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To cite this article: Lynn Abrams & Lin Gardner (2021) Recognising the Co-dependence of Machine and Hand in the Scottish Knitwear Industry, *Textile History*, 52:1-2, 165-189, DOI: [10.1080/00404969.2021.2014768](https://doi.org/10.1080/00404969.2021.2014768)

To link to this article: <https://doi.org/10.1080/00404969.2021.2014768>



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Published online: 15 Mar 2022.



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# Recognising the Co-dependence of Machine and Hand in the Scottish Knitwear Industry

LYNN ABRAMS  AND LIN GARDNER 

*Knowledge of the economy and culture of knitted textiles in Scotland since the late eighteenth century is framed by opposing paradigms. The study of craft regards knitting as a traditional practice and focuses on the techniques and designs of the hand knitter. The industrial paradigm, on the other hand, is dominated by studies of factory production that subordinate hand knitting as an outmoded and non-economic practice superseded by mechanisation. This article analyses the production of knitwear in post-war Shetland to demonstrate how the bipolarity of that frame needs to be modified to highlight the manifest interconnectedness and mutual dependence of the two parts of the sector. It also challenges interpretations which assume craft production is automatically superseded by machine production. Knitting has maintained a dual identity as a hand craft and an industrial process since the mid-nineteenth century and thus provides a case study for bridging these disconnected histories.*

## INTRODUCTION

In 1967, the knitwear company Clousta Handcraft was established in the Shetland home of a recently arrived English couple, Iain and Gaye Caldwell. By 1973, the renamed Shetland Fashions Ltd produced machine-made knitwear at a purpose-built factory in Lerwick, using automated Bentley-Cotton knitting machines.<sup>1</sup> It also maintained hand-operated machine production at two other sites. Finished garments were checked, washed, boarded and packed within the factories. Just two years later, Shetland Fashions was the second largest employer in the islands. At its peak the company was able to produce up to 4,000 garments a week, primarily for export. Although the Caldwells had no prior experience of the textile sector — Gaye recalled they arrived ‘with no plan, no money, just lots of energy and youthful enthusiasm’ — they quickly utilised the deep reservoir of labour and skill in the islands as well as benefiting from the longstanding tradition of knitting at home to supplement household income.<sup>2</sup>

In addition to employing a small number of permanent staff in its factories, Shetland Fashions provided employment for around 400 casual home workers, the

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vast majority of whom were women. Home workers either produced the plain bodies of sweaters using hand-operated knitting machines or they hand knitted Fair Isle yokes.<sup>3</sup> The company supplied yarn and instructions and hand-operated knitting machines to those who needed them. It also took over the ailing Shetland Knitters' Association, a co-operative of home- and workshop-based knitters, to rescue it from insolvency. Shetland Fashions was able to incorporate the remaining knitters of the Association into its business because it chose to combine hand and machine knitting. As the business grew, Shetland Fashions also purchased a spinning mill in Leicester to secure its supply of Shetland yarn, although it eventually converted it to the production of knitwear. Iain Caldwell was ambitious and enthusiastic, and, for a time, successful. However, changes in both the market for Shetland garments and in the Shetland economy with the arrival of the oil industry and its higher wages brought about Shetland Fashions' eventual demise. The company ceased trading in 1982.

Shetland Fashions was, at one stage, the largest knitwear manufacturer in the islands. Shetland was a place where knitted textile production was almost as important as fishing and agriculture until the arrival of the oil industry in the 1970s. In a remote archipelago with few alternative means of making a living until oil and its subsidiary industries transformed the employment market, knitting was a staple industry that complemented the predominantly rural way of life. At its peak, in the mid-1980s, the islands' knitwear industry consisted of around 60 separate businesses, large and small, with a combined turnover of £6.4 million. It employed around 350 workers in factories and up to another 2,000 home knitters, who were involved in the production of garments and trims, either using hand-operated machines or knitting by hand.<sup>4</sup> It was only in the 1990s with the inexorable growth of automation in order to compete with overseas competition, and the concomitant contraction of the sector, that outwork by home knitters on hand-operated machines declined. By 2003 the industry only employed 150 full- and part-time workers in its factories and ancillary trades, and it is likely that the employment of home knitters declined too.<sup>5</sup> Production of knitwear at home for sale, either on a hand-operated machine or on needles, had become largely limited to the specialist and luxury market.

This examination of the knitted textile sector in Shetland addresses the interconnectedness and mutual dependence of the different modes of production — hand, hand-operated machine and automated machine — to bridge an analytical gap that characterises studies of knitted textiles especially. Historical accounts of the industry in Scotland have failed to identify the connections between hand and machine production and the interdependence of both.

Knowledge of the economy and culture of knitted textiles since the late eighteenth century is framed by opposing paradigms. The study of knitting as a craft practice treats it as a traditional activity, albeit adapted to modern sensibilities and taste, and focuses overwhelmingly on the techniques and designs of the hand knitter. Hand craft in this narrative, defined as a learned skill employed to earn income, excludes the use of hand-operated machines, an omission that downgrades the skill required to produce garments this way and perpetuates a false distinction between hand- and machine-made knitwear. These histories privilege materials, patterns and

motifs. They have much to say about particular knitting traditions but, with rare exceptions, less to contribute on the culture and economy of production and consumption.<sup>6</sup>

The industrial paradigm, on the other hand, is dominated by studies of factory production that subordinate the economics of hand knitting and regard it as an out-moded and unprofitable practice superseded by mechanisation.<sup>7</sup> In these accounts woollen hosiery was traditionally produced on stocking frames. These remained, for the most part, on domestic premises until the late nineteenth century when the increasing use of power and automated knitting machinery moved the industry towards workshop and factory production.<sup>8</sup> Even the more labour-intensive stages of production — the seaming, binding and linking that had been carried out by home workers — were now also brought into the factory by larger companies to maintain quality control and create integrated processes of production.<sup>9</sup>

Thus, 'semi-domestic industry based upon handicraft production' was transformed into 'one where most processes were performed on factory premises, many of them, including knitting, by power', to quote an historian of the Scottish textile industry.<sup>10</sup> More widely, accounts of the knitwear industry emphasise the high degree of technical specialisation required. However, these reference developments in machinery rather than recognise the importance of technical skill across the spectrum of hand and machine production.<sup>11</sup> These accounts also simplify the process of a much more gradual change in the craft economy during the industrial age. They overstate the decline of the craft worker or artisan and downgrade their skills. And they ignore the continued significance of small firms, which continued to utilise both hand and machine production. Whereas histories of industrialisation in other sectors now see the process as more porous and open than was traditionally understood — and have identified craft as a key element in economic change in the eighteenth and nineteenth centuries — the history of knitted textiles remains bifurcated.<sup>12</sup>

Although studies of other specialist sectors have identified the co-dependence of factory production with craft workers and the craft economy well into the nineteenth century, the craft versus industrial paradigm continues to characterise interpretations of the knitwear industry. The craft approach is attuned to recent reinterpretations of small-scale manufacturing that reappraise craft skills as integral to economic change.<sup>13</sup> The industrial approach, on the other hand, situates knitting in a broader narrative of the textile industry that focuses on mechanisation and modernisation in a context of increasing global competition.<sup>14</sup> In the case of knitted textiles the two seemingly antithetical approaches of craft and machine production require reappraisal in line with historical accounts of other specialised production processes that have told a more complex and subtle story about the relationship between hand and machine.<sup>15</sup>

Since the mid-nineteenth century knitting has maintained a dual identity as a hand craft and an industrial process and thus provides a case study for bridging these disconnected histories. While the larger hosiery and fully-fashioned knitwear producing areas in Scotland, such as the Borders' towns and the south-west, did embrace automated factory production during the nineteenth century, hand skills remained an integral part of the production process.<sup>16</sup> Hand skills were still

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required and relied upon for both the manufacture of garments on hand-operated machines and for the more specialised tasks that could not be carried out by machine. For example, many knitwear companies in Hawick, the centre of the fully-fashioned knitwear industry in Scotland, continued to employ outworkers in the post-war decades for both machine and hand work, side-by-side with their factory elements of production.<sup>17</sup> The bulk of production at Peter Scott Co. Ltd (Pesco), for instance, was carried out in the factory setting, yet outworkers were still employed as menders and lookers (inspectors of products) until the 1970s.<sup>18</sup> Drumohr Knitwear in Dumfries and Galloway, made a virtue of its hand-operated machine production of luxury knitwear in small factory units by a skilled workforce of women. In 1973 it set up a demonstration exhibit at Liberty's of London where 'The women, who have been chosen for their versatility and skills, will demonstrate the complete process of the making of cashmere knitwear on hand-operated machines'.<sup>19</sup> In Shetland, however, this dualism not only existed but proved to be vital to the very survival of the sector.

