Article

Access Over Ownership: Case Studies of Libraries of Things

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Abstract: Over the last decade there has been increasing interest in the concept of the sharing economy, which replaces the focus on individual ownership with a focus on access to goods and services through borrowing, hiring or sharing. This study investigates the efficacy of extending the library concept to include more items, such as those that are used infrequently. The aim is to explore how Libraries of Things (LoTs) operate and the potential to broaden their appeal, reach and sustainability. This study adopts a multiple case study method to provide a snapshot of six LoTs in the UK. Findings indicate that all LoTs shared common environmental and social values, with the most prevalent values being to use the library concept to reduce resource use and waste and to enable more equitable access to goods. All relied on volunteers and public support, in the form of free or discounted space and none were yet economically self-sufficient. This poses important questions about the future for LoTs and whether they could or even should, transition towards the mainstream to make a more substantive contribution to creating a more socially equitable and environmentally sustainable economy.

1. Introduction

Circular economy (CE) approaches are seen as crucial to the pursuit of sustainability because they seek to 'close the loop' of production/consumption systems to increase the efficiency of resource use and decouple economic value creation from the destruction of finite resources [1,2]. CE approaches have attracted increasing focus to deliver more sustainable business and development that better balances the economy, the environment and society [1,2]. A common thread within the CE literature is that it requires the implementation of innovative business models [3–5], for example a shift from ownership-based models to ones based on performance or "pay-per-use" [6]. A business model describes and explains how a firm creates, delivers and captures value through various frameworks and components, including the key elements of product, customer interface, infrastructure management and financial model [7]. A key focus of circular business model (CBM) studies has been on commercial manufacturers and their evolution from conventional "linear" and wasteful systems towards more circular, resource-conserving business models. This has led to a comparative neglect of models based around sharing and product re-use, where the main emphasis is on service provision and customer relationship management [8]. It also means the role played by start-ups and by less conventional types of enterprise (e.g., social or community enterprises), adopting CBMs remains underexplored.

Sharing economy business models—as a subset of CBMs—are increasingly being a means of sustainable value creation [9,10]. For example, the negative environmental impacts of a buy,

use and dispose business model can be partially offset by greener production and recycling, but a business model based on access over ownership addresses issues of over-consumption at the source.

There has been a growth of studies into the sharing economy over the last decade [11]. However, a recent review of sharing economy business models for sustainability concluded that too many studies had focused on the best-known examples such as Airbnb and Uber and had failed to explore the diversity of sharing economy initiatives [12]. This paper seeks to explore more sustainable means of accessing resources at the community level by extending the library concept to include more items, such as those that are used infrequently. This means that instead of each household purchasing a full set of tools for example, they could join a tool lending library. As common tools such as drills are used typically for less than an hour a year [13], this is a more efficient means of providing access to resources than individual ownership. It costs less and so is more equitable, it uses fewer finite resources and releases space in over-crowded homes. Such libraries would also create a community hub that could also provide resilience by reducing reliance on the conventional financial and supply chain infrastructure. Despite these sustainability advantages, the literature dedicated to Libraries of Things (LoTs) is sparse. Although the concept has received periodic attention in the literature dedicated to librarianship, it was not until the publication of a 2017 book on the topic [14] that their implications from a business and sustainability perspective began to be explored. This paper aims to further our understanding by presenting a multiple case study of six UK LoTs, with the aim of assessing their potential to offer more sustainable, community-based modes of consumption.

1.1. Sharing Economy

The term 'sharing economy' is an umbrella construct covering a variety of models including product service platforms that provide access to tangible resources, peer-to-peer platforms to access intangible resources (such as knowledge and skills), as well as platforms facilitating resale and exchange of second–hand goods, gifting, swapping and bartering ([15–17]. Of these, very few models manage to diffuse nationally and internationally [18]. Inability to collaborate due to the lack of trust among the competing platforms, and the lack of open innovation in knowledge, technology and resource sharing may restrict diffusion of sharing economy models [18]. Van Wes et al. [19] propose a framework to analyse the upscaling potential of innovative sustainable business models (see Figure 1).
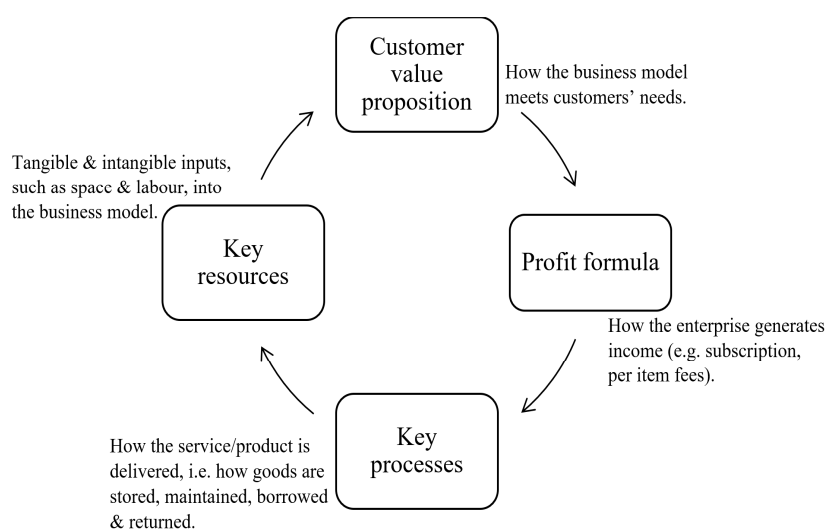

Figure 1. Components of business models (adapted from van Wes et al. 2018).

A key feature is a notion of increasing returns to adoption, whereby the more a service is accepted, the better the financial returns due to economies of scale, the more awareness is generated of the service/product and the more attractive the customer value proposition becomes as resources'

availability increases. Cultural institutions in the form of norms and beliefs relating to access over ownership are also relevant. Several studies have indicated, for example, that the most significant factors affecting consumer adoption of access-based models are awareness of their existence [20,21] and norms relating to ownership [22,23].

