to expand their range of domestic items, and the frequency with which they could update them, without the expense of buying new goods. Alterations were also made to existing items before re-use, for example re-dyeing silk dresses in the latest colour (Anishanslin, 2016). In these situations the motivation appears to have been that re-use, either with or without alterations, provided a cheaper way to update the house and wardrobe than buying new goods. The subsequent Industrial Revolution facilitated the acquisition of new goods, but there are indications that practices of circularity persisted in households for some decades. The significant shift in attitudes, Strasser argues, came in the 1920s when household management publications began to criticise the time-consuming nature of repair and to promote disposable items, such as paper napkins, as a time-saving alternative to the cleaning of reusable ones (Strasser, 1999: 22–3; 48–67, 180, 180; 196–7; 269).

The perspective of manufacturers, meanwhile, has been examined for c. 1870 onwards. Some manufacturers engaged in recycling as a necessary element of the production process. Paper-making required textile waste, an opportunity that was not available in our period, when animal skin parchment was used for documents (Zimring, 2005: 164). Other manufacturers, notably in the ‘steel, copper, aluminium and rubber industries’ were motivated by the high production costs of their initial production run, and the strong market demand for products (Zimring, 2017: 159).

Local government initially promoted circularity in order to prevent disease and maintain healthy living conditions for the population. In the

1850s the unpleasant smell of rotting waste and the health implications of waste discharge into watercourses encouraged Chicago’s authorities to work with the animal slaughterhouses on alternative waste disposal methods (Meisner Rosen, 2007: 299–300). The re-entry of waste products into production, such as meat by-products into glue, provided both a hygienic solution of waste disposal that satisfied the authorities, and additional product streams that benefited the producer (Meisner Rosen, 2007).

The activities of central government, meanwhile, intensified during the Second World War, when supply chain disruption and armament production led to policies promoting repair, reuse and recycling amongst civilians (Summers, 2015; Thorsheim, 2015; Zimring, 2005: 165).

Some differences exist between these motivations and the ones that we are more familiar with today (Evans, 2011; Fuentes et al., 2019). The potential ecological benefits of prolonging the product’s lifecycle appear to have been less of a concern. That industry could have a detrimental impact on the natural environment was beginning to be recognised, but the impact was mainly framed in terms of damage to human health. Nonetheless, the range of incentives highlighted in the historical literature may allow us to identify additional opportunities for the present.

2.2. Context to the period 1250–1500

England during the period 1250–1500 experienced a commercial revolution which is considered to be the precursor of the Industrial Revolution of 1750–1860. Urban development increased through the creation of new towns and the expansion of existing ones. As a result, the number of available markets in which to buy and sell goods and the consumer base both grew. The consumer base was wide. Married women were expected to focus on household management and would have co-ordinated purchases for the home. Single and widowed women could be wage earners and, along with skilled male workers, had surplus income for the purchase of fashion items. However, population density also prompted concerns about the health and visual impacts of some production processes, notably tanning and butchery (Rawcliffe, 2013).

Overseas trade contributed to the country’s economic prosperity, with English wool and cloth exports possessing an international reputation. Investment in transport infrastructure for roads, rivers and bridges aided internal distribution networks. Technological improvements made production more efficient, particularly by replacing some manual labour with wind and water power. However, highly-skilled labour intensive craft occupations remained a significant part of the manufacturing sector and most processes were reliant on organic materials (including wool, metals, clay and wood) which were time consuming to collect and could fluctuate in availability. These conditions mean that there were potential incentives for repair, re-use and recycling, as the acquisition of raw materials and production process were both labour intensive, but there were also alternatives available in the form of new goods.

3. Material and methods

Data was collected from documentary and archaeological sources relating to England. Records produced by central and local government in towns, and by trade organisations (known as guilds) provide their perspective on recycling and re-use. Central government regulated the quality of England’s key export goods of cloth and wool, direct and indirect taxation, the currency and the quality and price of daily necessities (such as bread and ale) (Musson and Ormrod, 1999). Its activities are recorded in Statute Rolls and Parliament Rolls. The day-to-day policing of those issues was delegated to local governments in the towns, who were also given some autonomy to make their own regulations. Their administrative records of court rolls, books of custom and books of correspondence reveal their perception of recycling and re-use and inform on the activities of producers and consumers (Casson and

Casson, 2017). Some trade organisations also maintained their own administrative records which reveal policies towards recycling and re-use and instances of their observation or infringement by members (for example Jefferson, ed., 2003). Records also survive that inform on the domestic context. Household accounts survive in relatively small numbers, but inform on purchasing patterns and how items were maintained (Greco and Rose, 2009; Ward, ed., 2014). Wills survive in much greater numbers and detail the distribution of household goods after death (Salter, 2003, 2017).

Archaeological evidence complements documentary sources. The Portable Antiquities Scheme catalogues finds made by members of the public in England and Wales, including via metal-detecting. However, it provides no context on ownership, production or consumption. The excavations of burial sites, rubbish pits and site-specific digs undertaken prior to redevelopment provide greater context (Egan, 2010; Schofield et al., 2018). Burials can inform on items deemed to have symbolic significance, and on styles of clothing, jewellery and domestic items. Rubbish pits reveal what was discarded while site-specific digs can inform on production processes.

Given the often hidden nature of re-use, repair and recycling in historical sources, a broad approach was taken to ensure a breadth of coverage across a variety of datasets (Table 1).

With regards to documentary sources, systematic data collection was undertaken from a group of administrative records from central and local government covering the period 1250–1500 (Anon, 1810–1828; Bateson, 1899–1901; Brand et al., 2005; Dormer Harris, 1907–1913; Hudson, 1891; Hudson and Tingey, 1906–1910; Hughes and Larkin, 1964; Riley, 1868) (Table 1). These covered the locations of Coventry, Leicester, Norwich and London and the central government records pertaining to parliament and statutes. This material was supplemented by the sampling of trade organisation records, wills and household accounts (Table 1).

Archaeological data was gathered from the Portable Antiquity Scheme database for the same period, and from supplementary reports (Barnwell et al., 2004; Egan, 2010; Egan and Pritchard, 1991; Grew and De Neergaard, 1988; Schofield et al., 2018; Seeley et al., 2006; Shoesmith, 1985; Stocker et al., 2015; Still, 1993) (Table 1). These included both finds organised by theme (for example dress accessories and shoes) and those organised by location (for example from site-specific digs in London, Hereford and Winchester).

The framework developed for the data collection focused on defining the various categories of re-use, repair and recycling. Each documentary entry or archaeological artefact was examined for potential evidence of each repair, re-use or recycling. Where such evidence was found, a data collection sheet was created. This recorded the location, date and institution or business. The nature of labour was noted, distinguishing between formal contract of employment and no contract of employment (for example labour in the household). Distinction was made between production, consumption and distribution. Specific details of the case and the reference were then recorded.