In what follows, the production of knitwear in post-war Shetland is analysed to demonstrate the interconnectedness and mutual dependence of the two parts of the sector. Drawing on archival sources documenting the knitwear industry in the islands and elsewhere in Scotland, Scottish Board of Trade and export records which offer a view of the opportunities for and constraints on knitwear businesses, and oral history interviews with Shetland knitters, we present a new interpretation. We challenge the assumption that knitting undertaken in the home, whether by hand or machine, is to be regarded as a remnant of a pre-industrial-style economy or as a quaint hand craft. We argue instead that the industrial sector relied on the flexibility, adaptability and creativity of home knitters employed as outworkers in fluctuating economic circumstances.<sup>20</sup> In turn, domestic hand and machine knitters profited from the demand for their labour, which had beneficial consequences for households and the local economy. In particular, as we show, the existence of a large flexible workforce producing knitwear at home enabled some women to become entrepreneurs in their own right. Thus, by attending to questions of geography, skill, labour supply and the economics of knitwear production, we propose a new model to understand the complexities of the knitwear industry — one with application not solely to Shetland but elsewhere in Scotland and further afield.

#### SHETLAND'S KNITTING ECONOMY

Shetland has a distinct and yet marginal place in the historiography of the knitted textile industry in Scotland and the UK. It is primarily known for the longevity of its hand-knitting sector and the globally recognised techniques of Fair Isle patterning and hand-knitted lace. However, its primary association with knitting as a hand craft means that the transformation of the sector here in the post-war decades has largely been ignored.<sup>21</sup> In Shetland today the knitted textile sector retains elements of traditional ways of making by hand and at home alongside modern industrial production. Industrial production remains small-scale in the context of the wider Scottish knitwear industry, driven by the possibilities facilitated by automation and the introduction of computer-aided design (CAD).<sup>22</sup> The global recognition of

Shetland knitwear in the twenty-first century is a result of a combination of the maintenance of longstanding traditions, notably the use of Shetland wool, the continued popularity and adaptation of complex patterning and colour work, and a recognition of the importance of hand skills including the use of hand-operated machines. Moreover, the embrace of modern technology has enabled designers and manufacturers to innovate and, in turn, maintain a place in the highly competitive knitwear market.

The Shetland hand-knitting tradition is presented to the world as a unique selling point by marketing organisations and Shetland's own heritage narrative. This heritage underpins the global popularity of Shetland Wool Week and the burgeoning textile tourism trade.<sup>23</sup> Yet the reality is that the Shetland knitwear sector today is characterised by the interdependence of hand and machine knitting. Machine-knitted garments, whether produced by hand-operated or automated machines, are the mainstay, both at the luxury and designer end of the market and the more everyday purchase points. Yet, despite this, machine-made knitwear as a historical artefact or mode of production receives little attention either from scholars or knitwear designers interested in historic patterns. This situation is observable in the Shetland Museum textile collection by the paucity of machine-made knitted garments compared with hand-knitted items.<sup>24</sup> In short, the economic value of machine-made knitwear is not matched by the low cultural value ascribed to it.<sup>25</sup>

At least since the 1950s Shetland's knitwear industry has been characterised by a symbiotic relationship between machine and hand knitting on the one hand and factory and home production on the other. It was the late introduction of hand-operated and then automated knitting machines that rescued the knitwear sector in Shetland in the 1940s, 1950s and 1960s when it was in the doldrums.<sup>26</sup> The introduction of machinery enabled hand knitters to complement rather than compete with machine-made knitwear by knitting Fair Isle yokes and ribs, whilst those using hand-operated machines at home could be employed by knitwear businesses as outworkers to produce plain-knit garments. Although the use of both automated and hand-operated machinery had transformed the knitwear industry throughout Britain by the late nineteenth century, it was to take another 100 years for machine knitting to make significant inroads in Shetland.<sup>27</sup>

This may be the reason why the machine-knitting sector in the islands has received negligible attention from historians of knitted textiles who have tended to focus predominantly on Shetland hand-knitting traditions.<sup>28</sup> A number of other factors also account for this neglect. Historians have been deflected to dwell on the idiosyncrasies in the Shetland wool trade: the unusual and exploitative practice of barter-truck operated by merchants whereby hand-knitted garments were exchanged for goods or credit notes rather than cash; the distinctive techniques, patterns and motifs in Fair Isle and lace hand-knitted garments; and the prevalence of romantic myths of knitting in the islands, representing hand knitters as a piquant curiosity rather than skilled and exploited workers. Although these myths have never represented the economic reality of hand knitting, they have remained surprisingly persistent.<sup>29</sup> Added to these considerations are the recent growth in popularity of hand knitting. This finds inspiration in a place where the traditions and heritage of craft production are still much in evidence.<sup>30</sup> And the feminist reclamation and

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recuperation of craft practices such as knitting from the condescension of those who consign them to the category of the domestic has reframed women's domestic work as skilled and creative, as opposed to the drudgery and poorly paid work it often was.<sup>31</sup> Whilst these approaches are important and have merit, they tend to obliterate recognition of the more machine-based industrial processes that operated side-by-side with them.

Shetland's knitting economy was, until the 1950s, dominated by hand knitting and associated activities such as spinning, carding and finishing. In a place where fishing and crofting provided household sustenance for a largely rural population denuded of men, knitting was an essential economic activity to supplement income and in some cases a mainstay, undertaken predominantly by women at home.<sup>32</sup> In 1901, around two-thirds of working women in the islands were employed in some capacity in the textile and hosiery trades. Whilst numbers fluctuated, the hosiery sector continued to engage at least a third of working women until the 1950s, although in most households knitting was invariably just one economic activity amongst many.<sup>33</sup> After the First World War a combination of factors, including an increase in the price of wool, the decline if not the complete disappearance of truck following the 1887 Truck Act, the competition from knitting machines and the discovery of Fair Isle patterned knitwear by consumers outside Shetland, precipitated a significant shift in the place of hand knitting in the household economy. From home-based production, knitting gradually became more organised and mechanised while still providing employment to around three-quarters of the female population, or around 9,000 knitters.<sup>34</sup> The very gradual introduction of hand-operated knitting machines by island manufacturers — there were just 13 machines on the islands in 1932–1933, but by 1938 six firms employed around 100 full-time workers in small factory knitting units — was beginning to raise standards to meet the demand from overseas buyers who were no longer willing to accept non-standard sizes and shaping.<sup>35</sup>



FIG. 1. An example of a hand-knitted Shetland patterned jumper, made from hand-spun Shetland wool dyed with vegetable dyes. It also has a Shetland Woollen Industries Association label. This was an organisation established in 1925 to identify original Shetland knitwear.

*Reproduced with permission of Shetland Amenity Trust.*

Despite a wartime boom in demand for hand-knitted items and the continued demand for Fair Isle patterned jumpers, which could only be hand knitted at this time (see Fig. 1), the march of the hand-operated knitting machine was unstoppable. As island companies began to move into higher volume production, even strong resistance to hand-operated machines by the Shetland Woollen Industries Association (SWIA), a co-operative organisation committed to protecting the hand-knitting industry, proved ineffectual.<sup>36</sup> During wartime the only way merchants could fulfil orders was by resorting to production on hand-operated knitting machines.<sup>37</sup> By 1949, there were nine factory units in Lerwick and the outlying rural areas employing both full-time workers and an army of outworkers to machine and hand knit garments.<sup>38</sup> Ella Law described how

All through the war [Second World War] I was machining for dear life because you could get a good price: that was the only time we made any money. It didn't matter if it was awful good because they were that eager for it. I mind big firms like Marks and Spencer advertising in the *Shetland Times* for children's jumpers and pantaloons, and me machining it and sending it to London ...<sup>39</sup>

By the 1960s, as the market beckoned from lack of fulfilled supply on mainland Scotland, companies like Shetland Fashions expanded exponentially, looking beyond the UK to overseas. At the same time, other longer-standing businesses,



FIG. 2. Example of knitted garment with a machine-knitted body joined to a hand-knitted yoke produced in Shetland during the 1960s. *Reproduced with permission of Shetland Amenity Trust.*

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such as L. J. Smith of Hoswick, Tulloch at Urafirth and Kay's of Yell, adapted to the new conditions and adopted a similar strategy based on a combination of factory- and home-based labour. This mode of operation limited the need to invest in expensive machinery onsite and allowed for flexibility in the employment of outworkers depending on orders. A production model was established whereby the plain knitting of flat garments such as jumpers and scarves was undertaken by outworkers on hand-operated machines while Fair Isle trims were knitted separately by skilled hand knitters (see Fig. 2).

Elaine Nicolson explained how her whole family were engaged in knitwear production at home on Whalsay for another local company, John Tait's, but also independently.