An alternative perspective is that the tendency for many sharing economy business models to remain niche is not necessarily a bad thing, such enterprises may operate more effectively on a community or regional basis, reflecting the sustainability of distributed economy models championed by the likes of Wells and Bristow [24]. Furthermore, those that transition into the mainstream may lose their original values and develop unintended consequences, such as exploitative labour practices (Uber) or community disruption (Airbnb) [25,26]. For those that expand successfully, the focus on sustainability may become diluted, as they try to increase the attractiveness of their offering for a broader range of users prioritising convenience and cost considerations [27,28]. There is a concern therefore that genuine peer-to-peer sharing that creates communities, enables more equitable access and reduces resource use, is vulnerable to "corporate" co-option that threatens these goals [29]. This contrasts with the original motivations behind numerous peer-to-peer sharing schemes established as social enterprises that use business means in pursuit of social ends [30] to provide community-level sharing to address issues of over-consumption and poverty [31,32].

1.2. Libraries of Things (LoTs)

One form of the sharing economy that can encourage a switch from product ownership to product access, is the LoT which extends the library concept from lending just books to other items. Some are existing libraries that have extended their range to include further items such as tools or toys. These are predominantly funded by local authorities or charitable grants. For example, in the US, Berkeley's Tool Lending Library was established in 1979 with $30,000 from a federal Community Development Block Grant [33]. Research indicates that users and staff relate to this tool library primarily in terms of its community role and local social and economic contribution, rather than in terms of explicit global sustainability contributions. However, respondents did emphasise that Berkeley represents a community with a strong underlying sustainability orientation and the "common sense" virtues of avoiding waste through borrowing [33]. Toys and games are additional items that some libraries have included as part of their borrowing options [34]. Such toy libraries are often run by an existing public library, but some are also operated by individuals, charities or government agencies. A review of toy library users reveals a variety of motivations to take part, ranging from the perceived community and social benefits of sharing, to those who hold anti-consumption and/or sharing values [32]. Similarly, some libraries provide free book-a-bike borrowing programmes, utilising public funding and motivated by the goal of creating healthier communities [35]. The funding models tend to be a mix of grants, donations of money and resources and membership fees [36]. The extension of item ranges by conventional libraries has been followed by the emergence of dedicated LoT initiatives set up to provide access to a much broader range of items in countries including the US/Canada, Germany and Norway with a few in the UK [14].

A LoT, as a contributor to sharing and sustainability, depends on people's willingness to borrow, rather than buy, durable items. Despite the longevity of libraries and the potential centrality of borrowing to more sustainable lifestyles, the behaviour of borrowing (particularly as an alternative to purchase) is under-researched and poorly understood [33]. This is despite public libraries being commonly proposed as potential centres for sustainable community development [37]. Studies on consumer response to such libraries indicate that there is a high willingness to share rather than own across many countries, but despite this, sharing is rarely put into practice, in part due to a lack of structured sharing options [38]. A study of LoTs in Germany found that users are motivated by cost savings, convenience and positive social aspects of sharing, while barriers include lack of awareness about LoTs, hygiene issues, security, low quality of items, high effort and unwanted dependency on other people [38]. Additionally, there were discrepancies with respect to supply and demand of

loanable goods as users are not keen to lend personal possessions to strangers and completely let go of them, unless they are of low quality. On the other hand, borrowers only want to access high-quality items. This perhaps explains why the popularity of informal sharing amongst family and friendship groups can be difficult to convert into a commercial operation [39]. Moreover, users' preferences for a wide range of items and long opening hours can be difficult to deliver in an economically sustainable way without access to a high level of volunteers. Whereas the LoTs studied in Germany tended to rely on donated goods, whereby borrowers also shared their goods, other LoTs may operate differently, for example by buying new items for lending and recouping this through hiring fees.

Our study aims to explore how UK LoTs operate and the barriers and opportunities to broaden the appeal, reach and sustainability of the LoT model. Findings are based upon case studies of six LoTs across the UK.

2. Methods

This exploratory study adopts a case-based methodology to investigate the contemporary phenomenon of LoTs in the UK within its real-world context [40]. This approach is considered appropriate given the comparatively early stages of research into CBMs for sustainability [8,41], following recommendations for the use of case studies when investigating relatively new phenomena [42], particularly in business sustainability contexts [43]. Cases also provide benefits in terms of coping in situations where the boundaries between phenomenon and context may be "fuzzy" [40] and by allowing for serendipitous findings in idiosyncratic situations [42]. The fact that situations can be idiosyncratic highlights a weakness of single case studies, often used in experiments or for the analysis of specific phenomena or extraordinary events, in that they may focus on unrepresentative outliers. This study instead uses multiple case studies and a variety of data sources to compare the experiences and business models of six LoTs across the UK to establish their similarities and differences [40]. It is, therefore, more in line with the "vignette" case methodology popular in fields such as healthcare [44] than with the single organisation, in-depth case methodology most used in management. The rationale is that having multiple units of analysis can provide a more comprehensive understanding of the current state of play of LoTs in the UK, their challenges and their opportunities, in order to inform an understanding of how the potential of this innovative sustainable business model can be more fully realised.

Consistent with recommendations [40], the data for this study are derived from a mixture of semi-structured interviews in person or by telephone with key informants (LoT founder/manager) supplemented by questions responded to by email. Where possible, interviews were recorded and transcribed, although one interview was conducted during a tour of the LoT, and notes were taken and then written up. The transcripts were analysed manually by the authors to identify recurring themes and any unique properties of cases. These primary data sources were supplemented by additional secondary data sources such as the LoT websites and reports/surveys conducted by certain of the LoTs. For the primary data, an interview guide was developed with questions covering the legal status, funding, business model operation and the values behind each enterprise. We also asked about their opinions on prospects for LoTs. The semi-structured interview format also provided scope for moments of serendipity and the exploration of any novel issues that emerged in an interview. The aim is to give a snapshot of the state of play with LoTs in the UK at the current time and some indications of what factors affect prospects for this new sharing business model. To enhance data integrity while creating a conducive environment for constructive dialogue and discussion during the interview process, respondents were given the opportunity to remain either anonymous or named. The sample represents all the six LoTs that were fully established in the UK at the time of the study that the researchers were aware of, based on an Internet search of Libraries of things in the UK. There were, however, several more embryonic LoTs in the process of starting up and there may have been some LoTs that the researchers were unaware of.