Three Excel spreadsheets were then created, one for the data from central government and local government sources, one for the data from PAS and one for the data from the archaeological reports. The data from the collection sheets was entered into those spreadsheets in columns corresponding with the data sheet and using dummy variables. These helped to highlight the presence or absence of trends (for example there is a trend to the use of formal contracts of employment in the records of central government and local government, indicate by the presence of ones in the column, and the prevalence of zeros in the no contract of employment column). These key trends are outlined in the paper, supported by illustrative examples obtained during the data collection.

A key limitation of our approach, which is often encountered in historical research, is that some locations may be over-represented in source survival and others under-represented. For documentary evidence this may be because some had fewer institutions that generated records than others. For archaeological evidence it may be because

Table 1

A summary of the type and number of documents analysed.

Type of document	Location covered in the source	Document reference	Number of documents by type
Central government	England England England	Brand et al., 2005. Anon, 1810–28. Hughes and Larkin, 1964. Total	3
Local government	Coventry Leicester London Norwich Norwich	Dormer Harris, 1907–13. Bateson, 1899–1901. Riley, 1868. Hudson and Tingey, 1906–10. Hudson, 1891. Total	5
Trade organisations	London	Jefferson, 2003. Total	1
Household accounts	Clare, Suffolk Various locations in England, but focus on London Paris, France	Ward, 2014. Veale, 1966. Greco and Rose, 2009. Total	3
Wills	Bury St Edmunds London	Merry, 2000. Alsford, 2020(c). Total	2
Archaeological data: Portable Antiquities Scheme	England and Wales (data collected on England)	Portable Antiquities Scheme Database, 2020.	The database contains 1596,782 objects within 1028,906 records
Archaeological data: Reports	Western Europe (data collected on England) London London London London London Hereford	Coatsworth and Owen-Crocker, 2018. Egan and Pritchard, 1991. Egan, 2010. Grew and de Neergaard, 1988. Seeley et al., 2006. Schofield et al., 2018. Shoesmith, 1985. Total across all archaeological sources	8

Note: For reasons of space the short references are provided in the table. The full reference to each source is provided in the reference list to the article. Examples that illustrate production but were not part of the data collection on repair, reuse and recycling were not included in this table (Alsford, 2002a, 2022b; Norfolk Record Office NCR 5 B 1 1287/8 folio 1r).

excavations have not been possible. The sources are not always chronologically aligned within each location, for example we may have wills surviving from one period and administrative records from another. Despite this limitation, our novel methodological approach in undertaking this work can be defined as interdisciplinary (Barry et al., 2008).

4. Options for practising circularity of items

Prolonging the use of items through careful storage and maintenance was intended to defer the need to repair. A household manual written in the late 1300s by an elderly husband for his new (young) wife gives tips on preventing damp and insect damage in household linens and clothes,

alongside recipes for stain removers (Greco and Rose, 2009: 220–1). Despite the couple's wealth, emphasis is placed in the manual on the care of the wife's existing expensive clothes, rather than the purchase of new ones (Greco and Rose, 2009: 57). Careful conservation of items, the husband argues, will distinguish his wife from 'foolish or ignorant women who do not care about their own estate or that of their husband' (Greco and Rose, 2009: 57). It was a means, scholars suggest, through which a wife could communicate her and her family's 'good order, simplicity and respectability' (Greco and Rose, 2009: 57–8).

When objects did eventually break, repairs were attempted. The archaeological evidence also provides evidence of repairs to household objects. Bowls of lead spoons were reattached to handles using solder (Egan, 2010: 252; Sumnall, 2005), although we cannot identify if they were done by the householders themselves or professionally. Professional expertise was almost certainly needed for the repairs to ceramic vessels which involved pouring molten lead into cracks to seal them. Despite this being a relatively labour intensive process, 128 such repairs were noted in the archaeological evidence consulted (for example Webley, 2005).

Passing on of items to other consumers could be done through gifts or by sale. Gifts are primarily recorded through wills, when the testator allocated the disposal of their possessions after death. It was common, for example, to leave clothing and household items to servants to aid them in setting up their own home or business. John Baret II, for example, was a cloth merchant of Bury St Edmunds who died in 1467. He bequeathed his servant John Aleyn a horse and sets of Baret's clothes and bedding. If Aleyn were to take up an apprenticeship in a craft then the executors were instructed to help him by providing additional goods (Merry, 2000: 254, 257).

There was, however, also a commercial market for second-hand goods (Davis, 2010). Items could enter the second-hand market in a number of ways. Some were sold to dealers directly by owners, including the monastic house Durham Priory, which sold clothing, and one of the earliest Cambridge colleges, The King's Hall (now part of Trinity college), which part-exchanged old cutlery for new replacements (Davis, 2010). The medieval equivalent of house-clearances also occurred. As well as leaving bequests to specific individuals, testators sometimes ordered that their property and household goods be sold to fund other initiatives. In his will of 1439, for example, the London merchant Robert Chichele instructed his executors that 'the remainder of all my moveable goods and chattels whatsoever, after my debts have been paid and my testament fulfilled, I wish and bequeath to be entirely disposed of by my executors in works of charity' (Alsford, 2020c). Pawnbroking was a further channel through which items might enter the market. Individuals of all social groups pawned items to generate quick cash, and failure to repay meant that the items were sold by the pawnbroker (Davis, 2010).

Recycling waste material by re-processing it was an option for medieval manufacturers. The most detailed surviving evidence relates to the textile and butchery and metal sectors, as described in more detail below. Two main forms of recycling occurred; surplus material from the first round of production might be made into additional items or waste generated during production might be used to make additional items. There is evidence that production waste was also sold unprocessed, for example the wood chips from construction work on Leicester's guildhall in 1366 were sold for 15 shillings 4 pence, although the use they were put to is unknown (Alsford, 2020b).