Yes, it was to supplement their income in the early 70s, maybe even in the late 60s as well, many households in Shetland had a knitting machine, a big Dubied type knitting machine often in the kitchen or in the sitting room. Our machine was in a bedroom, so I first knitted on a knitting machine when I would have been about, I reckon ten years old. So my mum would pick/hook on the sleeve loops onto the machine bed and then I wid knit ten rows and then ten again and that's how I started on the machine ... She knitted a lot o' yokes, we owned a croft at that time so they would send away the raw fleece to the wool brokers, get back the yarn, then she would machine, well it was actually Dad that would machine the jumpers and then she would hand knit in the yoke and at the same time they were knitting jumpers for John Tait's factory, they machined 60 jumpers in a week for the knitwear factory.<sup>40</sup>

This model of household production, with men and children as well as women working hand-operated machines, was commonplace in Shetland when demand for knitwear was strong (see Fig. 3). Indeed, in the 1960s when the labour market for men was extremely depressed, the use of these hand-operated knitting machines in the home had a significant impact.<sup>41</sup> At a time when the hosiery and fashion knitwear industry in the rest of the UK was predominantly factory based, in Shetland the sector persisted with a production model from which other parts of the textile industry were beginning to move away. Here the bulk of the knitwear produced could not be described as either luxury or fashion-forward. Instead, the majority of businesses concentrated on traditionally shaped and designed garments that were recognisably 'Shetland' in materials and patterning. They were also relatively simple to knit in contrast with the fashion or styled knitwear produced by mainland companies. In putting out much of their knitwear production, Shetland companies benefited from the flexibility they could demand of their outworkers, by paying piece rates and avoiding the overheads that would have been incurred by making workers employees. Shetland Fashions, however, did acknowledge the right for their outworkers to be recognised as regular employees with associated benefits.<sup>42</sup>

The reliance on this production model carried Shetland knitwear producers through the 1960s and 1970s when demand for traditionally styled garments remained buoyant. But reliance on production by outworkers using hand-operated machines was a limiting factor if the sector was required to remain competitive. Manufacturers on the UK mainland and overseas that were already using



FIG. 3. Kathleen Niven knitting on a machine in her Shetland home.  
*Reproduced with permission of Shetland Amenity Trust.*

automated machinery could turn out multiple garments at once, all produced to the same high standards.<sup>43</sup> Not only was home-based production comparatively slow, it was also inefficient in respect of quality control. Shetland Fashions had to remind its outworkers to keep garments clean, to avoid staining with ‘tea, coffee, orange juice etc’, and to ‘avoid scorching by fire or cigarettes’.<sup>44</sup> The introduction of automated machinery in Shetland in the 1960s was also hindered by the islands’ lack of infrastructure. Electricity did not arrive in parts of Shetland beyond Lerwick until the 1950s and even later on some of the outlying islands. Moreover, a lack of investment by local knitwear companies made it difficult for them to scale up production in response to improvements in market conditions. Two cases — one of a very small knitwear venture and another of a larger concern — are illustrative of the obstacles to modernisation and growth on the islands during the 1960s.

#### MODERNISING PRODUCTION IN A CHALLENGING ENVIRONMENT

In 1963, a proposal to establish a small knitwear unit on the island of Yell was mooted by Dr W. H. Nisbet who, with his wife, ran a small company producing designer knitwear, Jan E. Lebet, in the textile town of Tillicoultry near Stirling. The business had strong links with a luxury knitwear company, R. & J. Bryant, and through these channels Jan E. Lebet had secured contracts with Italian brands for the supply of fashionable garments. Nisbet, who had family links with the island and much enthusiasm but no business experience, saw the unit as a means of stimulating employment on Yell, which was experiencing economic decline and depopulation owing to the lack of work for local men. But this enterprise was not established along the lines of the production model employed by existing Shetland knitwear businesses. Rather than competing with local companies producing traditional style garments, the business model adopted by Jan E. Lebet was based on



FIG. 4. Dr Nisbet (far left) with employees in the Yell knitwear unit, 1968.  
*Reproduced with permission of Shetland Amenity Trust.*

fashion knitwear. A specialist product was heavy fisherman's rib style garments unusually knitted in Pringle yarn, spun on the mainland. Furthermore, garments were manufactured on German Universal machines, which were operated by men, to provide new employment for male inhabitants of Yell.<sup>45</sup>

Although this was a production model adopted by the larger Border firms and other sizeable knitwear manufacturers, it was distinctive for Shetland. The *Glasgow Herald* reported in optimistic terms:

The garments are knitted to [a] high degree of accuracy by male operators on flat knitting machines, are put together on making-up machines, and are power finished. They are a complete departure from the Shetland tradition of hand-machine knitting and hand finishing and could give the islands entry into a new and quite vast market.<sup>46</sup>

With the help of grants and loans from the Highland Fund and the Department of Agriculture and Fisheries Scotland to aid the capital expenditure and training, the machine knitters were sent to Tillicoultry, an established spinning and knitwear centre, to learn how to operate the unfamiliar machines.

The unit opened in April 1964 and was powered by a generator owing to the absence of a mains electricity supply on the island. Two years on, the enterprise employed five male knitters, two linkers, one seamer and two finishers. In 1966, R. & J. Bryant was taken over by an Italian company that secured a contract from the fashion house Cerruti. The Shetland unit was contracted to supply 20,000 garments annually, a number that was impossible for this small enterprise to fulfil (see Fig. 4). Even meeting the revised level of production of 150 garments a week required further investment, the establishment of a second unit for finishing and packing (where the water was brought from a stream in baths), the installation of two Italian

Santagostino knitting machines, a growth in the workforce to fifteen and the introduction of shift work.<sup>47</sup>

However, despite the commitment of Nisbet, support from Shetland's development officer and the existence of a guaranteed market, the enterprise collapsed just two years later. Failure to make a repayment on the Highland Fund loan and an outstanding debt to a yarn supplier would have tipped Jan E. Lebet into bankruptcy but for Nisbet's ability to pay off the debts from private funds.<sup>48</sup> The Scottish Office view of Nisbet was that his inexperience in the knitwear sector, his failure to 'take guidance from others', his lack of business sense and the absence of onsite supervision were fundamental flaws in the project.<sup>49</sup> Nisbet's enterprise had received support in part because some recognised that in order for knitwear to become Shetland's 'spearhead industry' the sector would need to modernise and adapt to the new market conditions and be less dependent on traditional knitwear styles and modes of production.<sup>50</sup> But the island of Yell, with its inadequate infrastructure and labour supply, did not prove conducive to such a departure. When the unit was given the opportunity to increase output dramatically, it was unable to do so without compromising quality. It seemed that the Shetland knitwear production model, which relied upon skilled and experienced home workers, was, at least in the 1960s, better suited to the conditions in the islands.

As Jan E. Lebet folded, Shetland Fashions Ltd, the company set up by the equally inexperienced Caldwells, expanded its production capacity by adopting a blended model. It produced both traditional and fashionable styles of garments and relied upon hand-knitting and machine-knitting skills. While their purpose-built Gremista plant housed automated Bentley-Cotton machine production (see Fig. 5 for an example of this kind of production in another automated knitwear plant, Judane), Caldwell's rescue of the Shetland Knitters' Association (SKA) in 1974 meant that home production was also supported. In a rationalisation process 'to avoid duplication', Caldwell closed the two SKA factories and transferred the hand-operated machinery to the knitters' own homes where they continued to knit for Shetland Fashions, specialising in Fair Isle garments.<sup>51</sup> The closure of the SKA factories also



FIG. 5. Interior of Judane knitwear factory, Lerwick 1980 — with automated knitting machinery similar to that used by Shetland Fashions.  
*Reproduced with permission of Shetland Amenity Trust.*

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reduced overheads at a time when some in the knitwear trade were feeling ‘gloomy’ about its prospects.

Yet less than a year later, Caldwell was forced to deny that the company was in trouble.<sup>52</sup> Shetland Fashions still had up to 400 ‘crofters’ in its employ producing ‘3 to 4 thousand hand-made garments per week with a normal stock of between 13 and 14 thousand hand framed knitwear’. But by 1976, even this company, which had embraced modernisation, mechanisation and rationalisation was struggling to compete with the wages offered by the oil industry and competition from mainland companies.<sup>53</sup> A shrinking market for Shetland garments and changes in the economic landscape (cheap foreign imports, branding and the advent of ‘designer labels’) continued to make trade difficult. The Gremista factory, which had housed the most modern knitwear manufacture in the islands, was converted into the offices and print works for *The Shetland Times*.<sup>54</sup>

The fortunes of Jan E. Lebet and Shetland Fashions are illustrative of the difficulties of operating on the islands a successful knitwear company that tried to compete with companies on the mainland by embracing new technology and new modes of production. The traditional model, which depended upon outworkers to produce the bulk of the knitwear, was flexible and responsive to demand and saved on capital outlay. Companies that did succeed, albeit on a smaller scale than Shetland Fashions, modernised to a lesser degree. Norman Tulloch had made a success of his knitwear business on Yell by expanding from a cramped premises with just six hand-operated machines to a large factory unit employing the same number of workers — 24 — but doubling the output.<sup>55</sup> The unit facilitated improvements in quality control and working conditions for those employed there. Yet this company continued to rely on outworkers: more knitwear was produced in people’s own homes than in the factory.<sup>56</sup>

The difficulties faced by Shetland knitwear companies, especially those with ambitions to expand and compete with larger and more efficient companies on the UK mainland, were not only related to labour supply and production costs. Shetland Fashions was unusual in two respects: by actively engaging with government export agencies to identify overseas markets, and in pursuing a degree of vertical integration to ensure a secure yarn supply and sufficient labour. As companies grew they found it difficult to source sufficient yarn, a problem exacerbated by the absence of a spinning mill on the islands. Shetland Fashions had relied upon Pickard & Co.’s spinning mill in Leicester, but when this company ceased trading Caldwell took over the firm, in part to guarantee his supply. The incorporation of the SKA workers into the business similarly insured against a labour shortage. But Shetland Fashions also had the problem of branding to contend with, which had been a longstanding issue for Shetland knitwear producers. Companies anywhere in the world could append a ‘Shetland’ label to a garment or describe their garments as ‘Shetland’.<sup>57</sup> This meant that Shetland-based companies were hobbled in their claims to be producing authentic Shetland knitwear, and hence struggled to maintain distinctive brand recognition against cheaper imitations.