An outline of the six case studies is provided in Table 1. In the following section we present an analysis of the key themes that emerged from the analysis of the data, we then conclude by comparing some of the LoT features and experiences.

Table 1. Sampled schemes and their origins.

Cases (LoTs in the UK)	Description
Library of Things London (LoTL)	LoTL was established in 2014 in partnership with Lambeth Council as a pilot project located in a spare room offered at no cost by the local library: "*Back in 2014, like many London residents, we were cash-strapped, living in tiny box rooms and socially isolated - we didn't know our neighbours. We said to ourselves, 'why do we all buy and own things like drills, sewing machines and sound systems when we could share them?'*". It was trialled as a "pop-up" LoT, then, encouraged by 100 people signing up as members and 1000 people visiting the shop, a crowdfunding campaign was launched that raised £15,000 from 248 backers. This enabled the team to set up a full-time LoT in the library space a few months later. It has evolved into a social enterprise company limited by shares, with a 51% profit lock and mission lock held by a nonprofit company. There are two partners comprising two social enterprises (CIC and charity).
SHARE:Frome	SHARE:Frome is a social initiative set up in April 2015 by Edventure:Frome (nonprofit Community Interest Company) in association with Frome Town Council and The Cheese & Grain (not-for-profit, member-owned social enterprise and also a registered charity). The Council provided some money to pump prime the initiative; Edventure provided apprentices who did the market research, recruited volunteers and developed initial systems and Cheese and Grain provided the premises used. This partnership came together rapidly with: "*A team of 8 people setting it up from scratch in 6 weeks with a £500 budget . . . It's kind of crazy!*" They open three days per week but aspire to open more often.
Share Shed, Totnes (SS)	SS started up in April 2017 after over a year's planning by the Charity, Network of Wellbeing and was launched as a partnership with the local council who provide space and is run by a community steering group: "*We've been created as a project of the Network of Wellbeing (NOW), a charity that supports a UK network of people and organisations who care about the wellbeing of people and planet. We've been also supported, through funding, by the Big Lottery, and through training, by the School for Social Entrepreneurs.*" It began by opening on Saturday mornings and then added two weekday afternoons.
Benthyg, Cardiff	Benthyg means "borrow" in Welsh and opened in November 2017 as Wales' first LoT. It is a project run by Rumney Forum, a registered charity run by and for, the community. Benthyg was originally inspired by a Canadian LoT: "*The idea first came about when I had just moved into a new house with a big garden but couldn't afford to buy a lawnmower. I didn't know anyone locally to borrow one and didn't drive to be able to borrow one off friends further away. At around the same time I signed up for a newsletter randomly for a website called Shareable—one of the first things I read about was a tool library in Toronto, Canada. After further investigation, I discovered something a bit closer to home them in Frome. I got in contact with them and they shared their toolkit with me, which has been vital*" (From https://www.walesonline.co.uk/news/wales-news/cardiff-now-library-you-borrow-13836782).
Borrow Don't Buy, Plymouth (BDB)	BDB was set up in 2018 by a Community Group (MESH) with some additional local authority support. MESH describes itself as a "Communiversity", an organisation that uses knowledge and skills to help people improve and learn digital skills. Alongside the LoT, MESH runs a regular Repair Café where members can bring their broken items and learn how to fix them. BDB opens two days per week.
Kaim Shop Robert Gordon University, Aberdeen (KS)	Kaim shop is different in that it is run by students for students and the local community. It forms part of several projects run within the RGU Union "GoGreen" initiative, which also includes a bike hire scheme and a zero-waste café. The scheme developed in response to the needs of students who live in an area temporarily. The idea was to tackle the issue of students buying goods when they join the university and then dumping them when they leave. They developed two separate swap-shop areas, one which deals with household items, DVDs, books, etc. and another that covers clothing and textiles. The current manager describes the process: "*Since its inception in 2017, Kaim Shop has been RGU Go Greens creative and social hub. The enterprise is supported by the Robert Gordon University and the Student Union financially and with advice and advertising.*"

3. Analysis

Insights that emerged from the data gathered about these six LoTs concerned several key themes related to their inception and underlying ethos and to the current operation of and future prospects for, their business models:

3.1. Items Offered:

Schemes varied in the range and number of items offered. BDB noted: "We have lots of cameras, computer consoles, someone even brought in an electric guitar and speakers. We have also lots of things we expect people to want like pressure washers, drills, other DIY stuff. But we also have disco lights, a smoke machine and even a candy floss maker. A big selection". This selection had extended to 276 different inventory items. By contrast, LoTL began by testing 400 different items and then realised that this was time-consuming and that it was more efficient and financially sustainable to focus on the top 70 items. They identified their most popular items as a carpet cleaner, pressure washer, steam cleaner, drill, power saw, hand sander, sewing machine, projector, strimmer and hedge trimmer. This suggests that LoTs face something of an external attractiveness/internal complexity tradeoff. A wider range of items increases the potential range of customers and reduces the chance of new users being disappointed by an initial "not in stock" experience. However, it also requires more staff input and knowledge and available storage. Hence, for individual schemes, both the nature of items offered and the ideal range width that optimises the attractiveness/complexity balance is likely to vary with location (e.g., large versus small, rural versus urban communities).

3.2. Pricing:

Unlike conventional libraries, LoTs tend to have diverse inventories meaning that flat-rate pricing is unworkable, therefore hiring fees will generally depend on the item chosen. LoTL asks for £1 membership fee plus individual daily hire fees for items. SHARE:Frome offers a choice of free membership on a "pay as you borrow" approach, with items individually priced on a tiered system where, for example, hire cost for a cake tin is £1, a drill is £3. An alternative is a monthly membership fee by direct debit, ranging from £3 entitling you to borrow £6 of items; to £5 to borrow £10 of items; to a £10 membership for unlimited borrowing. These low prices are designed to attract people to the cause of borrowing rather than owning and are financially unsustainable without volunteer and grant support.