5. Industries

Recycling and re-use appears to have been relatively industry specific in the middle ages. Textiles and metalworking feature commonly in the documentary records. These sectors produced relatively durable goods, which could potentially withstand re-use or be easily repaired. Their production was relatively labour intensive, meaning that replacements were relatively expensive. It is estimated, for example, that

to produce a piece of cloth in the 1540s took a total of 978 hours (50 for wool sorting, 572 for yarn preparation, 130 for weaving, 90 for cleansing, thickening and stretching, 120 for finishing, 8 for dyeing and 8 for packing and transport) (Lee, 2018: 72–3). The costs of this labour impacted on the prices charged to consumers. It has been proposed that the price of four square yards of first quality wool represented 124.8 per cent of the monthly income of a labourer, 78 per cent of a craftsman and 15.6 per cent that of a merchant (Richardson, 2008: 36). Even more basic fabric was relatively costly, with 4 square yards of linen shirting representing 39.6 per cent of a labourer's monthly income, 24 per cent that of a craftsman and 4.8 per cent of a merchant's (Richardson, 2008: 36). Precious metal items were expensive, but so too was metal kitchen equipment. Pots and cauldrons were cast from copper, brass and bronze – with a 20 gallon copper cauldron being worth 639.6 per cent of a labourer's income, 339.6 percent of a craftsman's and even 80.4 per cent of a merchant's (Richardson, 2008: 36).

5.1. Clothing

Clothing was repaired and also repurposed in the domestic context, even in the case of fairly humble garments. Surviving stockings found in the grave dated 1350–1370 were 'heavily worn and had been repaired' and their owner had also repurposed old garments to make additional shoe linings (Coatsworth and Owen-Crocker, 2018: 280–1). Used clothes and textiles were also gifted in the domestic context, as indicated in the examples above. However, there was also significant consumer demand for the purchase of second-hand clothing, as discussed in more detail later in the paper. In 1321 in London, for example, at least 41 traders were present at a night-time market of second-hand goods and a record from 1323 indicates that 'old clothes and shoes' were amongst the items sold (Davis, 2010; Thomas, 1926: 2). Interestingly, the purchase of second-hand goods extended right to the top of society. The household accounts of Henry, Earl of Derby, for example, reveal that he purchased second-hand fur for some of his gowns from members of the skinnners trade association in London (Veale, 1966: 13).

Flocks (coarse tufts and refuse of wool, removed before spinning and shearings cut from the cloth) and thrums (unwoven ends of the warp threads left on the loom, and other pieces of waste thread or yarn after weaving) were waste products from cloth production (Lee, 2018: 132, 165, 166, 167). They were recycled into the production of bedding, serving as stuffing and quilting, although this was controversial, as Section 9 will show.

5.2. Metal

Objects made of metal were also repaired and gifted. Archaeological evidence indicates that repairs to small dress items, such as metal buckles, and to jewellery, including ring hoops and suspension loops on pendants, were relatively common (for example Brown, 2016; Burnett, 2010). Perhaps surprisingly we have so far found no documentary evidence of the recycling of metal materials, but there are instances of their resale. Second-hand metal objects appear to have been traded. On 24 February 1316 the trade organisation responsible for manufacturing metal pots informed local government officials that some of their colleagues, especially Alan le Sopher, had been buying pots of bad metal and putting them in the fire 'so as to resemble pots that have been used and are of old brass', and were then selling the pots at Westchepe (Riley, 1868: 118). Customers were discovering that the pots melted when put in the fire. In this instance, therefore, unscrupulous manufacturers were making inferior quality new items and passing them off as better quality second-hand ones.

Not all metal items were considered appropriate for re-use. The repair of weapons and armour was prohibited in guild ordinances of the armourers (1322) and the furbishers (1350) (Riley, 1868: 145–6; 258–9). The sale of 'battered and vamped-up' helmets was prohibited, while broken swords were not to be 'repaired or made up again' (Riley,

1868: 145–6; 258–9). Health and safety and reputational reasons appear to have motivated these concerns. In the case of helmets, the ‘revamped’ items were allegedly being taken from London into the countryside and sold there as new, including to high-status consumers. This potentially caused ‘great peril...to the King and to his people’, presumably as hidden defects meant that the helmets provided inadequate protection, as well as a ‘disgraceful scandal to the armourers’, damaging the reputation of their new products (Riley, 1868: 145–6).

5.3. Butchery, tanning and leather working

Recycling in butchery and tanning, however, provided opportunities to tackle their associated hygiene problems. Tanning was considered to be problematic as human waste was used in the softening of skins, and the treated skins were then washed in rivers where water was sourced for cooking and bathing. Butchery produced waste products such as bones and skins. Leather, meanwhile, was a durable commodity that had the potential to be re-used.

The three processes were interconnected and to some extent had built-in opportunities for recycling of production waste. Tanning, despite its problems, did essentially recycle human waste and in that sense addressed one set of hygiene concerns. Skins were waste byproduct of butchery and were a production input for tanning. Leather goods were made from the processed skins. However other opportunities were also available. Animal fat could be recycled into cheap candles, although distinction appears to have been made between higher quality fat (tallow) and lower quality ‘foteys’ or ‘skimmings’ (Alsford, 2020a). Wax-chandlers, who made candles from beeswax, were prohibited from mixing animal fat into their products (Dummelow, 1973; Riley, 1868: 300–302). Horns, meanwhile, were transformed into drinking vessels.

Leather shoes were a particularly common item for both repair and for re-sale (as mentioned above). Archaeological evidence suggests that soles wore-out faster than uppers (Grew and de Neergaard, 1988: 70). This is not that surprising, since medieval shoes were less sturdy than modern ones. They were flat-soled (raised heels, to stop feet slipping out of stirrups, did not transfer from Asia to Europe until the 1500s) and were pieced together using thongs, not nails (Coatsworth and Owen-Crocker, 2018: 348–350). Leather thong or flaps and toggles then fastened the shoe (Coatsworth and Owen-Crocker, 2018: 348–350). Minor repairs to the soles were made by adding irregular shaped pieces of leather (possibly surplus material from production) and were done by less skilled cobblers. However the replacement of the whole sole was a task for the more highly skilled cordwainer.

Environmental management and infrastructure investment mitigated the impact of any remaining waste products. In some towns, such as Norwich, strict zoning separated residential areas from noisy manufacturing sectors (metal working) and from butchery and tanning. Investment in piped water supplies and situating tanning downstream from residential areas helped to limit water pollution.

6. Practical and physical incentives for repair, re-use and recycling

The price of replacement items, which reflected the labour-input and raw materials, provided an incentive for re-use by repair, and for gifting (Helgesson and Muniesa, 2013: 6). Cloth, for example, was not only time-consuming to produce (as discussed above) but also required expensive, usually imported, raw materials to provide the colour and to fix the colour to the cloth. The fixing agent of alum, for example, had to be obtained from Asia via Italy (Lee, 2018: 63). The cost of the dyes meant that some consumers on lower incomes economised by wearing clothes in their natural undyed colours of white or grey (Dyer, 1989:176). Furthermore, the production of items such metal domestic objects required skilled labour and investment in tools and training. Some production, such as of low quality cloth or of wooden objects, could be undertaken in the household. But most manufactured items

needed to be purchased. The raw materials and labour inputs were reflected in the final price of the finished product, as discussed above. Avoiding regular repeat purchases through repair or gifting provided the opportunity to economise.