Most Shetland companies traded under the ‘Shetland’ brand; that is, they claimed distinctiveness in the market by offering a product that was manufactured from Shetland wool in Shetland. Shetland Fashions’ label stated their garments were

'Genuine Shetland Knitwear' in an attempt to bolster claims to authenticity in a crowded market.<sup>58</sup> There had been several attempts to create a Shetland trademark in order to protect goods made on the islands in the face of competition from companies outwith the islands, but producers were loath to pay the fee required.<sup>59</sup> When Caldwell tried to find a market in Finland for his product he was told by the Commercial Department of the British Embassy in Helsinki that:

there would be only a very limited market in Finland for your type of knitwear. So called 'Shetland' knitwear, as you probably realise, comes into Finland from a number of sources ... Local stores are not really concerned that this is not genuine Shetland because it is acceptable to their customers and at prices which are popular.<sup>60</sup>

It was not until 1983, when a number of Shetland knitwear manufacturers formed the Shetland Knitwear Trades Association with its own trademark that the issue of 'plagiarisation' was addressed.<sup>61</sup>

#### UNINTENDED CONSEQUENCES OF MACHINES: WOMEN AS ENTREPRENEURS

The post-war decades saw the promotion and gradual adoption of domestic knitting machines. Manufacturers such as Singer, Dubied and Rapidex produced small, flat-bed, manually operated machines for use specifically in the home, which were distinguished from the industrial hand-operated models by their size and ease of use.<sup>62</sup> Hand knitters in Shetland were finding it increasingly difficult to find a market for their goods due to the competition from far cheaper and more standardised machine-made garments. The availability of domestic knitting machines provided women, especially, with welcome economic opportunities to take on work offered by the new factories.

Agnes Leask, who acquired her machine in the 1960s, explained that the maturation of an insurance policy for £100 was the impetus she needed to start working for a local knitwear factory.

We hummed and hahed, shouldn't we put it in the bank or should I buy a knitting machine? So I bought the knitting machine and once I got the knitting machine, got orders, firms were giving out orders because it was sort of a cottage industry then. Then we were more or less financially secure, as long as I could churn out about a dozen jumpers in the week.<sup>63</sup>

Audrey Smith's mother managed to acquire a machine when she inherited money from the division of the family crofts: 'The brothers got a croft each and my mother got enough money for her to buy a knitting machine.'<sup>64</sup>

The acquisition of knitting machines across the islands, either provided by manufacturers or domestic models purchased privately, was critical to the growth of the Shetland knitwear industry in the 1960s and 1970s at a time when the industry in other parts of Scotland was investing in technology to improve productivity and drive down costs. The fast multi-division Samco-Rapid machines and Bentley-Cotton frames, which were able to knit several garment parts at once, could operate

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at up to ninety courses (or rows of knitting) a minute.<sup>65</sup> However, in Shetland, labour was available, cheap and adaptable. Home workers were employed on piece rates and required to work flexibly to meet the ebb and flow of production targets. This meant that large and small companies thrived for a time without the need for major technological investment. This was in contrast to the sector in other parts of Scotland where clothing production companies including knitwear producers struggled to source sufficient female workers owing to competition from alternative employers.<sup>66</sup> In Wick in the far north-east for example, two small knitwear businesses experienced recruitment issues. The reasons given were that 'local girls do not display any keenness in factory work' and lacked the aptitude for work requiring attention to detail and dexterity.<sup>67</sup>

The introduction of the domestic knitting machine had both positive and negative effects, particularly for women knitters. It facilitated entrepreneurship, specialisation, creativity and a degree of economic freedom whilst also binding some even more firmly to the home. On the positive side, the ownership of a knitting machine opened up opportunities for women. It enabled them to earn more money than they would from hand knitting, and to become independent businesswomen in their own right.<sup>68</sup> It allowed them to design their own garments, be able to negotiate with knitwear agents and, in some cases, employ other women. Shetland's historic profile as a women-centred place where women not only worked but established a female culture of control in the absence of men underpinned the propensity of women in the twentieth century to turn their skills to their advantage.<sup>69</sup> Yet the freedom bestowed by the knitting machine, whether an industrial or domestic model, was offset by it reinforcing the household as a site of production for women.<sup>70</sup>

Martin Smith, who grew up in Hoswick on the Shetland mainland, a knitwear hub, described the entrapment by the machine but also the possibilities it enabled:

My mother and hundreds like her, spent many hours slaving over their knitting machines trying to make ends meet. Some men and women even turned it into a full-time occupation, building sheds to hold the machines and employing women to knit in the Fair Isle and then 'graft' together the various parts of the jumpers. In this way they could make a lot more jumpers and women who didn't have, didn't want, or perhaps couldn't afford a knitting machine, could make some money putting in the Fair Isle yokes, grafting and finishing the jumpers.<sup>71</sup>

Undoubtedly, in the decades before the changes brought about by the arrival of the oil industry, machine knitting at home could be a lifeline for households.

Smith had observed that, despite the harsh working conditions, 'One way or another, knitting machines helped to improve the lives of many Shetland families, even if it was only in a small way'.<sup>72</sup> This was especially the case in families where the male earner was unable to work owing to ill health or was absent. Knitting had always had this role in Shetland in an economy of makeshifts. But whereas the pre-war hand-knitting economy produced networks of women all undertaking different tasks such as spinning, knitting a garment or finishing it, the machine brought forth a different kind of network.<sup>73</sup> This enabled volume production through a division of labour sited within women's homes: one might machine knit the body or the

welt, another would hand knit the Fair Isle yoke and others still would graft the pieces together, and wash, board or block and pack.

Audrey Smith's mother purchased her domestic knitting machine in the 1950s and quickly became enmeshed in a local network of knitters who all completed different elements of the garments.

I think she knitted what do you call them basques or welts, but it's what you call the rib of jumpers. You knit the bottom of the jumper, the neck and the cuffs and maybe the bottom up to the armpits for children's but she used to put these to her mother who had these knitters who put in Fair Isle. And my mother had one or two knitters too who put in the Fair Isle, she'd knit the frame, they would put in the Fair Isle, and put it back to my mother and whatever she did she probably put in ends and grafted in the neck and the cuffs and whatever.<sup>74</sup>

Because orders for standardised garments were received in quantities of dozens and later hundreds, it was necessary for those with an entrepreneurial spirit to employ their own outworkers.

Audrey Smith described how her grandmother and mother were at the centre of a small network of knitters in Hoswick. Her grandmother had already established a small business hand knitting Fair Isle gloves during the Second World War when demand was high. An order she received for eight dozen gloves in several different sizes was distributed to eleven other knitters in the neighbourhood. Audrey read from her grandmother's order book:

Well this is for Lewis's Ltd Liverpool, children's Fair Isle gloves. Two dozen pairs at 33 shillings that's £1-13d in old money; two dozen pairs at 42 shillings; two dozen pairs at 51 shillings; half a dozen pairs at 60 shillings and 1 dozen at 69 shillings ... So that's 2, 4, 6, 8 and a half dozen of children's Fair Isle gloves, presumably 3 [or] 6 different sizes and for that they got £21-9d, 5 per cent discount is £20-7-7, purchase tax is 33 and a third per cent makes it £27-03s. And then you have your knitters, there's three, six, nine, eleven here and they're all within I would say a mile of where my grandmother lived and some related too.<sup>75</sup>

Audrey's maternal relations were following a much longer tradition of entrepreneurial activity by Shetland knitters who, since the seventeenth century, had sold their hosiery to visiting Dutch fishermen, a trade that was thriving by the late eighteenth century. And although the operation of truck in the nineteenth century entrapped knitters in a largely one-sided relationship with the merchants, many found alternative cash buyers for their work amongst visiting philanthropists eager to support the hand knitters of Shetland, or agents on the mainland.<sup>76</sup> In the post-war decades this entrepreneurial activity was replicated, as Audrey's account recalls.