BDB has a yet more complicated mix of membership options, from a casual borrower with no membership fee and pay-as-you-go hiring fees, regular/frequent borrowers who pay £5/£10 a month that entitles borrowers to discounts on borrowing items, to a £120 annual membership fee that gives 60% discount on borrowed items. The price range of borrowing items goes from 0.50 p to £10 for a seven-day period. As of July 2018, just one percent were frequent borrowers, 18% regular and 73% casual borrowers. Benthyg, by contrast, has a simple, but multifaceted approach, allowing members to pay to borrow through time contributions, money or item donations. This ability to participate through time or item donations further extends the potential sustainability contribution of LoT models through widening access to material goods and thereby improving social equity.

The viability of the membership models that feed into variable pricing will also interact with a scheme's product range decisions since borrowing frequency will be impacted by the range available.

3.3. Resourcing:

Although all schemes charged fees and/or memberships for users, they also depended on other forms of resource support. As SHARE:Frome describe: "*We are lucky to be living in a town with a very supportive Town Council. Other places might struggle to get the support we've had there. Finding a suitable location and getting into people's heads are key barriers that need to be overcome.*"

LoTL were unusual in that they covered most of their costs through hire fees noting that: "*Hire fee revenue currently covers part of a Community Activator salary, stock replacement and repair, marketing,*

and other admin costs associated with borrowing. We don't need to pay space hire because it only uses up 10 sqm of space in an existing community hub".

Resources for schemes include:

- item donations (SHARE:Frome reported that 99% of the items shared were donations, SS reported 95%, 84% for BDB),
- council funding (or from the local university in the case of KS),
- charitable funding (e.g., Big Lottery funding for SS or expansion funding for LoTL from the UK National Endowment for Society Technology and the Arts),
- space donations (mentioned as a success factor by LoTL, SHARE:Frome & SS) and volunteering.

Start-up funding was an important factor for launching schemes and could come from sources such as local authorities (BDB) or charities (e.g., Benthyg). LoTs face typical social enterprise problems of financial sustainability and often depend on an earned income/local authority support mix [45], but some are using innovative approaches to overcome this such as crowdfunding to leverage wider community support. For example, BDB raised £11,109 from 153 supporters in 35 days to facilitate their launch in February 2018. Over 200 members signed up in the first six months (with 71% of them female). Their Crowdfunder appeal supplemented the funding accessed from Plymouth Council and the Changemaker Fund, launched at the end of 2016 as part of a collaboration between the bank Santander and Crowdfunder.

The complexities of scheme resourcing were perhaps best captured by SS in saying: "*The fees we get from our memberships, loans and donations still don't cover the costs we have (mainly, staff costs since we've hired someone that works six hours per week). The Network of Wellbeing supports the Share Shed through having it in its office (without charge) and allocating a great deal of staff time (M's role) to manage the Share Shed. We very much rely on volunteers helping us at our stall three hours* per *week, and 95% of our items have been donated to us. The Big Lottery has also supported us twice.*"

SHARE:Frome hoped in the future to be able to become more independent of outside funding: "*We have a team of volunteers alongside one shared paid role. We rely on donations for items. We have also always relied on funding. It is our current aim to get to self-sufficiency without funding.*"

Consistent with the literature [8,46], the importance of location as a success factor was highlighted by several schemes (and both LoTL and Benthyg stressed the importance of colocation with other services). The importance of donated space was highlighted in SS's response: "*In terms of barriers, in our context, location is key, and unless we're in the High Street of Totnes, people are much less likely to use our service. If it wasn't for the office space provided by the Network of Wellbeing, at the moment, we'd be struggling since we're unable to cover the rental fees for a shop front in the High Street (which is our ideal).*"

In terms of the reliance on donations, LoTL went through an interesting evolution in that they began by accepting donations of goods, but then realised that these were often not of sufficient quality to justify the costs of staff time involved to sort through them and ready them for use. They then switched to sourcing new goods through a mixture of donations from manufacturers and stores (e.g., B&Q) and buying items via partnerships with manufacturers like Bosch and Karcher to access discounted stock. This strategy guarantees quality, allows greater control over product range availability and perhaps can send a quality signal to users in terms of items entering the scheme new rather than towards their "end of life". This may tackle some of the factors deterring potential scheme users such as concerns about hygiene or item quality [38].

3.4. Startup Challenges:

As with any social enterprise, the process of becoming established represents a key challenge in terms of accessing resources (including suitable advice and professional support), incorporating the enterprise in an appropriate legal form, establishing administrative and operational processes and generating awareness amongst potential customers [30]. Most LoTs undertook preliminary market research. SHARE:Frome began by surveying if the local community liked the idea of a LoT and what

items they would want to borrow. They also shared ideas and brainstormed how such a scheme would work with future project partners. They then adopted the "social lean canvas model" of business planning and created three versions based on their three customer segments identified through market research: parents, low-income families and affluent, environmentally conscious individuals. This was taken to local experts (i.e., entrepreneur, manager of a charity shop) for advice and feedback to work out how to balance potential tensions between financial sustainability and attractiveness to users. Consistent with the literature on the pro-sustainability potential of sharing platforms, usage of green, economic and social logics were integrated within their business models and marketing to enable a broader appeal to diverse stakeholders and investors [28].