Household labour, in contrast, was provided for free by female family members so the conservation of items and minor repairs to prolong their use were viable. For married women in particular, who were not expected to work outside the household, there was an expectation that they would allocate a proportion of their time to such activities, as discussed above in reference to the new wife’s household manual.

7. Institutional incentives for repair, re-use and recycling

Institutional practices associated with commemoration encouraged the re-use of items. Medieval religious beliefs emphasised the need to pray for the soul of the dead person, to ease their passage through Purgatory and ensure their arrival in Heaven. Bequeathing items in a will for re-use by another individual served a practical and commemorative purpose. Alongside supporting his servant, John Baret II bequeathed his nieces Janet and Joan money and property but also bed linen and washing basins (Merry, 2000: 253). Baret II had no children and that may have intensified his wish to ensure remembrance through the re-use of his possessions. In supporting the next generation in practical ways, he would hope in return that they would support him spiritually by praying for his soul.

Family status could also be maintained and enhanced through the re-use of items. Precious metal items, such as jewellery, were passed down through generations. Agnes Bedford of Hull, for example, in her will of 1459 bequeathed to her son items including ‘a set of silver best spoons, a silver salt cellar with a cover, brooches, and other pieces of jewellery, notably three rings, one of which was a signet ring decorated with a cross’ (Salter et al., 2017: 44). Valuable bequests of gold jewellery, meanwhile, were made to Agnes’s daughter-in-law (Salter et al., 2017: 44). Such items were predominately ‘heirlooms’ (Salter et al., 2017: 45). Wealthy families in many localities also bequeathed metal objects and textiles to their local churches. Sometimes the items concerned were made direct use of, for example as altar coverings. On other occasions the expectation was that they would be sold to fund the salaries of priests, who would then pray for the donor’s soul. Donations of objects to churches therefore combined institutional practices of commemoration with a demonstration of family status.

8. Practical and physical barriers to repair, re-use and recycling

Changes in fashion and taste posed a barrier to re-use even in the middle ages. In shoes, there were regular changes in the popularity of different styles. Pointed shoes were fashionable in the mid 1100s, and were compared by a contemporary chronicler to ‘scorpion’s tails’ (Coatsworth and Owen-Crocker, 2018: 360–1). These became more extreme when revived in the mid 1400s, with a surviving man’s shoe measuring 31 cm in total (Coatsworth and Owen-Crocker, 2018: 368–9). Also fashionable in Northern Europe during the 1100s were shoes of colourful leather with embroidered patterns (Coatsworth and Owen-Crocker, 2018: 364–5). However when fashions faded these shoes were quickly discarded, with surviving artefacts being discovered in excavations of rubbish heaps and of infill on the Thames embankment. Indeed shoes from the 1380s excavated in central London were discarded after very little wear, probably by members of the royal court, which was in the vicinity of where they were dumped. Shoes were also discarded in fairly high volumes, with nearly 10,000 appearing in a rubbish dump in Norway spanning the period 1170 to 1470 and 359 appearing in a rubbish dump in London, dated by dendrochronology to the period 1430–40 (Coatsworth and Owen-Crocker, 2018: 364–5, 372–3).

Durability was also a barrier to re-use and recycling. Shoes may have been discarded in fairly large quantities, at least by the wealthy, because they were easily damaged by dirt and damp and wore-out quickly.

However some wealthy consumers did make an effort to prolong the product's life. Wooden overshoes – chunky wooden wedges with straps at the heel and toe – were attached to leather shoes to elevate them from the ground when walking in the street (Coatsworth and Owen-Crocker, 2018: 372–3). The earliest examples date to the 1100s but they appear greater numbers in the archaeological evidence from 1400 onwards.

9. Institutional barriers to repair, re-use and recycling

Institutional barriers deterred both re-use through sale, and recycling by re-entering production waste into production. Local government raised a number of objections around the sale of second-hand goods. Firstly, London's civic authorities and central government frequently expressed the fear that second-hand markets provided an outlet for stolen goods and thus caused problems for the maintenance of law and order (Davis, 2010). However, more significantly, there were concerns about how consumers could be protected against dishonest practices. Evening or night markets were considered to heighten the risk to consumers, as darkness concealed faults in the items (Rexroth, 2007). But a greater risk occurred in the regular day-time markets, when a consumer might be misled into purchasing a second-hand item that they believed was new. The difficulty in balancing consumer demand for second-hand goods with consumer protection is illustrated in Norwich, where the local court records reveal regular prosecutions of traders for washing and repairing old clothes and selling them as new. A common practice was to improve the appearance of clothes by using tools to raise the surface of the cloth, so that it resembled newly manufactured material (for example Norfolk Record Office, NCR 5 B 1 1287/8 folio 1r).

Second-hand goods also represented a threat to traders in, and manufacturers of, new goods. Trade organisations which managed many crafts had rules relating to quality control and specialised in the sale of new goods (Casson, 2020). When consumers purchased from a member of a trade organisation, such as the tailors, their expectation was that the goods would be of a certain quality and new. Consumer confidence was damaged if manufacturers did not adhere to craft rules. This is demonstrated in a heated discussion recorded in London on the 5 November 1344 (Thomas, 1926: 213–4). Four manufacturers of felt or woollen caps were charged by the local authorities with dyeing light furs dark and then selling them as good. The four admitted to dyeing furs for other people, but not to selling them, and a jury that appears to have contained several members of their trade was summoned. The jury's verdict was that the hat manufacturers had always dyed old white furs brought to them, but they were not intended for sale nor to deceive customers. However the mayor and aldermen believed the jury's verdict to be unreasonable and untrue and decided to make their own decision on the matter. They eventually decided 'in order to prevent deception and maintain the reputation of the skimmers' trade' that the dyeing of fur was to be made an offence. When the decision was read out, however, Richard de Bryby, a capper, 'shouted out that he would continue to do as he had done before in spite of it', and was therefore imprisoned, and released a few days later. This case is revealing for three reasons. Firstly, the cappers argue in their defence that there was a market for the refreshing of old (presumably worn or second-hand) furs and, implicitly, that they undertook the service only for the owners of the furs – not for the purposes of resale. Secondly, the civic authorities decide that the cappers were deliberately misleading consumers. Thirdly, by entering the fur trade at all the cappers were infringing on the speciality of the skimmers, who were the trade organisation responsible for the sale of furs. They were then compounding the damage to the skimmers by selling deceptive products, which undermined consumer trust in the skimmers products.