Audrey obtained a domestic knitting machine, a Dubied model, at the age of eighteen, with the help of local knitwear company L. J. Smith for whom she worked before she married, grafting on necks and cuffs, and sewing up the rib welts at home. The employer paid for the machine at the outset and Audrey then knitted orders for the company to pay off the balance. After many months the machine was hers. When she married, Audrey and her husband were able to renovate an old

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building, which provided a comfortable family home. For Audrey, knitting helped her to save for extra consumer items such as carpets, a gramophone and a replacement car. The purchase of these items and the house renovation would have been much more difficult without the extra cash gained from knitting for long hours. Although Audrey described knitting as ‘the bane of my life’, her ownership of a knitting machine enabled her to weather some personal and economic storms. ‘In the ’60s and ’70s pay was poor, the employment was sporadic at times so being able to have a stable, if low, income from knitting was so appreciated.’<sup>77</sup> As L. J. Smith had plenty of orders, this offered a valuable opportunity to earn at home. In 1975, finding herself a single parent just as the oil industry began to transform the islands’ economy, Audrey went to college and found a job at the expanding airport. Then later, when the helicopter company she worked for relocated to Aberdeen, she found a job working for the council, but it offered much lower pay. ‘So that’s when the knitting machine came out ... and you can imagine me with young children and having to knit evenings and weekends to make ends meet!’<sup>78</sup>

In 1983, with a 50 per cent grant from the Shetland Islands Council, Audrey obtained a Brother single-bed knitting machine that could knit Fair Isle and lace garments.<sup>79</sup> She was already a member of the Shetland Knitwear Traders Association (SKTA), a co-operative that was attempting to stimulate home production to meet the demand for Fair Isle knitwear owing to the oil boom and the growing number of visitors to the islands. The idea was for home knitters to design

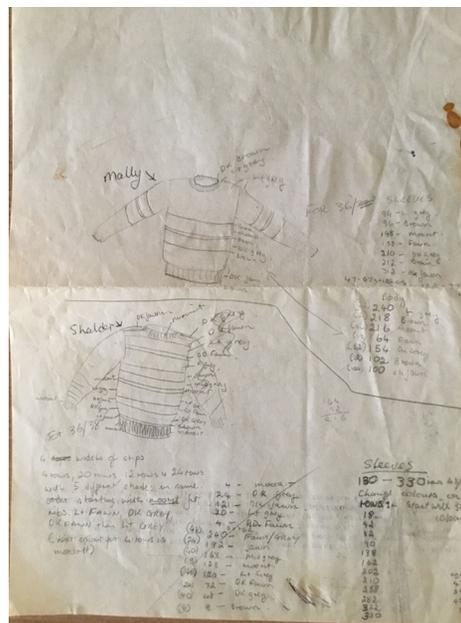


FIG. 6. Audrey Smith’s handwritten designs and instructions for machine-knitted striped jumpers.

*Reproduced by permission of Audrey Smith.*

garments which the SKTA would offer as samples to London agents in the hope of stimulating orders. Although the plan came to nothing for Audrey, she still had the machines, and these enabled her to create her own designs, to knit her own orders and to take on work from local independent knitwear designers.<sup>80</sup> Audrey's hand-written designs for striped jumpers to be knitted on a hand-operated machine can be seen in [Figure 6](#).

Hand-operated knitting machines provided women with an opportunity to make more money, obtain their own orders, design their own products and create small businesses at all levels. Winnie Leask and her husband purchased the Shetland Knitwear Company store in Scalloway in 1967 and sold knitwear during the tourist season. But a visit from a French buyer resulted in an order for fifty garments a week, requiring a major operation to fulfil as Winnie described:

This seemed a huge order at that time but I took it on. It meant going around the village of Scalloway and further afield to get people with knitting machines in their homes to do the knitting and finishing (grafting on necks and cuffs) and also taking on staff in the Shetland Knitwear Co. shop to wash and dress the finished garments and to pack and ship them weekly. It seemed like a good challenge. We set up the whole upstairs of the building for working with the knitwear and we also had a brushing machine downstairs as well as a machine that made skeins of wool into cones to use on outworkers' machines. As business grew we needed more outworkers so I went over to Burra and Trondra to find contacts there ... It was very hard work but a very enjoyable time even though many a time I'd be back after hours brushing garments that had to be shipped the following day. We were shipping anything [from] 200–300 garments each week all hand washed, labelled and packed. Most of the knitwear we produced was sold to the continent with France being the biggest buyers, we also sold to Belgium, Norway and Canada. We also had an agent in London who at first had no idea where Shetland was.<sup>81</sup>

Knitwear production on this scale was labour intensive and required a steady supply of willing and able home workers. Its success was also dependent on a stable market. However, because businesses like this tended not to be sensitive to changes in design or technology, they were often vulnerable to the whims of fashion as well as competition from much cheaper factory-produced garments.

The Shetland Knitwear Company closed its doors in 1972. But the business model built upon the symbiosis of hand and machine knitting and, for the most part, the design and entrepreneurial skills of women, continued to have a place in the sector. The example of NorNova, established in 1991 on Unst, illustrates the model's longevity in the islands. NorNova's founder, Margaret Peterson, grew up in a family with a proud spinning and knitting heritage. Her parents ran a knitwear company, Old Rock Woollens, and her mother-in-law was a champion lace knitter. Margaret worked for a number of knitwear companies until the gift of a Singer domestic knitting machine enabled her to strike out on her own. By 2001, the company employed thirty-two outworkers — a combination of machine and hand knitters. It produced both machine-made garments, to maintain a steady income, and more specialised hand-knitted lace items.<sup>82</sup> Businesses like this were able to occupy a niche between the high-volume, cut-and-sew knitwear producers and the low-

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volume hand knitters producing individually designed items. Though, as Peterson acknowledged, its sustainability was dependent on the availability of sufficient skilled workers.<sup>83</sup>

In Shetland today the same symbiosis between hand and machine knitting is still evident across the sector. Companies such as Jamieson & Smith continue to produce traditional-styled garments by means of knitting the garment body on a hand-operated machine and then joining it to a hand-knitted Fair Isle yoke. Garment finishing also continues to be done by hand.<sup>84</sup> And small traditional knitwear businesses such as The Shetland Designer, established in the 1980s, quickly employed skilled machine and hand knit outworkers. As Wilma Malcolmson explained:

It seems to me, how it works in my Shetland Designer business, is one lady will make the plain jumper — bodies — the body of a jumper on her machine, it comes back here and is passed on to another lady to knit in the yoke ... Maybe another one too — if it's a plain garment — to graft — hand-graft down the neck and cuffs and finish all the ends.<sup>85</sup>

In the twenty-first century a variety of hand-operated and automated knitting machine models have become part of a complex knitting economy in the islands, one that is a far cry from the outworking model that powered the growth of the sector during the post-war decades. The modern Shetland knitwear industry now combines hand knitting with the use of hand-operated, automatic and advanced CAD knitting machine models. It also depends on a skilled workforce who are capable of knitting complex patterns with needles, or who have the ability to work hand-operated knitting machines, or who have the technical proficiency to operate advanced digital technology.<sup>86</sup> Although a variety of production methods continue to be employed within the islands' knitting economy, the number of people working from home as outworkers for larger manufacturers — especially on hand-operated machines — has significantly reduced. Island manufacturers still use automated machinery to increase levels of production, but the flexibility offered by hand-operated knitting machines and advanced digital technology has fostered a new and creative type of manufacture.

Local knitwear designers can now take advantage of a range of machines that provide a variety of manufacturing options whilst also permitting them to concentrate on design originality. Hand-operated machines that combine pattern making with garment shaping provide designers with the means to produce desirable and affordable original knitwear. They can choose to make traditionally styled all over Fair Isle patterned garments or employ more contemporary patterns, textures and garment shapes. In addition to operating their own hand-operated machines or working with a small number of staff, designers are now able to outsource production of some garments and products to automated machinery based in factories on the islands or the mainland. Outsourcing allows designers to market a more affordable range of products but in a limited number of styles alongside smaller numbers of their own highly original products. Outsourcing also extends to the use of highly advanced digital technology. Although this offers a huge range of design possibilities, the machinery is extremely expensive to buy and costly to maintain and

operate.<sup>87</sup> Its sophistication in respect of its ability to integrate garment shaping and pattern/texture making also requires specialised technical support to operate the machines and help designers interpret their ideas.<sup>88</sup>

But reliance on a skilled machine operator — whether of an automated machine or an advanced digital machine — can be considered an advantage to the designer. Designers are not dependent solely on their own technical proficiency and can concentrate on creativity and originality. The production of knitwear using highly advanced CAD technology further extends the range of products — and the level of originality — that a designer can offer. A combination of production methods can provide a designer with a much wider range of design and marketing opportunities.<sup>89</sup> The independent knitwear designer's use of a variety of production methods represents a fundamental shift in the organisation of the islands' knitwear economy. Instead of only larger manufacturers seeking outworkers with hand-operated machinery to expand their production, small independent designers can now choose to outsource production to larger firms with automated machinery. The adoption of machinery sustained the islands' knitting economy by introducing flexible working and production practices, which contemporary designers have continued to utilise and alter to their own advantage.