Both the practical challenges involved and the necessity for schemes to evolve and adapt as they develop, was also demonstrated by the experience of LoTL: "*Through four years of testing, we learnt that running a Library of Things in isolation requires a lot of heavy-lifting. Sourcing things, pricing them, cataloguing, storing, maintaining and repairing them. Coordinating volunteers. Designing and maintaining a space. We did this as a team of 10+ volunteers for 18 months—Us three directors were nearly full-time. We realised this approach just wasn't viable. So in partnership with the local community in Crystal Palace, we developed a 'smart borrowing kiosk' and an ongoing maintenance service designed to do that heavy-lifting—so that local people and the host site can focus on the joyful, impactful stuff: the outreach, engagement, skill-sharing events and volunteer programmes.*"

3.5. Volunteers:

Most of the schemes explicitly mentioned the use of volunteers as part of their business model and/or success factors. SHARE:Frome indicate that lack of volunteers is a constraint: "*We would love to be able to be open more than the current three days per week. This would be of benefit to the community as well. If we can get our revenue up we will be able to do this—it's all a balancing act at the moment. Being open on a Saturday would be of benefit as well. However, it's a lot more difficult to find volunteers who can give their time at the weekend*".

However, they varied considerably in their reliance on volunteers. At one end of the scale, LoTL explained that: "*We do have volunteers but they aren't fundamental to the model working, and are rewarded through a credit system that can be used against borrowing and events. Set-up work and R&D is being funded through grants and social investment.*" At the other end of the scale, KS were the most volunteer dependent operation: "*At the moment, Kaim Shop does not have funding support from the council, it runs under the Student Union with the help of student volunteers, with the Student Union's funding being limited. Therefore, volunteers need to plan well the activities e.g. pop-up stalls, workshops and other innovative ideas to continue promoting Kaim's value and to economically sustain itself . . . All activities are led by volunteers with roles including Vice President of RGU Go Green for Kaim Shop, Secretary, Administrator, Adviser, Visual Merchandiser, Creative Workshop Leader, Pop-up Shop Coordinator and General Volunteer*".

Although schemes can use volunteers to reduce staff costs, retaining and managing volunteers adds to scheme complexity [47]. An important lesson from the social enterprise literature is that using volunteers can be a mixed blessing since their cost-saving benefits can be compromised by challenges relating to quality management, disciplinary issues and equity issues with paid staff [30]. SHARE:Frome was very explicit in its ambition to attract a range of volunteers with a mix of different skills who can share their knowledge with members (e.g., relating to repairing good) and sought to develop volunteer policies on induction, shift rotations, responsibilities and oversight to reduce potential problems. They also sought to attract volunteers by offering free scheme membership.

3.6. Values and Goals:

In expressing their values and goals, there were both recurring and unique themes:

- **Environmental sustainability**: either referred to explicitly or through stressing benefits to the planet or environment, was common to all. Carbon footprint reduction was explicitly mentioned by KS and BDB.

- **The circular economy**: was referred to in terms of values by KS: "*We're on a mission to build a more circular economy at RGU, one that sees value in things that would normally be thrown into Landfill, left neglected at the back of the shed, or left lingering at the back of the wardrobe*" and they framed this in terms of a: "reduce, reuse, recycle ethos". LoTL saw a move towards a more CE as one of the impacts of initiatives like theirs: "*More indirectly, product manufacturers are incentivised to design products for repair; retailers shift their business models towards rental and leasing and policymakers become more aware of policies needed in a circular economy.*" BDB did not explicitly reference CE but did stress the importance of the reuse of materials as a key value linked to their monthly repair café events.

- **Inclusivity**: either referred to explicitly or through stressing benefits of accessibility and affordability, was also a common theme: "*In terms of values, our key ones are trust, affordability and sustainability. As far as goals, our vision is to support a more resourceful, collaborative, inclusive and sustainable lifestyle*" (SS); "*We really want to make sure this does benefit the people that need it most . . . We don't want it just to be a middle-class swapsies*" (SHARE:Frome).

- **Social justice**: this was most explicitly addressed by LoTL in their promotion of fairness: "*We strive to have a fair exchange of value, economic or otherwise, with all stakeholders, rather than value being extracted by a small or exclusive group.*"

- **Localism**: was implied when the schemes referred to the communities in which they operated, but was at times explicitly articulated, for example: "*Strengthen community development*" (BDB); "*. . . to enjoy a better neighbourhood through lower waste living and more thriving local spaces*" (LoTL).

- **Convenience**: within the sustainability marketing literature, convenience is viewed as a key explanatory factor in the relative success or failure of many sustainable market initiatives [48] including sharing initiatives [27,28]. LoTL explicitly aimed to make borrowing cheaper and more convenient than buying, whilst BDB pledged to provide "*Friendly 'borrower' support*".

- **An alternative future:** although all schemes were implicitly orientated towards the future through a contribution to environmental sustainability, LoTL was unusual in their Founder's expression of their initiative as part of the shape of things to come: "*I think there is a strong economic incentive in urban centres to access rather than own material goods and this will increase as populations become more urban and nomadic. Thought leaders such as World Economic Forum predict that 'all products will become services in the city of 2030'*".

Overall, the values expressed by the schemes clearly sought to integrate the three core elements of the sustainability agenda and ran from the specific and practical to the idealistic and society changing. Benthyg's value statements embodied both: ranging from "*Save money, save space, and save the planet*" to "*This is more than just a library—Benthyg is a movement. Let's stop buying stuff we don't need, let's start sharing the stuff we already have, and let's make sure everyone has equal access to that stuff.*"

3.7. Impact:

It is perhaps not surprising that as the most mature scheme, LoTL had done the most to analyse and assess their impact. To understand where their service was having a benefit within society, they had undertaken their own (unpublished) research. This allowed them to analyse their borrower profile, revealing that 20% were low income individuals or families, 5% were community groups and 75% were young professionals and young families. They also analysed their volunteers, 57% of whom came from 30–50-year age group, a third from the 50+ age group and 9.3% from the 18–30 age group. LoTL also reported that 91% of 120 borrowers they surveyed felt better connected to their community because of engaging with the scheme, demonstrating success in delivering against the localism value noted above.