Institutional motives could also be self-serving, however. Central government perceived access to second-hand clothing as a risk to the social hierarchy. By purchasing cheap clothes previously owned by the wealthy, those of lower incomes could falsely present themselves as of higher social status. This concern intensified as opportunities for social

mobility improved in the aftermath of the plague of 1348–9, with survivors demanding higher wages and enhanced political representation. Dress became a mechanism for attempting to maintain the social hierarchy. The Statute of Diet and Apparel of 1363 dictated appropriate apparel by income level and social status (Anon, 1810–28: 378–83). Craftsmen, for example, were not to 'receive or wear cloth worth more than 40 shillings for a whole cloth...nor wear bejewelled cloth', while knights with an income of 200 marks per year were permitted to wear cloth of a much higher value of 6 marks for the whole cloth (Anon, 1810–28: 378–83).

Recycling was also a controversial topic. Manufacturers of new goods perceived the incorporation of 'waste' by-product to damage the quality of items. Legislation was introduced at a national level, for example in 1464 to prevent production waste of threads and wool being used as a filling for other textiles, such as blankets, or from being reprocessed (Lee, 2018: 165). For some manufacturers, however, the mixing of these waste products with new wool was integral to the texture of their finished cloth (Lee, 2018: 165). Three areas of Devon were exempted from the national legislation after demonstrating that recycling production waste was an accepted regional practice.

10. Conclusions: learning from past practices of circulation

The re-use of objects in England the middle ages was promoted by resource scarcity and the costs of replacement products but also by institutionalised practices surrounding gifting and commemoration. Re-use via repair and gifting occurred in the domestic environment but there was also a substantial commercial trade in second-hand items and repairs. Yet, while consumer demand existed for second-hand items and repairs, institutional barriers to these practices were created by trade organisations, local and central government. Consumer protection was one motivation. There were concerns that consumers might unwittingly purchase, or deceitfully be sold, second-hand or repaired goods as if they were new. In the case of weapons and armour, this could have serious health and safety consequences. However, manufacturers of new goods perceived second-hand items and those made from production waste to be of inferior quality to new goods. They were therefore reluctant to allow consumers the choice to purchase them. This aided the maintenance of quality standards but also limited the competition that the sale of second-hand and recycled goods could potentially pose to the new goods trade.

Looking at what can be learned from past practices of circulation, we note first of all that our evidence suggests that there existed a range of practices of circulation, in particular within the domestic household, to deal with resource scarcity and high cost of replacement. These situational conditions favoured practices of repair and re-use. Bringing these into the commercial sphere met with barriers which were imposed based on concerns of quality, relating to dimensions such as health and safety as well as status. We also find that, in the middle ages, the contestation over second-hand use was at least in part driven by the commercial interests of manufacturers of new goods. Opportunities and challenges therefore existed which have relevance for today, namely:

- 1 The domestic household has traditionally been a viable site for practices of circulation, based on motivations that resonate in part with modern concerns about resource scarcity (Evans, 2005; Klepp and Laitala, 2018; Mylan et al., 2016; Svensson et al., 2018; Wheeler and Glucksmann, 2015).

The reuse of items within and across households is an area in which there is some continuity from the middle ages. The church may no longer be the significant promoter of reuse that it was, but we can see some continuity in motivations for reuse nonetheless. Financial and social motivations unite in the circularity of maternity wear amongst friends and family (Gregson and Beale, 2004). The expectant mother avoids spending money on clothing that has a limited use at a time of

additional financial outlay for baby items (Gregson and Beale, 2004: 694). Lenders of clothing, meanwhile, have an opportunity to demonstrate their love/friendship (Gregson and Beale, 2004: 695). The purchase of secondhand clothing remains a way of managing household income. Indeed there are fewer restrictions on the sale and purchase of second-hand clothes compared to 1250–1500 (Gregson and Crewe, 2003). Financial motivations have been identified as the primary reason for the purchase of secondhand clothes from charity shops, followed by the opportunity to support charity and to be environmentally sustainable (Hur, 2020: 5).

In contrast, there are fewer incentives for households to engage with repair compared to 1250–1500. Mass production has substantially lowered the costs of new items, product design is complex, women are primarily working outside the home, and access to skilled repairers is limited (Crosby and Adams Stein, 2020: 179, 181; Eurostat, 2015; Hochschild and Machung, 1989; Kumar et al., 2020). Because people are so much wealthier today, they are able to replace products much more frequently, which means that fashion and novelty have become more important determinants of consumer behaviour. Can repair be revived?

Today, new goods can be accessed easily and cheaply. In 2019/20, for example, households in the UK spent on average 3 or 4 per cent of their weekly household budget on clothes and shoes and 5 to 7 per cent on household goods and services (Joseph Rowntree Foundation, 2022). The financial motivation to repair goods is therefore less than in 1250–1500, when a much higher proportion of household income had to be spent. However the motivation may increase if retail prices of new goods rise as predicted (McKinsey and Company, 2022: 13).

Making the act of repair more attractive and more convenient may encourage a re-engagement with the practice by household members. Attractiveness can be enhanced by promoting greater ‘appreciation for the labour, skill and resources involved in making objects’ and the stories attached to them (Lee and Wakefield-Ram, 2021: 4–5). This in turn may encourage more people to take up repair work as a profession, thus increasing the availability of skilled repairers (Bozkurt and Cohen, 2018). Convenience can be aided by citizen-led initiatives, notably repair cafes, which connect skilled local community members with their neighbours (Ordóñez and Hagy, 2019; Zapata Campos and Zapata, 2017).

Encouraging companies to design products in such a way that repair and reuse is possible is also necessary. Design needs to focus on extending the lifecycle of products, including by providing opportunities for consumers to ‘open, disassemble, or alter’ products and removing planned obsolescence (Charter, 2018; Crosby and Adams Stein, 2020: 182). The use of materials should be considered carefully, particularly that of plastic, which is a key obstacle to repair (Burgess et al., 2021).

- 2 Concerns about consumer protection in the areas of health and safety and product quality can limit the scope of the circular economy. In 1250–1500 local and central government were, justifiably in some cases, worried that repaired or reused products might end up being unsafe, and that consumers might be deceived by recycled items. They therefore created rules that limited circularity. Manufacturers provided some support for repair, but little for reuse or recycling.

A comprehensive solution is needed. Repair requires greater transparency on the part of manufacturers and government support for policies that prevent manufacturers of cars and appliances from using ‘product software’ that makes the consumer ‘wholly reliant on the original manufacturer for maintenance and repair’ (Crosby and Adams Stein, 2020: 182). Instead, repair instructions and demonstration videos should be made available on open knowledge platforms (Crosby and Adams Stein, 2020: 182). At the same time, efforts made by manufacturers to engage in recycling through the return of items to production after consumption should receive greater support from local and central government. In 1250–1500 opportunities for recycling were underexploited. In contrast Zimring (2005: 165; 2017: 2; 2017: 2–3; 5) suggests

that today attempts are made to recycle too wide a range of items, and some recycling efforts made indeed damage the natural environment. He proposes that recycling be refocused towards materials where value could be added by reprocessing, and that the input of manufacturers should be sought to identify those.