## CONCLUSIONS

Knitting machines of all kinds were pivotal in sustaining a sector of the Shetland economy at a time, in the immediate post-war decades and prior to the arrival of the oil industry, when there were few alternatives for women's employment. The production model operated by the majority of knitwear companies involved putting out most of the knitting of garments to mainly female machine and hand knitters. This suited both the types of knitwear produced — mostly traditional plain and Fair Isle garments — and the island economy whereby the majority of households earned an income from a number of sources. However, the success of this model depended on the skills of the outworkers and their willingness or need to accept this kind of work. When companies attempted to scale up and adopt the automated and factory-based production model that had been commonplace on the mainland for decades, they foundered. This was due mostly to their inability to make the gear change required to compete in a global market owing to their remote location, the challenges presented by the islands' lack of infrastructure and the demands of operating in a fashion-forward market. Moreover, by the early 1980s, they also faced competition from the oil industry and its associated sectors which provided a wide variety of better paid jobs for men and women. The ill-fated Jan E. Lebet venture, which focused on fashionable design and male operatives working in a factory, foundered precisely because of these factors.

Knitting in Shetland has always been embedded in the domestic; the introduction of hand-operated knitting machines did not alter this. Even when the industry was employing hundreds of knitters, the vast majority were working in their own homes, fitting knitting in between everyday tasks and other means of making a living. And while the work created by knitwear companies such as Shetland Fashions provided employment opportunities for women especially, knitting was poorly paid

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and was always present, the bulky machine a reminder that work needed to be done. Yet the introduction of domestic knitting machines did transform the sector in another way. They enabled knitters to scale up their production at home, producing garments of their own design for buyers outwith Shetland.

In fact, it could be argued that the knitting machine has played an important role in reframing knitting in Shetland, enabling women to reclaim a craft practice that had been poorly rewarded or recognised. Machines opened up a space in which knitters could express their creativity and insist on respect for a practice that has traditionally been regarded as unskilled. The new generation of designers and makers in Shetland have embraced the heritage of knitwear in the islands but have also transformed it into a modern craft practice that confers recognition and, importantly, financial reward. The textile crafts in particular, so closely associated with the feminine, have been regenerated with the aid of modern technology.

Shetland remains unusual in the Scottish knitwear industry for its distinctive branding and its commitment to local materials and designs. However, the development of knitwear production since the Second World War tells a different story to that promoted by the heritage and tourist industry. Owing to local factors relating to location, infrastructure and economy, the knitwear sector could only survive by harnessing the skills of its mainly female knitters. These women embraced the shift from hand to machine knitting, which sustained a production model that combined factory and domestic production and relied upon labour flexibility, low wages and a ready supply of skill. In Shetland the interdependence of craft and industrial production lasted longer than anywhere else in the Scottish knitwear industry. And the survival and resilience of hand craft on these islands alerts us to the dependence of the knitwear industry as a whole on hand skills. These skills — possessed mainly by women — continue to remain vital to the production of luxury knitwear in particular.

The process of industrial change in the knitted textile industry continued to require the skills of the craftworker. This created a symbiotic relationship between the technical advances and efficiencies of automated machinery and the hand craft skills that help produce knitwear for the luxury market.<sup>90</sup> The post-war Scottish knitwear industry never abandoned craft production. The example of Shetland sits at one end of a spectrum. But the duality of hand and machine, home and factory production has enabled both large and small businesses across Scotland to adapt to a competitive market by capitalising on a reservoir of skilled, mostly female labour. And while Shetland's knitwear sector might be distinctive, this case study represents a bridge between craft and industrial modes of production. It connects histories that have too often been regarded as separate and demonstrates that linear accounts of change are misleading when economic, technological and cultural processes are considered together.

#### ACKNOWLEDGEMENTS

The research for this article was funded by award AH/SO11528/1: 'Fleece to Fashion: Economies and Cultures of Knitting in Scotland'.

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## REFERENCES

<sup>1</sup> The Bentley-Cotton knitting machine – or frame – was developed during the mid-nineteenth century. Prior to its introduction the only other mechanical knitting process was the stocking frame developed by William Lee during the late sixteenth century. The stocking frame was operated by hand and foot and required the operator to increase and decrease stitches to shape the stocking. The frames were worked in the homes of stocking framers and their families. The Bentley-Cotton frame successfully automated the knitting and shaping of garment pieces (for example, fronts, backs, sleeves) by machine. It was developed for workshop and factory use and was powered initially by steam, then later by electricity. Several frames could be linked to produce multiple garment pieces or knitted textile lengths simultaneously with each set of frames requiring only a single operator to tend them. Hand-operated flat-bed knitting machines were developed during the late nineteenth century to produce more complex patterns and textures. These machines relied upon individual skilled operators moving a carriage by hand across the needles to produce knitted garment pieces. They were not powered, and the operator was required to decrease and increase the stitches to shape the garment piece. Only once the separate garment pieces were knitted could they be joined. Garments constructed in this way were described as fully-fashioned.

<sup>2</sup> Shetland Archives (SA) D1-701-6: *Shetland Times*, 2 June 2017.

<sup>3</sup> In this article the following terminology is used to distinguish between the different modes of production. Hand knitting refers to knitting by hand with knitting needles. Hand-operated machine knitting refers to producing knitwear on knitting machines operated and powered by hand (in the post-war period smaller hand-operated ‘domestic’ knitting machines were developed and promoted for use specifically in the home). Automated machine knitting refers to the production of knitwear using automated knitting machines or frames developed solely for use in factories, powered first by steam and later by electricity.

<sup>4</sup> *Shetland in Statistics*, 15 (1986), p. 27.

<sup>5</sup> *Shetland in Statistics* ceased publishing figures on home knitters after 2000.

<sup>6</sup> R. Rutt, *A History of Hand Knitting* (London: B. T. Batsford Ltd, 1987); M. Hartley and J. Ingilby, *The Old Hand-Knitters of the Dales* (Cleveland, OH: Cooperative Press, 2014; original 1951).

<sup>7</sup> S. Chapman, *Hosiery and Knitwear: Four Centuries of Small-Scale Industry in Britain c.1589–2000* (Oxford: Oxford University Press, 2002); C. Gulvin, *The Scottish Hosiery and Knitwear Industry* (Edinburgh: John Donald Publishers, 1984). Studies of the wool textile industry such as D. T. Jenkins and K. G. Ponting, *The British Wool Textile Industry 1770–1914* (Aldershot: Scolar Press, 1982), are likewise focused on the factory system and have very little to say about knitted textiles, focusing overwhelmingly on woven cloth.

<sup>8</sup> Gulvin, *Scottish Hosiery and Knitwear*, pp. 72–73. On frame knitting, see C. Gulvin, ‘The Origins of Framework Knitting in Scotland’, *Textile History*, 14, no. 1 (1983), pp. 57–65; J. Rapley, ‘Handframe Knitting: The Development of Patterning and Shaping’, *Textile History*, 6, no. 1 (1975), pp. 18–51; W. D. Cooke and M. B. Tavman-Yilmaz, ‘Hand Knitting, Frame Knitting and Rotary Frame Knitting in the 17th, 18th and 19th Centuries. A Question of Identification’, *Textile History*, 30, no. 2 (1999), pp. 199–206.

<sup>9</sup> Gulvin, *Scottish Hosiery and Knitwear*, p. 73.

<sup>10</sup> *Ibid.*, p. 86.

<sup>11</sup> For example, see M. Llonch-Casenovas, ‘Trademarks, Product Differentiation and Competitiveness in the Catalan Knitwear Districts during the Twentieth Century’, *Business History*, 54, no. 2 (2012), pp. 179–200, here p. 181.

<sup>12</sup> See K. Bruland, A. Gerritsen, P. Hudson and G. Riello, eds, *Reinventing the History of the Industrial Revolution* (Montreal: McGill-Queen’s University Press, 2020) for a recent approach that seeks to bridge craft and industry. In respect of woollen textiles in the volume, see P. Hudson, ‘An Outlook “Wrapped up in Flannel”: the Wool Textile Industry in Wales in the Early Twentieth Century’, pp. 87–103.

<sup>13</sup> G. Adamson, *Thinking through Craft* (London: Bloomsbury, 2007); G. Adamson, *The Invention of Craft* (London: Bloomsbury, 2013).

<sup>14</sup> Jenkins and Ponting, *British Wool*; Gulvin, *Scottish Hosiery and Knitwear*.

<sup>15</sup> See S. Nenadic, *Craftworkers in Nineteenth Century Scotland* (Edinburgh: Edinburgh University Press, 2021). The shoe industry also provides an historic precedent for the use of machinery by craft workers at home. Despite the development of machinery during the mid-nineteenth century, shoemakers remained resistant to entering factories and many opted to use machines but continue to work from home; see R. A. Church, ‘Labour Supply and Innovation 1800–1860: The Boot and Shoe Industry’, *Business History*, 12, no.