In terms of environmental benefits, LoTL calculated that each year their lending and repair service activities save 11 tonnes of waste from going to landfill and 60 tonnes of CO_2 (based on recorded numbers of product repairs and loans and standardised measures of resource efficiency of product reuse). They also anticipate indirect benefits through stimulating wider behaviour and systems change

(e.g., amongst manufacturers, retailers and policymakers) resulting from thousands of people being incentivised to borrow rather than buy. In addition, the local reuse and repair economy is stimulated by this activity, for example, 60% of borrowers surveyed said they were now more likely to recycle and repair items. This suggests that engagement with a LoT could prompt users into other types of pro-sustainability behaviours as a "spill-over" effect [49]. However, as Ameli notes [47], although a shift towards households accessing rarely used items through LoTs can offer theoretically substantial savings in resource consumption, in practice these are likely to be lessened through the operation of multiple rebound effects.

3.8. Future Strategies and Prospects:

The most marked differences in the responses amongst different schemes concern their planned future strategies and perceived prospects, where a range of different approaches was suggested to grow their businesses and increase their community contribution:

- **Adding value**: the development of value-adding services beyond access to goods, was important to several of the schemes. Several LoTs hold regular repair cafés, for example, BPD hold a monthly repair café to mend clothes and repair items to both add value for users and to reinforce their key value of the importance of reusing materials; SHARE:Frome and LoTL both hold occasional skill-sharing events.

- **Replication**: Benthyg hoped to set up "miniprojects" across communities around Cardiff and the rest of Wales, whilst SHARE:Frome hoped to promote the LoT concept more broadly by creating a "toolkit" for other potential schemes to pick up and learn from (which the Benthyg scheme had already used in their early development). "*The more Libraries of Things there are, the more we can share with one another the pitfalls to be avoided and the successes to be replicated—so as the movement builds, so it will become easier for new Libraries to set up*" (SHARE:Frome).

- **Centralisation**: LoTL believes that if their project can be replicated and expanded with one central organisation taking care of costs such as equipment, software, insurance, marketing, training, etc. for ten or more local LoTs, then there would be a chance for LoTs to become more financially self-sufficient and financially sustainable.

- **Relocation**: BDB hoped to expand and relocate: "*As we gain in popularity we are looking to move out into another city centre location*".

- **Going mobile**: SS: "*We're in the process of applying for a grant to create a mobile version of the project (i.e., a traveling library of things). In this way, we'd be able to serve the nearby communities as well as those who haven't got a car, for instance, to be able to borrow big item such a lawn mower.*"

- **Marketing-led**: the importance of marketing for further development was evident in SHARE:Frome who had been the most reliant on formal market research in their establishment and who stressed factors like branding, marketing materials, website presence and PR strategy as factors in the development. SS also stressed the importance of marketing and communications: "*For us, as far as intentions go, we want and need to have more people using the Share Shed, therefore we've been investing on publicity and different ways to reach out to people*".

- **Relationship building**: Future prospects were often linked to relationships with other organisations, for example, KS benefitted from links to the University's Zero Waste Café and bike hire scheme but also felt: "*It would be good for the shop to join local communities' activities and other local green charity groups to promote its values for future development*". LoTL used partnerships with manufacturers to access potential stock on a favourable basis and SHARE:Frome linked to a local "Street Bank" by encouraging members to use it to share larger and/or unsuitable (e.g., potentially dangerous) items.

- **Segmentation**: some schemes recognised the importance of recruiting users representing different segments of the potential market: " ... *reaching out to those who are more in need, who probably would benefit most of our project. At the moment our audience are mainly those who're environmentally*

active/minded." (SS). However, serving new segments may create challenges for schemes by making decisions about pricing structures, product ranges and marketing communications more complex.

All the schemes viewed the LoT model as having considerable potential to be extended within society, although there were perceived barriers in terms of inertia and going against the prevailing cultural grain, for example: "*I believe there's a lot of potential for Library of Things, as soon as people hear about it, they tend to think it's a great idea and that it makes a lot of sense. Having said that, it still takes time for people to remember we're here, and to do things differently (in this case, borrow rather than buy)*" (SS). Similarly: "*I am very optimistic about the potential. The wealth of positive feedback from members as well as visitors backs up the potential. The issue is bridging the gap from the existing default mindset of ownership with that of sharing. It's not most people's default position to think, 'borrow!' when they need something. It is default to think, 'go and buy'. If we can get into people's heads at the moment they think of needing something we will succeed.*" (SHARE:Frome)

However, to capitalise on its potential, the key future success factors identified included finding appropriate spaces (high footfall/low rent), finding the local social entrepreneurs to provide leadership and accessing investment to allow startup and expansion. In accessing financial and other support there is an important role for other types of organisation including governments (local, regional or national), housing associations, NGOs/charities, funding bodies, landlords and other social enterprises. There may, for example, be opportunities for LoTs to benefit from networking with other forms of local social enterprises through the emerging "Social Enterprise Places" movement [50].

4. Cross Case Comparison and Discussion

There is almost complete similarity and overlap across all six case studies in terms of the key values and goals of the LoTs, which all centre mostly on the environmental and social benefits of sharing versus ownership, but also highlight economic benefits to users in terms of affordable access to goods. This underlines the social sustainability and emancipatory potential offered by library-based approaches [33].

The process of setting up the LoTs also shared more similarities than differences. They were usually led by a team of enthusiasts who recruited volunteers and project partners and gained support from organisations that could offer free space (typically local authorities) and funding from a mixture of crowdfunding from the local community and grants from charities.

There is also a large overlap in terms of the items borrowed. These tend to be items that are needed on an infrequent temporary basis. The most popular goods for borrowing appear to be gardening tools, DIY and cleaning tools, sporting equipment and kitchen items, but also include items needed for parties/events, baby/children's items, computer/technical items, outdoor/hobby items, camping/holiday gear.

The greatest difference amongst the LoTs was in how they selected and accessed goods, particularly in terms of the attitude to donations. At one extreme was LoTL, the longest established LoT, who shifted away from donations and streamlined their item range by more than 80% to focus on a range of 70 popular items that were proactively selected and sourced as new. The benefit of such a focussing strategy was underlined by one interviewee citing an organisation who tried to set up a project to share office equipment, but because the owner was so focussed on accepting and sharing everything possible, the project became unwieldy and, lacking a sustainable business model, it ultimately failed. At the other extreme was SHARE:Frome which sourced almost all their goods through donations. This more reactive approach to stock management was then counter-balanced by proactively soliciting donations of items they lacked that were in demand. This LoT was able to succeed by relying on donations because it had a vibrant volunteer network providing sufficient people to manage them effectively. Most of the others fell somewhere between these two extremes.