- 3 Attention should be paid to the financial and symbolic motivations for engaging in sustainable practices. Our research has shown that in 1250–1500 goods had a financial value which consumers appear to have factored into their decision making. Contemporary research suggests that this motivation remains. The religious teachings of the medieval church also endowed items with a symbolic value when they were presented as gifts. While a religious dimension may no longer be as relevant, there is evidence that emotional attachment to items can encourage repair and reuse (Holmes, 2018; Maguire and Fahy, 2022). Today, the importance of considering values attributed through ‘social practice’ as well as financial value has been posited as an important area of ongoing research (Helgesson and Muniesa, 2013: 4; Helgesson and Woolgar, 2018; Hultman et al., 2021: 2).

To support these findings, future work on the project will firstly extend the collection of data on domestic re-use from wills, and on commercial re-use and recycling from trade organisations, for example the Merchant Taylor’s Company and the Haberdasher’s Company in London Metropolitan Archives. Secondly, it will use that to explore in greater depth the social and symbolic practices associated with repair and reuse.

CRediT authorship contribution statement

Catherine Casson: Investigation, Conceptualization, Resources, Writing – original draft, Funding acquisition. **Frank Boons:** Conceptualization, Writing – original draft, Funding acquisition, Validation. **James Davis:** Investigation, Resources, Data curation, Funding acquisition. **Helen Holmes:** Conceptualization, Methodology, Resources, Writing – original draft. **John S. Lee:** Investigation, Resources, Data curation, Methodology. **Harald Wieser:** Conceptualization, Methodology, Resources, Writing – original draft.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data will be made available on request.

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References

Anon, 1810. *Statutes of the Realm*. -28. George Eyre and Andrew Strahan, London.