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1 (1970), pp. 25–45. The clothing industry also provides an example of a complex relationship between hand and machine. Even after the introduction of the sewing machine in 1851, clothing production still relied heavily upon outworkers, either working by hand and needle or with the machine, for much of the nineteenth and early twentieth centuries; see A. Godley, 'Singer in Britain: The Diffusion of Sewing Machine Technology and its Impact on the Clothing Industry in the United Kingdom, 1860–1905', *Textile History*, 27, no. 1 (1996), pp. 59–76; J. A. Schmeichen, *Sweated Industries and Sweated Labor: The London Clothing Trades 1860–1914* (London: Croom Helm, 1984), pp. 7–79.

<sup>16</sup> Fully-fashioned knitwear describes garments that are made by knitting and shaping garment pieces separately before joining them together. Bentley-Cotton machines could automatically knit and shape the fronts, backs and sleeves of garments before they were then linked or joined together. Initially, fully-fashioned garments were only underwear. However, the growing popularity of knitted outerwear during the inter-war period encouraged knitwear manufacturers to expand their product lines and use the same machinery to produce fully-fashioned knitted outerwear.

<sup>17</sup> Lyle and Scott employed mechanics/engineers in the 1970s and 1980s to service knitting machines used in people's homes. Private conversation with Gordon Macdonald. The Hawick Hosiery Manufacturers' Association agreed pay rates for outworkers broadly equivalent to those for factory-based workers. Hawick Heritage Hub (HHH) SBA/1045-Box 6792-1962-1964 — HHMA Wages Agreement 21/12/1962.

<sup>18</sup> HHH, SBA/512/15/1 to SBA/512/15/7 [acc. no. 0322]: Peter Scott Personnel Records (cards) and SBA/512/15/1/8: Personnel Book.

<sup>19</sup> Dumfries Archive Centre, GGD538/4/13: *Dumfries News*, 31 August 1973.

<sup>20</sup> The reference to home knitters includes those who worked by hand and machine as well as linkers, seamers and finishers.

<sup>21</sup> L. Fryer, *Knitting by the Fireside and on the Hillside: A History of the Shetland Hand Knitting Industry c.1600–1950* (Lerwick: Shetland Times, 1995) pays relatively little attention to the post-war period.

<sup>22</sup> Hand-operated knitting machines became increasingly advanced throughout the twentieth century. The addition of jacquard technology during the inter-war period added complex pattern making to the flexibility of garment shaping. By the 1980s, the development of computer technology and software provided knitwear designers with an even greater number of pattern-making and garment-shaping possibilities. By the 1990s, designers could not only design patterns and garment shapes with computer-aided design (CAD), it also provided increasingly realistic visualisations of garments prior to production. However, as technology became more complex, knitwear designers required IT specialist support to operate the machines and interpret designs.

<sup>23</sup> Shetland Wool Week was launched in 2009. In 2019 it attracted almost 1,000 participants from across the world. <https://www.shetland.org/blog/tenth-wool-week-a-huge-success> (accessed 1 March 2021).

<sup>24</sup> It is notable that a recent compendium of articles on Shetland textiles gives scant attention to machine-made knitwear with just one exception, a short profile of designer Joanna Hunter. S. Laurenson, ed., *Shetland Textiles 800 BC to the Present* (Lerwick: Shetland Heritage Publications, 2013).

<sup>25</sup> This is not an omission restricted to Shetland. Domestic machine knitting has received very little attention from historians of knitted textiles, the exceptions being S. Black, *Knitting: Fashion, Industry, Craft* (London: V&A Publishing, 2012) and C. Tulloch, 'Home Knitting: Culture & Counter-Culture 1953–1963', in *One Off* (London: V&A Publishing, 1997), pp. 205–24.

<sup>26</sup> It should be noted, however, that knitwear production elsewhere in the UK followed a distinct path toward mechanisation: one that was never introduced or adopted in Shetland. Elsewhere in the UK, the hosiery industry, like that based in the Borders, adopted hand-operated circular knitting machinery to produce seamless hosiery, along with automated Bentley-Cotton machines to produce fully-fashioned knitted underwear during the nineteenth century. During the early twentieth century, knitted outerwear became increasingly popular, and knitwear manufacturers adapted their use of Bentley-Cotton machines to also produce fully-fashioned outerwear. In addition to this, large hand-powered and hand-operated flat-bed knitting machines were introduced that could produce both patterned and shaped garment pieces. As the popularity of knitted outerwear grew, the manufacture of cut and sewn knitwear also increased. This method had initially only been used to produce underwear but by the inter-war period it was also employed to produce outerwear. For the cut and sewn method, lengths of knitted fabric were produced, and from these lengths garment shapes were cut out and sewn together. This method used the sewing machine, which had been introduced in the mid-nineteenth century. However, it also depended on the overlocker to prevent the cut edges of knitted fabric from unravelling. Overlocking machines were introduced in the late 1880s.

<sup>27</sup> Gulvin, *Scottish Hosiery and Knitwear*, pp. 70–72; Black, *Knitting: Fashion, Industry, Craft*, pp. 64–66.

<sup>28</sup> For example, Fryer, *Knitting by the Fireside*; R. Chapman, 'The History of the Fine Lace Knitting Industry in Shetland in the 19th and 20th Centuries' (PhD thesis, University of Glasgow, 2015).

<sup>29</sup> See L. Abrams, 'Knitting, Autonomy and Identity. The Role of Hand Knitting in the Construction of Women's Sense of Self in an Island Community: Shetland c.1850–2000', *Textile History*, 37, no. 2 (2006), pp. 149–65.

<sup>30</sup> See the work of knitwear designers Kate Davies, Ella Gordon and Donna Smith, all of whom reference Shetland traditions as an inspiration for their modern designs.

<sup>31</sup> On the feminist reclamation of craft, R. Parker's *The Subversive Stitch: Embroidery and the Making of the Feminine* (London: Women's Press, 1983) is the most influential interpretation in this vein. A more recent manifestation is E. Rutter, *This Golden Fleece. A Journey Through Britain's Knitted History* (London: Granta, 2019). For a discussion, see Adamson, *Thinking Through Craft*, pp. 150–51.

<sup>32</sup> The population of Shetland was characterised by a stark sex imbalance until the 1970s. In 1861 the ratio peaked at 130 women to 100 men. L. Abrams, *Myth and Materiality in a Woman's World: Shetland 1800–2000* (Manchester: Manchester University Press, 2005), pp. 65–80.

<sup>33</sup> See Fryer, *Knitting by the Fireside*; Abrams, *Myth and Materiality*, pp. 98–111.

<sup>34</sup> Fryer, *Knitting by the Fireside*, p. 140.

<sup>35</sup> Fryer, *Knitting by the Fireside*, p. 14; A. Black, 'The Impact of External Shocks upon a Peripheral Economy: War and Oil in Twentieth Century Shetland' (PhD thesis, University of Glasgow, 1995), p. 114.

<sup>36</sup> See National Records of Scotland (NRS), DD 16/16: Wool Selling Scheme, 1926–1930 — letter from Miss Eunson to Ministry of Labour, September 1937: 'I hardly need tell you that the principle means of livelihood of thousands of my people is the Woollen Industry and during recent years Knitting machines have been introduced into these islands by manufacturers from the mainland. These machines can produce garments in 20 mins where by hand the same would take 2½ days. And are sold to the public as real [Island] knit and the would be purchaser thinks they are getting the garment knit by the hands of those industrious people.' Her view was that the trademark would help to distinguish authentic hand-knit items from machine-knit. The SWIA's approach to the gradual march of the knitting machine was to petition government to require companies to label their goods 'machine made in Shetland' to distinguish them from hand-knitted goods. *Shetland News*, 19 October 1933. 'The Menace of Knitting Machines'.

<sup>37</sup> Fryer, *Knitting by the Fireside*, p. 146.

<sup>38</sup> Fryer, *Knitting by the Fireside*, p. 156.

<sup>39</sup> SA, 3/75/1: Oral history interview with Ella Law. In Scots vernacular, 'mind' means 'remember'.

<sup>40</sup> Oral history interview with Elaine Nicolson conducted by Lynn Abrams, 2020.

<sup>41</sup> When Robert Leask obtained a knitting machine in the 1960s he recalled it was the first time in his life that he had managed to afford comfortable shoes. Private communication from Brian Smith.

<sup>42</sup> SA, D1-701-7: Account of History of Shetland Fashions produced by Gayle Caldwell.

<sup>43</sup> See Gulvin, *Scottish Hosiery and Knitwear*, pp. 132–33.

<sup>44</sup> SA, D1-701-10: Shetland Fashions: Instructions to Home Machinists. Undated.

<sup>45</sup> Universal machines, manufactured in Germany, were large industrial hand-powered and hand-operated flat-bed machines.

<sup>46</sup> NRS, DD16-56: Knitwear Unit, Yell, 1963–1966 — *Glasgow Herald*, 4 November 1963.

<sup>47</sup> SA, 4/594/17/195: L. Tulloch, 'North Yell and Tillicoultry: The Bond', in *Shetland Life*, vol. 408, October 2014, pp. 24–25. Santagostino knitting machines were industrial hand-powered and hand-operated flat-bed machines produced in Milan.