The projects also differed in the service offered. LoTL was open 40 h a week whereas many of the newer LoTs only opened once or a few times in a week. There was considerable overlap in payment structures with most offering a variety of packages that included elements of a monthly membership,

in addition, to hire fees, although Benthyg also accepted time and donation of goods as payment for borrowing. This presents additional benefits in terms of social equity and community resilience as it allows participation by those who may be rich in time rather than money [51]. This suggests that one potential route for LoTs to succeed, particularly given the challenges of making them financially viable, is through integration with other schemes such as time banks.

4.1. Discussion

This study of six UK LoTs revealed organisations that were strongly concerned with sustainability, both in the sense of their sustainability as viable enterprises and in terms of contributing environmentally, economically and socially to the communities within which they operate. However, to contribute to this over-arching goal of sustainability, they face a set of interrelated challenges involving five "S" factors:

4.1.1. Scale

One of the questions we set out to explore was the potential for LoTs to upscale. In all cases, it was clear that the service LoTs could provide depended on the resources available to them, which were limited by having not yet achieved sufficient economies of scale to be financially self-sufficient. However, the LoTs studied were relatively new. The most established LoT which had been going for four years did express a belief that economies of scale could be realised by a centralised approach to marketing, sourcing, training and software that could serve several satellite LoTs. If done on a large enough scale, then there is potential for LoTs to be self-sustaining and financially viable in the long run. The other LoTs were similarly optimistic that expansion was possible. However, this optimism was founded on the assumption that free space and volunteer help would continue to be available.

A related question is whether LoTs should upscale. Studies of the broader population of social enterprises show that as they grow there is a tendency towards isomorphism [30,52]. Yet in terms of sustainability, a diversity of business models, each growing out of and adapted to, their local context may offer greater resilience and opportunities for learning. For example, one of the LoTs allowed users to access goods directly by donating their time or sharing their existing goods that they do not use often. This provides the potential to explore alternatives to the use of money as the sole means of exchange. If every local neighbourhood had such a community LoT, this could help reduce our dependence upon a single mode of consumption that requires money and stable supply chains.

4.1.2. Sharing as "Alternative"

We found that at this relatively early stage, the providers of LoTs were themselves "green enthusiasts" motivated by their sustainability-orientated values and supported by like-minded volunteers. The LoT owners/managers and their volunteers were consciously taking on the early work of marketing, not just their enterprise, but the broader idea of access over ownership and the benefits it offers. However, there is a risk that the enthusiasm for sustainability amongst those promoting LoTs and unusual aspects of their business models (such as the use of donations of times and goods as payment) may strongly position LoTs as part of an "alternative" production and consumption segment in consumers' minds. The emphasis on social norms within the wider sustainability marketing literature strongly suggests that most consumer prefer to be associated with forms of consumption that are considered "normal" rather than "alternative" [53].

As this is still a relatively new idea, there is a marketing challenge to communicate the benefits of sharing-based business models to a mainstream public, not all of whom will share strong sustainability values. Attracting mainstream consumers and positioning sharing as mainstream will be crucial to the future success of LoTs. It was notable, for example, that research on tool library users found that the motivations for the majority were framed around issues of "common sense", economy and practicality. Only a minority of users mentioned ideologies linked to the sustainability of alternative lifestyles, environmental issues and opposition of "commercial forces" [33]. Studies of engagement

with access-based goods demonstrate that familiarity with the concept is the most prevalent factor that predicts consumer adoption [20,21,38]. Therefore, effective communication of concepts of reuse and sharing that reach a wide range of consumers and utilise a full range of communications techniques, including social media, are likely to be key to the future success of sharing and other CBMs [54].

4.1.3. Social Enterprise

One factor that may compound the perception of LoTs as "alternative", is their reliance on social enterprise as a business form that is different from conventional businesses, and this may also be significant for the development of future research on LoTs. The emphasis in existing CE research concerning manufacturers highlights the tensions emerging between conventional business approaches to relationships, risks, processes and profit motives and innovative CBMs [55]. For LoTs, the challenges they face may be compounded by those already associated with establishing and sustaining social enterprises. These include the precariousness generated by mixed earnings and grant-based income stream, problems accessing finance and appropriate professional service advice and challenges in managing a volunteer/worker mix [30,45]. Despite this, the potential significance of social enterprise as a business form (in legal, financial and cultural terms) does not currently seem to be appreciated in the literature on CBM. It did not feature amongst the significant terms constituting the field generated by the bibliometric analysis within a systematic literature review of the field [56]. This means that although sharing and circular business models may be increasingly understood as physical resource use systems and as market structures, the role played by business form and organizational culture risks being under-appreciated.

4.1.4. Social Benefit

The findings suggest that using LoTs can contribute to community development, both by strengthening peoples' ties to their local community and by establishing a community of practice linked to the LoT. As such, in addition to contributing to economic activity and reductions in resource use, they contribute to the wider social sustainability benefits frequently overlooked in studies of circular business models [57,58]. The emphasis on eco-efficiency and commercial viability in the CBM literature needs to be more counterbalanced by an appreciation of the social sustainability benefits that LoTs can offer.

The willingness of so many charities and local authorities to offer support to LoTs and the positive social impacts that they report, suggests a strong case exists for public support within communities to address sustainability challenges and provide more equitable access to goods. Indeed, this may be a preferable route to follow if, over time, continued growth through social enterprise models creates tensions between business development needs and LoTs' underlying social and environmental values and the possible future co-option of the LoTs business model by more profit-minded stakeholders (e.g., players in the "*Rent-to-Own*" market whose operations apparently create ownership opportunities for poorer consumers, but which in practice tend to exacerbate consumer indebtedness [59]).