- (a) Extract from Alsford, S., 2020a. Protecting the supply of necessities, 1898. In: Markham, C. (Ed.), *The Records of the Borough of Northampton*, v1. Elliot Stock, London and Birdsall & Son, Northampton, pp. 373–378. <http://users.trytel.com/~tristan/towns/florilegium/economy/eccom15.html#n49> (accessed 19 January 2020).
- (b) Extract from Alsford, S., 2020b. Public works, 1899–1901. In: Bateson, M. (Ed.), *Records of the Borough of Leicester*. C. J. Clay, London, pp. 283–285. v1297–98; v2: pp. 142, 383–85. <http://users.trytel.com/~tristan/towns/florilegium/community/cmfabr12.html#n22> (accessed 19 January 2020).
- (c) Extract from Alsford, S., 2020c. The wills and testaments of three London grocers, 1937. In: Jacob, E.F. (Ed.), *The Register of Henry Chichele, Archbishop of Canterbury 1414–1443*, v2. Oxford University Press, Oxford, pp. 519–526, 564–68, 615–20. <http://users.trytel.com/~tristan/towns/florilegium/lifecycle/lcdth12.html#p23> (accessed 19 January 2020).
- Anishanslin, Z., 2016. *Portrait of a Woman in Silk: Hidden Histories of the British Atlantic World*. Yale University Press, New Haven.
- Barnwell, P.S., Palmer, M., Airs, M., 2004. *The Vernacular Workshop: From Craft to Industry*. Council for British Archaeology, York, pp. 1400–1900.
- Barry, A., Born, G., Weszkalnys, G., 2008. Logics of interdisciplinarity. *Econ. Soc.* 37 (1), 20–49. <https://doi.org/10.1080/03085140701760841>.
- Bateson, M., 1899. *Records of the Borough of Leicester*. v1. and v2. -1901. C.J. Clay, London.
- Berg, A., 2015. The Nazi rag-pickers and their wine: the politics of waste and recycling in Nazi Germany. *Soc. Hist.* 40 (4), 446–472. <https://doi.org/10.1080/03071022.2015.1076124>.
- Boons, F., 2009. *Creating Ecological Value: An Evolutionary Approach to Business Strategies and the Natural Environment*. Edward Elgar, Cheltenham.
- Bozkurt, Ö., Cohen, R.L., 2018. Repair work as good work: craft and love in classic car restoration training. *Hum. Relat.* 72 (6), 1105–1128. <https://doi.org/10.1177/001826718786552>.
- Brand, P., Curry, A., Given-Wilson, C., Horrox, R.E., Martin, G., Ormrod, W.M., Phillips, J.R.S., 2005. *The Parliament Rolls of Medieval England*. v.1–v.16. Boydell and Brewer, Woodbridge.
- Britnell, R.H., 1993. *The Commercialisation of English Society 1000–1500*. Cambridge University Press, Cambridge.
- Britnell, R.H., 1995. 'Commercialisation and economic development in England, 1000–1300'. In: Britnell, R.H. and Campbell, B.M.S. (Eds.), *A Commercialising Economy: England 1096 to c. 1300*. Manchester University Press, Manchester, pp. 7–26.
- Brown, A., 2016. SF-EE4C66: a medieval buckle, available at: <https://finds.org.uk/data/base/artefacts/record/id/787394> (accessed 21 January 2020).
- Burgess, M., Holmes, H., Sharmina, M., Shaver, M.P., 2021. The future of UK plastics recycling: one bin to rule them all. *Resour. Conserv. Recycl.* 164, 105191. <https://doi.org/10.1016/j.resconrec.2020.105191>.
- Burnett, L., 2010. *SUSS-C34F64: a medieval finger ring*. <https://finds.org.uk/database/artefacts/record/id/398482> (accessed 21 January 2020).
- Casson, M. and Casson, C., 2017. 'Pre modern and modern'. In: Wilson, J.F., Toms, S., de Jong, A. and Buchnea, E. (Eds.), *Routledge Companion to Business History*. Routledge, Abingdon, pp. 159–70.
- Casson, C., 2020. 'Guilds'. In: da Silva Lopes, T., Lubinski, C., and Tworek, H.J.S. (Eds.), *The Routledge Companion to the Makers of Global Business*. Routledge, Abingdon, pp. 159–170.
- Charter, M., 2018. 'Circular economy innovation and design: setting the scene'. In: Charter, M. (Ed.), *Designing For the Circular Economy*. Boca Raton, Routledge, pp. 23–34.
- Coatsworth, E., Owen-Crocker, G.R., 2018. *Clothing the Past: Surviving Garments from Early Medieval to Early Modern Western Europe*. Leiden and Boston. Brill.
- Cooper, T., 2010. Recycling modernity: waste and environmental history. *Hist. Compass* 8 (9), 1114–1125. <https://doi.org/10.1111/j.1478-0542.2010.00725.x>.
- Crosby, A., Adams Stein, J., 2020. Repair Environ. *Humanit.* 12 (1), 179–185. <https://doi.org/10.1215/22011919-8142275>.
- Davis, J., 2010. Marketing second-hand goods in late medieval England. *J. Hist. Res.* Mark. 2 (3), 270–286. <https://doi.org/10.1108/17557501011067815>.
- Davis, J., 2011. *Medieval Market Morality: Life, Law and Ethics in the English Marketplace*. Cambridge University Press, Cambridge, pp. 1200–1500.
- Dormer Harris, M., 1907. *The Coventry Leet Book*. v1–v3. K. Paul, Trench, -13. Trübner & Co. Ltd., London.
- Dummelow, J., 1973. *The Wax Chandlers of London: A Short History of the Worshipful Company of Wax Chandlers*. Phillimore, Chichester.
- Dyer, C., 1989. *Standards of Living in the Later Middle Ages: Social Change in England c. 1200–1520*. Cambridge University Press, Cambridge.
- Egan, G., Pritchard, F., 1991. *Dress Accessories of Medieval London*. H.M.S.O, London.
- Egan, G., 2010. *The Medieval Household: Daily Living c.1150–c.1450*. Boydell Press, Woodbridge.
- Eurostat (2015) Harmonised European Time Use Survey (HETUS), 2015: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=How_do_women_and_men_use_their_time_statistics&oldid=463738 (Accessed 16 September 2022).
- Evans, D., 2011. Thrifty, green or frugal: reflections on sustainable consumption in a changing economic climate. *Geoforum* 42 (5), 550–557. <https://doi.org/10.1016/j.geoforum.2011.03.008>.
- Evans, S., 2005. *Consumer Influence on Product Life: an Exploratory Study*. PhD thesis, Sheffield Hallam University.
- Fennetaux, A., Junqua, A., Vasset, S., 2014. *The Afterlife of Used Things, Recycling in the Long Eighteenth Century*. Routledge, New York.
- Fountain, L., 2008. *Alternative Exchanges: Second-hand Circulations from the Sixteenth Century to the Present*. Berghahn Books, New York and Oxford.
- Fuentes, C., Enarsson, P., Kristofferson, L., 2019. Unpacking package free shopping: alternative retailing and the reinvention of the practice of shopping. *J. Retail. Consum. Serv.* 50, 258–265. <https://doi.org/10.1016/j.jretconser.2019.05.016>.
- Greco, G.L., Rose, C.M., 2009. *The Good Wife's Guide (Le Ménagier de Paris): A Medieval Household Book*. Cornell University Press, Ithaca and London.
- Gregson, N., Crewe, L., 2003. *Second-Hand Cultures*. Berg, Oxford.
- Gregson, N., Beale, V., 2004. Wardrobe matter: the sorting, displacement and circulation of women's clothing. *Geoforum* 35 (6), 689–700. <https://doi.org/10.1016/j.geoforum.2004.03.014>.
- Grew, F., de Neergaard, M., 1988. *Shoes and Pattens*. H.M.S.O, London.
- Helgesson, C.-F., Muniesa, F., 2013. For what it's worth: an introduction to valuation studies. *Valuat. Stud.* 1 (1), 1–10. <https://doi.org/10.3384/vs.2001-5992.13111>.
- Helgesson, C.-F., Woolgar, S., 2018. Research note. valuation mishaps and the choreography of repair. *Valuat. Stud.* 5 (2), 145–162. <https://doi.org/10.3384/vs.2001-5992.1852145>.
- Hochschild, A.R., Machung, A., 1989. *The Second Shift*. Penguin, New York.
- Holmes, H., 2018. New spaces, ordinary practices: circulating and sharing within diverse economies of provisioning. *Geoforum* 88, 138–147. <https://doi.org/10.1016/j.geoforum.2017.11.022>.
- Hudson, W., Tingey, J.C., 1906. *Records of the City of Norwich*. v1 and v2. -10. Jarrold, Norwich.
- Hudson, W., 1891. *Leet Jurisdiction in the City of Norwich during the Thirteenth and Fourteenth Centuries*. B. Quaritch, London.
- Hughes, P.L., Larkin, J.F., 1964. *Tudor Royal Proclamations v1 The Early Tudors*. Yale University Press, New Haven and London, pp. 1485–1553.
- Hultman, J., et al., 2021. A resourcification manifesto: understanding the social process of resources becoming resources. *Res. Policy* 50 (9), 1–7.
- Hur, E., 2020. Rebirth fashion: secondhand clothing consumption values and perceived risks. *J. Clean. Prod.* 273, 1–16.
- Jefferson, L., 2003. *Wardens' Accounts and Court Minute Books of the Goldsmiths' Mystery of London 1334–1446*. Boydell and Brewer, Woodbridge.
- Joseph Rowntree Foundation, 2022. *Household spending*. <https://www.jrf.org.uk/data/household-spending> (accessed 4 August 2022).
- Klepp, I.G., Laitala, K., 2018. Shared use and owning of clothes: borrow, steal or inherit. In: Cruz, I., Ganga, R., Wahlen, S. (Eds.), *Contemporary Collaborative Consumption: Trust and Reciprocity Revisited*. Springer Fachmedien Wiesbaden, Wiesbaden, pp. 153–177.
- Krebs, S., Weber, H., 2021. Rethinking the history of repair: repair cultures and the 'lifespan' of things. In: Krebs, S., Weber, H. (Eds.), *The Persistence of Technology: Histories of Repair, Reuse and Disposal*, pp. 27–48. Transcript. Open. <https://www.transcript-open.de/doi/10.14361/9783839447413-003>.
- Kumar, J., et al., 2020. Chapter 2 challenges for waste in fashion and textile industry. In: Shrivastava, S., et al. (Eds.), *Recycling from Waste in Fashion and Textiles: A Sustainable and Circular Economic Approach*. Wiley, Hoboken, pp. 19–32.
- Lee, J.S., 2018. *The Medieval Clothier*. The Boydell Press, Woodbridge.
- Lee, T., Wakefield-Rann, R., 2021. Conspicuous and inconspicuous repair: a framework for situating repair in relation to consumer practices and design research. *J. Clean. Prod.* 294, 1–7.
- LeMenager, S., Foote, S., 2012. The sustainable humanities. *PMLA* 127 (3), 572–578. <https://doi.org/10.1632/pmla.2012.127.3.572>.
- Maguire, H., Fahy, F., 2022. Practising fashion and wardrobe studies: a geographical reframing? *Area* 54 (1), 69–77. <https://doi.org/10.1111/area.12761>.
- McKinsey and Company, 2022. *The state of fashion 2022*. <https://www.mckinsey.com/~/media/mckinsey/industries/retail/our%20insights/state%20of%20fashion/2022/the-state-of-fashion-2022.pdf> (accessed 4 August 2022).
- Meisner Rosen, C., 2007. The role of pollution regulation and litigation in the development of the U.S. meatpacking industry, 1865–1880. *Enterp. Soc.* 8 (2), 297–347.
- Merry, M.L., 2000. *The Construction and Representation of Urban Identities: public and Private Lives in Late Medieval Bury St Edmunds*. PhD thesis, University of Kent.
- Musson, A., Ormrod, W.M., 1999. *The Evolution of English Justice: Law, Politics and Society in the Fourteenth Century*. Macmillan, Basingstoke.
- Mylan, J., Holmes, H., Paddock, J., 2016. Re-introducing consumption to the 'circular economy': a sociotechnical analysis of domestic food provisioning. *Sustainability* 8, 794. <https://doi.org/10.3390/su8080794>.
- Norfolk Record Office NCR 5 B 1 1287/8 folio 1r.
- Oldenziel, R., Trischler, H., 2015. *Cycling and Recycling: Histories of Sustainable Practices*, v7. Berghahn Books, New York and Oxford.
- Ordóñez, I., Hagy, S., 2019. Fixotek: implementing and testing urban reuse and repair centers in Sweden. *IOP Conf. Ser. Earth Environ. Sci.* 225 (1), 1–7. <https://iopscience.iop.org/article/10.1088/1755-1315/225/1/012007/pdf>.
- Portable Antiquities Scheme, 2020. *Database*. <https://finds.org.uk/database> (accessed 15 January 2020).
- Rawcliffe, C., 2013. *Urban Bodies: Communal Health in Late Medieval English Towns and Cities*. Boydell and Brewer, Woodbridge.
- Rexroth, F., 2007. *Deviance and Power in Late Medieval London*. Cambridge University Press, Cambridge.
- Richardson, G., 2008. Brand names before the Industrial Revolution. *Natl. Bur. Econ. Res. Work. Pap.* 13930. <http://www.nber.org/papers/w13930> (accessed 17 January 2020).
- Riley, H.T., 1868. *Memorials of London and London life in the XIIIth, XIVth and XVth Centuries*. Longmans, Green and Co, London.
- Salter, E.E., 2003. Some differences in the cultural production of household consumption in three North Kent communities, c. 1450–1550. In: Beattie, C., Maslakovic, A., Rees Jones, S. (Eds.), *The Medieval Household in Christian Europe c. 850–c. 1550: Managing Power, Wealth and the Body*. Brill, Turnhout, pp. 391–408.