<sup>48</sup> NRS, DD16-56: Knitwear Unit, Yell, 1963–1966 — letter possibly from Highland Fund to Ross (Department of Agriculture and Fisheries Scotland [DAFS]), 13 January 1967.

<sup>49</sup> NRS, DD16-56: Knitwear Unit, Yell, 1963–1966 — Internal DAFS letter, 31 October 1966.

<sup>50</sup> NRS, DD 16/56: Knitwear Unit, Yell, 1963–1966 — letter from Storey, Lerwick County Council to Scottish Office, 12 July 1963.

<sup>51</sup> NRS, SEP 2/174: Shetland Fashions (Export Files) — *Press & Journal*, 12 October 1974; *Shetland Times*, 11 October 1974.

<sup>52</sup> NRS, SEP 2/174: Shetland Fashions (Export Files) — *Press & Journal*, 26 April 1975, 'Isles factory not to close'.

<sup>53</sup> NRS, SEP 2/174 Shetland Fashions (Export Files) — *Shetland Times*, 9 August 1974, 'Knitwear can't compete with oil industry wages'; 'There has been considerable loss of workers from the knitwear industry to the higher paid employment temporarily available because of oil related developments. It is estimated that at the peak of knitwear productivity in 1973 over 450 people were employed on a full time basis in the knitwear industry. Currently there are probably less than 20 people fully employed in the industry.' *Shetland in Statistics* (1978), p. 9.

<sup>54</sup> SA, D1-701-7: Shetland Fashions — Account of History of Shetland Fashions produced by Gayle Caldwell.

<sup>55</sup> NRS, SEP 2/174: Shetland Fashions (Export Files) — *Shetland Times*, 6 July 1973.

<sup>56</sup> *Ibid.*

<sup>57</sup> For a discussion of the issue of branding and authenticity in relation to Shetland lace knitted goods, see Chapman, 'The History of the Fine Lace Knitting Industry', pp. 148–53.

<sup>58</sup> SA, D1-701-6: Shetland Fashions Ltd — Labels.

<sup>59</sup> NRS, SEP 4/313: Proposed Wool Spinning Mill on Shetland — Memo of meeting, 26 September 1961.

## Recognising the Co-dependence of Machine and Hand

<sup>60</sup> NRS, SEP 2/174: Shetland Fashions (Export Files) — letter, 18 March 1971.

<sup>61</sup> *Shetland in Statistics* (1981), p. 10. The situation with regard to the protection of Shetland knitwear is in contrast to the protection of Harris Tweed which was granted a trademark — the orb — in 1910 which guaranteed any item carrying the mark to conform to the following definition: “‘Harris Tweed’ means a tweed handspun and hand-woven and dyed by the crofters and cottars in the Outer Hebrides”. The definition was subsequently amended culminating in the creation of the Harris Tweed Authority in 1993 responsible for maintaining the ‘authenticity, standard and reputation’ of Harris Tweed. J. Hunter, *The Islanders and the Orb: The History of the Harris Tweed Industry 1855–1995* (Stornoway: The Harris Tweed Authority, 2001), p. 14.

<sup>62</sup> On the much earlier development of domestic knitting machines, see R. M. Candee, ‘Domestic Industry in the Factory Age: Anglo-American Development of the “Family” Knitting Machine’, *Textile History*, 29, no. 1 (1998), pp. 62–92. On the domestic machine in Shetland, see A. Johnson, ‘The Singer in a Suitcase’, *Shetland Wool Adventures Journal*, 3 (September 2021), pp. 46–49.

<sup>63</sup> SA3/1/395: Oral history interview with Agnes Leask conducted by Lynn Abrams, 2002.

<sup>64</sup> Oral history interview with Audrey Smith conducted by Lynn Abrams, 2020.

<sup>65</sup> Gulvin, *Scottish Hosiery and Knitwear*, p. 132. Product type and volume of production were key considerations for any company investing in automated machinery. Although Bentley-Cotton machines were capable of knitting and shaping several garment pieces simultaneously and automatically, they were designed to knit a specific weight of yarn only. Fine-gauge knitting and heavy-gauge knitting could not be done on the same machine, separate machines were required. The speed of machines also related to flexibility in garment style. Faster machines were more efficient if they did not have to be reset frequently to accommodate a variety of garment shapes.

<sup>66</sup> NRS, SEP 4/778: Research Exercises (Availability of Female Labour) 1950–1969 — internal note dated 28 August 1969.

<sup>67</sup> NRS, SEP 4/442: Individual Areas (Employment) Wick 1948–1963 — letter from Ministry of Labour and National Service, 27 April 1950.

<sup>68</sup> On knitting as entrepreneurial activity for women, see J. Halbert, ‘The Revitalization of a Craft Economy: The Case of Scottish Knitting’, *Critical Studies in Fashion and Beauty*, 9, no. 2 (2018), pp. 179–95.

<sup>69</sup> See Abrams, *Myth and Materiality*, pp. 122–50.

<sup>70</sup> Adamson notes that many crafts undertaken by women exist on the cusp between amateur practice and paid work, in part because they are often ‘embedded in the domestic’. Adamson, *Thinking through Craft*, pp. 150–53.

<sup>71</sup> Martin Smith, *Hoswick Man* (Lerwick: Shetland Times, 2011), p. 58.

<sup>72</sup> *Ibid.*

<sup>73</sup> See Abrams, *Myth and Materiality*, pp. 98–111.

<sup>74</sup> Oral history interview with Audrey Smith conducted by Lynn Abrams, 2020.

<sup>75</sup> *Ibid.* Audrey was reading from her mother’s order book in the interview and attempting to interpret what she found there in real time which accounts for the arithmetical discrepancies.

<sup>76</sup> Abrams, *Myth and Materiality*, pp. 199–200; Chapman, ‘History of the Fine Lace’, pp. 163–69.

<sup>77</sup> Personal communication with Audrey Smith, August 2021.

<sup>78</sup> Oral history interview and personal communication with Audrey Smith, 2020–2021.

<sup>79</sup> Although the Brother single-bed machine was hand-powered and hand-operated, it automated the production of pattern making and knitted lace by using a selection of patterns (either electronic or punch cards) and a separate carriage and set of attachments.

<sup>80</sup> Black suggests that women set up their own knitwear businesses rather than return to working for the knitwear companies when the oil industry work dried up. Black, ‘Impact of External Shocks’, p. 245.

<sup>81</sup> Personal account by Winnie Leask (diary) provided by Anne Smith. The authors would like to thank the Smith family for access to this material.

<sup>82</sup> *Shetland Life*, July 2001, pp. 4–6.

<sup>83</sup> In 2001 the age of NorNova’s workforce ranged from 37 to 97, and Paterson recognised the need to train and recruit younger knitters. *Shetland Life*, July 2001, p. 5.

<sup>84</sup> Jamieson & Smith state, referring to production of their sweaters with Fair Isle yokes: ‘These yokes have been designed and manufactured in Shetland by Jamieson & Smith, the body is machine knit for us by a hand frame knitter and then the Yoke and finishing is done by a selection of Shetland knitters in their own homes. [https://www.shetlandwoolbrokers.co.uk/epages/BT4917.sf/en\\_GB/?ObjectPath=/Shops/BT4917/Categories/Knitwear](https://www.shetlandwoolbrokers.co.uk/epages/BT4917.sf/en_GB/?ObjectPath=/Shops/BT4917/Categories/Knitwear) (accessed 1 March 2020).

<sup>85</sup> Interview with Wilma Malcolmson conducted by Lynn Abrams, 2020.

<sup>86</sup> Designers are still responsible for pattern selection, but once the machine has been correctly set up — and although powered by hand — it can knit the pattern automatically. Shaping garment pieces — by

increasing or decreasing stitches — can either be done by hand or, depending on the sophistication of the machine, be programmed.

<sup>87</sup> Today's advanced digital technology provides innumerable pattern and garment shaping possibilities, but the sophistication of the machinery and its programming require specialist knowledge and experience to set up and operate. The cost of the machines — due to their levels of complexity — is not easily justified by small independent knitwear businesses.

<sup>88</sup> Interviews with Terri-Laura Leask, Wilma Malcolmson and Roisin McAtamney conducted by Lynn Abrams, 2020.

<sup>89</sup> On the recent initiatives to innovate in the textile sector see L. S. McHattie, K. Champion and C. Broadley, 'Craft, Textiles, and Cultural Assets in the Northern Isles: Innovation from Tradition in the Shetland Islands', *Island Studies Journal*, 13, no. 1 (2018), pp. 39–54.

<sup>90</sup> A number of companies producing knitwear for the high fashion and luxury markets continue to employ hand knitters. These include Brora, Eribé and Di Gilpin. Outworkers are also still employed by some of the specialist quality producers.

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NB: To avoid conflict of interest, as one of the journal Co-Editors, Marina Moskowitz, is affiliated with the research project from which this article is drawn, the commissioning of peer reviews, acceptance of publication, and editing of this article was completed by Co-Editor Vivienne Richmond.