4.1.5. Self-Sufficiency

This snapshot of the state of play of LoTs in the UK indicates that despite their environmental and social benefits and general support for the concept of sharing, these enterprises are still far from being economically self-sufficient. To varying degrees they depended upon volunteers, offers of free space and public or charity funding for support. However, this may partly reflect the priorities of the LoTs in their early stages, of attracting borrowers and people to the comparatively new idea of sharing as an alternative to ownership, as opposed to maximizing their earnings.

While small social enterprises like LoTs may be characterised by innovative and sustainable CBMs, they may also remain caught in a vicious circle whereby their small size, limited opening hours, lack of resources and lack of spatial density means that their customer value proposition will be insufficient to attract those who don't already have a green and/or sharing ethos or live within the immediate

vicinity. More users would enable increasing returns to adoption as a more convenient service can be offered, with better quality items, more branches and longer opening hours. This, in turn, would help to create more awareness, build legitimacy and potentially shift cultural norms towards access over ownership, leading to greater future uptake [60]. Only an entry by larger companies or entities (e.g., existing charity shop networks adopting an LoT function) or state-funded pump-priming would be likely to overcome this chicken and egg dilemma through an investment that allowed the creation of an attractive service at affordable prices to attract mainstream consumers. The potential for this may be suggested by the recent success of the Kierrätyskeskus chain of supermarkets for reused products in Finland, which is through a combined emphasis on scale, style and sophistication (e.g., through social media communication using a 'smart app' that analyses past customer behaviour to suggest future purchases).

4.2. Limitations and Future Research

This study shares the typical limitation of case-based research of having a relatively small sample size, but the sample does represent most the available UK population of LoTs at the time. It is UK focused and may not represent the experience of other countries where sharing and library-based models are emerging including the USA, Canada, Germany and Finland. In seeking to understand the emergence of LoTs as a phenomenon the study concentrates on LoT founders and managers as key informants and their experiences. We did not seek to access the opinions of other key stakeholders including LoT users, non-users, funders, suppliers, volunteers or workers, and these could form a focus of future studies. We also did not have access to financial data from the sample LoTs.

Research focusing on LoT stakeholders beyond founders/managers would allow for more marketing orientated studies that consider user (and non-user) attitudes towards LoTs, their services, pricing structures, communication and the relative convenience of using their services. There is also a potential to consider the relationship between LoTs and wider societal and marketing trends including the shift towards experiences and service, the importance of phone-based access to services and trends towards domestic 'streamlining' represented by the popularity of the minimalist movement [61].

This research has increased the understanding of LoTs' contribution to communities and to sustainability from a business model perspective and explored their viability as businesses. Future research could balance this with an eco-efficiency perspective that considers how LoTs use resources and considering issues like product durability and longevity, since these may have an impact on pricing structures, financial performance and customer satisfaction.

One aspect that has affected previous sharing economy initiatives has been rising tensions between financial goals and social/environmental goals, which is a recurrent theme within the social enterprise literature and particularly elements of it such as Fairtrade [62]. This was not an issue that arose spontaneously from any of our respondents, probably because these are early stage. small-scale projects driven by enthusiasts with strong environmental and social values. However, as such projects grow and if they aspire to become financially self-sufficient, it is likely that potential tradeoffs may need to be made if perceived tensions between profit generation and core values emerge. Future research could follow the progress of LoTs to determine to what extent these tensions arise and how they are resolved.

It will also be interesting to follow whether LoTs will face isomorphic pressures and start to resemble one another more, as has been observed with social enterprises more generally [52] or whether responsiveness to local contexts will allow them to be more diverse in form and strategy. Finally, the challenge that LoTs face in finding the optimal depth and breadth of product range, combined with that of finding the most appropriate and sustainable pricing model that addresses concerns about accessibility and equity with those of financial viability, would seem likely to benefit from some form of modelling-based or experimental research to test the effectiveness of different approaches.

5. Conclusions

Our conclusion from these case studies of UK LoTs is that, despite their innovation, optimism and desire to expand, they remained far from achieving the economies of scale required to represent significant competition to the dominant buy-use-dispose model of production and consumption. To date, government policy and societal norms both focus on increasing economic growth, despite widely accepted sustainability concerns, partly to enable people to access goods and resources. Therefore, while consumers have been encouraged to make different consumption decisions in terms of recycling or brand/product substitutions, there has been less emphasis on people consuming less in material terms, either by forgoing consumption experiences or through radically more efficient approaches such as accessing rather than purchasing goods [63]. The emergence of sharing-based enterprises such as LoTs within communities may help to normalise and promote sharing, particularly as the emphasis in marketing moves towards service provision and the value of experiences [53]. This process may be accelerated by an emerging consumer cohort of millennials who value access to experiences over a need for ownership [64,65] for whom sharing may appear more acceptable and logical.

The literature on CBMs has prioritised economic and environmental value over social value [58] and tended to focus on defining concepts, analysing business model structures and explaining related management processes [8,66]. This has created a somewhat abstract and inward-looking discourse that has underplayed the potential social value of CBMs and the importance of the specific places and communities within which they operate. Ünal et al. [8] highlight the importance of understanding the internal and external factors that explain the success of CBMs and their management, particularly those that span across the boundaries of a specific firm. For our LoTs, this went beyond elements of the supply chain/value system and customer interface management processes suggesting a need for a more socially embedded appreciation of such initiatives. For example, each of these LoTs grew and developed in specific ways depending on local needs, one, for example, enabled LoT users to pay via time rather than money.

One contribution that CBMs in general—and LoTs in particular—may make is through adding diversity to how people's needs are met within communities. It is increasingly being appreciated that diversity is important for resilience, not just in the natural world, but also in a broader socioeconomic context [24]. There is growing anxiety about potential shortages or disruption due to war, pandemic, climate change or hacking. This is evidenced by the increase in the prepper movement and those preparing for the end of the world as we know it [67]. Developing a community-level provision of goods helps to assuage such anxiety by providing a degree of resilience and community cohesion. In addition, it provides an alternative model that could grow in a bottom–up fashion to help redirect our economy towards a more sustainable model in a gradual and less disruptive fashion.

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