- Salter, E., Starkey, D.J., Atkinson, D., McDonagh, B., McKeon, S., Salter, E., 2017. Hull's medieval lives. Hull: Culture, City, Place. Liverpool University Press, Liverpool, pp. 41–59.
- Schofield, J., Blacknoll, L., Pearce, J., 2018. London's Waterfront 1100–1666: Excavations in Thames Street, London. Archaeopress Publishing, Oxford, pp. 1974–1984.
- Seeley, D., Phillpotts, C., Samuel, M., 2006. Winchester Palace: Excavations at the Southwark Residence of the Bishops of Winchester. MOLAS, London.
- Shoosmith, R., 1985. Hereford City Excavations 3: The Finds. Council for British Archaeology, London.
- Stobart, J., Van Damme, I., 2010. Modernity and the Second-Hand Trade: European Consumption Cultures and Practices. Palgrave Macmillan, Basingstoke, pp. 1700–1900.
- Stocker, D., et al., 2015. Lincolnshire's Middle Trent Valley: the building stock before enclosure. The case of Manor Farm, Thrope-on-the-hill. Vernac. Archit. 46, 40–65. <https://doi.org/10.1080/03055477.2015.1123409>.
- Still, G.G., 1993. A Medieval Industrial Complex and Its Landscape: The Metalworking Watermills and Workshops of Bordsley Abbey. Council for British Archaeology, York.
- Strasser, S., 1999. Waste and Want: A Social History of Trash. Metropolitan Books and Henry Holt and Company, New York.
- Sumnall, K., 2005. BERK-2764F6: a medieval spoon. <https://finds.org.uk/database/artefacts/record/id/101455> (accessed 16 January 2020).
- Summers, J., 2015. Fashion On the Ration: Style in the Second World War. Profile Books, London.
- Svensson, S., Richter, J.L., Maitre-Ekern, E., Pihlajarinne, T., Maigret, A. and Dalhammar, C., 2018. The emerging 'right to repair' legislation in the EU and the U. S. Paper presented at Going Green Care Innovation, Vienna.
- Thomas, A.H., 1926. Calendar of the Plea and Memoranda Rolls of the City of London. v1. Cambridge University Press, London.
- Thorsheim, P., 2015. Waste Into Weapons: Recycling in Britain during the Second World War. Cambridge University Press, New York.
- Veale, E.M., 1966. The English Fur Trade in the Later Middle Ages. The Clarendon Press, Oxford.
- Ward, J., 2014. Elizabeth De Burgh Lady of Clare (1295-1360): Household and Other Records. The Boydell Press and Suffolk Records Society, Woodbridge.
- Weber, H. (2021) Nazi German waste recovery and the vision of a circular economy: the case of waste paper and rags. Business History (advance online publication) 10.1080/00076791.2021.1918105.
- Webley, R., 2005. NARC-B61DB3: a medieval vessel. <https://finds.org.uk/database/artefacts/record/id/96125> (accessed 17 January 2020).
- Wheeler, K., Glucksmann, M., 2015. Household Recycling and Consumption Work: Social and Moral Economies. Palgrave Macmillan, Basingstoke.
- Wieser, H., Tröger, N., 2018. Exploring the inner loops of the circular economy: replacement, repair, and reuse of mobile phones in Austria. J. Clean. Prod. 172, 3042–3055. <https://doi.org/10.1016/j.jclepro.2017.11.106>.
- Zapata Campos, M.J., Zapata, P., 2017. Infiltrating citizen-driven initiatives for sustainability. Environ. Polit. 26 (6), 1055–1078. <https://doi.org/10.1080/09644016.2017.1352592>.
- Zimring, C.A., 2005. Cash For Your Trash: Scrap Recycling in America. Rutgers University Press, New Brunswick.
- Zimring, C.A., 2017. Aluminium Upcycled: Sustainable Design in Historical Perspective. Johns Hopkins University Press, Baltimore.